



CONTENTS

Welcome Letter	4
The IPSA Executive Committee	5
The Local Organising Committee	10
The Scientific Committee	12
About IPSA	18
Acknowledgements	19
Congress Information	20
Venue Map	x
Congress Secretariat	x
Social Programme	x
Information for Presenters	x
Oral Presentations	x
Poster Display	x
Invited Keynote Speakers	x
Scientific Programme at a Glance	x
Wednesday, 5th December 2012	x
Thursday, 6th December 2012	x
Friday, 7th December 2012	x
Abstracts: Key Note Speakers	x
Abstracts: Symposia	x
Abstracts: New Researcher	x
Abstracts: Data Blitz	x
Abstracts: Posters	x
Exhibition Floorplan	x
Alphabetical List of Exhibitors and Sponsors	x
Directory of Exhibitors and Sponsors	x
List of Participants	x

Dear Attendees,

On behalf of the Executive Committee, it is my pleasure to invite you to attend the Congress of the International Pediatric Sleep Association (IPSA), to be held in Manchester 5-7 December 2012. The IPSA Congress has been held as part of the World Association of Sleep Medicine since 2005 but, starting with the IPSA congress in Rome in December 2010 the Board decided to have independent meetings due to the increasing interest of sleep researchers for the pediatric field.

The success of the last Congress in Rome highlighted the importance of pediatric sleep in the scientific community and we really hope that the Manchester Congress will be even more fruitful and will contribute lead to the advancement of pediatric sleep medicine.

As traditional for IPSA, the most renowned International speakers will join this Congress. The pre-congress courses will focus on the most important topics in Pediatric Sleep and will give the opportunity to physicians, technicians, nurses and different sleep practitioners to learn from the leading scientists in the field.

The content of the scientific programme is outstanding and will highlight the most recent significant advances in pediatric clinical sleep medicine and will provide a special opportunity to share knowledge in sleep medicine and research. The excellence of the key-note speakers and the high quality of the symposia will ensure a great scientific success of the IPSA Congress in Manchester.

It is my pleasure to inform you that the next IPSA Congress will be held in Porto Alegre in 2014.

Enjoy the meeting!

Oliviero Bruni

President of the International Pediatric Sleep Association

Oliviero Bruni, M.D., Italy

IPSA Chairman



Oliviero Bruni, MD received his M.D. in 1982 from the “La Sapienza” University of Rome (Italy) where he also received the specialization in Child Neuropsychiatry in 1986. He is chief of the Pediatric Sleep Centre of the Department of Developmental Medicine and Psychiatry of the Sapienza University of Rome (Italy). Dr. Bruni has been involved in sleep research and clinical care in children for over 15 years, and has published more than 80 peer-reviewed papers, in addition to several book chapters and abstracts.

He is President of the International Pediatric Sleep Association, member of the Board of Directors of the Italian Association of Sleep Medicine and of the Italian Sleep Research Society, and Field Editor (Pediatrics) of the journal Sleep Medicine. Dr. Bruni has been secretary of the European Pediatric Sleep Club of the European Sleep Research Society and has been also involved, as Pediatric Sleep Advisor of the World Health Organization, for the development of Night Noise Guidelines and ICF. In 2009 he has been elected as Chair of the Childhood Sleep Disorders and Development Section of the American Academy of Sleep Medicine.

His specific areas of interest are the different aspects of sleep disorders in children, the application of computer analysis in human sleep electroencephalogram and of the Cyclic Alternating Pattern, the analysis of sleep patterns in cognitive deficits ranging from mental retardation to specific learning disabilities like dyslexia, focusing on the relationships between sleep and cognition in learning impaired children; more recently, has been involved in the study of sleep neurophysiology of periodic limb movements and narcolepsy in children. Dr. Bruni has supervised several graduate – doctoral, postgraduate students for their theses and participated as teacher and invited lecturer in several national and international congresses. Dr. Bruni has published more than 90 papers in peer-reviewed international journals in addition to books and chapter of books.

Ronald D. Chervin, M.D. M.S, USA



Ronald D. Chervin, M.D., M.S. is Professor of Neurology and the Michael S. Aldrich Collegiate Professor of Sleep Medicine at the University of Michigan. Dr. Chervin earned his medical degree at Stanford University, trained in neurology at Cornell University / The New York Hospital, completed a fellowship in sleep medicine at Stanford, and obtained a master’s of science in clinical research design and biostatistics at the University of Michigan School of Public Health. Since 2000, Dr. Chervin has directed the University of Michigan Sleep Disorders Center, a multidisciplinary academic program with diverse services for patients of all ages, active training programs, and well established

investigative teams. Dr. Chervin’s research has addressed a wide range of issues, including obstructive sleep apnea, sleepiness, sleep questionnaires, sleep laboratory techniques, and neurobehavioral consequences of sleep disorders, particularly in children. Dr. Chervin collaborates with engineers on new signal analysis algorithms and hardware to improve assessment and treatment of sleep apnea. He serves on the board of the International Pediatric Sleep Association, the American Academy of Sleep Medicine, and the NIH Sleep Disorders Research Advisory Board. He also assists as a Deputy Editor for Sleep, and on the editorial boards for Journal of Clinical Sleep Medicine and Sleep Medicine.



Patricia Franco, M.D. PhD, France



Doctor Franco received her M.D. and her Ph.D. degrees from the Free University of Brussels. She then completed her residency in Pediatrics and Neuropediatrics at the same institution with additional postgraduate degrees in pediatric neurophysiology and sleep medicine at the Université Pierre and Marie Curie in Paris. She has training as a pediatrician and neuropediatrician. She has been in charge of the Pediatric Sleep Unit at Erasmus Hospital in Brussels for 15 years. Since 2005, she moved to her current position at the Pediatric Sleep Unit in Children's Hospital in Lyon, France. She has an active clinical practice seeing both respiratory medicine and neurological sleep medicine patients. Since August 2006, her pediatric sleep unit is become a National Center for Narcolepsy in Children. Dr Franco is an Associate Professor in the Faculty of Medicine at Claude Bernard University in Lyon. She actually belongs to a research unit (INSERM U 1028, "Integrative Physiology of Brain Arousal System", Dr JS Lin) supported by the Institut National de la Santé et de la Recherche Médicale. Her research topics are the « Physiology and pathophysiology of arousal mechanisms in children" especially in Sudden Infant death Syndrome, Prematurity and Narcolepsy. She has published numerous articles and given multiple presentations within these fields.

Christian Guilleminault, M.D., France



Christian Guilleminault obtained his MD at the Faculte de Medecine in Paris (France) in 1962, and had is Doctorate in medicine in 1968 at the same place. He did his neurology training mostly at the hospital de La Salepetriere in Paris, and after finishing neurology, his psychiatry training in Geneva Switzerland and Paris France. He was board certified in neurology and board certified in psychiatry in France in 1970. He obtained a Diplome d'Etude Approfondies from the Paris University Faculty of Sciences (Histology and Histo-Chemistry) in 1968. He received a Doctorate in Biology/Neurosciences from the Universite of Grenoble in 1999; He had the Academic Diploma "Habilitation a Diriger la Recherche" from the Universite de Montpellier medical school in 1998. He was nominated « Maitre de Recherche » (tenure) in L'Institut National de la Sante et Recherche Medical (INSERM) in Paris (France) in 1977. Associate Professor of Psychiatry and Behavioral Sciences, Stanford University; in 1980. Professor with tenure of neurology in psychiatry, department of psychiatry and behavioral sciences and (by courtesy) Neurology, Stanford university school of medicine in 1985 He is currently professor in the department of psychiatry and behavior sciences and by courtesy, in the department of neurology, Stanford university medical school, Stanford CA. He has been Guest Professor at the University of Marburg (Germany) with a Humbolt grant in 1987-1988. Professor without tenure, ecole de medecine de Montpellier (France) 1994-96. He has published 590 peer-reviewed articles, 220 chapters in books in the field of Sleep Medicine and 510 notes and abstracts.

Dr Leila Kheirandish-Gozal, USA



Dr. Leila Kheirandish-Gozal is currently the director of clinical sleep research in the Section of Pediatric Sleep Medicine at the University of Chicago. Her current research activities explore changes in the systemic vasculature that may reflect morbid consequences of sleep disorders in children as well as the presence of rare gene variants that may shed light into mechanistic determinants of sleep apnea in children. Dr Kheirandish-Gozal has extensively published over 90 articles in prestigious peer reviewed journals, and has acquired extramural funds from industry through investigatorinitiated projects as well as from the National Institutes of Health (NIH). She has been an invited speaker at multiple national and international meetings, and has collaborations with other investigators around the world. She is an associate editor for *Frontiers in Chronobioneurology and Sleep Medicine*, and a member of the editorial board for the journals of *The American Journal of Respiratory and Critical Care Medicine (AJRCCM)*, *Sleep Medicine*, *Journal of Clinical Sleep Medicine* and *The Scientific World Journal*. She is also a program committee member of the Assembly on Sleep and Respiratory Neurobiology of the American Thoracic Society as well as vice –chair for steering committee of the American Academy of Sleep Medicine. Dr Kheirandish-Gozal was named the Professional Woman of the Year by National Association of Professional Women in 2011 and is the recipient of Order of Extraordinary Merit from the Peruvian Medical Association

Professor Avi Sadeh, Israel



Prof. Avi Sadeh is a Professor of Psychology, Director of the Child Clinical Psychology Program, and the Director of the Children's Sleep Laboratory at the Department of Psychology, Tel Aviv University, Israel. Prof. Sadeh completed his B.A and M.A. studies at the Department of Psychology, Haifa University, and then completed his D.Sc degree at the School of Medicine, the Technion, Haifa. Prof. Sadeh completed a post-doctoral training at Brown University, Providence, RI. Prof. Sadeh is a clinical psychologist, with more than 20 years of experience in treating, infants, children and families. In addition to teaching and training dozens of graduate students in clinical child psychology, Prof. Sadeh is an established scientist in the field of sleep and its disorders in children. Prof. Sadeh is the author of "Sleeping Like a Baby", published by Yale University Press. He has published over 100 scientific papers on sleep disorders in infants and children, on the links between sleep and child development including neurobehavioral functioning and ADHD, on parenting and infant sleep, and on the treatment of childhood sleep problems.



Patricio Peirano, M.D. Ph.D., Chile



Patricio Peirano, M.D., Ph.D. is Professor of Neurophysiology and Sleep Medicine at the University of Chile. Dr. Peirano received his medical degree from the University of Chile in 1980. He completed his training in neurophysiology and sleep medicine at Port-Royal (1980-1985) and Pitié-Salpêtrière (1986-1990) Paris University Hospitals, and at Sleep Laboratories from the National Institute of Health and Medical Research (INSERM). In 1989, he obtained his Doctoral degree in Behavioral Neurobiology and Psychopathology from the University of Paris. In 1990 he joined the Institute of Nutrition (INTA) of the University of Chile and founded the Sleep and Functional Neurobiology Laboratory. His main areas of interest in research are the interaction between sleep and nutritional aspects and sleep development in the human being. He served as founding member and member of the board of the Latin American Federation of Sleep Societies and the Chilean Sleep Medicine Society. Currently, he is member of the board of the International Pediatric Sleep Association. He has contributed over 100 scientific publications on various aspects of human neurophysiology and sleep medicine.

Magda Lahorgue Nunes, M.D. Ph.D, Brazil



Magda Lahorgue Nunes MD, Ph.D. Associate Professor of Neurology at the Pontificia Universidade Católica do Rio Grande do Sul (PUCRS) in Porto Alegre - RS, Brazil. Obtained her MD degree in 1982 at PUCRS School of Medicine and did her training in Pediatrics and Neurology, both at the São Lucas Hospital, the University Hospital of PUCRS School of Medicine. In 1994 concluded a Ph.D. in Neuroscience at the University of Campinas in São Paulo – SP. She received a post doctoral training in Neuroscience (1998) in the Albert Einstein College of Medicine – New York, under the orientation of Prof. Solomon L Moshe. Recipient of the Bernard J. D'Souza Award of the Child Neurology Society (USA) in 1999. Board certified in Pediatrics, Neurology, Pediatric Neurology and Sleep Medicine. She is an active member of many international and Brazilian medical societies and former president of Brazilian League against Epilepsy. Belongs to the editorial board of Clinical Neurophysiology, Jornal de Pediatria and Journal of Epilepsy and Clinical Neurophysiology. Has published 112 papers in scientific journals and 49 book chapters. Has edited three books (Neurological examination-2002, Atlas of neonatal EEG-2003 and Sleep and Behavior in childhood and adolescence- 2009). Her main areas of interest in research are epilepsy in childhood, sleep ontogenesis and bioeletrogenesis, models for epilepsy and malnutrition in developing brain. She is in charge of Child Neurology Department of Sao Lucas Hospital and Dean of Post Graduation Program (Ph.D.) of Medicine and Health Sciences of PUCRS.

Professor Rosemary SC Horne, Australia



Professor Rosemary Horne is a National Health and Medical Research Council of Australia Senior Research Fellow and heads the Infant and Child Health theme within the Ritchie Centre, Monash Institute of Medical Research. Her research interests focus on sleep in infants and children. Rosemary has published more than 100 research and review scientific articles. She is Chair of the Physiology working group of the International Society for the Study and Prevention of Infant Deaths, a Director of the International Paediatric Sleep Association and is on the editorial boards of the Journal of Sleep Research, Sleep and Sleep Medicine.



Professor Paul Gringras, UK

IPSA Congress 2012 Co-Chair



Professor Paul Gringras founded and runs the Paediatric Sleep Group at the new Evelina Children's Hospital within Guy's and St Thomas' NHS Foundation Trust. His academic position is with Kings College London. He has worked in the field of Paediatric Neurodisability and Sleep Medicine for over fifteen years always combining clinical and research work. His Sleep Medicine experience and training was gained in both the UK and Chicago, USA. The Paediatric Sleep Group integrates fully with the adult sleep service already established at St Thomas' hospital, providing one of the countries few 'lifespan' multidisciplinary sleep services. His current areas of research interest include sleep phenotypes in autism, phase II psychopharmacological clinical trials, the development of online monitoring systems for children and young people with learning disabilities, and the impact of sleep disorders on daytime behaviour and cognition. He holds a number of multicentre grants and publishes work in books and peer reviewed journals.

Dr Catherine Hill, UK

IPSA Congress 2012 Co-Chair



Dr Catherine Hill is a Senior Lecturer in the University Of Southampton School Of Medicine where she established a paediatric research sleep laboratory in 2004. Her research has focused on the inter-relationship between sleep and neurocognition both in healthy typically developing children and those exposed to hypoxia due to sleep disordered breathing or high altitude environments. More recently she has studied sleep problems and memory consolidation in children with neurodevelopmental disorders. As a practicing clinician she heads up a busy multi-disciplinary children's sleep disorder service with a particular strength in the management of sleep problems in children with neurodevelopmental disorders. Teaching is a particular passion and along with her clinical colleagues she runs training courses in the practical management of children's sleep problems with plans to extend these courses to an international audience.

Mr Andrew Morley, BSc RPSGT, UK



Mr Andrew Morley (BSc, RPSGT) is the lead Sleep Physiologist at the Royal Hospital for Sick Children (Glasgow). Having worked in the field of sleep medicine for the past 15 years he has experience in both Clinical & Research settings, including a spell at the University of Auckland. He became a Registered Polysomnographic Technologist (RPSGT) in 2005 after taking the first UK sitting of Board of Registered Polysomnographic Technologists (BRPT) exam. He is currently an Executive committee member of the British Sleep Society, with one of his primary roles to represent paediatrics issues.

Dr Don Urquhart, UK



Dr Don Urquhart is a Consultant in Paediatric Respiratory and Sleep Medicine at the Royal Hospital for Sick Children in Edinburgh. He graduated from Aberdeen in 1996, and trained in respiratory paediatrics at the Royal Brompton and Great Ormond Street Hospitals before undertaking a Sleep Fellowship at the Mater Children's in Brisbane, Australia in 2008-2009. He was awarded an MD in 2010 (University College London) following research into the relationship of sleep hypoxia and measures of inflammation in children with Cystic Fibrosis (CF). Don is co-chair of the UK paediatric sleep videoconferencing network, and also sits on the European Cystic Fibrosis Society working party on exercise testing in CF, as well as the scientific and local organising committees of the IPSA 2012 conference. He has a number of peer-reviewed publications, as well as national and international presentations in various areas of paediatric respiratory medicine, including asthma, CF and sleep medicine. He acts as reviewer for a number of international journals.

Dr Luci Wiggs, BSc DPhil CPsychol, UK



Dr Luci Wiggs BSc (Hons) DPhil CPsychol Luci is a chartered psychologist who conducts clinical research into sleep, its disorders and treatments and the effects of sleep disruption on daytime functioning. She has focussed on the sleep patterns of children and adolescents and their families, taking a special interest in children with developmental disorders. She has published her work in a variety of scientific journals and co-edited an internationally authored book about sleep disruption and its treatment in children with developmental disorders. She is currently an Associate Editor for the Journal of Sleep Research. She has previously served as a board member of the British Sleep Society's Executive and Scientific Committees and the European Paediatric Sleep Group as well as Chairing the European Sleep Research Society's Education Committee and the British Sleep Society Paediatric Group.

Dr Sameer Zuberi, UK



Dr Sameer Zuberi is a Consultant Paediatric Neurologist and leads the Paediatric Neurosciences Research Group at the Royal Hospital for Sick Children, Glasgow. He attended Edinburgh University Medical School and undertook postgraduate paediatric and neurology training in Edinburgh, Sydney and Glasgow. His clinical and research interests include epilepsy, movement disorders, neurogenetics, the channelopathies and neurological sleep disorders. He has written several book chapters and published extensively in peer reviewed journals. He is clinical lead of the Glasgow Epilepsy Genetics Service, Associate Editor of the European Journal of Paediatric Neurology, Board Member of the European Paediatric Neurology Society and Education Officer of the Classification Commission of the International League Against Epilepsy.



Dr Sarah Blunden, MAPS BAPsych MSocSc Ph.D., Australia



Dr. Sarah Blunden (MAPS, BAPsych (Hons), MSocSc, Ph.D.) is a Paediatric Sleep Research Fellow at the Centre for Sleep Research, University of South Australia, an Adjunct Research Fellow at Central Queensland University and a clinical psychologist specialising in the treatment of children's sleep problems. She has published many papers on paediatric sleep, has presented at national and international sleep and psychology conferences, presents regularly to health and education professionals throughout Australia, has won awards for academic and research excellence and is a recognized expert in her field both nationally and internationally. Sarah's sleep research interests over the last 10 years include sleep and daytime performance, learning, behaviour, media usage, general wellbeing and mental health in children, with increasing interest in sleep education. In addition to her research activities, Sarah is the Founder/Director of the Paediatric Sleep Clinic which operates both individual and group clinics offering diagnosis and treatment of sleep problems in children and their families in South Australia and around the country. She also founded and leads the Australian Centre for Education in Sleep© (ACES) which has a primary aim of increasing sleep education in the community by delivering sleep education to schools, families, health and education professionals.

Oliviero Bruni, M.D., Italy



Oliviero Bruni, MD received his M.D. in 1982 from the "La Sapienza" University of Rome (Italy) where he also received the specialization in Child Neuropsychiatry in 1986. He is chief of the Pediatric Sleep Centre of the Department of Developmental Medicine and Psychiatry of the Sapienza University of Rome (Italy). Dr. Bruni has been involved in sleep research and clinical care in children for over 15 years, and has published more than 80 peer-reviewed papers, in addition to several book chapters and abstracts.

He is President of the International Pediatric Sleep Association, member of the Board of Directors of the Italian Association of Sleep Medicine and of the Italian Sleep Research Society, and Field Editor (Pediatrics) of the journal *Sleep Medicine*. Dr. Bruni has been secretary of the European Pediatric Sleep Club of the European Sleep Research Society and has been also involved, as Pediatric Sleep Advisor of the World Health Organization, for the development of Night Noise Guidelines and ICF. In 2009 he has been elected as Chair of the Childhood Sleep Disorders and Development Section of the American Academy of Sleep Medicine.

His specific areas of interest are the different aspects of sleep disorders in children, the application of computer analysis in human sleep electroencephalogram and of the Cyclic Alternating Pattern, the analysis of sleep patterns in cognitive deficits ranging from mental retardation to specific learning disabilities like dyslexia, focusing on the relationships between sleep and cognition in learning impaired children; more recently, has been involved in the study of sleep neurophysiology of periodic limb movements and narcolepsy in children. Dr Bruni has supervised several graduate – doctoral, postgraduate students for their theses and participated as teacher and invited lecturer in several national and international congresses. Dr. Bruni has published more than 90 papers in peer-reviewed international journals in addition to books and chapter of books.

Ronald D. Chervin, M.D. M.S., USA



Ronald D. Chervin, M.D., M.S. is Professor of Neurology and the Michael S. Aldrich Collegiate Professor of Sleep Medicine at the University of Michigan. Dr. Chervin earned his medical degree at Stanford University, trained in neurology at Cornell University / The New York Hospital, completed a fellowship in sleep medicine at Stanford, and obtained a master's of science in clinical research design and biostatistics at the University of Michigan School of Public Health. Since 2000, Dr. Chervin has directed the University of Michigan Sleep Disorders Center, a multidisciplinary academic program with diverse services for patients of all ages, active training programs, and well established investigative teams. Dr. Chervin's research has addressed a wide range of issues, including obstructive sleep apnea, sleepiness, sleep questionnaires, sleep laboratory techniques, and neurobehavioral consequences of sleep disorders, particularly in children. Dr. Chervin collaborates with engineers on new signal analysis algorithms and hardware to improve assessment and treatment of sleep apnea. He serves on the board of the International Pediatric Sleep Association, the American Academy of Sleep Medicine, and the NIH Sleep Disorders Research Advisory Board. He also assists as a Deputy Editor for *Sleep*, and on the editorial boards for *Journal of Clinical Sleep Medicine* and *Sleep Medicine*.

Patricia Franco, M.D. PhD, France



Doctor Franco received her M.D. and her Ph.D. degrees from the Free University of Brussels. She then completed her residency in Pediatrics and Neuropediatrics at the same institution with additional postgraduate degrees in pediatric neurophysiology and sleep medicine at the Université Pierre and Marie Curie in Paris. She has training as a pediatrician and neuropediatrician. She has been in charge of the Pediatric Sleep Unit at Erasmus Hospital in Brussels for 15 years. Since 2005, she moved to her current position at the Pediatric Sleep Unit in Children's Hospital in Lyon, France. She has an active clinical practice seeing both respiratory medicine and neurological sleep medicine patients. Since August 2006, her pediatric sleep unit is become a National Center for Narcolepsy in Children. Dr Franco is an Associate Professor in the Faculty of Medicine at Claude Bernard University in Lyon. She actually belongs to a research unit (INSERM U 1028, "Integrative Physiology of Brain Arousal System", Dr JS Lin) supported by the Institut National de la Santé et de la Recherche Médicale. Her research topics are the « Physiology and pathophysiology of arousal mechanisms in children » especially in Sudden Infant death Syndrome, Prematurity and Narcolepsy.



David Gozal, M.D., USA



David Gozal, MD is known as a pioneer in the study of childhood sleep problems, and the relationships between sleep disorders and neurobehavioral, cardiovascular, and metabolic disease. His research focuses on translational, or “bench to bedside,” approaches to pediatric sleep disorders, and is funded by several NIH grants.

Professor Gozal received his M.D. from the Hebrew University of Jerusalem, completed his pediatric residency in Israel, and then spent 2 years in Cameroon, West Africa, developing rural healthcare networks, for which he received the title of “Knight of the Order of Merit”.

He then completed fellowship training at Childrens Hospital Los Angeles in 1993, and joined the faculty at the University of Southern California and UCLA. In 1994, he moved to Tulane University, where he rose through the ranks and was appointed tenured Professor and Constance Kaufman Endowed Chair in Pediatric Pulmonology Research. In 1999, Dr Gozal moved to the University of Louisville as the inaugural director of Kosair Children’s Hospital Research Institute, and the Division of Pediatric Sleep Medicine and the Sleep Medicine Fellowship Programs, both of which were recognized as programs of distinction by the American Academy of Sleep Medicine. In 2009, Dr. Gozal was appointed Chair of Pediatrics at the University of Chicago where he also serves as Physician in Chief for Comer Children’s Hospital.

Dr. Gozal also has held prominent positions in many professional societies. He is Associate Editor of the American Journal of Respiratory and Critical Care Medicine, Deputy Editor of the journal Sleep and Frontiers in Sleep and Chronobiology, and serves on the editorial board of several scientific publications. An accomplished author and speaker, he has published more than 420 peer-reviewed articles, 2 books, more than 100 chapters and reviews, over 700 scientific abstracts, and has lectured at scientific meetings around the world.

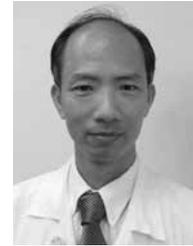
Magda Lahorgue Nunes, M.D. Ph.D, Brazil



Magda Lahorgue Nunes MD, Ph.D. Associate Professor of Neurology at the Pontificia Universidade Católica do Rio Grande do Sul (PUCRS) in Porto Alegre - RS, Brazil. Obtained her MD degree in 1982 at PUCRS School of Medicine and did her training in Pediatrics and Neurology, both at the São Lucas Hospital, the University Hospital of PUCRS School of Medicine. In 1994 concluded a Ph.D. in Neuroscience at the University of Campinas in São Paulo – SP. She received a post doctoral training in Neuroscience (1998) in the Albert Einstein College of Medicine – New York, under the orientation of Prof. Solomon L Moshe. Recipient of the Bernard J. D’Souza Award of the Child

Neurology Society (USA) in 1999. Board certified in Pediatrics, Neurology, Pediatric Neurology and Sleep Medicine. She is an active member of many international and Brazilian medical societies and former president of Brazilian League against Epilepsy. Belongs to the editorial board of Clinical Neurophysiology, Jornal de Pediatria and Journal of Epilepsy and Clinical Neurophysiology. Has published 112 papers in scientific journals and 49 book chapters. Has edited three books (Neurological examination-2002, Atlas of neonatal EEG-2003 and Sleep and Behavior in childhood and adolescence- 2009). Her main areas of interest in research are epilepsy in childhood, sleep ontogenesis and bioeletrogenesis, models for epilepsy and malnutrition in developing brain. She is in charge of Child Neurology Department of Sao Lucas Hospital and Dean of Post Graduation Program (Ph.D.) of Medicine and Health Sciences of PUCRS.

Dr Daniel K. Ng, Hong Kong



Dr. Daniel K. Ng is currently the President of Hong Kong Society of Paediatric Respiriology and Consultant Paediatrician in the Department of Paediatrics, Kwong Wah Hospital, Hong Kong. Dr. Ng graduated from the University of Hong Kong in 1984. He underwent general paediatric training in the Caritas Medical Centre and Kwong Wah Hospital in Hong Kong. His interest in paediatric respiratory medicine started in 1992 and he received further training in this area in the Hospital for Sick Children, Toronto. He was awarded Master of Medical Sciences by the University of Hong Kong for his works in neonatology in 1999. He received training in paediatric sleep medicine in Stanford University Sleep Disorders

Center and started the paediatric sleep service in Kwong Wah Hospital. For his research works in paediatric sleep-disordered breathing, he was awarded Doctor of Medicine by the University of Hong Kong. Dr. Ng was Foundation Fellow of Hong Kong Academy of Medicine and Fellow of the Royal College of Physicians of Edinburgh and Royal College of Paediatrics and Child Health. Dr. Ng served as international affairs committee member of the American Thoracic Society and the American Academy of Sleep Medicine. He is also the regional director of the International Pediatric Sleep Association. Dr. Ng’s main research interests are sleep-disordered breathing, asthma, allergic rhinitis and scoring system for children admitted to PICU. Dr. Ng has published over 80 peer-reviewed papers in indexed journals and has served as reviewers for over 10 international medical journals. He is also the editor of Journal of Paediatric Respiriology and Critical Care.

Patricio Peirano, M.D. Ph.D., Chile



Patricio Peirano, M.D., Ph.D. is Professor of Neurophysiology and Sleep Medicine at the University of Chile. Dr. Peirano received his medical degree from the University of Chile in 1980. He completed his training in neurophysiology and sleep medicine at Port-Royal (1980-1985) and Pitié-Salpêtrière (1986-1990) Paris University Hospitals, and at Sleep Laboratories from the National Institute of Health and Medical Research (INSERM). In 1989, he obtained his Doctoral degree in Behavioral Neurobiology and Psychopathology from the University of Paris. In 1990 he joined the Institute of Nutrition (INTA) of the University of Chile and founded the Sleep and Functional Neurobiology Laboratory. His

main areas of interest in research are the interaction between sleep and nutritional aspects and sleep development in the human being. He served as founding member and member of the board of the Latin American Federation of Sleep Societies and the Chilean Sleep Medicine Society. Currently, he is member of the board of the International Pediatric Sleep Association. He has contributed over 100 scientific publications on various aspects of human neurophysiology and sleep medicine.



Professor Avi Sadeh, Israel



Prof. Avi Sadeh is a Professor of Psychology, Director of the Child Clinical Psychology Program, and the Director of the Children's Sleep Laboratory at the Department of Psychology, Tel Aviv University, Israel. Prof. Sadeh completed his B.A and M.A. studies at the Department of Psychology, Haifa University, and then completed his D.Sc degree at the School of Medicine, the Technion, Haifa. Prof. Sadeh completed a post-doctoral training at Brown University, Providence, RI. Prof. Sadeh is a clinical psychologist, with more than 20 years of experience in treating, infants, children and families. In addition to teaching and training dozens of graduate students in clinical child psychology, Prof.

Sadeh is an established scientist in the field of sleep and its disorders in children. Prof. Sadeh is the author of "Sleeping Like a Baby", published by Yale University Press. He has published over 100 scientific papers on sleep disorders in infants and children, on the links between sleep and child development including neurobehavioral functioning and ADHD, on parenting and infant sleep, and on the treatment of childhood sleep problems.

Dr Stephen H Sheldon, USA



Dr. Stephen H Sheldon is Professor of Pediatrics, Northwestern University, Feinberg School of Medicine and Director of the Sleep Medicine Center of Children's Memorial Hospital. He is very active in the clinical practice of pediatric sleep medicine, and has an intense involvement in pediatric sleep medical education and research. He completed his residency in pediatrics at Rush-Presbyterian-St. Luke's Medical Center, Chicago, visiting faculty fellowship in medical education at Southern Illinois University Medical School, and faculty fellowship in Sleep Medicine at the University of Chicago. He has served as Chair of the Continuing Medical Education Committee, and member

of the National Sleep Medicine Course Committee, Education Committee, and Fellowship Training Committee of the American Academy of Sleep Medicine. Dr. Sheldon served on the Board of Directors of the American Academy of Sleep Medicine from 2000 to 2006 and as Secretary/Treasurer 2003 to 2006. He has served on the Board of Directors of the American Sleep Medicine Foundation as its Secretary and is past Chair of the Educational Research Advisory Board. He currently serves as Associate Editor, Journal of Clinical Sleep Medicine. Dr. Sheldon was appointed to the American Board of Pediatrics in 2005 as representative to the ABMS Sleep Medicine Policy and Examination Committee, is a Diplomate in Sleep Medicine of the American Board of Pediatrics. He is author of Pediatric Differential Diagnosis (Raven Press 1979), Pediatric Sleep Medicine (WB Saunders 1992), Evaluating Sleep in Infants and Children (Lippincott-Raven 1995), Atlas of Sleep Medicine in Infants and Children (Futura Publishers 2000), and is Senior Editor of Principles and Practice of Pediatric Sleep Medicine (Elsevier-WB Saunders, 2005). A second edition of this textbook is currently in preparation.

Dr Andrew Wilson, Australia



Dr Andrew Wilson is a respiratory and sleep paediatrician at Princess Margaret Hospital in Perth, Western Australia. He has been extensively involved in the development of the paediatric sleep training curriculum in Australasia, and has for the last five years been the coordinator of paediatric advanced training in sleep and respiratory medicine for the Royal Australasian College of Physicians. He has also been involved in the development of online courses in paediatric sleep medicine through the University of Western Australia. Dr Wilson has ongoing research interests in the diagnosis of sleep disordered breathing in paediatrics, as well as in the long

term outcomes of chronic neonatal lung disease.

The International Paediatric Sleep Association is pleased to be holding its 2012 gathering in the UK, during the nation's Olympic Year. This rapidly growing biennial event addresses hot topics across every sub-speciality related to paediatrics and child health. The IPSA Congress is an influential forum for sleep practitioners from around the world to network and exchange views, whilst learning from world-class researchers about the latest scientific and clinical developments in the field.

The International Pediatric Sleep Association (IPSA) was founded in 2005; since then the Association has grown up with increasing numbers of members that actually are more than 800. The conferences of the IPSA have been held together with the WASM meeting in 2007 in Bangkok and in 2009 in Sao Paulo. From 2010, due to the growing interest in the pediatric sleep field, the IPSA board decided to have independent meetings. The first independent meeting was held in Rome on December 3-5, 2010, the second one will be in Manchester on December 5-7, 2012 and the 2014 meeting will be in Porto Alegre. All these meetings highlight and emphasize the recent significant advances in both basic science and clinical sleep medicine during development.

IPSA operates exclusively for scientific and educational purposes, and more specifically to:

- Promote basic and applied research in all areas of sleep in infants, children and adolescents
- Provide topical information to the public about pediatric sleep
- Increase the knowledge of pediatric sleep problems and their consequences
- To hold scientific meetings and to promote teaching programmes on pediatric sleep, and the coordination of these programmes among the different members and societies.

We would like to grow-up as an association and are searching for professionals involved in the Pediatric Sleep discipline as well as for companies that would like to support our mission aiming at increasing the awareness of the community all over the world regarding the importance of a good sleep since infancy.

Good sleep in infancy and childhood is not only a "next day" issue but is a matter of preventive health measures with the aim to ensure a healthy life into adulthood; therefore the mission of the IPSA is crucial and extremely important to guarantee that all infants, children and adolescents will grow-up at the best of their potential.



Associate Sponsor



Exhibitors





Venue

Manchester Central Convention Complex
Petersfield
Manchester M2 3GX
Tel: +44 (0)161 834 2700
Website: <http://www.manchestercentral.co.uk>

Registration

On-site registration will open on Wednesday, 5th December at 09.00 hours for the Pre-Congress Courses and at 16.00 for the Congress. The registration desk and Congress secretariat is located in Exchange Foyer and will remain open during the following hours:

Wednesday, 5th December 2012	09:00 - 19:00
Thursday, 6th December 2012	07:30 - 18:30
Friday, 7th December 2012	07:30 - 16:00

Badges

Please wear your registration badge at all times. All participants are required to wear identification badges when attending sessions, social events and when entering the exhibition. If you lose your badge, please go to the registration desk where a new badge will be made for you.

Speakers & Chairpersons

Please ensure that you are available in your presentation room at least ten minutes before the start of the session. It is recommended that all Speakers visit the Speaker Preview Room to confirm audiovisual requirements at least 2 hours prior to the start of the session.

Exhibition

An exhibition is being held in conjunction with the Congress. The exhibition is located in Exchange Hall at Manchester Central. The official opening hours are as follows:

Wednesday, 5th December 2012
Thursday, 6th December 2012
Friday, 7th December 2012

Speaker Preview Room

Located in Exchange Room 2 at Manchester Central, the opening times are as follows:

Wednesday, 5th December 2012	16:00 – 18:00
Thursday, 6th December 2012	07:30 - 18:30
Friday, 7th December 2012	07:30 - 14:15

Language

The official language of the Congress is English

List of Participants

A list of participants (registered at time of printing) is included in the back of this programme.

Lunches and Refreshments

Coffee, tea and lunch will be served during the official breaks within the Exhibition Area.

Mail/Messages/Medical Assistance/Lost & Found

Please go to the IPSA registration desk

Mobile Phones

As a courtesy to speakers and other participants, all mobile phones and pagers must be turned off before entering the scientific sessions.

Posters

Posters will be displayed in Exchange Hall from Thursday, 6 December 2012 until Friday, 7 December 2012. All poster presenters should please ensure that they mount their poster by the correct poster number. Poster presenters should refer to the list of poster presentations included in this final programme for their board numbers. Delegates are encouraged to view the posters during the official tea/coffee and lunch breaks. Please note that the Organising Committee, Manchester Central or Kenes UK will not be responsible for any posters that are not removed by the end of the Congress

Liability & Insurance

The organisers are not able to take any responsibility whatsoever for injury or damage involving persons and property during the Congress. Delegates are advised to take out their own personal insurance to cover travel, accommodation, cancellation and personal effects.

Wifi

Wifi is available throughout Manchester Central: This will be free to all delegates and the passcode is IPSA2012

Congress Secretariat

Kenes UK Ltd
Chesterfield House
385 Euston Road
London NW1 3AU
Tel: +44 (0) 207 383 8030



Email: Registration, Accommodation and General Enquires: ipsa@kenes.com
Email: Abstract and Scientific Programme Queries: ipsaabstracts@kenes.com
Website: www.kenes.com/uk

All presenters must register at the registration desk on arrival and check in at the speaker's preview room located in Exchange Room 2. Please check the programme to confirm the date and time of your presentation. Speakers must report to the Speakers' Preview Room at least 2 hours before their session.

You may review your PowerPoint presentation in this room: Please pass your presentation CD/DVD or memory stick to the dedicated technician who will then upload the presentation and check for viruses (We can read PowerPoint 2007 and earlier versions. Any embedded movies or sound files should also be included on the disc or stick as separate files, for back-up purposes). If you wish to present directly from your laptop, please inform the technicians in the Speaker's Preview Room

Please;

- Assemble in your session room at least 10 minutes before the beginning of the session.
- Ensure that you sit near the front of the room with easy access to the right hand side of the stage.
- Ensure that you keep to the time allocated to you, as it will cause disruption to sessions if you run over your allotted time.

If there are any changes or corrections required to the presentation details in the programme, please let us know as soon as possible. If you are planning on presenting directly from your laptop/notebook/Mac, this can be done from the stage lectern but please pre-advise the technician in the Speaker's Preview Room. A VGA (15 pin HDD) and audio (mini-jack) connector cables are provided.

Speakers' preview room opening times:

There will always be a technician available to assist you with any queries you may have in the Speakers' Preview Room, located in Exchange Room 2 at Manchester Central.

Wednesday, 5th December	16:00 – 18:30
Thursday, 6th December	07:30 – 18:30
Friday, 7th December	07:30 – 14:15

Important information for Macintosh users:

In order to use MAC presentation on a PC compatible computer, please note that you need to prepare it according to the instructions below, BEFORE bringing it to the Speakers' Preview Room:

- Use a common font, such as Arial, Times New Roman, Verdana, etc. (special fonts might be changed to a default font on a PowerPoint based PC).
- Insert pictures as JPG files, and NOT TIF, PNG or PICT – these images will not be visible on a PowerPoint based PC.
- Use a common movie format, such as AVI, MPG and WMV. MOV files from QuickTime will not be visible on a PowerPoint based PC.

The posters will be viewed during the official Congress coffee and lunch breaks on Thursday 6th and Friday 7th December, 2012.

Equipment for Poster Display

Presenters will be provided with materials to fix posters to the boards upon arrival at Manchester Central. A large display board giving a display area for an A0 Portrait sized poster (84.1 cm x 118.9 cm) will be provided for your poster display. Please note that individual pieces of paper should be pre-mounted onto one large piece of paper or card.

Poster Installation

Your poster will be on display from 10:30 hours on Thursday, 6th December 2012 until 14:00 hours on Friday 7th December, 2012. You may set up your poster from 07:30 hours on Thursday, 6th December. Please report to the Congress Registration Desk at Manchester Central when you arrive where you will be directed to your poster board.

Poster Viewing

We kindly ask that you be at your poster during the official tea, coffee and lunch breaks so that you can answer any queries or comments that arise.

Poster Removal

Posters must be removed by 14:00 hours at the latest on Friday 7th December, 2012. Should they not be removed by this time, the Congress staff will take them down and no responsibility can be taken for their safe return.



Christian Guilleminault, M.D., USA



Christian Guilleminault obtained his MD at the Faculte de Medecine in Paris (France) in 1962, and had his Doctorate in medicine in 1968 at the same place. He did his neurology training mostly at the hospital de La Salpetriere in Paris, and after finishing neurology, his psychiatry training in Geneva Switzerland and Paris France. He was board certified in neurology and board certified in psychiatry in France in 1970. He obtained a Diplome d'Etude Approfondies from the Paris University Faculty of Sciences (Histology and Histo-Chemistry) in 1968. He received a Doctorate in Biology/Neurosciences from the Universite of Grenoble in 1999; He had the Academic Diploma "Habilitation a Diriger la Recherche" from the Universite de Montpellier medical school in 1998. He was nominated « Maitre de Recherche » (tenure) in L'Institut National de la Sante et Recherche Medical (INSERM) in Paris (France) in 1977. Associate Professor of Psychiatry and Behavioral Sciences, Stanford University; in 1980. Professor with tenure of neurology in psychiatry, department of psychiatry and behavioral sciences and (by courtesy) Neurology, Stanford university school of medicine in 1985 He is currently professor in the department of psychiatry and behavior sciences and by courtesy, in the department of neurology, Stanford university medical school, Stanford CA. He has been Guest Professor at the University of Marburg (Germany) with a Humbolt grant in 1987-1988. Professor without tenure, ecole de medecine de Montpellier (France) 1994-96. He has published 590 peer-reviewed articles, 220 chapters in books in the field of Sleep Medicine and 510 notes and abstracts.

Professor Rosemary SC Horne, Australia



Professor Rosemary Horne is a National Health and Medical Research Council of Australia Senior Research Fellow and heads the Infant and Child Health theme within the Ritchie Centre, Monash Institute of Medical Research. Her research interests focus on sleep in infants and children. Rosemary has published more than 100 research and review scientific articles. She is Chair of the Physiology working group of the International Society for the Study and Prevention of Infant Deaths, a Director of the International Paediatric Sleep Association and is on the editorial boards of the Journal of Sleep Research, Sleep and Sleep Medicine.

Associate Professor Declan Kennedy MBBS MD DCH, FRACP FRCP, Australia



Trained in respiratory paediatrics at Gt Ormond St Hospital and Royal Children's Melbourne. Joined the University of Adelaide/Department of Respiratory and Sleep Medicine, Women's and Children's Hospital Adelaide in 1991. My initial research training was in respiratory physiology and subsequently sleep medicine. Currently work as a thoracic physician with an emphasis on sleep issues in children. Our research group has concentrated on the evaluation of neurocognitive functioning in children with sleep disruption over the last decade. Our current work is focused on the effects of upper airway obstruction on autonomic and vascular functioning.

Dr Emmanuel Mignot, USA



Dr. Emmanuel Mignot, is Director of the Stanford Center for Sleep Sciences and Professor of Psychiatry and Behavioral Sciences. He is internationally recognized as having discovered the cause of narcolepsy and also directs the Center for Narcolepsy. Dr. Mignot is a former student of the Ecole Normale Supérieure (Ulm, Paris, France). He received his M.D. and Ph.D. from Paris V and VI University in France. He practiced medicine and Psychiatry in France for several years before serving as a visiting scholar at the Stanford Sleep Disorders Clinic and Research Center. He joined as faculty and Director of the Center for Narcolepsy in 1993. He was named Professor of Psychiatry in 2001, and Director of the newly established Stanford Center for Sleep Sciences in 2010.

Dr Jodi A. Mindell, USA



Dr. Jodi Mindell is the Associate Director of the Sleep Disorders Center at The Children's Hospital of Philadelphia where she treats children of all ages. She is also a professor of psychology at Saint Joseph's University and of pediatrics at the University of Pennsylvania School of Medicine. She is a clinical psychologist specializing in pediatric sleep medicine and board certified in Behavioral Sleep Medicine.

Dr. Mindell has written extensively on pediatric sleep disorders and presented over 250 papers at national and international conferences. She was vice-chair of the Board of Directors of the National Sleep Foundation and on the Board of Directors of the Sleep Research Society. She is on the editorial board of the journals Sleep and Behavioral Sleep Medicine. Dr. Mindell was the lead author on the review paper associated with the standards of practice paper on behavioral treatment of bedtime problems and night wakings in young children developed by the American Academy of Sleep Medicine. Dr. Mindell is the author of *Sleeping Through the Night: How Infants, Toddlers, and Their Parents Can Get a Good Night's Sleep* and co-author of *A Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems*, a handbook for practitioners, and *Take Charge of Your Child's Sleep: The All-in-One Resource for Solving Sleep Problems in Kids and Teens*.

Associate Professor Matthew P. Walker, USA



Matthew Walker earned his PhD in neurophysiology with the Medical Research Council, UK, and subsequently became an Assistant Professor of Psychology at Harvard Medical School in 2004. He is currently an Associate Professor of Psychology and Neuroscience at the University of California Berkeley, where he directs the Sleep and Neuroimaging Laboratory. He is the recipient of funding awards from the National Science Foundation and the National Institutes of Health, and in 2006, became a Kavli Fellow of the National Academy of Sciences. His research examines the impact of sleep on human brain function, with a particular focus on the role of sleep in memory processing, neural plasticity and emotional regulation.



PROGRAMME AT A GLANCE





Wednesday 5th December 2012

AUDITORIUM	
17:00-17:15	Opening of IPSA 2012
17:15-18:00	Key Note 1: "Children's sleep around the world: A cross-cultural perspective" Jodi Mindell, Saint Joseph's University, USA
18:00-19:30	WELCOME RECEPTION in the Exchange Foyer, Manchester Central

Thursday 6th December 2012

AUDITORIUM		ROOM 9
07:30-08:15	Registration in LOWER FOYER	
08:15-08:30	Welcome to IPSA 2012	
08:30-09:15	Key Note 2: "Obstructive sleep apnoea - an oral facial growth problem?" Christian Guilleminault, Stanford School of Medicine, USA	
09:15-10:30	Invited Symposium "Controversies in OSA diagnosis and management: A proposal for a consensus" Oliviero Bruni, Sapienza University, Italy	IPSA-BSS Symposium "Clocks, light and sleep - learning from mice" Rob Lucas, University of Manchester, UK "Circadian regulation of human sleep: Why do we sleep so late?" Derk-Jan Dijk, Surrey Sleep Research Centre, UK
10:30-11:00	Coffee Break, Poster Viewing & Visit the Exhibition in EXCHANGE HALL	
11:00-12:15	Submitted Symposium 1 "Canadian Perspective on novel ways of treating childhood behavioural insomnia: Outcomes of four behavioral intervention studies that are informing the development of a national web-based treatment study" Penny Corkum, Dalhousie University, Canada	Submitted Symposium 2 "Problems of prematurity - what we can tell from sleep studies" Rosemary Horne, Monash Institute of Medical Research, Melbourne, Australia
12:15-13:00	New Researcher	
13:00-14:00	Lunch, Poster Viewing & Visit the Exhibition in EXCHANGE HALL	
14:00-14:15	IPSA 2014 Porte Alegre Presentation	
14:15-15:00	Key Note 3: "Advances in narcolepsy research?" Emmanuel Mignot, Stanford School of Medicine, USA	
15:00-16:15	Submitted Symposium 3 "Impaired sleep and its management in children with developmental disorders" Leopold Curfs, Maastricht University Medical Centre, The Netherlands	Submitted Symposium 4 "Sleep problems in children and adolescents: Relationships with emotional well-being and cognitive functioning" Anne Marie Meijer, University of Amsterdam, The Netherlands

16:15-16:45	Coffee Break, Poster Viewing & Visit the Exhibition in EXCHANGE HALL	
16:45-17:30	New Frontiers: Data Blitz	IPSA Assembly
17:30-18:15	Key Note 4: "Sleep, Memory and Emotion" Matthew Walker, University of California, Berkeley, USA	
18:15-18:30	New Researcher's Award	
19:30-00:00	GALA DINNER at Manchester United Old Trafford Football Ground	

Friday 7th December 2012

AUDITORIUM		ROOM 9
07:30-08:30	Registration & Breakfast Buffet in LOWER FOYER	
08:30-09:15	Key Note 5: "Safe Sleeping: Why is the prone sleeping position such a risk for SIDS?" Rosemary Horne, Monash Institute of Medical Research, Melbourne, Australia	
09:15-10:30	Submitted Symposium 5 "Sub-clinical Cardiovascular Disease and Obesity in OSA - the evidence in children" Leila Kheirandish-Gozal, The University of Chicago, USA	Submitted Symposium 6 "Sleep and Epilepsy: A Dynamic Relationship" Sameer Zuberi, Royal Hospital for Sick Children, Glasgow, UK
10:30-11:00	Coffee Break, Poster Viewing & Visit the Exhibition in EXCHANGE HALL	
11:00-12:15	Submitted Symposium 7 "Sleep and Learning in Children" Kerstin Hoedlmoser, University of Salzburg, Austria	Submitted Symposium 8 "Inadequate sleep in Adolescents: Opportunities for treatment and intervention" Tamar Shochat, University of Haifa, Israel
12:15-13:15	Submitted Symposium 9 "Children, Parents, and Sleep: Dynamic Interactions between Health, Development and Functioning" Lisa Meltzer, National Jewish Health, Denver, USA	Submitted Symposium 10 "Promoting healthy sleep in children with cerebral palsy" Cathy Hill, University of Southampton, UK
13:15-14:00	Lunch, Poster Viewing & Visit the Exhibition in EXCHANGE HALL	
14:00-14:45	Key Note 6: "What do we know about sleep and neurocognition?" Declan Kennedy, Children's Sleep Research Centre, Adelaide, Australia	
14:45-15:00	Closing Remarks	



Wednesday, 5th December 2012





AUDITORIUM

17:00-17:15

Opening of IPSA 2012

Oliviero Bruni, IPSA Chairman

17:15-18:00

Key Note 1

“Children’s sleep around the world: A cross-cultural perspective”

Jodi Mindell, Saint Joseph’s University, USA

Chairs: Catherine Hill, University of Southampton, UK and Paul Gringras, Kings College/Guy’s and St Thomas’, London, UK

18:00-19:30

WELCOME RECEPTION in the Exchange Foyer, Manchester Central

Thursday, 6th December 2012





LOWER FOYER

07:30-08:15 Registration

AUDITORIUM

08:15-08:30 **Welcome to IPSA 2012**
Paul Gringras and Catherine Hill, IPSA 2012 Co-Chairs

08:30-09:15 **Key Note 2**
“Obstructive sleep apnoea - an oral facial growth problem?”
Christian Guilleminault, Stanford School of Medicine, USA
Chair: Oliviero Bruni, Sapienza University, Italy

09:15-10:30 **Invited Symposium**
“Controversies on OSA diagnosis and management: A proposal for a consensus”
Oliviero Bruni, Sapienza University, Italy and Christian Guilleminault, Stanford School of Medicine, USA

09:15-09:30 **Spanish guidelines for OSA diagnosis and treatment**
Oscar Sans Capdevila, Hospital Sant Joan de Déu, Barcelona, Spain

09:30-09:45 **A proposal treatment algorithm of paediatric OSAS**
Maria Pia Villa, Sant'Andrea Hospital, Rome, Italy

09:45-10:00 **Adenotonsillectomy outcomes in treatment of OSA**
Stijn Verhulst, University of Antwerp, Belgium

10:00-10:15 **Final considerations on the algorithm for diagnosis of OSA and proposal for an IPSA consensus**
David Gozal, University of Chicago, Illinois, USA

10:15-10:30 **Discussion**

ROOM 9

09:15-10:30 **IPSA-BSS Symposium**
Chair: Paul Reading, South Tees NHS Trust, UK

Clocks, light and sleep - learning from mice
Rob Lucas, University of Manchester, UK

Circadian regulation of human sleep: Why do we sleep so late?
Derk-Jan Dijk, Surrey Sleep Research Centre, UK

EXCHANGE HALL

10:30-11:00 **Coffee Break, Poster Viewing & Visit the Exhibition**

AUDITORIUM

11:00-12:15 **Submitted Symposium 1**
“Canadian Perspective on novel ways of treating childhood behavioural insomnia: Outcomes of four behavioral interventions studies that are informing the development of a national web-based treatment study”
Chair: Sarah Blunden, University of South Australia, Australia

11:00-11:02 **Introduction to the symposium**
Penny Corkum, Dalhousie University, Halifax, Canada

11:02-11:14 **The treatment of insomnia in children with mental health disorders**
Roger Godbout, Université de Montréal, Canada

11:14-11:26 **Using group-based short-term interventions to treat behavioral sleep problems in infants**
Wendy Hall, University of British Columbia, Vancouver, Canada

11:26-11:38 **Lessons learned from delivering distance-based treatment for preschoolers with sleep problems**
Graham Reid, University of Western Ontario, London, Canada

11:38-11:50 **Distance treatment of behavioural insomnia in school-aged typically developing children and children with ADHD**
Penny Corkum, Dalhousie University, Halifax, Canada

11:50-12:02 **Innovations in Sleep Research: Development of a Canadian, Web-based Project for the Treatment of Behavioural Insomnias in 1- to 10-year old Children**
Aimée Coulombe, Dalhousie University, Halifax, Canada

12:02-12:15 **Discussion and Q&A**

ROOM 9

11:00-12:15 **Submitted Symposium 2**
“Problems of prematurity – what we can tell from sleep studies”
Chair: Don Urquhart, Royal Hospital for Sick Children, Edinburgh, UK

11:00-11:20 **Sleeping preterm infants prone: is it really good for their brains?**
Rosemary Horne, Monash Institute of Medical Research, Melbourne, Australia



11:20-11:35 **Thermoregulation and peripheral vasomotor control and sleep stages in preterm neonates**

Veronique Bach, University of Picardy Jules Verne, Amiens, France

11:35-11:50 **Predischarge monitoring for very preterm infants: what is the best method for determining cardio-respiratory stability during sleep?**

Dawn Elder, University of Otago, Wellington, New Zealand

11:50-12:05 **Influence of prematurity on sleep patterns: data from the Aube prospective study**

Patricia Franco, University Lyon, France

12:05-12:15 **Panel Discussion**

AUDITORIUM

12:15-13:00 ***New Researcher***

Chairs: Catherine Hill, University of Southampton, UK and Paul Gringras, Kings College/Guy's and St Thomas', London, UK

12:15-12:21 **Sleep problems and cognition in children with Down syndrome and Williams syndrome**

Anna Ashworth, Institute of Education, London, UK

12:21-12:27 **Long-term improvements in sleep disordered breathing in school-aged children are associated with improvements in neurocognition but not behaviour**

Sarah Biggs, Monash Institute of Medical Research, Clayton, Australia

12:27-12:33 **Children with obstructive sleep apnoea have impaired exercise capacity independent of weight status**

Carla Evans, The University of Sydney, Australia

12:33-12:39 **Is Parental Style Related to Health Behaviors and Quality of Life in Young Adolescents?**

Ofra Flint-Bretler, University of Haifa, Haifa, Israel

12:39-12:45 **Clinical and electrophysiological characteristics of narcoleptic children with rapid weight gain at disease onset**

Clara Odilia Inocente, University Lyon, France

12:45-12:51 **Mother-infant sleep; infant circadian rhythms and maternal sleep types**

Desaline Joseph, University of Nottingham, UK

12:51-12:57 **Cerebral vascular control in healthy term infants: Effects of prone sleeping**

Stephanie Yiallourou, Monash Institute for Medical Research, Clayton, Australia

EXCHANGE HALL

13:00-14:00 **Lunch, Poster Viewing & Visit the Exhibition**

AUDITORIUM

14:00-14:15 **IPSA 2014 Porte Alegre Presentation**

14:15-15:00 ***Key Note 3***

“Advances in narcolepsy research?”

Emmanuel Mignot, Stanford School of Medicine, USA

Chair: Patricia Franco, University Lyon, France

15:00-16:15 ***Submitted Symposium 3***

“Impaired sleep and its management in children with developmental disorders”

Chair: Patricia Franco, University Lyon, France

15:00-15:05 **Multidisciplinary management of impaired sleep**

Leopold Curfs, Maastricht University Medical Centre, The Netherlands

15:05-15:20 **Synopsis of sleep**

Karen Spruyt, University of Chicago, USA

15:20-15:35 **Loss of response to melatonin treatment**

Wiebe Braam, Maastricht University Medical Centre, The Netherlands

15:35-15:40 **Why should (salivary) melatonin be measured in patients to be treated with melatonin?**

Marcel Smits, Hospital Gelderse Vallei, France

15:40-15:55 **Use of melatonin MENDS study**

Paul Gringras, Kings College/Guy's and St Thomas', London, UK

15:55-16:10 **Non-pharmacological management**

Luci Wiggs, Oxford Brookes University, UK



ROOM 9

- 15:00-16:15 **Submitted Symposium 4**
“Sleep problems in children and adolescents: Relationships with emotional well-being and cognitive functioning”
 Chair: Patricio Peirano, University of Chile, Santiago, Chile
- 15:00-15:10 **Sleep problems in children and adolescents: Relationships with emotional well-being and cognitive functioning.**
 Anne Marie Meijer, University of Amsterdam, The Netherlands
- 15:10-15:25 **DLMO and adolescent emotional well-being, as measured by symptoms of chronic sleep reduction, before and after melatonin treatment.**
 Marcel G. Smits, Hospital De Gelderse Vallei, The Netherlands
- 15:25-15:40 **Gradual sleep extension and cognitive performance: An experimental study.**
 Julia F. Dewald-Kaufmann, University of Amsterdam and Dr. von Hauner Children’s Hospital, Munich, Germany
- 15:40-15:55 **Neuropsychological dysfunctioning in OSAS.**
 Karen Spruyt, University of Chicago, USA
- 15:55-16:10 **Insomnia treatment and cognitive functioning in adolescents.**
 Ed J. de Bruin, University of Amsterdam, The Netherlands
- 16:10-16:15 **Discussion**

EXCHANGE HALL

- 16:15-16:45 **Coffee Break, Poster Viewing & Visit the Exhibition**

ROOM 9

- 16:45-17:30 **IPSA Assembly**

AUDITORIUM

- 16:45-17:30 **New Frontiers: Data Blitz**
 Chair: David Gozal, The University of Chicago, USA
- 16:45-16:50 **The effect of fragmented sleep on appetite in 17-year-old Chilean subjects**
 Cecilia Algarin, University of Chile, Santiago, Chile
- 16:50-16:55 **Distribution and periodicity of leg movements during sleep in children with Restless Legs Syndrome**
 Al de Weerd, Zwolle-Groningen, Zwolle, The Netherlands

16:55-17:00

Does thermal instability influence sleep in preterm neonates?

P Décima, Laboratoire PériTox, Paris, France

17:00-17:05

Morning bright light therapy for adolescents diagnosed with Delayed Sleep Phase Disorder: Does a circadian rhythm intervention improve insomnia?

Michael Gradisar, Adelaide, Australia

17:05-17:10

Variations in the obesity genes FTO, TMEM18 influence the vulnerability of children to weight gain induced by short sleep duration

F Jiang, Shanghai Children’s Medical Center, China

17:10-17:15

Greatly increased rate of new diagnosis of childhood narcolepsy since 2009 at an Irish centre: population characteristics

Bryan Lynch, Children’s University Hospital, Ireland

17:15-17:20

Unattended ambulatory polysomnography or gold standard attended laboratory polysomnography in paediatric obstructive sleep apnoea diagnosis

J Maul, Sleep Laboratory, Princess Margaret Hospital, Australia

17:20-17:25

Sleep in Young Children with Asthma

Lisa Meltzer, National Jewish Health, Denver, Colorado, USA

17:25-17:30

Leg movements during sleep in children: lasting effects of iron deficiency anaemia (IDA) in infancy

Patricio Peirano, University of Chile, Santiago, Chile

17:30-18:15

Key Note 4

“Sleep, Memory and Emotion”

Matthew Walker, University of California, Berkeley, USA

Chair: Avi Sadeh, Tel Aviv University, Israel

18:15-18:30

New Researcher’s Award

Chair: Oliviero Bruni, Sapienza University, Italy

19:30-00:00

GALA DINNER at Manchester United Old Trafford Football Ground



Friday, 7th December 2012





LOWER FOYER

07:30-08:30 **Registration in LOWER FOYER**

AUDITORIUM

08:30-09:15 **Key Note 5**

“Safe Sleeping: Why is the prone sleeping position such a risk for SIDS?”

Rosemary Horne, Monash Institute of Medical Research, Melbourne, Australia
Chair: Don rquhart, Royal Hospital for Sick Children, Edinburgh, UK

09:15-10:30 **Submitted Symposium 5**

“Sub-clinical Cardiovascular Disease and Obesity in OSA – the evidence in children”

Chair: Andrew Wilson, Princess Margaret Hospital, Western Australia, Australia

09:15-09:30 **Obstructive Sleep Apnea and Obesity: Risk and Patho-physiological Insights**

Aviv Goldbart, Soroka University Medical Center, Sheva, Israel

09:30-09:45 **Evidence of Endothelial Dysfunction in Children with Obstructive Sleep Apnea**

Leila Gozal, The University of Chicago, USA

09:45-10:00 **Hypertension and Autonomic Dysfunction in Obesity and Obstructive Sleep Apnea**

Fahed Hakim, Rambam Medical Center, Haifa, Israel

10:00-10:15 **Treatment of Pediatric Obstructive Sleep Apnea in Obese Children**

Rakesh Bhattacharjee, The University of Chicago, USA

10:15-10:30 **Inflammation in Obesity and Obstructive Sleep Apnea**

David Gozal, The University of Chicago, USA

ROOM 9

09:15-10:30 **Submitted Symposium 6**

“Sleep and Epilepsy: A Dynamic Relationship”

Chair: Sameer Zuberi, Royal Hospital for Sick Children, Glasgow, UK

09:15-09:40 **Sleep, epilepsy and cognition**

Lieven Lagae, Catholic University of Leuven, Belgium

09:40-10:05 **Semiology & genetics of nocturnal frontal lobe**

Sameer Zuberi, Royal Hospital for Sick Children, Glasgow, UK

10:05-10:30

Sudden Unexpected Death in Epilepsy

J Helen Cross, Institute of Child Health & Great Ormond Street Hospital, London, UK

EXCHANGE HALL

10:30-11:00 **Coffee Break, Poster Viewing & Visit the Exhibition**

AUDITORIUM

11:00-12:15 **Submitted Symposium 7**

“Sleep and Learning in Children”

Chair: Luci Wiggs, Oxford Brookes, Oxford, UK

11:00 - 11:07 **Introduction**

Avi Sadeh

11:07 - 11:24 **The formation of motor memories during sleep in children**

Ines Wilhelm, University Children’s Hospital Zurich, Switzerland

11:24 - 11:41 **The impact of sleep spindles on declarative learning and general cognitive abilities in school aged children**

Kerstin Hoedlmoser, University of Salzburg, Austria

11:41 - 11:58 **Brain development and cognitive function in adolescents: Insights from longitudinal assessment of the sleep EEG**

Leila Tarokh, University of Zurich, Switzerland

11:58 - 12:15 **Sleep promotes consolidation of emotional memory in healthy children but not in children with attention-deficit hyperactivity disorder**

Alexander Prehn-Kristensen, Center for Integrative Psychiatry, Kiel, Germany

ROOM 9

11:00-12:15 **Submitted Symposium 8**

“Inadequate sleep in Adolescents: Opportunities for treatment and intervention”

Chair: Stephen H. Sheldon, Northwestern University, Illinois, USA

11:00-11:07 **Introduction: the concept of inadequate sleep in adolescents: biological and environmental determinants**

Tamar Shochat, University of Haifa, Israel

11:10-11:24 **Effects of 2 weeks sleep extension on adolescents’ self-reported and actigraphy measured sleep, mood, and depression.**

Anne Marie Meijer, University of Amsterdam, The Netherlands



- 11:24-11:41 **A parent-based intervention study to promote healthy sleep patterns and electronic media exposure in young adolescents.**
Orna Tzischinsky, Emek Yezreel College, Israel
- 11:41-11:58 **Cognitive behavior therapy for adolescent sleep problems: findings from a study on group and online CBT-I.**
Ed de Bruin, University of Amsterdam, The Netherlands
- 11:58-12:15 **Morning bright light therapy for adolescents diagnosed with Delayed Sleep Phase Disorder: Does a circadian rhythm intervention improve insomnia?**
Michael Gradisar, Flinders University, Adelaide, South Australia

AUDITORIUM

- 12:15-13:15 **Submitted Symposium 9**
“Children, Parents, and Sleep: Dynamic Interactions between Health, Development and Functioning”
Chair: Luci Wiggs, Oxford Brookes, Oxford, UK
- 12:15-12:20 **Introduction and Overview**
Lisa Meltzer, National Jewish Health, Denver, Colorado, USA
- 12:20-12:35 **Impact of Pediatric Atopic Dermatitis on the Sleep Quality of Children and their Parents**
Lisa Meltzer, National Jewish Health, Denver, Colorado, USA
- 12:35-12:50 **Triadic Links Between Infant Sleep, Maternal Sleep, and Paternal Involvement in Infant Caregiving**
Liat Tikotzky, Ben-Gurion University of the Negev, Israel
- 12:50-13:05 **Maternal Depression and Insecure Mother-Child Attachment: Sources of Inaccuracy in Maternal Reports of Child Sleep**
Annie Bernier, University of Montreal, Canada
- 13:05-13:15 **Questions and discussion**

ROOM 9

- 12:15-13:15 **Submitted Symposium 10**
“Promoting healthy sleep in children with cerebral palsy”
Chair: Catherine Hill, University of Southampton, UK
- 12:15-12:30 **Domiciliary functional management strategies, for sleep difficulties in CP - 6 years experience**
Sue McCabe, The Centre for Cerebral Palsy, Perth, Western Australia

- 12:30-12:45 **A qualitative study of the lived experience of sleep for children with CP and their families.**
Jessica Underhill, Chailey Heritage Clinical Services, Lewes, UK
- 12:45-13:00 **Restless Legs Syndrome - a missed co-morbidity, in children with CP and challenging behaviour**
Osman Ipsiroglu, University of British Columbia, Vancouver, Canada
- 13:00-13:15 **Respiratory function in children with severe, CP using postural lying support**
Catherine Hill, University of Southampton, UK

EXCHANGE HALL

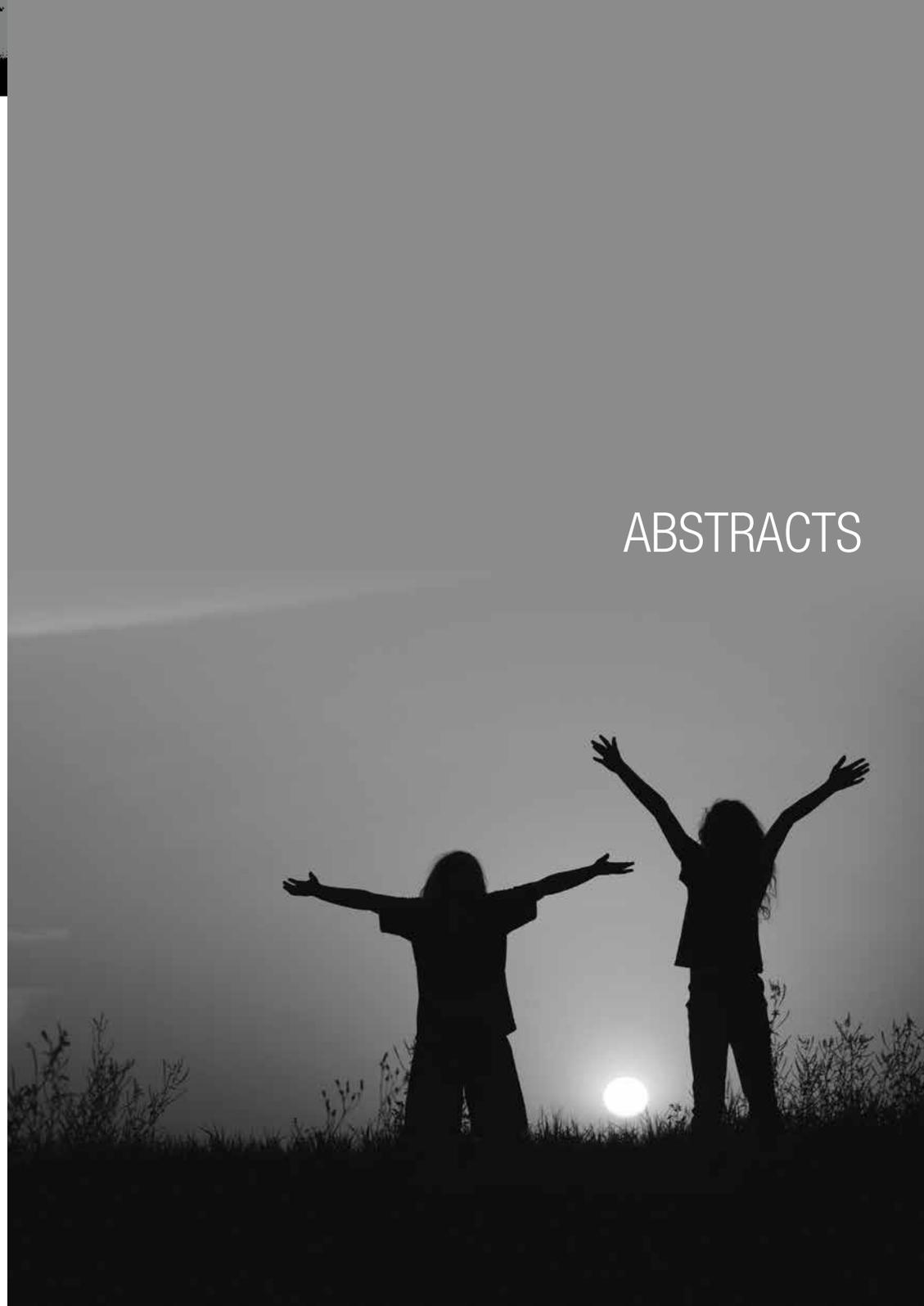
- 13:15-14:00 **Lunch, Poster Viewing & Visit the Exhibition**

AUDITORIUM

- 14:00-14:45 **Key Note 6**
“What do we know about sleep and neurocognition?”
Declan Kennedy, Children’s Sleep Research Centre, Adelaide, Australia
Chair: Sameer Zuberi, Royal Hospital for Sick Children, Glasgow, UK
- 14:45:15:00 **Closing Remarks**



ABSTRACTS





Key Note 1

Wednesday 5th December 2012

AUDITORIUM

17:15-18:00

Children's sleep around the world: A cross-cultural perspective

Jodi Mindell, Saint Joseph's University, USA

Given that IPSA is an international organization whose mission includes promoting research and knowledge about pediatric sleep, it is important to develop a global perspective on sleep. It is clear that children's sleep differs from one place to another throughout the world, with differences in sleep patterns, sleep problems, parental perceptions of sleep, and sleep disorders. For example, there are vast differences in such factors as bedtimes, total sleep times, and prevalence rates of snoring across cultural groups. These differences likely reflect an interplay of cultural and biological factors within an interactional model. We are only just beginning to understand the relationships between culture and children's sleep, but examining the differences around the world will help us promote better sleep and better health in our children.

Key Note 2

Thursday 6th December 2012

AUDITORIUM

08:30-09:15

Obstructive sleep apnoea - an oral facial growth problem?

Christian Guilleminault, Stanford School of Medicine, USA

Despite the widespread use of limited recording techniques to identify the complete cessation of abnormal breathing and its effects during sleep, many studies have demonstrated significant improvement in SDB but without complete elimination of the phenomenon with adenotonsillectomy. Recent prospective investigations have also shown that there was reappearance of SDB and abnormal neurocognitive test results in up to 40% of the subjects 6 to 12 months post adenotonsillectomy. Small oro-pharyngeal-facial anatomic abnormalities exist in OSA. Orthodontists for many years had shown that there is a continuous interaction between abnormal nasal breathing and changes in oral-facial growth. Experimental data obtained on monkey show change in oral-facial muscle discharges and secondary to muscle tone, abnormalities of growth is seen. In children, orthodontics research has confirmed the critical role of abnormal nasal resistance in the change in growth and the development of SDB, with a continuous interaction between abnormal nasal breathing-oral-facial growth and SDB. Such knowledge has led to usage of orthodontics in treatment of pediatric SDB (rapid-maxillary-expansion and bilaterally expansion), but adenotonsillectomy and orthodontics are not necessary sufficient treatment and again relapse are seen. Most commonly the underlying muscle hypotonia is not addressed in any of the current treatment approaches and is behind recurrences, possibly noted only during adulthood. Recent studies on premature infants confirm the important role of muscle oro-pharyngeal-facial hypotonia as a critical element in the development of SDB, with enlargement of tonsils been a secondary phenomenon.

SDB appears as a syndrome of abnormal oral-facial growth with continuous interaction between oral-facial muscles activity and skeleton growth with abnormal nasal resistance (related to different factors) been a critical step in the development of SDB. If all aspects impacting on normal oral-facial growth are not treated including the myofunctional component, abnormal breathing and inflammatory local reactions persist and continuous worsening of the syndrome will occur after temporary improvement obtained with treatment of one component responsible for the abnormal breathing during sleep.

Key Note 3

AUDITORIUM

Thursday 6th December 2012

14:15-15:00

Advances in narcolepsy research?

Emmanuel Mignot, Stanford School of Medicine, USA

Key Note 4

AUDITORIUM

Thursday 6th December 2012

17:30-18:15

Sleep, Memory and Emotion

Matthew Walker, University of California, Berkeley, USA

The functions of sleep remain largely unknown, a surprising fact given the vast amount of time that this state takes from our lives. This talk will present emerging evidence of a functional role for sleep in memory processing and emotional regulation. In the domain of memory, I will discuss a selection of studies describing (1) the detrimental impact of sleep loss on the ability of the human brain to initially encode (learn) new fact-based memories, and conversely (2) the benefit of sleep before encoding in preparing key brain regions for restoring the capacity for new learning, supported by specific NREM sleep oscillations; both of which have significant implications for the developing brain. In the domain of emotion, I will describe (1) a role for sleep in resetting the optimal next-day reactivity and functional connectivity of limbic and prefrontal brain networks, and (2) a specific role for REM sleep in recalibrating the sensitivity of the brain to unique and specific types of emotions. Special emphasis will be placed on the relevance of these findings regarding the adolescent developmental phase.



Key Note 5

AUDITORIUM

Friday 7th December 2012

08:30-09:15

Safe Sleeping: Why is the prone sleeping position such a risk for SIDS?

Rosemary Horne, Monash Institute of Medical Research, Melbourne, Australia

Introduction: Over 20 years ago it was identified that sleeping an infant in the prone position greatly increased the risk for the Sudden Infant Death Syndrome (SIDS). This sparked a series of “safe sleeping” campaigns advising parents of this risk. Despite the dramatic reduction in SIDS in by over 80% since the introduction of these safe sleeping campaigns, SIDS still remains the leading cause of postnatal death in western countries. SIDS has a unique age distribution with over 90% of infants dying in the first 6 months of life, with a distinct peak at 2-3 months of age. Currently it is believed that SIDS occurs during sleep, and that impairment of cardiorespiratory control, together with a failure to arouse from sleep, are both involved in the final pathway. Over the last 15 years our group has been investigating how the prone sleeping alters infant physiology to try to better understand the mechanisms of SIDS.

Methods:

Studies in infants have been carried out longitudinally at 2-4 weeks, 2-3 months and 5-6 months of age using daytime polysomnography to investigate the effects of prone sleeping on cardiovascular control and arousability.

Results:

When infants sleep prone arousability from sleep is depressed 3 fold. Furthermore, there is a fall in blood pressure despite an increase in heart rate, and cardiovascular control is impaired. These impairments are most marked at 2-3 months of age. Recently, we have shown that prone sleeping is also associated with reduced cerebral oxygenation.

Conclusions:

In normal healthy infants cerebral oxygenation decreased with postnatal age and this was most marked between 2-4 weeks and 2-3 months of age. This reduction may underpin the decreased arousability from sleep exhibited by normal infants in the prone position. Studies in healthy infants can provide important insights into the likely mechanisms for SIDS and provide important evidence for SIDS prevention campaigns.

Key Note 6

AUDITORIUM

Friday 7th December 2012

14:00-14:45

What do we know about sleep and neurocognition?

Declan Kennedy, Children's Sleep Research Centre, Adelaide, Australia

Sleep plays a vital and manifold role in children's cognition and behaviour. In the early years of life it is an important for normal brain development while over the last 30 years there has been a growing appreciation of sleeps pivotal role in memory formation and learning. This has occurred at the same time as an awareness of the negative effects of sleep restriction on children's daytime functioning. An area of major interest over the last two decades has been the effect of snoring on cognitive and behavioural functioning, given the former's prevalence in childhood. In infants there is a paucity of data but in older children there is a general consensus that behaviour and those cognitive domains of executive functioning are most vulnerable to sleep disruption. The treatment of sleep disordered breathing by adenotonsillectomy results in an improvement in behavioural parameters and in some but perhaps not all cognitive domains but long term follow up data is lacking. The aetiology of cognitive and behavioural deficits is believed to be a combination of upregulation of inflammatory cytokines and oxidative stress resulting from sleep fragmentation and hypoxia. A greater public awareness of the negative effects of sleep disruption on children is needed so that early assessment and treatment of affected can be offered.



Submitted Symposia 1

Thursday 6th December 2012

AUDITORIUM

11:00-12:15

Canadian Perspective on novel ways of treating childhood behavioural insomnia: Outcomes of four behavioral interventions studies that are informing the development of a national web-based treatment study.

Approximately 25% of 1-to 10-year old children experience behavioural insomnias (“Behavioural Insomnias of Childhood” [BICs]; e.g., difficulty settling, falling asleep, returning to sleep). This can disrupt sleep, leading to excessive daytime sleepiness and negatively effecting daytime functioning (e.g., behaviour, mood, attention, learning). Despite robust evidence supporting the efficacy of behavioural treatments for BICs, only 1% of children with BICs receive them. This symposium will present results from 4 pediatric behavioural sleep outcome studies delivered in a range of formats, including individual, one-on-one therapy; group education sessions and telephone support; and distance interventions (booklets, telephone coaching calls). We will outline study results, moving progressively away from individual and in-person interventions and towards distance interventions. Our chair, Dr. Weiss, will discuss the challenges of accessing evidence-based BIC interventions, while highlighting background information drawn from the international literature on BIC treatment. Dr. Godbout will discuss the treatment of children with BICs and co-morbid mental health disorders, using a traditional individual therapy format. Dr. Hall will present findings from the Rocky Sleep Study, developed to assist parents of infants with BICs using a group-based 2-hour teaching session with support phone calls twice a week for 2 weeks. Dr. Reid will present findings from Parenting Matters, a booklet-based behavioural intervention for BICs in preschoolers, accompanied by telephone coaching. Dr. Corkum will present outcome data from a distance model of BIC intervention for school-aged children, which included manuals and telephone coaching. We will then discuss how this research provided the basis for “Better Nights, Better Days”, a web-based intervention with the goal of increasing access to evidence-based BICs treatment and creating a healthier future for children with BICs.

Submitted Symposia 2

Thursday 6th December 2012

ROOM 9

11:00-12:15

Problems of Prematurity: What We Can Tell From Sleep Studies

Target Audience:

A broad audience of delegates involved in the care and research of paediatric population including paediatricians, neonatologist, researchers, and general practitioners

Learning Objectives:

This symposium will cover new research into mechanisms and problems in preterm infants associated with:

control of blood pressure, heart rate and cerebral blood flow thermoregulatory control control of breathing and the increased risk for the Sudden Infant Death Syndrome (SIDS) maturation of sleep patterns in preterm infants This symposium will cover the development of cardiorespiratory control during sleep in preterm infants. The symposium will focus of specific legacies and new research into underlying mechanisms of chronic lung disease, apnoea of prematurity, cardiovascular autonomic control, thermoregulatory control and the increased risk for Sudden Infant Death Syndrome in preterm infants. Associate Professor Rosemary Horne, Monash University, Australia will chair the session and provide an overview of the problem. She will discuss new research which has revealed preterm infants have lower blood pressure, impaired cardiovascular control and cerebral oxygenation compared to age matched term infants over the first 6 months of life and this is more marked when they sleep prone. Professor Veronique Bach, University of Picardie, France will address problems associated with thermoregulation during sleep in preterm infants and the effects of thermal stability on preterm outcomes. Associate Professor Dawn Elder, Otago University, New Zealand will discuss the role of the various methods of monitoring the convalescent infant in the NICU and issues related to the assessment of cardiorespiratory stability in sleeping preterm infants prior to neonatal discharge. Finally, Associate Professor Patricia Franco, Hôpital Femme-Mère-Enfant, Lyon, France will discuss how sleep patterns in preterm infants are different from those in term infants over the first two years of life.

Submitted Symposia 3

Thursday 6th December 2012

AUDITORIUM

15:00-16:15

Impaired sleep and its management in children with developmental disorders

The prevalence of sleep disturbances in children with developmental disorders (DD) is higher compared to children without DD. Sleep disturbances impede the development of mental functions, are associated with behavioural disturbances and impair the quality of life of the child and their caregivers. Therefore prevention and treatment of sleep disturbances helps both the child and their caregivers. Circadian rhythm disorders are a frequently occurring cause of insomnia in children with DD and that melatonin treatment is remarkably effective if administered at the right time and in the right dose. The first two speakers summarize recent findings. For instance, genetics play an important role in sleep disturbances such that Prader Willi and Angelman syndrome are associated with the same gene defect but exhibiting a different sleep phenotype (hypersomnia and insomnia, resp.) The third speaker summarizes indications for melatonin treatment and points at the hazards, especially as to children who are slow melatonin metabolizers. Possible causes of slow melatonin metabolism will be summarized including CYP1A2 polymorphisms. Also treatment options and the recently discovered possible association with autism will be discussed. The fourth speaker summarizes the literature, showing why (salivary) Dim Light Melatonin Onset should be measured before starting melatonin treatment. The fifth speaker presents findings from the largest randomised double-blind placebo controlled study designed to assess the effectiveness of melatonin in the treatment of sleeplessness in children with DD. Results suggest that treatment with fast-release melatonin significantly reduces sleep latency but that benefits for total night-time sleep are small and reasons for this will be explored. The sixth speaker discusses melatonin



treatment in the context of non-pharmacological management approaches and considers the latter's use as an alternative and an adjunct to melatonin therapy.

Submitted Symposia 4

Thursday 6th December 2012
ROOM 9
15:00-16:15

Sleep problems in children and adolescents: Relationships with emotional well-being and cognitive functioning.

Sleep problems in children and adolescents are an increasing, worldwide occurring problem, which may cause cognitive, emotional and behavioral problems as well as academic failure. Due to an interaction between extrinsic and intrinsic factors sleep problems in children and adolescents often become chronic and are associated with severe long-term effects on individuals' cognitive functioning, behavior at school, and emotional well-being. However, to date, questions concerning the causality of such relationships still remain unanswered. The present symposium aims to shed more light on the causality question by new research findings. The symposium provides both a broad overview of the topic and centers on analyzing and explaining important clinical questions. The session starts with research into the gene-environment interaction as explanation for the relation between sleep and mood. In this research the question will be answered which people are susceptible for depressed mood due to sleep problems. What the contribution of depressed mood and sleep is on adolescents' daily functioning is not yet clear. The second speaker will present a study with 925 adolescents in which the effects of depression and sleep on academic performance and school functioning will be disentangled. The third speaker will relate to the effects of enduring sleep problems on cognitive functioning by examining neuropsychological functioning in children with OSAS. The fourth speaker will discuss sleep problems in adolescents with DSPS and their relationship with Dim Light Melatonin Onset, emotional well-being and cognitive functioning. An interesting question with respect to the relation of enduring sleep problems with cognitive functioning is whether improvement of sleep problems will also improve cognitive functioning. Therefore, this symposium will conclude with findings on whether or not cognitive behavioral therapy for insomnia can improve cognitive functioning in adolescents.

Submitted Symposia 5

Friday 7th December 2012
AUDITORIUM
09:15-10:30

Problems of Prematurity: What We Can Tell From Sleep Studies

Target Audience:

A broad audience of delegates involved in the care and research of paediatric population including paediatricians, neonatologist, researchers, and general practitioners Learning

Objectives:

This symposium will cover new research into mechanisms and problems in preterm infants associated with: control of blood pressure, heart rate and cerebral blood flow thermoregulatory control control of breathing and the increased risk for the Sudden Infant Death Syndrome (SIDS) maturation of sleep patterns in preterm infants This symposium will cover the development of cardiorespiratory control during sleep in preterm infants. The symposium will focus of specific legacies and new research into underlying mechanisms of chronic lung disease, apnoea of prematurity, cardiovascular autonomic control, thermoregulatory control and the increased risk for Sudden Infant Death Syndrome in preterm infants. Associate Professor Rosemary Horne, Monash University, Australia will chair the session and provide an overview of the problem. She will discuss new research which has revealed preterm infants have lower blood pressure, impaired cardiovascular control and cerebral oxygenation compared to age matched term infants over the first 6 months of life and this is more marked when they sleep prone. Professor Veronique Bach, University of Picardie, France will address problems associated with thermoregulation during sleep in preterm infants and the effects of thermal stability on preterm outcomes. Associate Professor Dawn Elder, Otago University, New Zealand will discuss the role of the various methods of monitoring the convalescent infant in the NICU and issues related to the assessment of cardiorespiratory stability in sleeping preterm infants prior to neonatal discharge. Finally, Associate Professor Patricia Franco, Hôpital Femme-Mère-Enfant, Lyon, France will discuss how sleep patterns in preterm infants are different from those in term infants over the first two years of life.

Submitted Symposia 6

Friday 7th December 2012
ROOM 9
09:15-10:30

Sleep & Epilepsy: A Dynamic Relationship

The symposium will explore the relationship between sleep and epilepsy. The first talk will introduce the topic with a neurophysiologist describing how the sleep EEG can provide an insight into normal development, the pitfalls of interpreting a normal EEG and how specific it is as a biomarker of brain dysfunction. The second talk will review the semiology of nocturnal frontal lobe epilepsy using videotape examples of common and rare phenotypes and why conditions previously thought to be presentations of movement disorders are now considered epilepsies. The major advances revealing the genetic aetiologies of epilepsy will be reviewed. Sudden unexpected death in epilepsy has been a hidden but important cause of mortality in individuals with epilepsy. Though uncommon in childhood it does occur and is a source of significant anxiety for parents of children with epilepsy. Most individuals with SUDEP die in their sleep. Why is this the case and how can risks be minimized. What should physicians say about SUDEP to their patients. Epilepsy and sleep are linked in many ways. Many epilepsy syndromes are defined by their relationship to sleep. What is the impact of epileptic seizures and EEG abnormalities on cognition. How can the impact of seizures and EEG changes be measured and what is the evidence for the benefits of treatment.



Submitted Symposia 7

Friday 7th December 2012
AUDITORIUM
11:00-12:15

Sleep and learning in children

There is already an extensive body of evidence that sleep plays a crucial role in learning, memory, and general cognitive performance. Studying the literature it becomes apparent that most of the present empirical evidence on sleep and learning focuses on adults (Diekelmann & Born, 2010). From developmental research there is profound knowledge that children compared to adults show distinctly different sleep patterns: total sleep time (TST), sleep efficiency (SEFF), and slow wave sleep (SWS) decrease, while wake after sleep onset (WASO) increase with age. In past sleep and memory research a main focus had been lying on 'macroscopic' estimates of sleep, that is, the amount of REM or SWS. Today however, specific sleep features and mechanisms are regarded as increasingly important for different types of offline memory (re-)processing. Especially, sleep mechanisms like sleep spindles, slow oscillations or the actual number of rapid eye movements are being under active discussion. To date research on the effects of sleep for learning and memory in children is still very restricted (Wilhelm, Prehn-Kristensen & Born, 2012). There are only a few studies investigating the relationship between sleep and cognitive abilities focusing declarative (memories for facts and events, that are explicitly encoded; e.g., word-pair association task, object-location task), emotional (memories for events, which are associated with an affective response; e.g., negative or positive feelings, facial and bodily responses) and procedural (memories for skills and habits that are acquired through repeated practice; e.g., finger tapping task; serial reaction time task) memory in children. Furthermore some studies report relationships of intelligence and sleep. In the proposed symposium we will cover a range of important recent findings on sleep and learning in healthy as well as children suffering from ADHD.

Submitted Symposia 8

Friday 7th December 2012
ROOM 9
11:00-12:15

Inadequate Sleep in Adolescents: Opportunities for Treatment and Intervention.

Sleep is a biologically driven behavior, modified by culture and environment. It plays a crucial role in healthy adolescent development, particularly in the regulation of functions such as emotion, attention and behaviour. Changes in sleep during adolescence are characterized by a shift to a delayed sleep phase and by marked differences between weekday and weekend sleep timing and duration. Lifestyle factors associated with inadequate sleep in young individuals include excessive "screen time" (i.e., exposure to television, internet and cellular phones), consumption of caffeine, alcohol and other substances, poor dietary habits, weight gain, lack of exercise and inappropriately timed light exposure. Subsequently, chronic insufficient sleep entails serious consequences on adolescents' health and daily functioning. The aims of this symposium are to

discuss opportunities for: 1) treatment strategies for adolescents who experience chronic sleep disturbances; and 2) interventions for the health promotion of adequate sleep in youth. Findings from four randomized controlled trials will be presented, to include: 1) a novel internet-based cognitive behavioral therapy study, tailored specifically for adolescents; 2) circadian rhythm treatments for adolescents with Delayed Sleep Phase Syndrome; 3) sleep extension as a means to enhance functional outcomes in adolescents, and 4) a parent-based intervention study aimed to promote healthy sleep habits in young adolescents.

Submitted Symposia 9

Friday 7th December 2012
AUDITORIUM
12:15-13:15

Children, Parents, and Sleep: Dynamic Interactions between Health, Development, and Functioning

The overall goal of this session is to examine how child or parent sleep is related to different aspects of health, development, and functioning. Children do not exist within a vacuum, but rather are part of an active and dynamic family system. This session will bring together experts from around the world to present current research on sleep in children and/or their parents, and how sleep is associated to aspects of health, development and functioning. Together these experts will highlight the importance of considering the role of the dynamic family system for research and clinical interventions focusing on pediatric sleep. This session will provide the audience with a greater understanding of: 1. The impact of a child's chronic illness on parent sleep and daytime functioning 2. How maternal cognitions interact with/influence the sleep of infants and young children 3. Parent-child attachment in young toddlers as a predictor of preschooler sleep duration and sleep quality. 4. The relationship between child sleep, maternal sleep and maternal depression

Submitted Symposia 10

Friday 7th December 2012
ROOM 9
12:15-13:15

Promoting healthy sleep in children with cerebral palsy

Sleep difficulties are very common in children with physical disabilities and place high demands on carer givers. The importance of sleep is often overlooked as the child's medical and therapeutic demands are prioritised. Epilepsy, overnight feeding regimens, positioning requirements, continence problems, pain and sleep disordered breathing are just some of the factors that must be considered. Underlying this complexity is a heightened risk of sleep disorders such as behavioural insomnia, parasomnias and periodic limb movement disorder, all of which may be overlooked or misdiagnosed. Sleep problems in such children are however, amenable to treatment but require careful and structured assessment. This symposium brings together the experience of therapists, paediatricians and researchers from three continents that all have a special interest

in promoting healthy sleep in this group of children. We will present data on multi-dimensional approaches to home based assessments and intervention from a specialist occupational therapy led sleep service in Australia with a particular focus on functional assessment and practical strategies in the home setting. A novel approach using detailed home video assessments to analyse sleep behaviours will be presented by researchers from British Columbia. Vulnerability to upper airway obstruction and hypoventilation will be discussed and data from a series of in lab and domiciliary studies of respiratory function in children using night-time postural equipment will be presented from the UK. Finally data will be presented on the personal, social, contextual perspective of sleep in these families from a qualitative study of the experience of sleep in children with cerebral palsy, their siblings and parents.

Thursday 6th December 2012

AUDITORIUM
12:15-13:00

001

Sleep problems and cognition in children with Down syndrome and Williams syndrome

Ashworth, Anna¹; Hill, CM²; Karmiloff-Smith, A³; Annaz, D⁴

¹Psychology and Human Development, Institute of Education, WC1H 0AL, United Kingdom; ²Division of Clinical Neuroscience, University of Southampton, United Kingdom; ³Centre for Brain and Cognitive Development, Birkbeck University, United Kingdom; ⁴Psychology and Human Development, Institute of Education, United Kingdom

It is now well established that sleep problems can have a detrimental effect on behaviour, health and psychological and social functioning. Tired children perform less well at school, are more hyperactive and have poorer attention and memory than well rested children. Sleep is also an active state whereby new memories are reinforced and consolidated. This phenomenon is known as 'sleep-dependent learning'. Sleep problems are common in children with developmental disorders, yet relatively little research investigates the specific problems and the impact that they have on the child's development. This project characterises sleep problems in children with Down syndrome (DS) and Williams syndrome (WS) and a typically developing (TD) control group, using objective measures of actigraphy and pulse oximetry along with parent report. The impact of sleep on attention, memory and learning are examined using a range of established and novel tasks. Results for 88 children (22 DS, 22 WS, 44 TD) indicate group differences for objectively measured sleep parameters. Children with DS suffered greater sleep disruption related to breathing difficulties, and long sleep latencies were evident in the WS group. Results also show poorer performance for both disorder groups on attention and short term memory tasks, with particularly poor attention in the DS group. All groups show evidence of sleep-dependent learning on both a declarative and a procedural task, most noticeably the control group. It is expected that task performance will correlate positively with sleep quality, and that some of the learning difficulties experienced by children with developmental disorders could be exacerbated by their sleep problems. Implications will be discussed.

002

Long-term improvements in sleep disordered breathing in school-aged children are associated with improvements in neurocognition but not behaviour

Biggs, Sarah¹; Vlahandonis, A²; Walter, LM²; Anderson, V³; Davey, MJ⁴; Nixon, GM²; Horne, RSC²

¹The Ritchie Centre, Monash Institute of Medical Research, Monash Uni, Clayton, Australia; ²The Ritchie Centre, Monash Institute of Medical Research, Monash Uni, Australia; ³Psychology, Murdoch Children's Research Institute, Melbourne, Australia; ⁴Melbourne Children's Sleep Centre, Monash Children's, Melbourne, Australia

Background:

The detrimental neurocognitive and behavioural consequences of sleep disordered breathing (SDB) in children



are well documented. Whether these deficits improve, remain or continue to decline over time is still unknown. This study aimed to examine the long-term effect of improvement in SDB on neurocognition and behaviour in school-aged children.

Methods:

Children with SDB and healthy non-snoring controls (mean±SD age: 12.8±1.5 years; 53% male) underwent repeat polysomnography, and age-standardised neurocognitive and behavioural assessment 3.8 (±0.5) years following initial testing. Initial diagnosis classified subjects into four groups: control (OAHl<1 event/h and no history of snoring; N=18); PS (OAHl≤1 event/h with history of snoring; N=22); mild OSA (OAHl 1-5 events/h; N=11); and, moderate to severe OSA (MS OSA: OAHl>5 events/h; N=7). Mixed model analysis, controlling for socioeconomic status and maternal IQ, determined whether changes in OAHl predicted changes in neurocognition and behaviour.

Results:

65% PS, 75% Mild OSA and 100% MS OSA showed improvement in OAHl from Time 1. A decrease in OAHl predicted an increase in performance IQ and reading ability (p<0.05). No group differences were observed. In contrast, initial group differences in behavioural assessment did not change over time with all severities of SDB recording significantly higher internalising (p<0.001), externalising (p<0.05) and total problem behaviour (p<0.01) scores than controls, irrespective of changes in OAHl.

Conclusion:

The majority of children with SDB showed improvement in OAHl over a 4-year period, either with treatment or spontaneously. At an individual level, improvements in OAHl predicted improvements in two neurocognitive domains, but were not predictive of behavioural changes. Regardless of resolution, children with an initial diagnosis of SDB continued to exhibit poorer behaviour than controls, suggesting that early behavioural patterns developed in association with SDB may become engrained by school-age and increasingly habitual over time. This has substantial implications for timing of SDB treatment.

003

Children with obstructive sleep apnoea have impaired exercise capacity independent of weight status

Evans, Carla¹; Selvadurai, H²; Baur, LA³; Waters, KA²

¹Clinical School, The University of Sydney, Roseville, Australia; ²Department of Respiratory Medicine, The Children's Hospital at Westmead, Westmead, Australia; ³Weight Management Service, The Children's Hospital at Westmead, Westmead, Australia

Background:

Although the effects of obesity on cardiopulmonary exercise responses have been studied in children, effects of obstructive sleep apnoea (OSA) have not. Since OSA is a co-morbidity of obesity and OSA is known to affect ventricular dimensions and heart rate at rest and in sleep, we aimed to examine the effects of OSA versus obesity on cardiopulmonary responses to exercise.

Methods:

Healthy weight and obese children aged between 7-13 years were recruited. Polysomnography was used to diagnose OSA (OAHl > 1 hr⁻¹) and exercise testing was performed on a cycle ergometer. Independent t-test analysis was performed between 'No OSA' and 'OSA' groups. Analysis of covariance was performed to evaluate cardiopulmonary responses attributed to obesity versus OSA.

Results:

Forty of 71 children (56%, mean age 10 yr) had OSA (mean OAHl 8.9 ± 10.0 hr⁻¹). At peak exercise capacity, children with OSA had a lower cardiac output (8.9 ± 1.5 L/min v 10.5 ± 1.3 L/min, p < 0.001) and oxygen consumption (20.82 ± 8.28 mL/kg/min v 29.65 ± 9.21 mL/kg/min, p < 0.001) compared to those without OSA. Peak exercise was achieved at 69 ± 31 Watts for children with OSA and 83 ± 22 Watts (p = 0.06) for those without. There was no difference in ventilatory responses to exercise between the two groups. At peak exercise capacity cardiac output and oxygen consumption were independently associated with the respiratory-related arousal index, nadir SpO₂ and mean heart rate during total sleep time. Obese children fatigued earlier than healthy weight children but cardiopulmonary function was not affected by obesity.

Discussion:

Independent of weight status, children with OSA have impaired cardiac responses to aerobic exercise. Obese children are exercise limited due to physical deconditioning but those with OSA are further compromised due to an impaired cardiac response.

004

Is Parental Style Related to Health Behaviors and Quality of Life in Young Adolescents?

Flint-Bretler, Ofra¹; Shochat, Tamar²; Tzischinsky, Orna³

¹Graduate Studies Authority, University of Haifa, Haifa, Israel., Tel-Adashim, Israel; ²Graduate Studies Authority, University of Haifa, Haifa, Israel., Israel; ³Psychology Department, Emek Yezreel Academic College., Israel

Background:

Is Parental Style Related to Health Behaviors and Quality of Life in Young Adolescents? Background: Parental styles have been shown to affect some aspects of child and adolescent development. In particular, the authoritative style of parenting, characterized by high demands and high levels of responsiveness towards children, has been shown to promote academic performance and health behaviors. We assessed the relationships between parental styles and health related behaviors including sleep patterns based on actigraphy, daytime sleep related behaviors, electronic media habits and quality of life (QOL) in young adolescents.

Methods:

As part of a randomized case-control study, baseline measures of one-week actigraphy recordings and self-report questionnaires from 70 parent-adolescent dyads (mean age 10.7±0.9; females: n=35) were analyzed. Parents completed the 30-item Parental Authority Questionnaire (Buri, 1991), which provides composite scores reflecting levels of three parental styles: authoritative, authoritarian and permissive. Adolescents completed the Pediatric Quality of Life Inventory™ (PedsQL™), including the short core version of 6 subscales: physical,



emotional, social, school performance and psychosocial functioning and a total score; and subscales from the School Sleep Habits Survey (SSHS), assessing daytime sleepiness (DS), daytime problem behaviors (DPB), depressed mood (DM) and evening preference (EP).

Results:

No significant correlations were found between parental styles and actigraphy based sleep patterns. Permissive parenting style was correlated with increased TV viewing on weekends ($r=0.23$, $p=0.05$), and a tendency to increased TV viewing on weekdays ($r=0.23$, $p=0.065$). No relationships were found between parental styles and computer use or daytime sleep related behaviors. Authoritarian parenting style was correlated with low emotional QOL ($r=0.32$, $p=0.009$), and a tendency to low overall QOL ($r=-0.23$, $p=0.07$).

Conclusions:

These findings suggest that parental styles are associated with some aspects of health behaviors and quality of life. Our parent based intervention, aimed to enhance the authoritative parental style, may strengthen these associations and promote health behaviors and quality of life in young adolescents.

005

Clinical and electrophysiological characteristics of narcoleptic children with rapid weight gain at disease onset

Franco, Patricia¹; Arnulf, Isabelle²; Dauvilliers, Yves³; Lecendreux, Michel⁴; Reimão, Rubens⁵; Lin, Jian-Sheng¹; Inocente, Clara Odilia¹

¹CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, France; ²Université Pierre et Marie Curie Inserm U975, France; ³Inserm U1061, CHU Montpellier, France; ⁴Hôpital Robert Debré, CNR narcolepsie-hypersomnie, France; ⁵Clinical Hospital, University of São Paulo School, France

Introduction:

Some authors have reported a rapid weight gain at the onset of the disease in narcoleptic children. The purpose of our study was to compare the clinical and electrophysiological characteristics of narcoleptic children with and without rapid weight gain.

Methods:

The data of 38 children (22 boys) followed in the Reference Center of Lyon were collected. All these children received the diagnosis of idiopathic narcolepsy after a complete clinical and electrophysiological evaluation. Rapid weight gain was defined by a change in weight percentile curve (+1SD) within the year of the first symptoms of the disease. Patients were separated into children with rapid weight gain (type A) from those without any weight gain (type B) or with slow weight gain started more than one year before the clinical onset of the disease (type C). These data referred to new and non-treated children. Mann Withney rank and Fisher's tests were used for statistical analysis.

Results:

Type A was more frequent (52.6%) than type B (21%) or type C (26.3%). The children with type A were

younger (10.1 ± 3.8) than those with type B (13.1 ± 2.1 years) ($p=.028$) or type C (12.5 ± 3.6). There was no obese in the type B. Although the % of obesity was not significantly different between type A (70%) and type C (100%), children with type A had lower sleep efficiency ($p=.009$), higher insomnia severity index ($p=.004$) and apnea-hypopnea index ($p=.01$), more WASO ($p=.022$), REM sleep ($p=.024$) during night and SOREM during MSLT ($p=.027$) than type C. The adapted Epworth score, the frequency of narcolepsy with cataplexy, of HLA-DQB1*0602 positive tended also to be higher in the type A. All the cases after H1N1 vaccine ($n=3$) have been found in this group.

Conclusion:

Narcoleptic children with weight gain at disease onset present specific characteristics that could be related to a rapid autoimmune process.

006

Mother-infant sleep; infant circadian rhythms and maternal sleep types

Joseph, Desaline¹; Taub, N²; Chong, N³; Shanks, M⁴; Thompson, J⁵; Petersen, S⁶; Wailoo, MP⁷

¹Academic Child Health, University of Nottingham, Nottingham, United Kingdom; ²Health Sciences, University of Leicester, United Kingdom; ³Cardiology, University of Leicester, United Kingdom; ⁴Human Genetics, University of Oxford, United Kingdom; ⁵Ophthalmology, University of Leicester, United Kingdom; ⁶Medical Education, University of Leicester, United Kingdom; ⁷Child Health, University of Leicester, United Kingdom

Introduction:

In utero fetal biological rhythms are largely influenced and determined by the mother. There is an interdependent relationship with presumed maternal dominance. Following delivery in the first postnatal months the infant begins to develop circadian rhythms of its own. Longitudinal measurements of core body temperature can be used as a marker of this developmental maturation process. A delay in physiological maturity, including delay in sleep consolidation is a feature of vulnerability which may put the infant at risk.

Aim:

The aim of this study was to monitor the physiological development of normal full term infants, as well as changes in sleep patterns, concomitantly with maternal sleep and to determine factors which may influence these.

Methods:

Full term human infants were recruited from 6 weeks of age till 18 weeks into the study. Overnight core body temperature measurements were taken on a fortnightly basis from each infant in the home setting. Weekly overnight infant sleep records by actigraphy and somnologs were paired with maternal sleep records on the same night of sleep. Urine was collected for melatonin estimation. Maternal MEQ scores were calculated. Sleep environment and infant care practices were examined. Results: The rate of physiological maturation in infants was not determined by reported maternal sleep phenotypes (Automated ME-Q scores). With increase age and the development of physiological maturity; infants were more sleep efficient. Room sharing had a positive effect on infant sleep. Paired Infant-maternal actigrams showed similar patterns of sleep.

Conclusion:

Maternal sleep types as reported by questionnaire did not reflect synchrony seen between infant-mother pairs as by actigraphy. The interaction of sleep within the maternal-infant dyad may offer a possible basis for the investigation of modifiable risk factors for SIDS.

 007

Cerebral vascular control in healthy term infants: Effects of prone sleeping

Yiallourou, Stephanie¹; Wong, F²; Odoi, A²; Browne, P²; Walker, AM²; Horne, RSC²

¹Ritchie Centre, Monash Institute for Medical Research, Monash University, Clayton, Australia; ²Ritchie Centre, Monash Institute for Medical Research, Monash University, Australia

Introduction:

Prone sleeping is a major risk factor for the Sudden Infant Death Syndrome (SIDS). When sleeping prone blood pressure (BP) and cerebral oxygenation of infants are reduced, with the effects being most prominent at 2-3 months of age when SIDS risk is greatest. As the effect of sleeping position on cerebral vascular control has not been studied, we evaluated this in healthy term infants within the first 6 months of infancy.

Methods:

Daytime polysomnography was performed on term infants (N=17) at 2-4 weeks 2-3 months and 5-6 months PNA. BP (FinometerTM plethysmographic cuff) and cerebral tissue oxygenation index (TOI, NIRO-200 spectrophotometer, Hamamatsu) were recorded continuously. Three 15° head-up tilts (HUTs) were performed in 2 min epochs (1 min control / 1 min tilt) during quiet sleep in prone and supine sleeping positions. Beat-beat values for mean arterial pressure (MAP) and TOI were expressed as % change from baseline values averaged over 30 beats prior to tilt.

Results:

In the supine position, with HUT there was an initial rise in MAP (2-3%, p<0.05) and fall in TOI (2%, p<0.05), followed by a return to baseline in both MAP and TOI at all ages. In contrast, in the prone position there was an initial rise in MAP (2-3%, p<0.05) and TOI (2-3%, p<0.05), followed by a fall in MAP below baseline (2-3%, p<0.05) and a sustained increase in TOI. At 2-3 months this sustained increase in TOI was absent in the prone position.

Conclusion:

In the prone position at 2-4 weeks and 5-6 months, an increase in TOI in response to HUT suggests cerebrovasodilatation. This cerebrovasodilatation may be a protective response to avoid cerebral hypoxia in a condition with low cerebral oxygenation,; however at 2-3 months this protection is lost, perhaps placing infants at risk of hypoxia and of SIDS.

Thursday 6th December 2012

AUDITORIUM

 16:45-17:30

 008

The effect of fragmented sleep on appetite in 17-year-old Chilean subjects

Algarin, Cecilia¹; Peirano, P²; Reyes, S²; Burrows, R³; Reyes, M³; Gahagan, S⁴

¹Sleep Lab, INTA, University of Chile, Santiago, Chile; ²Sleep Lab, INTA, University of Chile, Chile; ³Endocrinology Lab, INTA, University of Chile, Chile; ⁴Pediatrics, UC San Diego, USA

Background:

There is increasing evidence supporting the relationship between sleep restriction and appetite regulation. However, the information regarding the effects of chronic sleep fragmentation on appetite is scarce, even more so in the paediatric age range. We studied the relationship between nighttime sleep fragmentation and the caloric intake in an eating in the absence of hunger (EAH) protocol in adolescents.

Methods:

Using a cohort of 405 healthy adolescents studied since infancy, we selected 238 participants who were attending school during the week of evaluation, with a morning start-time. They participated in continuously recorded actigraphy for one week, followed by a half-day laboratory assessment. After an overnight fast, body mass index (BMI) percentile according to WHO standards and fat mass (FM) percent by DXA were assessed, followed by a standardized, unrestricted breakfast. Twenty min later they were invited to relax in a room with unrestricted access to snacks (EAH protocol). Using the actigraphic data, we identified the following sleep-wake patterns (SWP) for school nights: number of waking episodes and total sleep time (TST). Participants were divided according to SWP: fragmented (FS) or non-fragmented (NFS) sleep, > or ≥ 2 waking episodes, respectively. Using linear regression analysis, we assessed the role of SWP on caloric intake during the EAH protocol.

Results:

Participants were 16.7 yrs, 53% male. Groups were similar regarding TST, BMI and FM. Calories consumed were related to sleep fragmentation, controlling for TST, BMI, FM and gender (p<.01). The FS group ate 83,2 more calories than the NFS group during snack. TST, BMI, FM and gender were not significantly related to calories consumed during snack.

Conclusion:

These results suggest that nighttime sleep fragmentation in adolescents could be related to increased caloric intake during the daytime, even in the absence of hunger. [NIH HL088530 & Fondecyt 1110513 grants]



009

Distribution and periodicity of leg movements during sleep in children with Restless Legs Syndrome

de Weerd, AI¹; Arends-Derks, W.²

¹Sleepcenter SEIN Zwolle-Groningen, Zwolle, Netherlands; ²Sleepcenter SEIN Zwolle-Groningen, Netherlands

Background:

In patients with Restless Legs Syndrome (RLS), polysomnography (PSG) reveals excessive (periodic or at random) leg movements (LMs). In adult patients, studies have shown characteristic values in parameters of limb movements during sleep. These measures are the periodicity index (PI), the duration of the inter limb movements intervals and the time distribution over the night. The aim of the study is to describe the same parameters in children with RLS and to compare the results to those in adults.

Methods:

N= 11 patients (3 females; median age: 8 years, range 2-16) were included if they showed limb movements with an index of at least 5/hour of sleep. Limb movements were measured and assessed according to the AASM rules (2007); recording and scoring of the accompanying video PSG was done using the same rules. For the PI, the duration of the inter limb movement intervals and the time distribution of LMs the methods described by Ferri et al and ourselves were used.

Results:

In contrast to the mean interval duration of 24.3 s, which we found previously in adults, no clear peak value was detected in children. The distribution of these intervals is mainly in the range of 10-20 seconds. During the night periodic limb movements in sleep (PLMS) have their highest prevalence in the beginning of the night with a peak in the 2e hour of NREM sleep. Isolated limb movements in sleep (LMS) are more evenly spread over the whole night, with a small peak during NonREM sleep in the 7th hour of sleep. The periodicity index (PI) had a value of 0.64 in REM sleep and of 0.69 when REM and NonREM sleep are taken together. The distribution over time and the PI values are approximately similar to those found in adults.

Conclusion:

In a small group of patients with RLS in childhood we only partly found the characteristics in limb movements during sleep as can be seen in adult patients with RLS.

010

Does thermal instability influence sleep in preterm neonates?

Décima, P¹; Stéphan-Blanchard, E¹; Delanaud, S¹; Dégrugilliers, L¹; Léké, A²; Bach, V¹; Libert, JP¹

¹Laboratoire PériTox EA4285-UMI01 INERIS, France; ²Neonatal and Intensive Care Unit, France

Background:

Preterm neonates should be nursed at thermoneutrality in closed incubators. Two types of control system are used to maintain thermoneutrality: skin servocontrol (SSC) and incubator air temperature control (ATC). The

incubator air temperature is stable in ATC mode but fluctuates in SSC mode. The effects of fluctuating thermal loads on sleep have been studied in adults but never in preterm neonates. By studying neonates in SSC and ATC incubators with similar mean incubator air temperatures, we assessed the influence of incubator air temperature fluctuations on sleep patterns.

Patients and Methods:

Two groups of neonates were nursed for 10 days in closed incubators using either SSC (n= 12, mean \pm SD gestational age: 29.7 \pm 1.6 wk; birthweight: 1367 \pm 373g) or ATC (n=11, gestational age: 29.9 \pm 1.2 wk; birthweight: 1378 \pm 265g). 12-hour overnight polysomnography was performed on days 6 and 9 of life, in order to assess a possible effect of maturation. Sleep was visually scored for stability and structure using total and average durations, the percentages and frequencies of active (AS), quiet (QS) and indeterminate (IS) sleep episodes and wakefulness after sleep onset.

Results:

SSC and ATC produced similar mean incubator air temperatures (respectively 33.7 \pm 1.4°C vs. 33.2 \pm 0.8°C on D6 and 32.8 \pm 1.6°C vs. 32.6 \pm 0.8°C on D9). As expected, fluctuations over 24-hour-periods were smaller with ATC than with SSC (respectively 0.6 \pm 0.4°C vs. 1.5 \pm 0.5°C on D6 and 0.5 \pm 0.4°C vs. 1.3 \pm 0.5°C on D9). On both D6 and D9, none of the sleep structure or stability criteria differed significantly when comparing neonates were nursed in incubators with SSC vs. ATC.

Conclusion:

Even though preterm neonates are very vulnerable, moderate thermal fluctuations in their environment do not appear to interfere with sleep. This observation raises the question of the efficiency and/or involvement of peripheral thermal receptors in the interaction between sleep and thermoregulation. Funding: ANR-TECSAN Project 08-006.

011

A randomised-controlled trial of behavioural interventions for infants' sleep disturbance: effects on sleep, parent and infant stress and attachment.

Gradisar, Michael¹; Jackson, K²; Spurrier, N³; Sved-Williams, A⁴; Powell-Davies, R⁵; Kelly, J⁶; Whitman, J⁶; Kennaway, D⁷

¹Psychology, Flinders University, Adelaide, Australia; ²Psychology, Flinders University, Australia; ³Public Health & Health Promotion, SA Health, Australia; ⁴University of Adelaide, Australia; ⁵No institution, Australia; ⁶Flinders University, Australia; ⁷Obstetrics and Gynaecology, University of Adelaide, Australia

Background:

Infant sleep disturbance is prevalent and poses risks for the infant's healthy development and attachment with parents. Whilst several validated treatments are available for improving infants' sleep, few data exist on the concomitant distress endured by infants and families resulting from this process. Moreover, theories of neurodevelopment and some supporting evidence suggest the distress caused by a lack of parental response to an infant's distress signals leads to later insecure attachment styles. The objective of the present study



was to evaluate the efficacy of behavioural interventions for infant sleep disturbance on sleep, distress, and parent-infant attachment.

Methods:

41 infants (age=10.8±3.5 mo, 6-16mo, 63% girls) and their parents (age=33.3±4.8yrs) were randomly assigned to either Graduated Extinction (GE: N=14), Bedtime Fading (BF; N=13) or a sleep education control (C; N=14). Each manualised intervention was delivered by a clinical postgraduate psychology student, who also provided 24/7 phone support during treatment implementation. Measures of infant sleep (sleep diary, actigraphy), parental distress (DASS-21) and infant stress (salivary cortisol) were taken at pre-treatment, and 1 week-, 1-month, and 3-months after treatment initiation. At a 12-month follow-up, parent-child attachment (Strange Situation Procedure) and child emotions-behaviours (Child Behaviour Checklist 1.5-5yrs) were measured along with sleep and stress.

Results:

Over the first 3 months, actigraphy data showed no differences in sleep between the 3 groups. In contrast, sleep diary data showed infants in the GE group had moderate-to-large improvements in sleep latency, number of awakenings, and wake after sleep onset, and BF infants showed large effects for sleep latency. Clinically significant effects were greatest for the GE group, followed by the BF group. Moderate-to-large decreases in salivary cortisol occurred for treatment groups ($d=.74-1.03$), yet a large increase occurred for the control group ($d=-1.64$). Fathers' distress did not differ between groups. Mothers' distress declined in the GE and control group, but not BF group. At the 12-month follow-up, no significant differences were found in attachment styles ($p=.91$), or emotional-behavioural problems (all $p>.32$).

Conclusion:

Validated (Graduated Extinction) and promising (Bedtime Fading) behavioural interventions assist infant sleep, with no adverse effects on infant-parent stress and later attachment.

012

Variations in the obesity genes FTO, TMEM18 influence the vulnerability of children to weight gain induced by short sleep duration

Jiang, Yanrui¹; Du, FZ²; Chen, QM²; Sun, WQ¹; Wang, Y¹; Jiang, F¹

¹Shanghai Children's Medical Center, China; ²Shanghai Jiao Tong University School of Medicine, China

Objective:

To test whether the association between short sleep duration and adiposity among Chinese adolescents is modulated by the obesity genes FTO, TMEM18.

Subjects:

Participants were 1344 fifth-grade students (698 boys, 646girls) from 10 primary schools in Shanghai, China. Body mass index (BMI), waist circumference, waist /height ratio and body fat percentage were assessed. Association between sleep duration and the above mentioned outcomes were tested for two common single-nucleotide

polymorphisms (SNPs), namely FTO (rs9939609), TMEM 18 (rs6548238) as well as for their combination.

Results:

TT homozygotes (but not in those with A risk alleles) for the FTO SNP, exhibited significant associations between decreasing sleep duration and increasing BMI, waist circumference, waist/height ratio and body fat percentage ($P<0.05$). Similar associations were only observed in children with CC homozygotes (risk alleles) for the TMEM18 SNP. The effects on obesity measures remained significant after correction for multiple testing.

Conclusion:

Common variations in FTO, TMEM18 influence the vulnerability of children to weight gain induced by short sleep duration.

013

Greatly increased rate of new diagnosis of childhood narcolepsy since 2009 at an Irish centre: population characteristics

Lynch, Bryan¹; O'Rourke, Declan¹; O'Rourke, DJ¹; McGann, M¹; King, M¹; McSweeney, N¹; Carey, A¹; O'Rourke, DJ¹; Purcell, E²; Crowe, C²

¹Neurology, Children's University Hospital, Ireland; ²Sleep Medicine, Mater Private Hospital, Ireland

Background:

Following the swine flu epidemic in the winter of 2009/2010, there have been a number of reports of increased incidence of narcolepsy, particularly in those who were vaccinated for the H1N1 virus with the Pandemrix vaccine. We have experienced a greatly increased rate of diagnosis of narcolepsy at our centre.

Methods:

Data is collected on all new patients presenting with suspected narcolepsy to our centre on an ongoing basis. Cases presenting from 2006 to 2009 have been retrospectively reviewed. All patients suspected and diagnosed with narcolepsy had an overnight sleep study and multiple sleep latency test. All had HLA typing. Lumbar puncture for measurement of CSF hypocretin was declined in some cases.

Results:

Two new cases of narcolepsy were diagnosed between January 2006 and November 2009. A total of 26 new cases of narcolepsy have been diagnosed since November 2009, from a total of 36 referrals. Sleep studies were confirmatory in all cases. 13 had cataplexy. 7 had sleep hallucinations. Age range in July 2012 is 6.2 to 16 years with a mean of 12.6, standard deviation of 2.9. A further 7 children with suspected narcolepsy are awaiting completion of investigations as of July 2012.

Of the 26 confirmed new cases of narcolepsy, 23 reported onset of symptoms following administration of swine flu vaccine. HLA typing results were available in 21 patients, all of whom were positive for DQB1 0602. CSF hypocretin was measured in 22 patients, and was less than 50 (normal >200) in all 22. Of 3 children with confirmed narcolepsy presenting in 2011, in whom onset of symptoms predated vaccination, all were positive for HLA B 0602 and all have declined lumbar puncture.

**Conclusion:**

A markedly increased rate of diagnosis of narcolepsy is confirmed, the majority with symptom onset following H1N1 vaccination.

014**Unattended ambulatory polysomnography or gold standard attended laboratory polysomnography in paediatric obstructive sleep apnoea diagnosis.**

Maul, J; Rosenheim, E; Stick, S; Wilson, A
Sleep Laboratory, Princess Margaret Hospital, Australia

Background:

Unattended type 2 PSG is a potential alternative to gold standard type 1 PSG Hypothesis: Unattended type 2 PSG will provide similar diagnostic outcomes (DO) to gold standard type 1 PSG.

Method:

Type 1 PSG ('E' Series and PSG 3); ambulatory type 2 PSG (Somté PSG) [Compumedics Melbourne Australia]. Group 1: 81 children simultaneously had ambulatory type 2 PSG and attended type 1 PSG. Group 2: 48 children separately had ambulatory type 2 PSG and attended type 1 PSG. The child had a type 2 PSG at home and within 2 weeks a laboratory type 1 PSG. Population: Age 4–17 years; no co-morbidities; referred for OSA investigation. Consecutive subjects identified by sleep specialist.

Analysis:

Blinded fashion at different times and orders, by one scientist. Diagnosis: Blinded fashion the duty sleep physician diagnosed studies for OSA utilising clinical information, raw study data and scientist analysis from PSG. Diagnosed as normal; mild; moderate; or severe and compared between study pairs.

Results:

Group 1: 96.2%; group 2: 98% studies success rate. DO ambulatory to gold standard: Group 1) 89% and Group 2) 94% of type 2 PSG matched the gold standard. False negatives diagnosed in 2.5% of type 2 PSG; False positives diagnosed in 7% of type 2 PSG.

Discussion:

Results support Type 2 PSG use when investigating OSA in specified paediatric populations when performed utilising appropriate staff, patient, study protocol and equipment guidelines. Type 2 PSG can enable diversification of diagnostic pathways providing a more holistic and timely service.

015**Sleep in Young Children with Asthma**

Meltzer, LJ; Sundstrom, D; Covar, R; Szefer, SJ
Pediatrics, National Jewish Health, USA

Background:

Circadian and sleep factors are believed to play a role in asthma, with school-age children and adolescents shown to experience a number of sleep problems (i.e., prolonged sleep onset latency, frequent nocturnal awakenings, daytime sleepiness), even when asthma symptoms are well controlled. Further, disrupted sleep may result in increased daytime asthma symptoms. However, no studies have examined sleep in young children with asthma.

Methods:

Parents of children (1-4 years, 49.7% male) in the United States with (n=200) and without (n=164) asthma completed measures of sleep (Brief Infant Sleep Questionnaire) and asthma (Test for Respiratory and Asthma Control in Kids).

Results:

More children with asthma (35.5%) were reported to have sleep problems compared to children without asthma (12.2%, $p < .001$). Specifically, children with asthma had more difficulties with falling asleep ($p < .001$), more night wakings ($p < .001$), longer night wakings ($p < .001$), shorter stretches of sleep at night ($p = .005$), and more frequent daytime naps ($p < .001$). More children with asthma also had parental presence at sleep onset ($p < .001$). Among children with asthma, more children with poor control were also reported to be poor sleepers (51.9% vs. 19.0%, $p < .001$). In particular, children with poorly controlled asthma had a later bedtime ($p = .002$), more night wakings ($p < .001$), and longer night wakings ($p < .001$) than children with well controlled asthma.

Discussion:

Although it is well known that young children with asthma have frequent nocturnal symptoms, this study is one of the first to demonstrate that young children with asthma have significant problems with sleep, including difficulties with falling asleep and staying asleep. Study results also suggest that among young children with asthma, symptom control may be related to sleep quality. Additional research is needed using objective measures of sleep (e.g., actigraphy) and lung functioning (e.g., daily peak flow meter) to determine the temporal relationship between sleep disruption and asthma symptoms.

016

Leg movements during sleep in children: lasting effects of iron deficiency anaemia (IDA) in infancy

 Peirano, Patricio¹; Algarín, Cecilia²; Chamorro, Rodrigo²; Manconi, Mauro³; Lozoff, Betsy⁴; Ferri, Raffaele⁵
¹Sleep Laboratory, INTA, University of Chile, Santiago, Chile; ²Sleep Laboratory, INTA, University of Chile, Chile; ³Sleep and Epilepsy Center, Civic Hospital of Lugano, Lugano, Switzerland; ⁴Center for Human Growth and Development, University of Michigan, Ann Arbor, USA; ⁵Sleep Research Centre, Department of Neurology, OASI Research Institute, Troina, Italy

Background:

Infants with IDA had altered motor activity patterns. To determine long-term effects, we assessed leg movements during sleep in otherwise healthy former IDA (FIDA) children.

Methods:

 As part of a longitudinal follow-up, 32 FIDA and 26 control children were drawn from a cohort studied since infancy. Polysomnographic studies were performed and leg movements were recorded from the tibialis anterior muscles. By means of the sleep analysis software Hypnolab, the total leg movement (LM) index was calculated as the total number of LMs /hour of sleep. The periodic LM (PLMS) index was calculated as the number of LMs in a series of ≥ 4 -separated by more than 5 and less than 90 s- /hour of sleep.

Results:

Sex distribution, attention deficit and hyperactivity disorder (ADHD) score and apnea/hypopnea index (AHI) in children, and the prevalence of a positive family history of RLS were similar between groups. Both groups showed a trend for the number of PLMS to decrease throughout the night, but were higher in the FIDA group for some hours of the night with differences becoming more apparent during the last 3 hours. There were no group differences for the distribution of isolated LMs.

Conclusion:

This study indicated that, despite adequate iron therapy in infancy, FIDA children show altered LM activity during sleep with selective increase in PLMS and no effect on isolated LMs. These results provide further support to the evidence of lasting neurofunctional consequences of IDA in infancy. [Fondecyt 1110513 & NIH HD33487 grants].

017

Changes in sleep-wake patterns from prepubescence to adolescence

 Reyes, Sussanne¹; Algarín, CR¹; Lozoff, B²; Peirano, PD¹
¹Sleep Laboratory, INTA University of Chile, Chile; ²Center for Human Growth & Development, University of Michigan, Ann Arbor, USA

Introduction:

Several studies describe the tendency during adolescence for modifications in the amounts of sleep and wakefulness together with delayed bedtime and rising time. The aim of this study was to examine longitudinal changes in sleep-wake patterns (SWP) from prepubescence to adolescence.

Methods:

 Subjects were 45 healthy participants (62% male) in a cohort followed since infancy (iron deficiency anemia preventive trial). Actigraphic recordings were made at prepubescence (10.2 ± 0.2 y) and during adolescence (15.4 ± 0.9 y) continuously for a week during the school year (Actiwatch-16/64 on the non-dominant wrist). Sleep and wake episodes were identified from actigraphic recordings by means of an automated method. The following SWP were determined for school-day recordings: (a) daytime – sleep total amount (DSTA), number of naps (NN), and (b) nighttime – sleep onset time (SOT), wake up time (WT), sleep total amount (NSTA), wake after sleep onset (WASO), and numbers of awakenings (NA).

Results:

 As compared to 10 y, changes in sleep-wake patterns prevailed in adolescents during the nighttime: higher NA (1.3 vs. 0.6, $p < .05$), delayed SOT (11:22 vs. 10:36 pm, $p < .005$), and lower NSTA (471 vs. 513 min, $p < .01$). These results were adjusted by gender and history of iron deficiency anemia in infancy.

Conclusion:

Our results show changes in nighttime SWP between prepubescence and adolescence. Although school schedules were the same at both ages, adolescent patterns were characterized by delayed sleep onset, reduced total sleep amount, and increased sleep fragmentation.

Support:

[Fondecyt 1110513 & NIH HD33487 grants]. (*)CONICYT, PhD program fellowship.

018

Depressive syndrome in adolescents: prevalence and associated symptoms of sleep

 Neghme, J¹; Carrillo, J²; Betancur, CG³; Vargas, C⁴
¹Department of Pediatrics, Regional Hospital of Rancagua, Chile; ²Sleep Studies Unit, Felix Bulnes Clinical Hospital, Chile; ³Department of Psychiatry, San Sebastián University, Chile; ⁴Department of Mathematics and Computer Sciences, University of Santiago, Chile



Introduction:

There is a high association between depressive disorders and sleep disorders, but the association is less well known among adolescents. Our goal is to estimate the prevalence of depressive syndrome (DS) among Chilean adolescents, and assess associated risk factors.

Material and Methods:

We conducted a cross-sectional study with data from the National Health Survey 2009-2010, Department of Epidemiology, Ministry of Health of Chile. We selected the subjects of both sexes, between 15 and 18 years of age, who were recorded socio-demographic and anthropometric answered a sleep questionnaire and the latest version corrected and adapted from the CIDI-SF. We apply expansion factors calculated in the sample design, to determine prevalence. We built a logistic regression model adjusted for sex, area of residence, habitual snoring, suspected of restless legs syndrome (RLS), excessive daytime sleepiness (EDS), unrefreshing sleep (uS) and nutritional status (BMI percentile for age and sex).

Results:

The sample consisted of 308 subjects between 15 and 18, mean age 16.6 ± 1.1 years, of which 50.3% were women. In this sample, 30 subjects (9.7%) had DS, and of these, 25 (83.3%) were women. The sample was representative of a population of 1,100,681 inhabitants. According to the results of the CIDI-SF questionnaire, the prevalence of SD is 11.6% (95% CI, 8.02 to 15.18) in the studied population. Men had a prevalence of 5.5% (95% CI, 1.89-9.11), while women had a prevalence of 19.3% (95% CI, 13.09-25.51). Results from the logistic regression model, women had an OR=4.9 (95% CI, 1.65-14.42, $p=0.004$), the SPI suspected OR=2.6 (CI 95%, 0.94-7.04, $p=0.065$), EDS an OR=3.8 (95% CI, 1.29-11.24, $p=0.015$), and uS an OR=2.8 (95% CI, 1.03-7.77, $p=0.043$).

Conclusions:

According to the results of our study, the prevalence of depressive syndrome among Chilean adolescents is high, being much higher among women. The female sex is an important risk factor, along with the suspicion of RLS. As symptoms of sleep associated with high risk include EDS and uS.

019

Correlation of nocturnal sleep duration and subjective happiness in adolescents

Chae, Kyu-Young¹; Lee, JG²; Rhie, SK²

¹Pediatrics, CHA Bundang Medical Center, Bundang-gu, Seongnam city, Korea, Republic of; ²Pediatrics, CHA Bundang Medical Center, Korea, Republic of

Background:

Sleep is essential for maintaining a vibrant and healthy life. In addition, memory, judgment, insight, learning and emotional stability are factors that contribute to. In South Korea, however, teenagers have been suffered from chronic sleep restriction due to excessive extracurricular academic lessons until late night, but still there was no national wide study for the impact of sleep deprivation on cognitive and emotional function in adolescent population. Through national wide online survey, we attempted to identify the current nocturnal sleep duration by age in adolescents and the relationships between sleep

duration and subjective happiness, stress level, depression and suicidal attempt.

Method:

In 2008, 75,066 of 76,937 students from 800 schools across the nation, whose data of online survey for health behavioral research were analyzed. On the survey, we assessed level of subjective stress, happiness, depressive mood and suicidal thoughts for the past year according to nocturnal sleep duration on weekday. By the nocturnal sleep duration, we divided respondents into groups as excessive (long, very long), appropriate, restricted (mild, moderate, severe and extreme) group. One-way ANOVA was used to study correlation among subjective happiness, depression and cognition of stress according to the each group.

Result:

The relationship between sleep duration and subjective happiness of each age group showed a significant linear relationship. In all age, the happiest students had the longest sleep duration, however, the i° a little unhappy j_{\pm} students had the shortest sleep duration. However, in i° very unhappy j_{\pm} students, sleep duration was rather extended, which seemed to reflect underlying physical or emotional problems. Mean sleep durations of i° most stressful j_{\pm} , i° felt sadness or frustration j_{\pm} and i° suicidal thought j_{\pm} groups were also significantly reduced compare to those of i° less stressful j_{\pm} , i° without sadness or frustration j_{\pm} and i° suicidal thought j_{\pm} .

Conclusion:

Sleep deficiency in adolescents has a clear relationship with emotional status such as a subjective happiness, depression, frustration and suicidal thoughts. Level of subjective happiness is significantly increased by sufficient sleep. The shorter the sleep duration, the higher level of the stress, frustration and the more frequency of suicidal ideation and attempts. This suggests taking an enough sleep on each age group in adolescents would improve the mental health and subjective level of happiness.

020

Concordance between subjective and objective measures of sleep in an adolescent cohort: A longitudinal design

Feilds, KL¹; Steinbeck, K¹; Hazell, P²; Hawke, C²; Paxton, K³; Maddox, R²; Chow, CM⁴

¹Academic Department of Adolescent Medicine, The Children's Hospital at Westmead, Australia; ²University of Sydney Medical School, Australia; ³School of Rural Health, University of Sydney, Australia; ⁴Faculty of Health Sciences, University of Sydney, Australia

Background:

Sleep changes during adolescence, with teenagers reporting delayed sleep on school nights, and catch up sleep on weekends. Inadequate sleep time impacts upon adolescent wellbeing. Subjective questionnaires and sleep diaries are typically employed in normative studies. To assess validity, we evaluated the concordance between subjective and objective sleep measures in adolescent populations, and longitudinally.

Methods:

Seven-day blocks of sleep data were collected from Australian rural adolescents (13-15 y, N = 19) at baseline,



3 months, and 6 months (total N = 46). Objective sleep variables were obtained via actigraphy; subjective data from sleep diaries, Sleep Habits Survey, and sleep-relevant items from the Youth Self Report. Variables compared were total sleep time (TST), bed time (BT), rise time (RT), and sleep onset latency (SOL). Agreement between the methodologies was assessed using Pearson's correlations and the Bland-Altman method for repeated observations.

Results:

Despite some small-to-moderate correlations between actigraphy and questionnaire variables, concordance was unacceptable according to the Bland-Altman analysis. Both the correlations and Bland-Altman concordance were poor for sleep diary and actigraphy SOL and TST. Adolescents overestimated TST by up to 2 hours on school nights, and up to 4 hours on weekends. High correlations were observed between actigraphy and diary BT ($r = .92, p < .01$) and RT ($r = .78, p < .01$), with acceptable Bland-Altman concordance (approximately ± 30 minutes difference). Longitudinal data suggests an improvement in agreement between diary and actigraphy.

Conclusion:

Diaries are a good reflection of sleep schedule, but not sleep length or quality. With practice, adolescents may get better at completing sleep diaries. We recommend that adolescent sleep studies utilise diaries over questionnaires, and objective measures where possible. The poor agreement between actigraphy and questionnaires suggests that large-scale studies may underestimate the sleep disturbances observed in adolescence, due to a reliance on questionnaire data.

021

A dose-dependent study of novel, violent videogaming on adolescents' physiological arousal and sleep

Gradisar, Michael¹; King, D²; Drummond, A²; Lovato, N²; Micic, G²; Wessel, J²; Douglas, P²; Delfabbro, P³

¹Psychology, Flinders University, Adelaide, Australia; ²Psychology, Flinders University, Australia; ³Psychology, University of Adelaide, Australia

Background:

There is considerable growth in the scientific literature of an association between technology use and sleep, especially in younger populations. Yet, our knowledge of the causal links and mechanisms involved is limited. The present study attempts to address these issues by examining the effects of evening technology use on sleep by assessing the dose-response from violent videogaming in a sample of adolescents.

Method:

17 males (age=16 \pm 1.0 yrs) participated in a counterbalanced within-subjects study design of 50min or 150min of novel and violent videogaming immediately before bed at the Flinders University Sleep Laboratory. Measures of sleepiness (Stanford Sleepiness Scale), objective sleep (polysomnography), subjective sleep (sleep diary), physiological arousal (heart rate), and subjective sleep quality were taken. Adolescents played Space Marine continuously on a stand-alone PlayStation 3®. Light exposure and bedtime were held constant between conditions. Testing nights were conducted 1 week apart during the school week to assess the negative impact

of technology use when adolescents are required to rise early for school.

Results:

Despite no effect on pre-sleep sleepiness ratings, subjective sleep latency was extended after 150 min of videogaming by 17 min ($p < .05, d = .59$). In contrast, a smaller effect was found for objective sleep latency ($d = .21$). However, no significant interaction was found for heart rate prior to sleep onset. Total sleep time was reduced by 27 min after 150 min of videogaming ($d = 0.59$), which was largely accounted for by reductions in REM sleep (13 min, $d = 0.49$) and SWS (11 min, $d = 0.23$). In the morning, adolescents were more likely to rate their sleep quality lower after videogaming for 150 min. Despite this, adolescents reported that they could have played longer than 150 mins.

Conclusion:

With bedtimes held constant, above-average time videogaming before bed can lead to moderate effects on nocturnal sleep and sleep quality. However, these effects cannot be explained via an arousal mechanism as indexed by heart rate. Future investigations of alternate explanations for tech-induced sleep disturbance will help to inform future interventions for this prevalent pre-bedtime activity.

022

Morning bright light therapy for adolescents diagnosed with Delayed Sleep Phase Disorder: Does a circadian rhythm intervention improve insomnia?

Gradisar, Michael¹; Oliver, M²; Leahy, E²; Hiller, R²; Slater, A²; Barbero, S²; Watherston, S²

¹Psychology, Flinders University, Adelaide, Australia; ²Psychology, Flinders University, Australia

Background:

The primary aetiology of Delayed Sleep Phase Disorder (DSPD) is a marked delay in the timing of the individual's endogenous circadian rhythm. There is also significant insomnia that accompanies DSPD, which has roots in cognitive-behavioural and learning theories. A combination of cognitive-behaviour therapy and bright light therapy is efficacious for adolescents with DSPD. The present study examines whether a circadian treatment alone is not only effective for phase advancing sleep, but also for improving insomnia severity and cognitions.

Methods:

12 adolescents (age=15.0 \pm 1.7, 12-17yrs, 75% boys) have so far enrolled in a 3-session manualised treatment of evening dim light and morning bright light therapy. Adolescents performed an initial clinical sleep history interview, sleep diary, and questionnaires to confirm their DSPD diagnosis. Questionnaires include modified versions of the Insomnia Severity Index (ISI) and Sleep Anticipatory Anxiety Questionnaire (SAAQ), which measure pre-sleep somatic sensations, cognitions about sleep and its consequences, and rehearsal and planning cognitions. These questionnaires along with sleep diaries are completed during treatment to assess associations between delayed sleep and insomnia.

Results:

At assessment, adolescents endorsed significant difficulties falling asleep and waking on school mornings, as



well as daytime impairments. Over the course of treatment, sleep latency decreased ($d=0.98$), sleep onset time advanced ($d=0.68$), and total sleep time increased ($d=0.90$) on school nights. Insomnia severity significantly decreased ($p=.02$), with the greatest change occurring between sessions 1 and 2 ($d=.73$). Similarly, pre-sleep cognitions significantly decreased over treatment ($p=.005$); the greatest change occurred between sessions 2 and 3 ($d=.60$), yet teens were still experiencing significant worries with rehearsing the day's events and planning for future events by treatment's end.

Conclusion:

Circadian treatment appears beneficial for the sleep of adolescents with DSPD, with some benefit for their insomnia. However, circadian treatments do not provide complete relief from sleep-onset insomnia. Future studies need to shift focus from process variables during treatment to longer-term follow-up of outcomes to assess potential relapse resulting from unresolved pre-sleep insomnia cognitions. This will help to inform whether CBT should be used to complement circadian treatment for adolescents with DSPD.

023

Diurnal sleepiness and sleep habits in Portuguese middle school adolescents from the Lisbon region

Moreno, Teresa¹; Rebelo Pinto, H²; Paiva, T³

¹Neuropediatrics, Hospital Santa Maria, Lisboa, Portugal; ²Faculdade de Psicologia e de Ciências da Educação, Portugal; ³Faculdade de Medicina de Lisboa, CENC, Portugal

Introduction:

Numerous studies document that inadequate sleep habits have impact on quality of life, development and school performance. This is demonstrated in college and middle school students. Cultural and regional differences are expected. There is urgent need in understanding the regional differences and the underlying mechanisms.

Objective:

To study diurnal sleepiness in a school population between 11 and 15th years old, in Lisbon metropolitan area, their sleep habits and diurnal consequences on school performance. The Lisbon region is the largest urban center in Portugal and includes 20% of the total population.

Materials and Methods:

This cross-sectional study was conducted in two middle schools in Lisbon. The questionnaire included a Portuguese version of Pediatric Daytime sleepiness scale (Drake C. 2003), items on socio demographic data of parents, sleep habits, school performance and Sleep Self Report (Owens J. 2000). Descriptive statistics and individual correlations of PDSS with age, gender, sleep habits, school performance, familial sociocultural status and SSR were done.

Results:

Four hundred and seventy children aged 11 to 15th years were studied. Mean age was 13,05 years old , 53.8%

were females. Data confirm that young adolescents sleep fewer hours than recommended: 60.4% sleep 8 hours or less, and 23% had bedtimes after 11 pm. The PDSS inversely correlated with number of night sleep hours and self-report sleep problems. Sleepiness was also more prevalent in female, older children, tardive bedtime hours, and older parents (statistically significant). No relationship was found between sleepiness and school performance. PDSS and SSR were positively correlated as expected.

Conclusions:

In this preliminary study, young adolescents from Lisbon metropolitan area sleep less than recommended for age and are sleepy during the day. Diurnal sleepiness increased with short sleep duration, late bedtime hour and subjective feeling of sleep problems. There was no correlation between daytime sleepiness and school performance.

024

Adolescent Chronotype Relates to Sleep and Meals Timing

Chamorro Melo, RA¹; Algarín Crespo, CR¹; Gahagan, S²; Peirano, P¹

¹Sleep Laboratory, INTA, University of Chile, Chile; ²Department of Pediatrics, University of California, San Diego, USA

Background:

Human chronotypes are associated with feeding habits and behavioral characteristics, mainly in adults. Our aim was to characterize adolescent chronotype and its relationship with sleep and eating patterns.

Methods:

In a sample of 286 healthy Chilean adolescents studied since infancy, data was obtained for weekday (WD) and weekend day (WED) meal times and sleep (Pediatric Sleep Questionnaire). Chronotype was assessed by the Horne and Östberg Morningness-Eveningness Questionnaire. Subjects were categorized into morning (MT), neither (NT), or evening (ET) types. Multivariate regression models, including covariates, were used to test the relationships between the independent variable chronotype with the outcomes for sleep time and amount and meal times.

Results:

Participants were 17-yrs-old, 51% male. The mean chronotype score was 50.0 ± 7 with 13.2% MT, 77.4% NT, and 9.4% ET. Compared to MT, ET skipped breakfast more often and consumed more caffeinated beverages ($p<0.05$). In regression analyses, chronotype score was related to bed and wake-up times ($p<0.05$) and WD sleep amount ($p<0,001$). Regarding meal times, chronotype score was inversely associated with meal times ($p<.01$) during WD and WED, and positively with meal number ($p<0.01$) during WED.

Conclusions:

Chronotype relates to sleep and meal timing in adolescents. Our results suggest that the ongoing timing for sleep and meals in MT adolescents are more closely aligned to health promotion recommendations. (NIH HL088530 and Fondecyt 1110513 grants; CONICYT*).



025

Portuguese validation of Cleveland Adolescent Sleepiness Questionnaire – final version

Rebello-Pinto, Teresa¹; Amaral, C²; Neves-da-Silva, V²; Silva, J²; Campelo, MV³; Paiva, T⁴

¹CENC, Lisbon, Portugal; ²Institute of Applied Psychology – ISPA-IU, Lisbon, Portugal; ³Lisbon Psychology Faculty, Portugal; ⁴CENC, Portugal

Objectives:

One of the goals of the Sleep-Schools Project is to develop or adapt instruments to evaluate sleep. After presenting pre-validation (1) and the first preliminary results (2) of the Portuguese version of the Cleveland Adolescent Sleepiness Questionnaire – CASQ, this work presents the final results from the national validation of this instrument.

Methods:

After authorization by the original author, we translated CASQ and applied it to a structured and representative sample of Portuguese adolescents. We used external data to correlate with sleepiness results. The final sample has 4600 subjects from 7th to 12th grade (53.1% females) with ages between 12 and 18 (mean=14.47; SD=1.793).

Results:

The mean scores of CASQ were similar to other works (29.79) and there was a significant correlation with age (R=0.245; p<0.01) and with grade (R=0.214; p<0.01). The frequency distribution curve is skewed to the right (skewness=0.780). Sleepiness scores were related with some sleep habits like watching tv or using the computer at bedtime, and with sleep problems. High body mass index was significantly correlated with sleepiness (p=0.003) and better grades were also associated with lower sleepiness (p=0.000). The Cronbach alpha was 0.829 and it didn't improve by taking out any item.

Conclusions:

These results corroborate the validity of the Portuguese version of CASQ, allowing clinicians and educators to objectively assess daytime sleepiness and to be more alert of sleep disturbances.

(1) T. Rebello-Pinto, H. Rebello Pinto & T. Paiva (2011). Verbal and Pictorial Approach in Evaluating Excessive Daytime Sleepiness in Schools. Poster presented in the Annual Pediatric Sleep Medicine Meeting. Amelia Island, Florida.

(2) T. Rebello-Pinto, & T. Paiva (2012) First step in the Portuguese validation of Cleveland Adolescent Sleepiness Questionnaire. Poster accepted for the 21st Congress of the European Sleep Research Society. Paris, France.

026

Sleep habits in Portuguese Adolescents – data from a National Survey in 2012

Rebello-Pinto, Teresa¹; Amaral, C²; Neves-da-Silva, V²; Silva, J²; Campelo, MV³; Paiva, T⁴

¹CENC, Lisbon, Portugal; ²Institute of Applied Psychology – ISPA-IU, Lisbon, Portugal; ³Lisbon Psychology Faculty, Portugal; ⁴CENC, Portugal

Background:

Adolescents' sleep shows marked variation in duration and variability; this is caused by the specific maturation period of adolescence and by external factors, among which the increasing school demands, high tech gadgets, the need of social interactions and health related factors must be accounted for. Trends towards sleep habits deterioration do increase with age and across time. This study aimed to collect data about sleep and sleep related habits in Portuguese adolescents, trying to compare them with data from previous years and from other countries.

Methods:

A national survey, stratified by region and age, was done in 2012 including 22 schools. The applied questionnaire included the following variables: sleep related habits, Cleveland Adolescent Sleepiness Questionnaire (CASQ), Depression Anxiety and Stress Scale (DASS), demographic and biometric data, health complaints, and academic rates. Descriptive statistics and analysis of variance was done using SPSS.

Results:

From the 3955 screened adolescents, the age range between 12 and 18 years, mean age 14.47(1.793) years; 53.1% females. Tables 1 shows the total sleep time (TST) and CASQ scores across ages (p<0.05). Table 2 presents the frequency of sleep related habits that potentially disturb sleep.

Table 3 shows sleep and health complaints.

		12	13	14	15	16	17	18	Total
TST Weekdays	Mean	08:49	08:34	08:20	07:57	07:39	07:24	07:16	08:08
	SD	01:05	01:09	01:11	01:01	00:59	01:04	01:09	01:12
TST Weekends	Mean	09:47	09:37	09:32	09:20	09:23	09:14	09:12	09:29
	SD	01:28	01:40	01:42	01:30	01:30	01:25	01:42	01:34
CASQ score	Mean	26,682	27,5077	29,3328	31,0295	31,4252	32,4379	32,7249	29,6646
	SD	7,55906	7,90166	8,58941	8,31999	8,38165	8,41124	9,44742	8,5003

Table 1 – total sleep time on weekdays and weekends by age groups

	Going out	Caffeine	Alcohol	Tv	Computer	Video games	Exercise	Leave cell phone on	Text messages
N	1439	641	415	3401	2951	1012	886	1189	1689
%	36.4%	16.2%	10.5%	86.0%	74.7%	25.6%	22.4%	30.1%	42.7%

Table 2 – frequency of sleep related habits

	Bad sleep	Insomnia	Snoring	Nightmares	DSPS	Overweight	Headaches	Depression	Asthma
N	739	1321	427	464	694	554	2076	202	719
%	18.7%	33.4%	10.8%	11.7%	17.5%	14.0%	52.5%	5.1%	18.3%

Table 3 – frequency of sleep and health complaints



Conclusions:

Although the methodology was different, we identify a small improvement regarding adolescent sleep habits (comparing with 2010). The usual trends are still there, but probably the Sleep-Schools Project and all its interventions in raising awareness and in prevention of sleep disturbances had some effect on Portuguese sleep habits. This supports the importance of continuing with Sleep Education strategies.

027

Peeking into the minds of troubled adolescents: The utility of polysomnography sleep studies in an inpatient psychiatric unit

Shahid, Azmeh¹; Khairandish, A²; Gladanac, Bo³; Shapiro, CM⁴

¹psychiatry, university of Toronto, youthdale Treatment Center, Canada; ²Department of Psychiatry, Youthdale Child and Adolescent Sleep CentreUnivers, Canada; ³psychiatry, Youthdale Child and Adolescent Sleep Centre, Canad, Canada; ⁴psychiatry, Youthdale Child and Adolescent Sleep CentreUnivers, Canada

Background:

Sleep problems are commonly associated with the primary diagnostic criteria for many psychiatric disorders. Evidence suggests sleep disturbances may precede development of psychiatric disorders and the severity of psychopathology reflects the severity of sleep problems. Polysomnography (PSG) sleep studies in child and adolescent psychiatric populations, a particularly at risk group, has considerable value but has been more elusive requiring further investigation.

Methods:

We performed a retrospective chart review of PSG sleep studies and psychiatrist evaluations of 106 adolescents aged 7–16 admitted to an involuntary adolescent psychiatric inpatient facility.

Results:

Less than 5% of cases had mild/no sleep problems. Hyperarousal hallmarked this population, and severity of sleep disturbances trends with the severity of psychopathology. Inpatients with multiple psychiatric disorders had greater frequencies of insomnia, decreased sleep efficiency, and arousals from SWS ($p<0.05$). Inpatient's with self-harm behavior more frequently had elevated sleep onset latency (SOL), reduced efficiency, reduced SWS ($p<0.05$), increased REM, and reduced REM latency compared to inpatients with dysthymia and/or depression.

Limitations:

Lacking an a priori hypothesis, this study was explorative and uncontrolled for factors such as medications. This notwithstanding however, analysis indicates the majority of inpatients were taking cocktails that “should” alleviate sleep symptoms suggesting greater associations may prevail in unmedicated populations.

Conclusions:

This study attests to the potential clinical utility of PSG sleep studies in the management of adolescent psychiatric disorders and contributes to the body of evidence reputed the intimate connection between sleep

problems and the development and perpetuation of psychopathology with public health implications.

028

Parental styles and perceptions of adequate sleep in young adolescents: relationships with parent and adolescent reported sleep patterns.

Shochat, Tamar¹; Flint-Bretler, Ofra²; Tzischinsky, Orna³

¹Faculty of Social Welfare & Health Sciences, University of Haifa, Haifa, Tel-Adashim, Israel; ²Graduate Studies Authority, University of Haifa, Haifa, Israel; ³Psychology Department, Emek Yezreel Academic College,, Israel

Background:

Parental styles and perceptions of adequate sleep in young adolescents: relationships with parent and adolescent reported sleep patterns. Background: As part of a prospective parental intervention aimed to address adolescent sleep patterns, we explored parental styles and attitudes towards adequate sleep time, and their relationships with adolescent sleep patterns.

Methods:

Baseline adolescent and parent reports of adolescent sleep patterns were collected from 70 parent-adolescent dyads (mean age 10.7 ± 0.9 ; females: $n=35$). Parents rated how often their child obtains adequate sleep (from “never=0” to “always=4”), estimated optimal sleep duration (hrs), and completed the Parental Authority Questionnaire (Buri, 1991).

Results:

Adolescent and parent reports of weekday and weekend sleep patterns were highly correlated ($p<0.01$), and paired comparisons showed no differences between them ($p>0.05$). The rate of adequate sleep “most of the time” and “always” was 65%, and mean estimated optimal sleep duration was $9.29 (\pm 1.0)$. Higher rates of adequate sleep and longer estimates of optimal sleep duration were associated with earlier weekday bedtimes ($r=-0.26$; $p=0.033$; $r=-0.40$, $p=0.001$) and weekend wake-times ($r=-0.28$, $p=0.023$; $r=-0.28$, $p=0.026$) respectively, based on parental reports; and to earlier weekday bedtimes ($r=-0.28$; $p=0.034$; $r=-0.33$, $p=0.015$) and weekend wake-times ($r=-0.30$, $p=0.025$; $r=-0.28$, $p=0.039$) respectively, based on adolescent reports. Rates of adequate sleep were not related to estimates of optimal sleep duration. Regarding parental styles, the authoritative parental style was associated with later weekend bed ($r=0.27$, $p=0.027$) and wake-times ($r=0.26$, $p=0.034$) and shorter estimated optimal sleep duration ($r=-0.26$, $p=0.034$) based on parental reports, and to later weekday bedtimes ($r=0.27$, $p=0.037$) based on adolescent reports. Authoritarian parental style was associated with earlier weekend bedtimes ($r=-0.24$, $p=0.05$). Permissive parental style was associated with neither sleep patterns nor parental attitudes towards adequate sleep.

Conclusions:

These findings suggest that parental styles and attitudes towards adequate sleep are associated with observed adolescent sleep patterns, and lend support to our parent based intervention, aimed to promote healthier sleep patterns and behaviors in the adolescent population.



029

Inadequate sleep and unhealthy food habits in Portuguese adolescents

Silva, Maria-Raquel G¹; Silva, Hugo-S²

¹Faculty Health Sciences-University Fernando Pessoa, Oporto, Portugal; ²Ministry of Education - Lisbon, Portugal

Background:

Adolescence is a unique stage of life time that often promotes changes in sleep habits, meals frequency and body composition, reflecting on the physical, mental and social well-being. The aim of this study was to analyze sleep quality and food habits in adolescents of both sexes. And to determine whether the food consumed favor the regulation of sleep cycle in accordance with its nutritional properties.

Methods:

95 Portuguese adolescents [16.36 (3.98) years old]: 35 girls [16.21 (1.74) years old] and 40 boys [15.98 (1.28) years old] were evaluated by a questionnaire, which collected: anthropometric data (weight, height and body mass index-BMI); food habits from a semi-quantitative questionnaire and; sleep assessed by the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index. Descriptive linear regression analysis and Pearson correlation coefficients were used. The significance level was 5%. Data was analyzed using SPSS, version 18.0.

Results:

Most adolescents presented poor sleep quality (n = 68; 71.6%) and severe somnolence (n = 73; 76.8%). Adolescents consumed more macronutrients than recommended. On the other hand, skipping meals was very frequent (n= 78; 82.1%), as well as the consumption of snacks rich in fat and soft drinks. Adolescents with higher levels of energy intake showed poorest sleep quality and more daytime somnolence (p<0.05). Snacks and soft drinks consumption were associated to a high BMI (>30Kg/m²).

Conclusion:

Poor sleep quality and quantity can influence energy intake in adolescents and BMI. Energy balance was altered, which can compromise adolescents health and daily behaviors.

030

Circadian rhythm similarity alters with growth in Japanese healthy children and adolescents.

Tajima, Seiki; Miike, T

Hyogo Children's Sleep and Development Medical Research Center, Hyogo rehabilitation central hospital, Japan

Background:

Behavioral induced insufficient sleep syndrome (BISS) and pediatric chronic fatigue syndrome secondary to BISS were major issue in Japan. Once those disorders are developed, it is difficult to cure. Therefore, we have worked not only for treating patients with BISS or BISS related disorders but also for the prevention of sleep deprivation related disorders. The aim of this study is to reveal circadian rhythm stability in children and adolescents for adequate sleep-awake rhythm teaching.

Methods:

61 healthy elementary school, junior high school, high school and university students (27 males and 34 females, age 8-24) were participated in this study. Activity has been monitored with ECOLOG (Seiko Instruments Inc., Japan), compatible with Micro Mini (AMI Inc., USA), for consecutive five days including weekend. The circadian period was analyzed as a peak to peak period (day 1st to 2nd, day 2nd to 3rd, day 3rd to 4th and day 4th to 5th) in auto-correlation coefficient time series between 5 template days and whole days. Finally, mean of twenty peak to peak periods (4 intervals by 5 template days) was calculated as an individual circadian period. Also mean of auto-correlation coefficient peaks was calculated as an individual circadian similarity of diurnal and nocturnal locomotion rhythm. Two-way ANOVAs were performed among the circadian periods, age and sex, and among the circadian similarity, age and sex.

Results:

The circadian similarity decreased linearly with growth (R = -0.714, p<0.001). Also age showed significant effect to the circadian similarity in the two-way ANOVA (F value; 60.7, p<0.001). There were no significant effects of sex and interaction between age and sex. The circadian period had no significant growth related change.

031

Quality of life in young adolescents: relations with sleep patterns and daytime sleep related behaviors

Tzischinsky, Orna¹; Shochat, Tamar²; Flint-Bretler, Ofra³

¹Psychology Department, Emek Yezreel Academic College,, Tel-Adashim, Israel; ²Faculty of Social Welfare & Health Sciences, University of Haifa, Haifa, Israel; ³Graduate Studies Authority, University of Haifa, Haifa, Israel

Background:

Quality of life in young adolescents: relations with sleep patterns and daytime sleep related behaviors
Background: Recently, there has been a growing interest in the investigation of Quality of Life (QOL) in normative, healthy young adolescents. Our objective was to assess relationships between QOL in young Israeli adolescents and objective actigraphic sleep-wake patterns, self-reports of sleep patterns, measures of daytime sleepiness (DS), daytime problem behaviors (DPB), depressed mood (DM), and evening preference (EP).

Methods:

As part of a randomized case-control study, baseline measures of one-week actigraphy recordings and self-report questionnaires from 70 young adolescents (mean age 10.7±0.9; females: n=35) were analyzed. The Pediatric Quality of Life Inventory™ (PedsQL™), including the short core version of 6 subscales: social, school performance, physical, emotional, and psychosocial functioning and a total score; and the School Sleep Habits Survey (SSHS), including sleep patterns, DS, DPB, DM and EP measures were used.

Results:

QOL was not related to any of the actigraphic sleep measures. Based on self-reports, lower social QOL was related to earlier weekend bedtimes (r=0.30, p=0.023), a tendency to earlier weekday bedtimes (r=0.24,



$p=0.07$), and to increases in DS ($r=-0.45$, $p<0.001$) and DM ($r=-0.29$, $p=0.024$). Lower school QOL was related to later weekend wake-times ($r=-0.26$, $p=0.05$), a tendency to later weekday wake-times ($r=-0.25$, $p=0.06$), to increases in DS ($r=-0.31$, $p=0.017$), DM ($r=-0.52$, $p<0.001$), and DPB ($r=-0.42$, $p=0.001$), and to a tendency towards EP ($r=-0.26$, $p=0.047$). Lower physical QOL was related to increases in DS ($r=-0.28$, $p=0.031$) and DM ($r=-0.30$, $p=0.023$). Lower emotional QOL was related to increased DM ($r=-0.58$, $p<0.001$). Lower psychosocial QOL was related to increases in DS ($r=-0.31$, $p=0.017$) and DM ($r=-0.61$, $p<0.001$). Lower overall QOL was related to increases in DS ($r=-0.36$, $p=0.005$), DM ($r=-0.60$, $p<0.001$), and a tendency to increased DPB ($r=-0.23$, $p=0.08$).

Conclusion:

QOL is associated with subjective but not objective sleep patterns, and related to sleepiness, daytime behaviors and depressed mood in young adolescents.

032

Power spectral analysis of sleep eeg in children with arousal disorders

Bruni, Oliviero¹; Novelli, Luana²; Della Corte, Martina²; Mallucci, Alice²; Ferri, Raffaele³

¹Department of Developmental Neurology and Psychiatry, Sapienza University, Italy; ²Developmental Neurology and Psychiatry, Sapienza University, Italy; ³Sleep Research Centre, Department of Neurology, Oasi Institute (IRCCS), Troina, Italy

Background:

Arousal Disorders (AD) are one of the most common (and benign) sleep disturbances in children. In adults AD was often associated at the presence of hypersynchronous delta activity (HSD), usually described as continuous high-voltage (> 150- μ V) delta waves. In children with sleep terrors (a specific type of AD), we showed an increased NREM sleep instability represented by an increase of CAP rate and of A1 phases per hour in SWS, a lengthening of the mean duration of A phases and a decreased duration of B phases.. The aims of our study was to define a neurophysiological marker of AD, by means of power spectral analysis of sleep EEG.

Method:

For this study, 9 children with AD and 9 normal control (range 5-13 years) underwent an overnight polysomnographic (PSG). Power spectra were calculated for the C3-A2 channel using the sleep analysis software Hypnolab 1.2 (SWS Soft, Italy), by means of the Fast Fourier Transform (FFT), on 2-sec EEG epochs sampled at 200 Hz. The power spectrum was calculated for frequencies between 0.5 and 30 Hz with a frequency step of 1 Hz.

Results:

Children with AD shows a significant increase in the frequency between 0.5-1 Hz, and a decrease in 4-5 Hz and 8-9 Hz, during sleep stage N2, in respect to the controls. Similarly, in stage N3, we found a similar increase in 0.5-1.0 Hz and a decrease in 4.0-5.0 Hz in AD vs. normal children. These results would indicate an increase of hypersynchronous delta activity and delta bursts (frequency between 0.5-1 Hz) similar to that reported in adults. These data also agree with the results of CAP analysis, where the increase of A1 in SWS (= delta bursts) correspond to the increase of the frequency between 0.5-1 Hz (Bruni et al., 2008).

033

Response of childhood onset restless legs syndrome and periodic limb movement disorder to treatment with intravenous iron sucrose

Grim, KJ; Lee, BR; Sung, AY; Kotagal, S
Mayo Clinic, USA

Objective:

Iron is effective in treating childhood onset restless leg syndrome (RLS) or periodic limb movement disorder (PLMD). Due to side effects of oral iron, we have used intravenous iron sucrose. The safety and effectiveness of iron sucrose has not been evaluated in this population. We report on its safety, adverse effect profile and efficacy in a retrospective study.

Methods:

Thirty children, mean age 8 years, range 1 – 17 years with RLS/PLMD who received intravenous iron sucrose between 2005 and 2011 were identified. The diagnosis of RLS / PLMD was based on sleep consultation with or without nocturnal polysomnography, with 76.7% having undergone polysomnography. Serum ferritin was assayed in all patients prior to iron infusion and in 73.3% of patients post infusion.

Results:

The mean periodic limb movement index was 13, range 1.4 to 31.7, $n=17$). Seventeen of 30 subjects (56%) had received prior oral iron, with 10/17 (58%) having experienced side effects. The dose of intravenous iron sucrose was 1.21 – 6.8 mg/kg (average 3.32 mg/kg). The baseline mean serum ferritin was 14.7 mcg/L (range 5-31 mcg/L). After infusion it rose to 43.6 mcg/L (range 16-85 mcg/L; CI 95% 18.9-39.4; $p < 0.001$). Subjective assessments included improved sleep in 53% (CI 0.36-0.69) and improved daytime behavior in 23% (CI 0.11-0.41). No patient had worsening of symptoms after treatment. Minor adverse events occurred in 5/30 (16%) of patients (CI 0.07 – 0.33). Of these, 60% were difficulties with peripheral intravenous catheter placement. Two patients experienced gastrointestinal symptoms; however, the evaluating clinician could not identify iron sucrose alone as the cause.

Conclusions:

Intravenous iron sucrose is a safe and effective therapy for patients with RLS / PLMD with iron deficiency who are intolerant to oral iron supplements. The most common adverse event was difficulty with intravenous line placement.

034

Impact of obesity in children with narcolepsy

Inocente, Clara Odilia¹; Lavault, Sophie²; Arnulf, Isabelle²; Dauvilliers, Yves³; Reimão, Rubens⁴; Gustin, Marie-Paule⁵; Lin, Jian-Sheng⁶; Spiegel, Karine⁶; Lecendreau, Michel⁷; Franco, Patricia⁶

¹CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, Lyon, France; ²Université Pierre et Marie Curie Inserm U975, France; ³Inserm U1061, CHU Montpellier, France; ⁴Clinical Hospital, University of São Paulo School, Brazil; ⁵Université Lyon 1, Institute of Pharmacy (ISPB), France; ⁶CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, France; ⁷Hôpital Robert Debré, CNR narcolepsie-hypersomnie, France



Introduction:

Obesity is highly prevalent in children with narcolepsy. The aim of this study was to evaluate the impact of obesity on the clinical and sleep characteristics in a population of narcoleptic children and adolescents.

Methods:

Children diagnosed with idiopathic narcolepsy in the four National Reference Centers for Narcolepsy between 2008 and 2011 had a complete evaluation with anthropometric measurements, a nocturnal polysomnography, multiple sleep latency tests, HLA typing and CSF hypocretin-1 levels ($n = 20$). The clinical and electrophysiological characteristics were compared between obese (body mass index [BMI] greater than P97) and non-obese children.

Results:

The 117 children (65 boys) had a mean age of 11.6 ± 3.1 years on diagnosis (43% were younger than 10 years). Cataplexy was present in 80%. DQB1*0602 was positive in 91%. CSF hypocretin-1 mean level was 31 ± 46 pg/mL. Mean BMI was 23.2 ± 5.2 kg/m², 60% were obese, Z-score was 2.9 ± 2.6 . Sleepiness and cataplexy started earlier in obese children. Although the sleepiness, mood, fatigue, hyperactivity and quality of life scores were similar in both groups, obese children missed school more often than non-obese children. Obese narcoleptic children had lower sleep efficiency, higher apnea hypopnea index and respiratory arousals index (RAI) than non-obese children. Z-score was positively correlated with RAI. In new and untreated patients ($n = 59$), obese children had lower hypocretin values than those of non-obese children.

Conclusion:

Obesity affects 60% of children (mostly younger at disease onset and those with the most marked hypocretin-1 deficiency) and has a deleterious impact on sleep quality as well as on school attendance.

035

Pitolisant, an Inverse Agonist of the Histamine H3 Receptor: An Alternative Stimulant for Narcolepsy-Cataplexy in Teenagers With Refractory Sleepiness

Inocente, Clara Odilia¹; Arnulf, Isabelle²; Bastuji, H  l  ne³; Thibault-Stoll, Anne⁴; Raoux, Aude⁵; Reim  o, Rubens⁶; Lin, Jian-Sheng⁷; Franco, Patricia⁷

¹CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, Bron, France; ²Universit   Pierre et Marie Curie Inserm U975, France; ³CRNL, INSERM U1028, CNRSUMR5292, University Lyon 1, France; ⁴Clinique Sainte BARBE, Strasbourg, France; ⁵H  pital Femme M  re Enfant, University Lyon 1, France; ⁶Clinical Hospital, University of S  o Paulo School, Brazil; ⁷CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, France

Objective:

Narcolepsy is a rare disabling sleep disorder characterized by excessive daytime sleepiness and cataplexy (sudden loss of muscle tone). Drugs such as pitolisant, which block histamine H3 autoreceptors, constitute a newly identified class of stimulants because they increase brain histamine and enhance wakefulness in animal and human adult narcolepsy.

Methods:

We report our experience with the off-label use of pitolisant in 4 teenagers with narcolepsy/cataplexy with severe daytime sleepiness, refractory to available treatments (modafinil, methylphenidate, mazindol, sodium oxybate, and D-amphetamine).

Results:

All teenagers developed their disease during childhood (11.3 ± 2.4 years; 50% boys) and were 17.3 ± 0.8 years old at the time of pitolisant therapy. Pitolisant treatment was increased from 10 to 30 mg ($n = 1$) and 40 mg ($n = 3$). The adapted Epworth Sleepiness Score decreased from 14.3 ± 1.1 to 9.5 ± 2.9 ($P = 0.03$) with pitolisant alone to 7 ± 3.4 when combined with mazindol ($n = 1$), methylphenidate ($n = 1$), or sodium oxybate plus modafinil ($n = 1$). Mean sleep onset latency increased from 31 ± 14 minutes to 36 ± 8 minutes ($P = 0.21$) on the maintenance of wakefulness test. The severity and frequency of cataplexy were slightly improved. Adverse effects were minor (insomnia, headache, hot flushes, leg pain, and hallucinations) and transitory, except for insomnia, which persisted in 2 teenagers. The benefit was maintained after a mean of 13 months.

Conclusions:

Pitolisant could constitute an acceptable alternative for the treatment of refractory sleepiness in teenagers with narcolepsy.

036

A boy exhibiting arm banging during sleep; a new type of sleep related rhythmic movement disorder?

Kohyama, Jun¹; Takano, Tomoyuki²

¹Tokyo Bay Urayasu/Ichikawa Medical Center, Urayashu, Japan; ²Pediatrics, Shiga University of Medical Science, Japan

According to the international classification of sleep disorders, sleep related rhythmic movement disorder (RMD) is characterized by repetitive, stereotyped, and rhythmic motor behaviors that occur predominantly during drowsiness or sleep and involve large muscle groups. In addition to typical three subtypes (body rocking, head banging, and head rolling), body rolling, leg banging, and leg rolling were known as less common forms. Here we experienced a 2-year-old boy patient who has exhibited arm banging on his face during sleep every night since 7 months of age.

Case report:

I.R. was an otherwise healthy first boy from healthy non-consanguineous parents, born at 40 gestational weeks with weighing 3725 g after an uneventful pregnancy. Since 7 months of age, he has exhibited arm banging on his own face every night. The banging usually involves each side of his arm, but sometimes occurs bilaterally simultaneously. He hits his face by a fist of the left arm, but not by a palm of his right arm. Although no EMG recording was performed, his arm banging seems to be involved in muscles around shoulders. Since this banging results in hitting his own face or even eye, parents have kept watching him, and prevented his hitting by putting their arm in front of his face, which has caused parents sleep deprived. At 29 months of age, no obvious abnormality was found on physical finding. When he was 23 months of age, all night EEG



recording was performed, and revealed that his banging occurs every 90 minutes without accompanying epileptic discharges. The banging never occurred during slow wave sleep stages. Laboratory examinations and MRI of his brain performed on this occasion showed no obvious abnormality.

Discussion:

Except for the movement involved, the clinical manifestation is compatible with RMD. We suggest arm banging of this case may be an additional subtype of RMD.

037

Assistance Dogs for Narcolepsy

Martyn, Rebecca

Paediatric Sleep, Guy's and St Thomas NHS Trust, London, United Kingdom

Background:

At a recent peer support group for young people with narcolepsy held at Evelina Children's Hospital, several young people reported that their pet dogs were helping them to manage their narcolepsy. Dogs have long been used to assist individuals with a range of disabilities, e.g. guide dogs for the blind.

Methods:

A literature search revealed no formal publications. A search of narcolepsy discussion forums showed that people with narcolepsy are using dogs to help them manage their symptoms of narcolepsy and cataplexy.

Results:

People with narcolepsy were found to use dogs to help them that had been both formally and informally trained. Assistance dogs are highly skilled dogs that are specially trained to assist individuals with a disability with the aim of increasing their level of independence. Common disabilities that assistance dogs are trained for include: blindness, deafness, epilepsy and seizures, autism. Four UK charities known to train assistance dogs were contacted to see if they were involved in training dogs for people with narcolepsy. Of the four UK charities contacted, three were not training dogs for people with narcolepsy. One charity in the past had helped to train dogs for narcolepsy sufferers. Narcolepsy forum reports on line indicate that some people with narcolepsy have dogs that are pets, that have not been formally trained but their owners have found that the dogs develop an ability to understand their condition. These abilities can include: an ability to detect when a person is feeling very tired and needs encouragement (e.g. being repeatedly licked in the morning to act as an alarm clock); staying with a person during a cataplexy attack so the person feels safe, and also understanding and support that helps the person on an emotional level. Assistance dogs can be trained in more complex skills such as learning to alert family members if a person has had a cataplexy attack, or spot when a cataplexy attack might be imminent.

Discussion:

Dogs are reported to be a useful source of both practical and emotional support for people with Narcolepsy. It will be useful to find out more widely how dogs are used internationally by people with narcolepsy and to formally

evaluate the benefits. This would help to build a case for the formal training of assistance dogs for narcolepsy.

038

Instability of NREM sleep in children with restless legs syndrome

Mohri, Ikuko¹; Kato-Nishimura, K²; Yagi, T³; Kagitani-Shimono, K²; Taniike, M²

¹The Research Center for Child Mental Development, United Graduate School of Child Development, Osaka, Osaka, Japan; ²The Research Center for Child Mental Development, United Graduate School of Child Development, Osaka, Japan; ³Sleep Center, Ohta Memorial Hospital, Japan

Objective:

To analyze sleep stage parameters and cyclic alternating pattern (CAP) in children with restless legs syndrome. Setting: Pediatric sleep clinic in Osaka University Hospital.

Methods:

Ten children who visited Osaka University Hospital from 2005 to 2010 and was diagnosed as definite RLS were subject to this study. They consisted of five boys and five girls, aged from 4 to 9 (mean 7.0). All night polysomnography was performed and sleep stages, the index for periodic limb movement during sleep and CAP was scored based on standard criteria. All parameter of RLS were compared with those of age-matched children (aged 4-9 years; mean 7.0) with obstructive AHI <1.

Measurements and Results:

Sleep latency was longer and REM sleep latency was significantly shorter in children with RLS than in controls. However, PLMS index, which is a supportive data for pediatric RLS, was not significantly different between RLS and control children. CAP analysis revealed that total CAP rate was significantly increased. Total cycle count, sequence cycle, and sequence cycle was significantly increased while total cycle time was significantly decreased. A1 and A2 indices were significantly increased, especially in stages 2 and 3. Duration of all A subtypes was shortened in RLS children and it reached the significant difference in case of A3 subtype.

Conclusions:

Children with RLS showed the NREM instability, which is suggested to be present independently of PLMS.

039

Childhood narcolepsy – a multicentric nEUroped study

Nevsimalova, Sona¹; Franco, Patricia²; Peraita-Adrados, Rosa³; Kemlink, David¹; Inocente, Clara⁴; Calvo, Elena⁵; Arzimanoglou, Alexis²

¹Department of Neurology, Charles University and Teaching Hospital, Prague, Czech Republic; ²Epilepsy, Sleep and Pediatric Neurophysiology, University Lyon 1, France; ³Sleep and Epilepsy Unit-Clinical Neurophysiology, University Hospital Gregorio Maranon, Madrid, Spain; ⁴Integrative Physiology of Brain Arousal System, CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, France; ⁵Sleep and Epilepsy Unit-Clinical Neurophysiology, University Hospital Gregorio Maranon, Madrid, Spain



Background:

Childhood narcolepsy belongs to the most frequently studied diseases, however, owing to its rare prevalence multicentric studies are useful.

Methods:

27 patients (11 boys, 16 girls) from 3 sleep centers (Prague 14, Lyon 7, Madrid 6 patients), all under 18 years at the time of the nEUroped project (2008-11) were evaluated, the diagnosis was proved by clinical and MSLT examination.

Results:

Narcolepsy-cataplexy (N-C) was diagnosed in 23 cases (85.2%) narcolepsy without cataplexy (Nw/oC) in 4 cases (14.8%). The mean age (in years) was: 15.2±4.3 (age at registry), 10.3±3.8 (age at onset), 11.9±3.6 (age at diagnosis). The most frequent symptoms were: excessive daytime sleepiness (100%), cataplexy (83.2%), disturbed nocturnal sleep (70.4%), hypnagogic/ hypnopompic hallucinations (59.3%), eating disorder (48.2%), automatic behavior (22.2%) and sleep paralysis (11.1%). The mean sleep latency was 3.2±3.0 min, and 3.6±1.1 SOREMs were found on MSLT. HLA-DQB1 06:02 was positive in all but one examined N-C cases. CSF Hcrt-1 was examined in 9 cases, mean value in N-C cases was 17.6±14.3 (range 1-40) pg/ml. Perinatal risk factors were found in a quarter of the patients, and as disease triggers were indicated: frequent streptococcal infections (29.6%), major environmental stress (25.5%), and in 2 patients vaccination. 22 children (91.7%) showed association with other sleep disorders: NREM parasomnias 10, REM behavior disorder 6 (2 as overlap syndrome), and PLMs -8 children. Almost a half (12 out of 27) showed poor school performance and emotional instability. Besides regular daytime napping, most of them used, now and/or in the past modafinil (25), antidepressants (15), methylphenidate (13), sodium oxybate (8), IVIG (2). The best results were obtained with sodium oxybate.

Conclusion:

The presentation evaluates 3-years of experience from a multi-centric registry studying clinical, diagnostic, and treatment options in childhood narcolepsy. Supported by PHEA project 2007122

040

Periodic limb movements in sleep in childhood and adolescence – a retrospective study

Prihodova, Iva¹; Kemlink, D¹; Nevsimalova, S²; Kemlink, D²; Nevsimalova, S³

¹Dpt of Neurology, 1 st Medical Faculty, Czech Republic; ²Dpt of Neurology, 1 st Medical Faculty, Charles University, Prague, Czech Republic; ³Dpt of Neurology, 1st Medical Faculty, Charles University, Prague, Czech Republic

Background:

To assess retrospectively a cohort of children and adolescents with periodic limb movements in sleep (PLMS) with respect to presenting complaints, symptoms of attention-deficit/hyperactivity disorder (ADHD), sleep parameters and final diagnosis.

Patients and Methods:

53 patients with a periodic limb movement index (PLMI) >5 on nocturnal videopolysomnography were identified: 33 boys, mean age 10.0±5.3, age range 2-21 years. We evaluated results of polysomnography and data from clinical records.

Results:

The presenting complaints were insomnia (sleep onset and sleep maintenance insomnia) – 34%, parasomnia – 30%, excessive daytime sleepiness – 17%, growing pains - 8% and various other complaints (bedwetting, bruxism, sleep paralysis). In the age group <8 years (29 patients) insomnia (41%) and parasomnia (34%) prevailed, in the group >8 years the most common complaints were excessive daytime sleepiness (33%) and parasomnia (25%). ADHD was diagnosed in 26 patients (49%). Standard sleep parameters were: TST 487.9±60.4 min, sleep efficiency 87.7±7.3 %, wakefulness 7.3±6.1 %, NREM 1 5.3±3.6 %, NREM 2 38.6±8.7 %, NREM 3 29.1±8.0 %, REM 19.4 ±4.8 %, sleep latency 28.8±28.5 min, REM latency 91.5±34.8 min, PLMI 12.5±6.8. Polysomnography revealed disorder of arousal in 24 (45%), bruxism in 6 (11%) and obstructive sleep apnoea in 4 patients (8%). 16 patients (30%) were finally diagnosed with restless legs syndrome, 16 (26%) with a periodic limb movement disorder.

Conclusion:

Clinical manifestations of PLMS included insomnia (prevalent in the <8 age group) and excessive daytime sleepiness in the older children and adolescents, but also parasomnia in both age groups. PLMS might be coresponsible for parasomnia persisting until older age. Since half of our patients showed symptoms of ADHD, our study also suggests a potential link between PLMS and ADHD.

041

REM Sleep Behavior Disorder in children. Clinical and Polysomnographic characteristics.

Rodriguez, Alcibiades¹; Ok, I²

¹Neurology Department, NYU School of Medicine, New York Sleep Institute, New York, New York, USA; ²Research Assistant, New York Sleep Institute, New York Sleep Institute, USA

Background:

REM Sleep Behavior Disorder (RBD) has been documented widely in adults, especially related to neurodegenerative diseases such as the alpha synucleopathies. The literature of RBD in children is scarce and only some cases have been reported. We report two cases of RBD in children.

Methods:

We reviewed the charts of all children 21 years-old or younger seen at the New York Sleep Institute over the last five years. We selected the children who have clinical and Polysomnographic evidence of RBD. Two patients met criteria.

Results:

A 4 year-old girl presented with restless sleep and nightmares since age 20 months. She had an ependimoma



of the fourth ventricle removed at age 30 months followed by chemo and radiation therapy. She had her tonsils removed with some improvement of her restlessness at night. Her Polysomnogram (PSG) showed markedly increased muscle tone during REM sleep with abnormal twitching, crying and movements. Her sleep latency was 0.5 minutes and REM latency of 54 minutes. There was no evidence of sleep disordered breathing (SDB) or Periodic Limb Movements of Sleep (PLMS). The second patient is a 20 year-old girl with a cavernous angioma removed at age 17. After the tumor removal, she developed abnormal night time behavior and sleepiness. The patient was taking no medications at that time. Her PSG showed a total Respiratory Disturbance Index (RDI) of 14.6 with a minimal oxygen saturation of 90%. Her sleep latency was 2.5 minutes with a REM latency of 137.5 minutes. Her PLMS index was 23.6. Her sleep efficiency was 91.9%. There was an increased muscle tone during REM sleep. This patient was taking low dose of sertraline.

Conclusions:

RBD is rare in children. We report two cases in which brain lesions near the pons likely caused RBD. One patient also had SDB and PLMS.

042

The role of actigraphy for objective evaluation of sleep/wake patterns in children with epilepsy

Sadaka, Y¹; Go, C²; Massicotte, C²; Bradbury, L²; Zak, M²; Sadeh, A³; Shorer, Z¹; Weiss, S²

¹Soroka Medical Center, Israel; ²The Hospital for Sick Children, Canada; ³Tel Aviv University, Israel

Background: The interaction between epilepsy and sleep is well established. Sleep disorders in children with intractable seizures are some of the most frequent bothersome symptoms reported. These coexisting sleep disorders have detrimental effects on seizure control and quality of life for both the children and their families. Nevertheless, sleep symptomatology in children with epilepsy is mainly studied by subjective parental reports. There are only a small number of studies published using objective measurements with single night polysomnography done in a sleep laboratory. Actigraphy may provide a more accurate objective evaluation of sleep in children with epilepsy. However, at present, the use of actigraphy has not been evaluated in children with epilepsy.

Objective:

The primary objective of this study is to validate the use of actigraphy as a tool in studying sleep patterns in children with epilepsy.

Methods:

Correlation are made between sleep parameters recorded for 24 hours simultaneously by actigraphy and by continuous video-electroencephalography (VEEG) monitoring in children age 2-18 years with intractable epilepsy.

Results:

Epoch by epoch analysis of the first 6 patient enrolled indicated an average sleep agreement (sensitivity) of 94% and an average wake agreement (specificity) of 89% with overall agreement of 92%

Potential application:

This initial results suggest actigraph is a reliable clinical and research objective tool for evaluating sleep and wakefulness in children with epilepsy.

043

Clinical Analysis of Restless Legs Syndrome in Korean Children

Seo, HE; Kwon, SH

Pediatric neurology, Kyungpook National University Hospital, South Korea

Purpose:

The restless legs syndrome (RLS) is a common neurologic sleep disorder but frequently undiagnosed in Korean children. This study was aimed to investigate clinical features of RLS in Korean children.

Methods:

We reviewed the medical records of twelve patients who had been diagnosed as RLS at the pediatric department of Kyungpook National University Hospital from March 2011 to May 2012.

Results:

The mean age was 7.4;±2.9 years (M:F=10:2). Chief complaints included abnormal movement during sleep (n=5, 41.7%), leg pain (n=4, 33.3%), insomnia (n=2, 16.7%) and headache(n=1, 8.3%). Four showed inattention, or hyperactivity and one of them was taking medication for ADHD. Eleven (91.7%) had sleep disturbance and family history for RLS was positive in four (33.3%). Six patients (50.0%) showed a periodic limb movement index of 5 or more per hour of sleep that was compatible with supportive criteria of RLS. Serum testing, including a complete blood count, iron, total iron binding capacity and ferritin was performed. Among eight children who revealed iron deficiency, one showed very low ferritin of 7 ng/mL, and oral iron supplementation(3mg/kg/day) over 1 month showed dramatic improvement in leg pain and daytime behavior. Two patients who underwent pramipexole (0.125mg) who were resistant to iron medication had much improvement in sleep onset and daytime behavior. One patient who experienced with severe abdominal pain due to pramipexole got better after ropinirole and gabapentin.

Conclusion:

This is the first study regarding pediatric RLS in Korean children. RLS can cause serious impact on quality of life in pediatric patients, so we need to find out the children with RLS. Iron repletion therapy is effective for the patient with RLS who shows iron deficiency. In addition, dopamine agonist and gabapentin are effective treatment options for pediatric RLS.

044

Polysomnography and MSLT findings in Children with narcolepsy

Aurangzeb, Sidra; Zaiwalla, Zenobia

Department of clinical neurophysiology, John Radcliffe hospital, Oxford, United Kingdom



Background:

It can take long for children with narcolepsy to receive a definite diagnosis. While CSF hypocretin measurement now provides an alternative diagnosis option, parents are often unwilling to subject their child to a lumbar puncture. Hence, the history, combined with polysomnography (PSG) and multiple sleep latency test (MSLT), remains the current gold standard for the diagnosis of narcolepsy. This study reviews the PSG/ MSLT findings in children with narcolepsy investigated at our centre between January 2005 and October 2012.

Method:

We identified 43 children diagnosed with narcolepsy referred to our paediatric sleep disorder clinic, John Radcliffe hospital, Oxford, between 2005 and 2012. 38 children had PSG and MSLT at our centre and are included in this study. 81.6% children had cataplexy episodes at presentation.

Results:

The 38 children had equal gender distribution. The mean age of onset of presenting symptom was 9.61±3.51 years (range: 4-15 years), 47.3% of these children were prepubertal. The mean age at which sleep studies were done was 11.95 ± 3.50 years, with three children under the age of six.

The mean sleep onset latency on the MSLT was 2.95 ± 2.98 minutes. REM sleep occurred in 2 naps in 13.2%, 3 naps in 21.1% and 4 naps in 55.3% children. MSLT results were diagnostic in 86.8% children.

Sleep efficiency on polysomnography was 77.82% ± 11.21. Sleep onset latency was 9.89±15.25 min and Sleep onset to REM latency was 13.13±47.54 min. %wake after sleep onset was 18.08± 8.90. Average PLM index was 15.13±13.75 and abnormal in 73.7% children.

Spontaneous daytime naps were recorded in 37 children during the day in between the two polysomnography nights; 84.2% children had one or more SOREM during these spontaneous naps.

The distribution of MSLT finding including number of naps with REM sleep, and polysomnography parameters were the same across children with onset of symptoms before or after puberty. (Table 1)

	Pre puberal, n=18 (mean±SD)	Peri/post pubertal, n=20 (mean±SD)
MSLT (min)	2.94 ± 3.262	2.95±2.80
Number of MSLT naps with REM	3.22 ± 1.06	3.05 ± 1.39
Sleep Efficiency (%)	76.28± 10.51	79.20± 11.89
%wake after sleep onset	18.72± 7.11	17.5± 10.4
Sleep onset latency (min)	5.00±6.615	14.30±19.25
Sleep onset REM latency (min)	20.00±67.88	6.95±13.88

Table 1: Comparison of polysomnography and MSLT data of children with pre and post pubertal onset of symptoms.

Conclusion:

Sleep studies can be performed satisfactorily in children including pre pubertal children, if done by trained paediatric sleep technologists, and the ICSD criteria can be used for diagnosis of narcolepsy, the MSLT diagnostic in 86.8%. In our study there was no age of onset related difference in the MSLT findings or distribution of sleep parameters on polysomnography.

045

Childhood narcolepsy experience of one Canadian sleep centre

Zweerink, Allison¹; Narang, I¹; Weiss, S²; Bendiak, G¹

¹Respiratory Medicine, Hospital for Sick Children, Canada; ²Neurology, Hospital for Sick Children, Canada

Body:

Narcolepsy is a chronic lifelong central nervous system disorder characterized by excessive daytime sleepiness, with or without cataplexy. Typically, narcolepsy presents during adolescence and early adulthood; however, there has recently been an increase in newly diagnosed childhood narcolepsy. Narcolepsy is believed to be related to an underlying autoimmune mechanism and it is thought that H1N1 may play a role in these new narcolepsy cases. The objective of this study is to review the demographics and presenting symptoms of newly diagnosed children with narcolepsy in Toronto.

Methods:

At the Hospital for Sick Children, Toronto, we reviewed medical records and polysomnograms of patients with narcolepsy who presented to the sleep disorders clinic.

Results:

MRI = Magnetic Resonance Imaging, MSLT = Multiple Sleep Latency Test, *MRI pending for 2 patients, **MSLT pending for 2 patients. ***Ferritin pending for 1 patient, ****HLA pending for 1 patient

Conclusion:

All patients had excessive daytime sleepiness, with 70% having cataplexy on presentation. H1N1 vaccination was not given to the majority of these patients. More research is needed to understand the recent increase in the number of childhood cases with narcolepsy.

046

Sleep stage effects on body temperatures and vasomotricity in preterm neonates.

Décima, P¹; Bodin, E²; Léké, A³; Stéphan-Blanchard, E¹; Libert, JP¹; Chardon, K¹; Telliez, F¹; Bach, V¹

¹Laboratoire PériTox EA4285-UMI01 INERIS, France; ²Pediatric Neurology Department, France; ³Neonatal and Intensive Care Unit, France

As a result of the close relationship between thermoregulation and sleep processes, core and skin temperatures vary along the sleep-wake cycle and thermal alterations can influence the sleep. This has been seldom studied in neonates although sleep plays a relevant role in the neuronal development and maturation. We analyzed whether the difference between internal (assessed by the abdominal skin temperature) and distal foot skin temperatures, reflecting the vasomotor control - which is the first thermoregulatory response to be sought in case of thermal stress - vary according to the outcome of the sleep cycle (complete vs incomplete sleep cycle). A nocturnal polysomnography was performed in 6 preterm neonates (gestational age: 30±0.4 wk) at 9th day of life. Wakefulness (W), active (AS) and quiet (QS) sleeps were scored in an incubator at thermoneutrality. Complete and incomplete sleep cycle (AS to QS and AS to W, respectively) were scored. Skin temperatures (T)



were measured the end of each sleep episode by infrared thermography on 3 sites (abdominal, pectoral and foot temperatures). Temperature differences were calculated between abdominal skin and other skin temperatures. Tskin differ according to the outcome of AS episode: complete sleep cycle (instead of incomplete cycle) is observed when the difference between Tabdominal and Tpectoral is small - i.e. decreasing Tpectoral towards Tabdominal level, $p < 0.001$) and in absence of peripheral vasoconstriction - i.e. low difference between Tfoot and Tabdominal ($p = 0.027$). Our results point out that vasomotricity is efficient in 9 day-old preterm neonates and differs according to sleep stage outcome. The tight relationship thermoregulation-sleep highlights the relevance of strictly controlling the thermal environment of the preterm neonate and also suggests that some manipulations of body temperature (e.g. via air temperature) may improve sleep as already observed in adults.

047

The prevalence and behavioural correlates of sleep problems in toddlers born preterm compared to term born peers

Bigwood, Rachel¹; Hill, Catherine²; Vollmer, Brigitte²

¹Division of Clinical Experimental Sciences, Faculty of Medicine, University of Southampton, Southampton, United Kingdom; ²Clinical Experimental Sciences Division, Faculty of Medicine, University of Southampton, United Kingdom

Background:

Sleep-wake regulation has been shown to predict neurodevelopmental outcomes at six months of age in preterm infants. This has not been studied beyond infancy. Aims- To determine if sleep in preterm born children differs from that of term born peers at two years of age and if sleep is associated with developmental status and behaviour.

Method:

Twenty-four full term healthy children aged 24 months (+/-12 weeks) were compared to 17 children born at <30 weeks of gestation or with a birth weight < 1500g, assessed at a corrected age of 2 years. In both groups, parents completed a modified version of the Brief Infant Screening Questionnaire (BISQ), the Child Behaviour Checklist 1.5-5 (CBCL 1.5-5) and a demographic questionnaire. Development was assessed with the Bayley III Neurodevelopmental Screener in term born children and the extended Bayley's developmental assessment in preterm children.

Results:

No differences in sleep timing, quality or duration were found between the two groups. Surprisingly, more parents of term born children had received advice about their child's sleep compared to preterm children. Preterms were less likely to settle to sleep independently. Comparing all children who self-soothed to sleep and those who require parental presence, self-soothers were reported to have fewer night wakings. A moderate correlation was found between night wakings and the total CBCL score within the preterm but not term born group. No correlations were found between sleep measures and developmental outcomes or demographic data.

Conclusions:

At two years of age, preterm children are less likely to self-soothe to sleep than term born peers but no additional differences in sleep were evident from parental report. Children who did not self-soothe to sleep were reported to have more night wakings, consistent with sleep onset association disorder. Data collection is on-going and more differences may emerge with a larger sample.

048

Changes in the EEG cortical topography of the first three years of life

Novelli, Luana¹; Bruni, Oliviero¹; Ferri, Raffaele²; Finotti, Elena³; Barucca, Marianna⁴; Marzano, Cristina⁴; De Gennaro, Luigi⁴

¹Developmental Neurology and Psychiatry, Sapienza University, Italy; ²Sleep Research Centre, Department of Neurology, Oasi Institute (IRCCS), Troina, Italy; ³Department of Neurological Sciences, University of Bologna, Italy; ⁴Department of Psychology, Sapienza University, Italy

Background:

In the first years of the life, sleep EEG frequency bands show prominent age-related power changes in scalp topography. It has been recently reported that slow-wave activity (SWA) topography shows an anterior-posterior gradient (Kurth et al., 2011) during sleep of 3 to 21 yrs old children. Taking into account that sleep and its EEG undergo their most important modifications during the early developmental period, the aims of our study were to evaluate the EEG anterior-posterior differences during the first years of life and to investigate the relationships between these topographic differences and developmental stages.

Methods:

Sleep was polygraphically recorded in 29 children aged 0-26 months. A spectral analysis of the sleep EEG was performed, after a careful rejection of artifact epochs, across the 0.5-25.0 Hz frequency range (frequency resolution=0.25 Hz). Newborns/infants were subdivided into 4 age subgroups: 0-2, 2-4, 4-12, and 12-26 months.

Results:

Delta band, during NREM sleep, shows a prevalent posterior topography with no age-related differences. A Group x Region interaction effect was found, in NREM sleep, only for the theta band: in the 12-26 months group the theta power significantly increased in all brain areas but with a prevalence over the central-frontal areas. This anterior predominance in theta power, present during the very early developmental stage, showed a sudden increase and an anterior diffusion after 12 months of age. Our data confirmed the posterior distribution of the delta band already reported in children of 3 years (Kurth et al., 2011). The only EEG frequency showing age-related changes in <3 years old children was the theta band that increased in power and showed a posterior-anterior shift. These changes, probably dependent on maturation processes, suggest that the shift and increase in power of the theta band over the frontal regions might be considered as a marker of normal development.



049

Preterms with NICU events vs those with home ALTES

Franco, P¹; Collinet, E²; Masson, D³; Pham Duc, M³; Patural, H⁴

¹CRNL, INSERM-U1028, CNRS UMR5292, University Lyon1, France; ²Hôpital Nord, University Jean Monet, St Etienne, France; ³Pediatric Home Care Service (HAD) Lyon, France; ⁴HFME & INSERM U1028, University Lyon1, France

Study Objective:

Preterm infants are at risk of morbidity and mortality in post neonatal period. The objective was to determine if preterm infants referred for ALTE events had different characteristics than those with persistent cardio-respiratory events in NICU.

Design:

Thirty preterm infants were followed up with home event record cardio-respiratory monitors after a cardio-respiratory recording (OCR) in our sleep unit. Sixteen infants had persistence of cardio-respiratory event in NICU and 14 infants had a history of ALTE some days after hospital discharge. Clinical and cardiorespiratory characteristics were compared between these two groups of infants as well as the recurrent events occurring after hospital discharge. Heart rate variability (HRV) was also retrospectively assessed on the OCR recording.

Results:

The median gestational age was 31 weeks, the birth weight was 1650 g and the median postmenstrual (CA) age at OCR was 40.7 weeks. The ALTE events occurred at 70 (1-120) days of life when the infants reached 39.5 (36-47.5) weeks CA. Clinical characteristics, OCR results, HRV and the occurrence of home events did not differ between the two groups of infants. There were respectively 78% and 100% of home events in ALTE and BA infants, essentially bradycardia. The infants had events until 9.5 (1-18) weeks of age and required to be stimulated until 5 (0-11) weeks. Respectively 45% and 56% of these infants were stimulated and 14 and 12% were hospitalized during this period for recurrent events during infection. A BA infant (26 week GA) deceased one week after discharge at 1.5 month CA. Clinical characteristics or OCR events did not distinguish this infant from the others. However, his HRV was already collapsed in all the band frequencies before hospital discharge.

Conclusion:

No clinical or OCR differences exist between BA and ALTE preterm infants. HRV could be an interesting tool to assess autonomic maturity before hospital discharge.

050

Night waking reduction in Canadian infants: A randomized clinical trial of a parent-based behavioral intervention in community health units

Hall, Wendy¹; Bhagat, R²; Brant, R³; Collet, JP⁴; Gafni, A⁵; Hamilton, D²; Hutton, E⁶; Hydamaka, K²; Ipsiroglu, O⁷; Munroe, V⁸; Saunders, R⁹; Triolet, K²; Tse, L²; Wooldridge, J¹⁰

¹School of Nursing, University of British Columbia, Canada; ²Vancouver Coastal Health Authority, Canada;

³Statistics; Child & Family Research Institute (CFRI), University of British Columbia, Canada; ⁴CFRI, Pediatrics,

University of British Columbia, Canada; ⁵Clinical Epidemiology & Biostatistics, McMaster University; Ontario, Canada; ⁶Obstetrics & Gynecology; Midwifery Education Program, McMaster University; Ontario, Canada; ⁷Pediatrics, Sunny Hill Centre for Children, British Columbia, Canada; ⁸Community Research, Vancouver Coastal Health Authority, Canada; ⁹Pediatrics, Faculty of Medicine, University of British Columbia, Canada; ¹⁰Early Childhood Development, Vancouver Coastal Health Authority, Canada

Background:

Behavioural sleep problems occur for 20 to 30% of infants and can negatively affect their development. Interventions to change parents' cognitions and behaviors have reduced infant night waking. Our randomized controlled trial evaluated the effectiveness of a cognitive-behavioral sleep intervention for 6 to 8-month-old infants compared to a safety intervention on parents' perceptions of severity of infants' sleep problems and frequency of night waking by actigraphy and sleep diary.

Methods:

Subjects were parents in single or two-parent families with English fluency, access to a telephone, and no pre-existing health or sleep problems. Infants were healthy and met our sleep problem criteria. Data were collected at baseline, 6 weeks (primary outcome), and 24 weeks post-intervention. Parents attended a public health nurse led 2-hour small group training session on infant sleep or infant safety, with telephone follow-up. From September 2009 to March 2011, 253 families were recruited. At baseline, 117 parents comprised the sleep intervention and 118 comprised the control group. At 6 weeks the intervention group (n=110); control group (n=108) completed sleep diaries and actigraphy.

Results:

At 6 weeks post intervention, a significantly smaller proportion of intervention group parents reported infants had severe sleep problems (2% vs. 9%, $p = 0.004$). There was no statistically significant difference in between-group decreases in night waking by actigraphy ($P = .8$, unpaired t-test, difference of means of 0.1, CI -0.8 to 1.0). From sleep-wake diaries, there was a significant reduction in number of night wakes (difference in means = 0.6, $p = .002$, CI 0.23 - 0.97) and total duration of night wakes in the intervention compared with the control group (difference in means = 13.3, $p = .003$, CI 4.6 - 22.0) A short-term group intervention can significantly improve infant sleep problems by sleep diary and parents' perspectives.

051

Nonlinear Heart Rate Dynamics and Heart Rate Variability in infants with maternal smoking and non-smoking

Kato, I¹; Hayano, J²; Scaillet, S³; Groswasser, J³; Sobajima, H¹; Tamura, M⁴; Togari, H⁵; Franco, P⁶

¹Neonatology, Saitama Medical University, Japan; ²Medical Education, Nagoya City University, Japan; ³Pediatric Sleep Unit, Free University of Brussels, Belgium; ⁴Pediatrics, Saitama Medical University, Japan; ⁵Administration Office, Nagoya City University, Japan; ⁶Pediatric Sleep Unit, University of Lyon, France

Background:

Victims of Sudden Infant Death Syndrome (SIDS) have a decreased arousability during sleep with fewer cortical



arousals and more frequent subcortical activations, suggesting an incomplete arousal process during sleep. Prematurity or incompleteness of the autonomic nervous system may account for the pathogenesis of their decreased arousability. Maternal smoking, which may reduce arousability of infants, is known as one of risk factors of SIDS. The present study was undertaken to evaluate the autonomic function in infants with maternal smoking and non-smoking.

Methods:

Thirty two infants were studied polygraphically during one night; sixteen infants were from smoking mothers, sixteen infants from non-smoking. Infants were matched for gender, gestational age and age at recording. Heart rate variability and nonlinear heart rate dynamics by detrended fluctuation analysis (DFA) during the whole night were analysed.

Results:

Significant differences were not observed between the infants with maternal smoking and non-smoking in mean normal-to-normal R-R (N-N) interval or standard deviation of all N-N intervals (SDDN). The root mean square of successive differences (RMSSD) of N-N intervals were 27.2 ms. and 26.7ms. in infants with maternal smoking and non-smoking. A short-term (4-11 beats) scaling exponent (α 1) and a long-term (>11 beats) scaling exponent (α 2) of DFA were 1.05 and 1.05, 1.00 and 1.02, respectively in infants with maternal smoking and non-smoking. They did not show the differences.

Conclusions:

RMSSD reflects beat-to-beat heart rate regulations and DFA α 1 primarily reflects the influences of autonomic and respiratory interactions on heart rate dynamics. In previous study, the increased RMSSD and decreased α 1 were observed in SIDS infants, whereas in this present study, no differences were seen in infants with smoking mothers and non-smoking. The characteristics of heart rate dynamics and variability in infants with maternal smoking were not similar with those of SIDS victims.

052

Investigation of cardio-respiratory sleep studies of infants in the neonatal intensive care unit (NICU): A retrospective study

Todhunter, Victoria¹; Kamstra, Barb²; Athaide, Melba²; MacLean, Joanna³

¹Undergraduate Research Initiative, University of Alberta, Canada; ²Neonatal Intensive Care Unit, Royal Alexandra Hospital, Canada; ³Department of Pediatrics, University of Alberta, Canada

Introduction:

Physiological measures such as heart rate and oxygen saturation are often recording in different activity states to determine if infants are ready for discharge from the neonatal intensive care units (NICU). However, little information exists to measure the efficacy of this practice despite delayed discharge and more investigations resulting in increases costs and encumbering infants and their families. The aim of this study is to describe the results of sleep studies in the NICU and determine their relationship to the clinical course.

Methods:

Data was collected retrospectively using 4 sources. The sleep study report provided reason for the study, summary data and primary interpretation; birth and NICU records were used for demographics and information on clinical course.

Results:

Records from 1279 cardio-respiratory sleep studies from 993 children were reviewed. This represents approximately 10% of infants admitted to the NICU. The mean chronological age at the time of the study was 12.5 ± 47.4 weeks with an average gestational age of 32.3 ± 5.0 weeks. The majority of studies were requested for diagnostic purposes (53%) as opposed to evaluation of treatment (42%); most were conducted as inpatient overnight studies (65%). Bronchopulmonary dysplasia (BPD) was present in 14% of infants and 24% of infants were on caffeine for apnoea of prematurity. The duration of longest central apnoea did not differ between infants with and without BPD (16.3 ± 7.6 s vs 17.7 ± 9.5 s, $p = \text{ns}$); however, a higher amount of periodic breathing was seen in infants with BPD compared to non-BPD ($9.4 \pm 12.5\%$ vs $6.62 \pm 10.2\%$, $p = 0.012$). Infants taking caffeine had shorter central apnoeas (9.0 ± 4.0 s vs 13.1 ± 37.1 s, $p = 0.002$) but higher amounts of period breathing ($9.1 \pm 13.6\%$ vs $6.2 \pm 9.2\%$, $p = 0.001$) compared to infants not on caffeine. Results were classified as abnormal for 55% of infants.

Conclusions:

Sleep studies completed in the NICU are primarily for diagnostic reasons. A minority of infants undergoing sleep study have classic preterm complications including BPD and apnoea of prematurity. Over half of results are abnormal but further analysis is needed to define risk factors and implications of abnormal results.

053

Preliminary results on the relationship between sleep, caloric intake, fasting glucose and body mass in rural Portuguese school-aged children

Penela, Filipa; Meira e Cruz, Miguel

Sleep Unit, GS Clinical Center, Portugal

Background:

A number of studies have showed that Portuguese school-aged children have inadequate sleep, mainly associated to inappropriate habits. It is also known that children's usual distribution of caloric intake it is not the recommended by the general guidelines. This can be a major cause of overweight and metabolic disorders in pediatric population.

Aim:

To test the association between objective sleep parameters (total sleep time – TST and sleep efficiency – SE), caloric intake (CI), fasting blood glucose (FBG) and body mass index (BMI) in a sample of rural Portuguese school-aged children.

Methods:

School-aged children from 3 different primary schools located in a rural location in the western region of



Portugal were randomly assessed regarding sleep, fasting blood glucose and caloric intake. Actigraphic devices were used to measure sleep parameters during 4 days (2 weekdays and 2 weekend days). Fasting blood glucose was taken by an ambulatory blood glucose monitoring system in the morning of the last actigraph controlled day. A 72h food diary was applied to estimate the caloric consumption during weekdays and weekends. Preliminary results obtained from the first 10 children were analyzed.

Results:

The mean age of the study group was 8.5 ± 1.08 years old without differences between genders. TST was 7.3 ± 0.9 hours on weekdays and 7.4 ± 1.6 hours on weekends, in average. SE was $81.4 \pm 6.5\%$ on weekdays and $83.5 \pm 4.8\%$ on weekends. Mean Blood Glucose was 88 ± 5.2 mg/dl. There was no correlation between caloric ingestion and sleep duration (either on weekdays or weekends). Overall, caloric intake in the form of carbohydrates during weekdays was negatively related with sleep efficiency on weekend ($r = -0.6; p = 0.48$).

Conclusion:

These preliminary results support the children sleep reduction observed in previous series. The negative correlation between sleep efficiency at weekends and carbohydrate ingestion during weekdays in this chronically sleep deprived children is an indicator of a link between sleep duration, sleep quality and caloric intake.

054

Active sleep microstructure in healthy infants

Merino-Andreu, Milagros¹; Quero-Jiménez, José²; Antonio, Martínez-Bermejo³

¹Pediatric Sleep Unit, University Hospital La Paz, Madrid, Spain; ²Neonatology Department, University Hospital La Paz, Spain; ³Pediatric Sleep Unit, University Hospital La Paz, Spain

Age is probably the single most crucial factor determining how humans sleep. In the first weeks of life, sleep organization is different than in older age, and active Sleep or AS (immature NREM sleep) is the predominant sleep stage. Several hypotheses have been proposed to explain the relation between neurological maturation in early life and AS. We have studied 62 healthy infants, 30 term neonates (TN) and 32 preterm neonates (PTN). Diurnal polysomnography was performed after feeding in all cases. Rapid Eye Movements (REMs) were analyzed and scored. REMs density (percentage of REM sleep with REMs), REMs index (frequency/min of REM sleep), complexity (isolated or grouped) and maximal amplitude were compared in both groups. REM sleep muscle atonia was also measured and we have calculated percentage of REM sleep with and without atonia. In our study, % AS, REMs density and REMs index were significantly lower in PTN, compared with term infants but REM sleep atonia was similar independently of maturational stage. Reduced REMs is a biomarker of brain damage and it has been hypothesized to be a sign of cognitive dysfunction. In our study, REMs but not muscle atonia in REM sleep has been reduced in more immature infants.

055

Influence of bronchopulmonary dysplasia severity on periodic breathing and oxygenation pattern.

Petrova, Natalia¹; Dobrodeeva, IV²; Begeza, ML³; Paltchik, AB⁴; Shabalov, NP⁵

¹Almazov Federal Heart, Blood and Endocr. Centre, St.-Petersburg, Russia; ²Neonatal Department, St.-

Petersburg Children City Hospital ¹¹, Russia; ³Neonatal Department, Almazov Federal Heart, Blood and Endocr. Centre, Russia; ⁴Neurological Department, St.-Petersburg State Paediatric University, Russia; ⁵Department of Paediatrics, St.-Petersburg Military Medical Academy, Russia

Background:

Periodic breathing (PB) is a common breathing pattern in premature infants. Our aim was to study PB occurrence and its impact in oxygenation in infants with moderate to severe and mild bronchopulmonary dysplasia (BPD) compared to infants without BPD.

Methods:

We performed respiratory monitoring on 25 premature infants with BPD (1 case of severe, 8 of moderate, and 16 of mild BPD) and 25 non-BPD prematures comparable in gestation age (26-30 weeks). Infants were examined 1-3 times at ages of less than 29 days, 29-50 days, more than 50 days. Incidence of main neurologic abnormalities appeared not to differ among groups.

Results:

Occurrence and duration of PB did not differ in infants with mild BPD and without BPD at all ages. Infants with moderate to severe BPD demonstrated no PB during first 28 days, lower incidence of PB at 29-50 days (1 of 3 infants), lower duration of PB at 50 days and older ($4.3 \pm 3.1\%$ of recording length) compared to infants with mild BPD (8 of 10 infants; $18.3 \pm 6.7\%$, respectively; $P < 0.05$) and without BPD (17 of 18 infants; 13.3 ± 5.3 , respectively; $P < 0.05$). In most cases PB was accompanied by arterial O₂ saturation (SpO₂) oscillation. The minimal SpO₂ values during this oscillation were $> 80\%$ in all except one cases of PB in infants without BPD. In BPD group in 5 of 9 PB cases at 29-50 days and 5 of 15 PB cases at 50 days and older SpO₂ was 80% and lower; these were infants with both moderate to severe and mild BPD.

Conclusion:

Infants with mild BPD seem to have more active peripheral chemoreceptors compared to prematures with moderate to severe lung disease. PB may be associated with significant desaturations in infants with BPD regardless of its severity.

056

The onset of crawling and sleep disruption: A longitudinal study

Scher, Anat¹; Cohen, Dina²

¹Counseling and Human Development, University of Haifa, Haifa, Israel; ²University of Haifa, Israel

Objectives:

In the course of the first year of life, gradual improvements in sleep efficiency and in the ability of infants to regulate sleep-wake states take place. In parallel with these changes, infants also go through periods of increased sleep disruption. Preliminary findings suggested that developmental spurts might be involved in periodic sleep-related difficulties. The objective of the study was to examine the hypothesis that the onset of crawling will involve increased nightwaking.

**Method:**

In a longitudinal design, 28 healthy infants (16 girls) were followed-up, every 2-3 weeks, in their home, starting at age 4-5 months until 10-11 months, producing, on the average, 9 data waves per child. Sleep was measured with 3-night actigraphy; motor development was documented with a diary as well as with filmed observations. Crawling onset was defined as at least 2 deliberate steps forward (mean age 7 months, SD=38 days).

Results:

The main finding was that along with the overall decrease in nightwaking across the follow-up period [$F(6,150)=3.43, p<0.05, \zeta^2=0.12$], the emergence of crawling was marked by a significant increase in nightwaking episodes ($t=-2.90, p<0.01$). Individual growth-modeling analysis (GLIMMIX) indicated that within three months of crawling onset, the number of night waking episodes returned to the level at the period before crawling onset.

Conclusions:

The results confirmed that sleep development involves not only continuous improvement but also times that may appear as "regression" periods. This is consistent with the conceptualization of the Dynamic Systems Theory (Thelen, 1993) that developmental change involves progression as well as periods of re-organization characterized by variability and behavioral instability. The findings are in line with the premise that the onset of crawling, involving changes in arousal and in psychological re-organization (Campos et al., 2000), is marked by a period of sleep disruption. Implications to parents, clinicians and sleep researchers are discussed.

057**Central sleep apnea and autonomic nervous activity in preterm neonates.**

Stéphan-Blanchard, E¹; Décima, P²; Delanaud, S²; Léké, A³; Bach, V²; Chardon, K²; Telliez, F²

¹Laboratoire PériTox EA4285-UMI01 INERIS, Amiens Cédex 1, France; ²Laboratoire PériTox EA4285-UMI01 INERIS, France; ³Department of Paediatrics, Amiens University Medic, France

Objectives:

Preterm infants with impaired autonomic control are at greater risk of sudden unexpected death from potentially life-threatening events during sleep, such as severe central apneas. Non-linear heart rate dynamics analysis provides valuable information on subtle abnormalities in cardiovascular regulation. Here, we evaluated the discriminant power of linear and non-linear heart rate variability (HRV) parameters according to the apneic status of sleeping preterm neonates.

Methods:

Autonomic nervous control was assessed according to sleep stages in 33 preterm neonates (postmenstrual age: 36.2±1 weeks, weight at study: 2062±276 g) recorded polygraphically. Healthy infants with <25 apneas per hour (control group, n=10) were compared to 1) infants with >25 apneas per hour (moderate group, n=14), and 2) infants with >25 apneas with bradycardia and/or blood O₂ desaturation per hour (severe group, n=9). Time- and frequency-domain linear parameters, as well as fractal (short- and long-term scaling exponents $\hat{\alpha}1$ and $\hat{\alpha}2$) and complexity (approximate and sample entropy) measures of heart rate dynamics were used to characterize HRV. HRV variables and apneic status were correlated using receiver-operating characteristic curves and logistic regression analysis.

Results:

There was no significant intergroup difference when considering the time- and frequency-domain parameters. Interestingly, fractal and complexity measures showed significant, sleep stage-dependent effects of apneic status on autonomic nervous activity in the severe group only. Discriminance analysis pointed out that pooled active and quiet sleep value of short-term scaling exponent $\hat{\alpha}1$ was a significant independent predictor of severe central sleep apneas.

Conclusions:

This study suggests that preterm infants with frequent apneas associated with bradycardia and/or O₂ desaturation have a disturbed autonomic nervous control during sleep. These changes are particularly revealed with non-linear heart rate dynamics analysis, which could help to detect infants at the highest risk.

058**Can pacifier use alter blood pressure during sleep? A possible protective mechanism for the Sudden Infant Death Syndrome**

Yiallourou, Stephanie; Wong, F; Prathivadi, P; Poole, H; Horne, RSC

Ritchie Centre, Monash Institute for Medical Research, Monash University, Australia

Background:

Epidemiological studies have consistently shown that pacifier use is protective for the Sudden Infant Death Syndrome (SIDS). However, the mechanism by which pacifier use acts is unknown. It is thought that impaired cardiovascular control accompanied with an uncompensated hypotension may play a major role in the underlying mechanism of SIDS. In support of this hypothesis, major risk SIDS risk factors such as prone sleeping, are associated with lowered blood pressure. Accordingly, we assessed the effects of pacifier use on blood pressure and heart rate during sleep within the first 6 months of life.

Methods:

Term infants were studied longitudinally at 2-4 weeks, 2-3 months and 5-6 months of age using daytime polysomnography. Infants were divided into those who regularly used a pacifier (n=10 at study 1; n=19 at study 2; n=14 at study 3) and those who did not (n=17 at study 1; n=16 at study 2; n=17 at study 3). Heart rate and systolic blood pressure were measured continuously in 2 min epochs during both quiet sleep (QS) and active sleep (AS) in the supine and prone sleeping positions. Only periods of non-sucking were analysed.

Results:

Systolic blood pressure was higher (10-22 mmHg) in those infants who used a pacifier compared to those infants who did not at 2-4 weeks during QS-prone ($p<0.05$) and AS-supine ($p<0.05$) and at 5-6 months during AS-supine ($p<0.05$). There was no effect of pacifier use on heart rate at any of the ages studied.

Conclusions:

This study has identified that pacifier use increases blood pressure during sleep. A higher baseline blood pressure in infants who routinely use a pacifier may indicate increased sympathetic tone of the peripheral



vasculature which may serve as a protective mechanism against possible hypotension during sleep leading to SIDS, however further analysis is required.

059

Predictive diagnosis of sleep apnea of a questionnaire for pediatric sleep-disordered breathing

Carrillo, J¹; Alvarez, A²; Cancelo, L²; Manjón, JL²; Terceros, S²; Herrera, K³; Martínez-Null, C²; Durán-Carro, J²; Durán-Cantolla, J²; Egea-Santaolalla, C²

¹Sleep Studies Unit, Felix Bulnes Clinical Hospital, Chile; ²Unidad Interdisciplinaria de Trastornos del Sueño, S. Respiratorio, Hospital Universitario Araba, Vitoria-Gasteiz, Spain; ³Centro de Estudios del Sueño, Fundación Neumológica Colombiana, Bogotá, Colombia

Introduction:

The nocturnal polysomnography (NPSG) is the reference diagnostic test for the obstructive sleep apnea syndrome (OSAS) in pediatric patients. But among its limitations is the weak relationship between severity index test with the clinical manifestations of childhood OSAS. Sleep questionnaires are a useful tool whose accuracy needs to be evaluated. Our aim is to measure the predictive diagnosis ability of a questionnaire to sleep-disordered breathing (QSDB) with NPSG.

Methodology:

We conducted a cross-sectional study in patients referred for suspected SDB, the years 2010 and 2011, in the sleep unit from Vitoria's Hospital. Parents completed the QSDB in before clinical evaluation, and patients underwent NPSG (timeout = 2.3 ± 2.1 months). The QSDB consists of 22 items, with a cutoff point set to 0.33, and NPSG was tested to the standards of AAMS for pediatric patients. With apnea/hypopnea index (AHI) was established three cutoff points: 1.5, 3 and 5 events/hour. With the results we applied the tests of diagnostic accuracy for sensitivity (S), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (PLR), and negative likelihood ratio (NLR).

Results:

Of a total of 287 patients with sleep tests (RP + NPSG), 51 were excluded for comorbidities and insufficient information. We studied 124 patients aged 4.2 ± 2.1 (IQ = 3.0 to 4.6), of which 72 (58.1%) were men. In the QSDB were positive 103 (83.1%) subjects. NPSG were positive in 89 (71.8%), 73 (58.9%) and 58 (46.8%) for the cut points of 1.5, 3 and 5 events/hour in the AHI, respectively. To the same cut points S was 87.64%, 93.15% and 91.38%, the Sp was 28.57%, 31.37% and 24.24%, the PPV was 75.73%, 66.02% and 51, 46%, NPV was 47.62%, 76.19% and 76.19%. Meanwhile, the PLR was 1.23, 1.36 and 1.21; to turn the NLR was 0.43, 0.22 and 0.36.

Conclusions:

According to our results there is considerable difference in diagnostic accuracy of the QSDB, to apply different cutoff points in the NPSG. However, an AHI of 3 events/hour seems to be an appropriate cutoff.

060

Long term ventilation in children with metabolic conditions

Chan, EY¹; Bruce, I²; Wraith, JE³; Jones, S³

¹Paediatric Respiratory Medicine, Royal Manchester Children's Hospital, United Kingdom; ²ENT, Royal Manchester Children's Hospital, United Kingdom; ³Paediatric Metabolic Medicine, Royal Manchester Children's Hospital, United Kingdom

Background:

Progressive upper airway obstruction (UAO) and sleep disordered breathing (SDB) are recognised complications of a number of metabolic conditions, most notably mucopolysaccharidosis (MPS). Although chronic respiratory failure is a well-established cause of morbidity and mortality in metabolic conditions, the experience of long term ventilation (LTV) in this group of children is limited. Aim: To review the experience of LTV for sleep disordered breathing and chronic respiratory failure in children with metabolic conditions at a large tertiary centre.

Methods:

Retrospective review of children with metabolic conditions who were commenced on LTV. Setting: Royal Manchester Children's Hospital, Manchester, U.K.

Results:

The metabolic service at our institution looks after approximately 2000 children with metabolic conditions including 200 children with MPS, one of the largest cohorts in Europe. Over a period of 9 years (2003- 2012), 12 children (Median [IQR] age: 12 [2.1-13.6] years, 4 females) were commenced on LTV. All children received bi-level ventilation using pressure support mode via face/nasal mask/tracheostomy interface. Seven children (6 MPS (I, II, IV); 1 i-cell disease) received non-invasive ventilation (NIV). The decision to commence NIV was based on symptoms, evidence of SDB on cardiopulmonary sleep studies, signs and symptoms of chronic respiratory failure. Five children (3 mitochondrial cytopathy; 2 Pompe's disease) were invasively ventilated (InV) as a result of failure to wean following acute respiratory failure. One child (with mitochondrial cytopathy) discontinued InV because of clinical improvement. Two patients (on NIV) died from respiratory complications unrelated to LTV. Median (range) length of LTV was 33 (5-110) months. All children on NIV/InV achieved improved gas exchange and most reported symptomatic improvement.

Conclusion:

Our result supports LTV in this group of children, as a safe, effective and well-tolerated treatment which positively impacts on quality of life. Further research is needed to determine the impact of LTV on the morbidity/mortality of this population.

061

Non-invasive ventilation in neuromuscular diseases in children: review of a 20-year cohort from a UK tertiary centre

Chan, EY¹; Bhowmik, S¹; Shawcross, A¹; Hughes, I²

¹Paediatric Respiratory Medicine, Royal Manchester Children's Hospital, United Kingdom; ²Paediatric Neurology,



Royal Manchester Children's Hospital, United Kingdom

Background:

Respiratory insufficiency, sleep disordered breathing (SDB) and eventual diurnal respiratory failure account for significant morbidity and mortality in neuromuscular diseases (NMD). Non-invasive ventilation (NIV), by correcting SDB and hypercapnia, has impacted on the survival of these patients.

Aim:

To review the experience of using NIV in children with NMD at a large tertiary centre.

Methods:

Retrospective review of medical records of NMD patients on NIV. Setting: Royal Manchester Children's Hospital, Manchester, U.K.

Results:

The Neuromuscular service at Royal Manchester Children's Hospital looks after approximately 400 children with NMD. Over a period of twenty years (1992 - 2012), 59 children (Median [IQR] age: 10.7 [2.6-13.6] years, 25 females) with NMD were commenced on NIV. Table below detailed the main NMD diagnostic groups of children (where N>1) on NIV, median age of initiation and duration of NIV.

Diagnostic groups	N	Median age of initiation of NIV (range) in years	Median duration of NIV (range) in years
Congenital myopathies	12	0.75 (birth -12.9)	2.2 (0.5 -7.1)
Duchenne muscular dystrophy	10	14.3 (12.3 -16.4)	3.3 (1.2 -7.3)
Spinal muscular atrophy (SMA) Type I	5	1.8 (0.9 -3.1)	6.4 (2.3 - 8.1)
Spinal muscular atrophy (SMA) Type II	15	9.4 (2.9 -15.3)	5.9 (0.4 - 13.6)
Congenital muscular dystrophy	10	11.2 (1.1 - 16.3)	7.2 (2.2 -9.2)
Neuropathies	3	13.4 (7.3 - 16.3)	1 (1 - 5.9)
Myotonic Dystrophy	2	7.3 (1 - 13.7)	3.6 (0.7 -6.6)

The indications for initiating NIV included at least 2 of the following: nocturnal and/or diurnal hypoxia, hypercapnia (PaCO₂ > 6 kPa), FVC<30% predicted, morning headaches, recurrent chest infections and facilitate discharge home. All children received bi-level NIV using pressure support mode with face/nasal mask interface. Two children (both with myotubular myopathy) who were initially started on NIV were converted to invasive ventilation over a year later due to clinical deterioration. Median (range) length of use was 4.5 (0.4-13.6) years. Fifteen children of this 20-year cohort died. Thirteen patients were successfully transitioned to adult service. All children on NIV achieved improved gas exchange and most reported symptomatic improvement.

Conclusion:

This 20-year cohort of NMD children on NIV offers insight into the differences in age of onset of respiratory insufficiency requiring NIV between different types of NMD, and NIV as a well- tolerated, effective treatment from birth onwards.

062

Urine Biomarkers for Obstructive Sleep Apnea in children - A systematic review

Cheruvalli, Vineeth¹; Pillai, AMA²

¹paediatrics, Leeds Teaching Hospitals, Leeds, United Kingdom; ²Paediatric respiratory medicine, Royal Brompton, United Kingdom

Background and Aims:

Various urinary metabolites have been suggested as biomarkers for Obstructive Sleep Apnoea (OSA) in children and could potentially be used as screening tests. We aimed to conduct a systematic review of the published literature on urine biomarkers for OSA in children.

Methods:

A Medline search via Pubmed interface using terms "Obstructive sleep apnea" [MeSH] and "urine" on 15th December 2010 with limits for "All children 0-18" gave 6 results. The papers were obtained and critically appraised.

Results:

See Table 1. All studies were observational/case-control studies.

Author, date and country	Patient group	Key results
Krishna et al, 2006, USA	11 children with OSA and 11 normal children	Increased expression of gelsolin, perlecan, albumin and immunoglobulin in first morning urine of children with OSA
Gozal et al,2009,USA	60 children with confirmed OSA and matched controls	Urinary concentrations of uromodulin, urocortin-3, orosomucoid -1, and kallikrein were predictive of OSA.
Kaditis et al,2009,Greece	64 children with mild to severe nocturnal hypoxemia and 10 controls	Children with severe hypoxemia had significantly higher norepinephrine levels in morning urine
Snow et al,2009,USA	159 children with snoring	Positive correlation between urine norepinephrine levels and polysomnographic indices
Kaditis et al 2010, Greece	126 US children and 123 Greek children with nocturnal hypoxemia	Greek children with moderate to severe hypoxemia had higher uric acid excretion than those with mild hypoxemia
Snow et al,2010,USA	A small sample of children with OSA	Urocortins were elevated in children with OSA

Discussion:

Most studies demonstrate a significant selective alteration in expression of urine biomarkers in children with OSA. Larger better designed studies are needed to develop urine biomarkers into a validated non-invasive tool for screening and diagnosis of children with OSA. They may also be useful in assessing response to treatment in OSA.

063

Continuous Positive Airway Pressure (CPAP) for persistent upper airway obstruction in Pierre Robin Sequence

Davies, B; Kansra, S; Thomas, DA

Paediatrics, Nottingham University Hospitals NHS trust, United Kingdom



No.	Sex	Associated syndrome	Nasopharyngeal Airway used	Cleft repair	Age at CPAP initiation	Outcome
1	M	Fetal alcohol syndrome	Yes	No	7 months	Improved sleep and oximetry
2	F	Isolated cleft	Yes	No	11 months	Improved sleep and oximetry
3	F	Isolated cleft	Yes	Yes		Spontaneous improvement
4	M	Stickler syndrome	Yes	No		Improved with positioning

Background:

Pierre Robin Sequence is a congenital condition classically comprising a triad of features, including micrognathia, glossoptosis and cleft palate. Problems arise in infancy related to feeding difficulties as well as a variable degree of upper airway obstruction which may require acute medical and surgical management. There is no international consensus on the management of Pierre Robin Sequence with options including lateral positioning, palatal plate therapy, tongue-lip adhesion, mandibular distraction, tracheostomy, nasopharyngeal airway (NPA) placement and non-invasive respiratory support. If upper airway obstruction persists and does not correct as expected with growth, it may disrupt sleep with potential consequences for development. We present our clinical experience of infants with Pierre Robin Sequence requiring active management of upper airway obstruction beyond the age of six months.

Methods:

Over the past twelve months, we identified four children with Pierre Robin Sequence requiring ongoing management of upper airway obstruction with disrupted sleep after six months of age. We analysed overnight oximetry studies for these children together with summaries of their clinical condition, management and progress. Overnight oximetry data is presented for this case series as well as comparative analysis of the effects of medical interventions including nasopharyngeal airway insertion, prone positioning and the use of continuous positive airway pressure.

Results and Conclusion:

All four cases were initially managed with nasopharyngeal airway insertion. NPA was poorly tolerated by all by the time they were six months leading to upper airways obstruction and sleep disruption. They were subsequently considered for non-invasive respiratory support (CPAP). Two of the four cases were managed conservatively with positioning and improved spontaneously. The other two were managed with CPAP support at 6 months. Use of CPAP improved the upper airways obstruction and ameliorated sleep disruption. This also improved their weight gain and growth.

064

CPAP is a feasible treatment for obstructive sleep apnoea in children under 2 years

Ferreira, Rosário¹; Nunes, T²; Pereira, L²; Saianda, A²; Bandeira, T²

¹Pediatrics, Santa Maria Hospital, Lisbon, Portugal; ²Pediatrics, Santa Maria Hospital, Portugal

Introduction:

The main reason for obstructive sleep apnoea syndrome (OSAS) in children is adenotonsillar hypertrophy (ATH), being ENT surgery the most common treatment. In children under 2 years OSAS is frequently associated with

complex disorders. For this group of children at a particular risk for surgery complications and failure, CPAP therapy is being increasingly suggested as an eligible therapy. We describe our experience in CPAP treatment for OSAS in children under 2 years of age.

Methods:

Retrospective chart review of all children < 2 years who initiated CPAP for OSAS, followed in our unit since 2000. Analysis was made through descriptive statistics.

Results:

21 children, 9 (42.9%) male; median age 5 months (0;22). 11 (52%) children presented craniofacial malformations, 5 (24%) had laryngomalacia (2 with associated ATH) and 5 (24%) had diverse neurological conditions. 12 (57%) patients did sleep studies; the others had only clinical diagnosis (breathing effort associated with sleep desaturation or poor weight gain). 15 (71.4%) children initiated CPAP in acute setting due to severe desaturations and/or cardiovascular repercussion. 5 patients had previous surgery and 4 needed subsequent surgery. 3 children progressed to bilevel ventilation to achieve better compliance or to control an associated hypoventilation. 8 (38%) patients are currently on treatment, 9 (42.9%) overcame CPAP due to clinical improvement, 1 died and only 3 were non compliant. Average CPAP therapy duration was 31 months.

Conclusion:

This study supports the suggestion that OSAS in young children is frequently due to complex but mostly self-limiting disorders for which CPAP may be a successful transient treatment. Main conclusion is that CPAP is a feasible treatment for OSAS in this age group allowing growth to occur.

065

Obstructive sleep apnoea in children linked to impaired baroreflex sensitivity and delayed heart rate responses to changes in blood pressure.

Walter, LM¹; Yiallourou, SR¹; Vlahandonis, A¹; Johnson, CA¹; Sands, SA²; Trinder, J³; Nixon, GM¹; Davey, MJ⁴; Home, RSC¹

¹The Ritchie Centre, Monash Institute of Medical Research, Monash University, Australia; ²Division of Sleep Medicine, Harvard Medical School, USA; ³Discipline of Psychological Sciences, University of Melbourne, Australia; ⁴Melbourne Children's Sleep Centre, Monash Children's, Monash Medical Centre, Australia

Introduction:

The baroreflex is a homeostatic control mechanism for blood pressure (BP). Baroreflex sensitivity (BRS) is a measure of baroreflex function. The pathogenesis of hypertension in adults with obstructive sleep apnoea (OSA) has been associated with low BRS, suggesting that low BRS may be the harbinger of the circulatory consequences of OSA. Limited research has been performed investigating BRS in children with OSA, although they are known to have elevated BP.

Methods:

105 children (7-12 y) referred for assessment of OSA and 36 non-snoring controls were studied. Overnight



polysomnography was performed with continuous BP monitoring. Subjects were grouped according to their obstructive apnoea hypopnoea index (OAHl); primary snoring (PS, OAHl \leq 1 event/h), mild obstructive sleep apnoea (OSA, OAHl $>$ 1-5) and moderate/severe OSA (MS, OAHl $>$ 5). 39 \pm 2, 3 min epochs/subject were analysed. BRS was calculated by cross-spectral analysis in the low frequency range (0.04-0.15 Hz). BRS and the delay in heart rate (HR) in response to a change in BP were compared between SDB severity groups and sleep states using 2-way ANOVA.

Results:

There was a significant effect of SDB severity on BRS and the heart rate delay ($p < 0.001$ for both). Children with Mild or MS OSA had significantly lower BRS and a longer HR delay compared with the Control and PS groups. There was no effect of sleep state (BRS, $p = 0.2$; HR, $p = 0.6$) or interaction (BRS, $p = 0.9$; HR, $p = 0.4$).

Conclusion:

Our data demonstrating reduced BRS and delayed HR response to changes in BP in children with OSA which are not dependant on sleep state, suggest that children with OSA, who are known to have elevated BP, have inhibited vagal and increased sympathetic activity. Although not clinically hypertensive, these children display reduced autonomic regulation. Longitudinal studies are required to ascertain if the dampening of the normal baroreflex response will lead to hypertension in these children.

066

Significantly increased blood pressure variability in children with obstructive sleep apnoea.

Walter, LM¹; Yiallourou, SR¹; Vlahandonis, A¹; Johnson, CA¹; Sands, SA²; Trinder, J³; Nixon, GM¹; Davey, MJ⁴; Horne, RSC¹

¹The Ritchie Centre, Monash Institute of Medical Research, Monash University, Australia; ²Division of Sleep Medicine, Harvard Medical School, USA; ³Discipline of Psychological Sciences, University of Melbourne, Australia; ⁴Melbourne Children's Sleep Centre, Monash Children's, Monash Medical Centre, Australia

Introduction:

Obstructive sleep apnoea (OSA) has been associated with elevated blood pressure (BP) in children. The underlying mechanisms are unknown however, impaired autonomic control leading to increased blood pressure variability (BPV) is thought to play a role. To date few studies have assessed autonomic BP control in children with OSA. We aimed to assess the affect of OSA severity and sleep state on BPV in children.

Methods:

105 children (7-12 y, 59% male) referred for assessment of OSA and 36 (50% male) non-snoring controls were studied. Overnight polysomnography was performed with continuous BP monitoring. Subjects were grouped according to their obstructive apnoea hypopnoea index (OAHl); primary snoring (PS, OAHl $<$ 1 event/h), mild obstructive sleep apnoea (OSA, OAHl $>$ 1-5) and moderate/severe OSA (MS, OAHl $>$ 5). 3 min epochs of BP (mean 39 \pm 2) were analysed/subject. BPV was assessed using power spectral analysis in the low frequency range (reflecting sympathetic activity, 0.04-0.15 Hz). BPV was compared between OSA severity groups and sleep states using 2-way ANOVA.

Results:

There was a significant effect of OSA severity, sleep state ($p < 0.001$ for both) and a significant interaction ($p = 0.02$) on BPV. Children with Mild and MS OSA, had significantly higher BPV during REM compared with the Control and PS groups ($p < 0.05$). During SWS, BPV was higher compared to REM in the Control, PS and Mild OSA groups, and lower compared to NREM1/2 in the PS and Mild OSA groups. There was no difference in BPV between the sleep states in the MS OSA group.

Conclusion:

Children with OSA have significantly increased BPV compared to non-snoring controls and children with PS, suggesting that children with OSA have increased sympathetic activity. This may be the underlying mechanism for the increased BP previously reported in these children, however further studies are required to identify if the increased sympathetic activity persists after treatment.

067

Retrospective analysis of children with early OSA treatment and relapse at puberty

Huang, Yu-Shu¹; Lin, Cheng-Hui²; Guilleminault, Christian³; Quo, S³; Monteyrol, JP³

¹Department of Child Psychiatry and Sleep center, Chang Gung Memorial Hospital and University, Taipei, Taiwan; ²Craniofacial Center and Sleep Center, Chang Gung Memorial Hospital and University, Taiwan; ³Stanford University Sleep Medicine Division, USA

Objectives:

We evaluated adolescents who had been previously cured of obstructive sleep apnea (OSA) following adenotonsillectomy for recurrence of sleep apnea following puberty.

Study Design:

Retrospective analysis of 29 adolescents (9 girls) with OSA previously treated by adenotonsillectomy. Clinical evaluation and sleep-related complaints were assessed annually from pediatric sleep questionnaire (PSQ) Systematic cephalometric x ray of subjects was performed by orthodontists between 12-15 years of age. Compared polysomnography at the time of OSA diagnosis, following adenotonsillectomy, and after puberty.

Results:

After initial OSA diagnosis, (age 7.6 \pm 1.7 years, AHI 9 \pm 5, RDI 15 \pm 6.4) and following adenotonsillectomy, (AHI 0.4 \pm 4.4, mean RDI 0.6 \pm 0.5) children were followed by orthodontist for other reasons. At pubertal evaluations (mean age of 14 years), complaints obtained from PSQ included snoring, difficulty getting up in morning/going to school, inattention or poor school performance within last year, fatigue, napping on school bus or ride home, and indicators of sleep phase delay. Nine subjects (7 girls) were asymptomatic. Cephalometric comparison of subjects (N=20) performed at mean age 11 years versus mean age 14 years, showed reduction of posterior airway space of 2.3 \pm 0.4 mm. Polysomnography of asymptomatic subjects showed mean AHI 1.1, mean RDI 1.8, versus symptomatic subjects mean AHI 3.1, mean RDI 5.6 \pm 1.2,



Conclusion:

Puberty may be a risk factor for the recurrence of OSA due to enlargement and hypotonia of theoro-naso-facial muscles in boys and less frequently, abnormal decent of the hyoid bone in girls.

068

Evening-to-Morning Urinary Concentrations of Neurotransmitters Are Selectively Altered in Children with Obstructive Sleep Apnea.

Kheirandish-Gozal, Leila¹; McManus, C.J.T.²; Kellermann, G.H.²; Samiei, A.³; Gozal, D.³

¹Pediatrics, The University of Chicago, Chicago, USA; ²NeuroScience Inc., USA; ³Pediatrics, The University of Chicago, USA

Background:

Obstructive sleep apnea (OSA) is associated with altered neurobehavioral and cognitive function in children. Measurement of neurotransmitters in urine samples has significant potential as a clinical tool, due to the stability, sensitivity, and noninvasiveness of this approach. We therefore explored overnight changes in an array of neurotransmitters in the urine of children with and without OSA.

Subjects and Methods:

Urine samples were collected in consecutive children being evaluated for OSA before and after a sleep study in the laboratory using custom collection tubes. In addition, similar samples were obtained in healthy children undergoing a research sleep evaluation. Samples were then subjected to multiple ELISA assays for epinephrine, norepinephrine, dopamine, DOPAC, serotonin, 5-HIAA, glycine, taurine, GABA, glutamate, -phenylethylamine (PEA), and histamine, and corrected individual values for corresponding creatinine concentrations.

Results:

A total of 28 children with OSA (age: 7.0± 03 [SE] years; 30% girls; 40% AA;) and 13 matched controls were thus far enrolled and analyzed. Significant overnight increases in creatinine-adjusted epinephrine and nor-epinephrine urinary levels emerged in children with OSA. In addition, significant increases in GABA urinary concentrations emerged. Furthermore, larger decreases in urinary taurine levels were also present, with no significant differences in any of the other measured neurotransmitters.

Conclusions:

Pediatric OSA is associated with increased urinary concentrations of neurotransmitters indicative of heightened sympathetic outflow, thereby confirming previous findings from our and other laboratories. The increases in GABA may reflect altered aminergic transmission in the context of nocturnal hypoxemia, while decreases in taurine could underlie enhance utilization of this neuroprotective amino acid against neuronal excitotoxicity or alternatively play a role in altered cardiovascular regulatory mechanisms implicated in pediatric OSA.

Acknowledgements:

This study was supported in part by NIH grants HL-65270 and HL107160.

069

New Questionnaire in Hungary to Assess Sleep Quality in School-Age Children

Lendvai, Zs; Pasti, K; Kiss, G; Prokai, A; Szabo, AJ

I. Dept. of Pediatrics, Semmelweis University, Hungary

Screening of sleep disorders in children is of high importance. In Hungary there is no validated questionnaire for assessing sleep problems. We evaluated the results of sleep quality scales of our questionnaire and compared the data of healthy and clinical population. We analyzed the correlation between our questionnaire and validated tests and the severity of obstructive sleep apnea (OSA). Our questionnaire is designed to estimate sleep hygiene and quality in two age groups (8-14 and 15-18 ys.) by nighttime and daytime symptoms score. Two groups of children were analyzed: 1. healthy group (n=2020), 2. children with sleep problems (n=66). The second group filled out two validated tests, Modified Pediatric Epworth Sleepiness Scale (MP-ESS), Conner's Rating Scales-Revised (CRS-R) and underwent polysomnography. Severity of OSAS was characterized by Apnea-Hypopnea Index (AHI) and Oxygen-Desaturation Index (ODI). Children underwent polysomnography had significantly higher score both on nighttime and daytime symptoms scale than healthy children. Correlations were: score of nighttime symptoms scale and CRS-R score (r=0.441; p=0.001), score of daytime symptoms scale and MP-ESS score (r=0.389; p=0.001). Children in the highest quartile of nighttime symptoms scale had significantly higher AHI (mean±SD: 0.62±1.07 vs. 5.97±11.39; p=0.04) and ODI (mean±SD: 0.49±0.53 vs. 6.23±12.07; p=0.02) than children in the lowest quartile. The nighttime and daytime score index had higher sensitivity to predict OSA than other tests. Our questionnaire can be potentially useful in evaluating sleep problems in children and give more information about sleep hygiene than other tests. However validation of the questionnaire is still needed. Grants: TAMOP-4.2.1.B-09/1/KMR, 4.2.2/B-10/1-2010-0013

070

Apnea-hypopnea index overestimates severity of polysomnography abnormalities in children under 2 years of age

DeHaan, Kristie¹; Waters, Karen²; MacLean, Joanna¹

¹Department of Pediatrics, University of Alberta, Canada; ²Discipline of Paediatrics & Child Health, University of Sydney, Canada

Background:

Polysomnography (PSG) is a routine investigation for breathing concerns during sleep in all age groups. There are, however, no accepted criteria to define an abnormal result in infancy. The aim of this study is to describe the indications and results of PSG for children <2 years of age and evaluate their relationship with physician's recommendations. The results will define parameters on PSG that relate to clinical decision making for infant sleep studies.

Methods:

Retrospective PSG data from children <2 years of age were retrieved from a 3 year period (2008-2010). PSG data and clinical notes were reviewed to collect study indication, PSG results, and physician's recommendations.



Results:

A total of 435 PSG records from 325 children were retrieved. Of the 250 studies that have been reviewed to date, the average age was 9 months 4 days \pm 14 days, with 42% of the children <6 months at the time of the study. Compared to children \geq 6 months, children <6 months had higher arousal index (54.5 events/h vs 11.5 events/h, $p < 0.001$), higher apnoea hypopnea index (AHI; 31.9 vs 12.9, $p < 0.001$), and higher desaturation index (34.0 events/h vs 15.2 events/h, $p < 0.001$) but similar minimum oxygen saturation (83% vs 79%, $p = \text{ns}$). Applying the current paediatric criteria for abnormal PSG (AHI > 1.0 events/h), 243 (97%) of the children studied had an abnormal result and 61% of these children had an AHI > 10 events/h. Only 33% of children were similarly classified by AHI and physicians with AHI always classifying as more severe than physician classification.

Conclusion:

The current paediatric criteria defining abnormal PSG leads to over estimation of the severity of PSG abnormalities. Separate criteria should be investigated for children 0-6 months and 6-24 months of age. Linking PSG data to clinical recommendations and treatment will support development and testing of new criteria to identify abnormal PSG results in children <2 years of age.

071

A novel method for evaluating respiratory effort using intercostal EMG in children with obstructive sleep apnea syndrome

Takahashi, Ayumi¹; Teraoka, Sayako¹; Mugii, Satomi¹; Okazaki, Asako¹; Asahi, Kayoko¹; Kimura, Shihoko²; Mohri, Ikuko³; Ohki, Noboru⁴; Kato-Nishimura, Kumi³; Taniike, Masako³

¹Laboratory for Clinical Investigation, Osaka University Hospital, Japan; ²Department of Pediatrics, Osaka University, Graduate School of Medicine, Japan; ³United Graduate School of Child Development, Osaka University, Japan; ⁴NoruPro Light Systems, Inc., Japan

Objective:

Although obstructive sleep apnea syndrome (OSAS) in children has recently gained attention, the guidelines for the appropriate diagnosis and treatment of this condition have not been established. As hyperactivity and impulsiveness are widely reported to be unrelated to the apnea hypopnea index (AHI), other suitable parameters are required. As we have been recording intercostal electromyogram (EMG) results as a part of polysomnography (PSG) testing, we developed a novel method for its quantitation as a parameter for respiratory effort; we compared these values in patients before and after undergoing adenotonsillectomy. In addition, we analyzed the correlation between the changes in the AHI score, respiratory effort, and clinical symptoms.

Methods:

We studied 16 children diagnosed with OSAS who underwent PSG (REMbrandt, Embla) before and after adenotonsillectomy (mean age at first PSG = 4.1 \pm 1.8; male:female = 11:5; AHI score at first PSG = 24.0 \pm 31.2/h). By using the software "ECG/EMG Respiration Detection Analysis" developed by NoruPro Light Systems (Tokyo, Japan), we extracted waves corresponding to labored breathing from intercostal EMG results, and compared the average pre- and postoperative wave amplitudes. Alterations in daytime behavior were assessed according to the child behavior checklist and reports by parents.

Results:

Ten children exhibited more than 50% reduction in AHI score after surgery. However, 9 children showed more than 50% reduction in respiratory effort, and hyperactivity and impulsive behavior were improved in 5 children. In particular, 2 children, whose respiratory effort was robustly increased despite a decreased AHI score, indicated transient improvement, followed by a relapse of hyperactivity and impulsive behavior.

Conclusions:

Changes in AHI score were not always correlated with respiratory effort in pediatric OSAS. Therefore, we suggest that respiratory effort can be a new parameter for the diagnosis and treatment in OSAS.

072

Sleep disordered breathing among the community children: screening using a questionnaire and ambulatory monitoring

Norimi, Takata¹; Oka, Y²; Tanno, S³; Horiuchi, F⁴; Tanigawa, T³

¹Institute of Nursing, Ehime Prefectural University of Health Sciences, Japan; ²Center for Sleep Medicine, Ehime University Hospital, Japan; ³Department of Public Health, Ehime University Graduate School of Medicine, Japan;

⁴Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Japan

Objectives:

Sleep disordered breathing (SDB) is a common sleep disorder in children which may lead to sleep fragmentation and daytime symptoms. However, little efforts have been made to identify children with SDB among the community in Japan. The aim of the study was to identify the method of effective screening of SDB among the community.

Subjects and Methods:

3643 children in three age groups (417 kindergarteners, 1677 elementary school children, 1549 junior and senior high-school students, response rate 86%) in the community were included in the study. Parents/caregivers were requested to fill out the Child and Adolescent Sleep Checklist (CASC) and the percentage of children with SDB related symptoms were identified in each age group. Of the subjects, 45 children (9 kindergarteners and 36 elementary school children) were recruited for the type-3 ambulatory monitoring (PMP-300E, Pacific Medico) study. SDB was judged (RDI > 5) based on the recording. Responses to SDB related CASC questions were analyzed to see if they were useful in identifying SDB patients.

Results:

Habitual snoring (>2 nights/week), occasional (>1 nights/week) gasping while sleeping, occasional witnessed apnea, enlarged adenoids were observed in 7.0%, 7.3%, 3.7%, 7.1% of children respectively. Percentage of these symptoms was similar among the age groups. Ambulatory monitoring identified 25 subjects with SDB. When one or more of the following symptom was met; habitual snoring, occasional gasping while sleeping, occasional witnessed apnea or enlarged tonsil, sensitivity and specificity for the SDB group was 76% and 80% respectively.



Conclusions:

As a screening of possible SDB children who may require further investigations, CASC items were shown to be useful.

073

Sleep disordered breathing and mouth breathing among the community children in Japan

Oka, Yasunori¹; Takahashi, N²; Horiuchi, F³; Kawasaki, Y⁴; Tanno, S⁵; Takata, N⁶

¹Center for Sleep Medicine, Ehime University Hospital, Ehime, Japan; ²Iyo Dental Association, Japan; ³Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Japan; ⁴Center for Sleep Medicine, Ehime University Hospital, Japan; ⁵Department of Public Health, Ehime University Graduate School of Medicine, Japan; ⁶Institute of Nursing, Ehime Prefectural University of Health Science, Japan

Introduction:

Sleep disordered breathing (SDB) is a common sleep disorder in children which may lead to adverse outcomes such as developmental delay and behavior problems. Impact of SDB on a child's quality of life is an important public health issue. However, little efforts have been made to identify children with SDB among the community in Japan. The aim of our study was to describe the prevalence of SDB symptoms among the community children in Japan and to elucidate its relationship with mouth breathing that is often present in SDB patients.

Methods:

5134 community children (nursery school, kindergarten and primary school in Iyo area, 0-12 years of age) were included in the study. Child and Adolescent Sleep Checklist (CASC) was distributed and parental report on snoring, apnea or mouth breathing were collected. Relationship between SDB symptoms and mouth breathing was also analyzed.

Results:

Prevalence of occasional witnessed apnea (>1 days/week) was 1.0%. Habitual snoring (>2 days/week) was seen in 10.8% and daily snoring (>5 days/week) was seen in 1.9% of children. Overall, 26.2% of children were mouth-breathers. 63.5% of children with witnessed sleep apnea were mouth-breathers which was significantly more prevalent than in children without sleep apnea. Mouth breathing was significantly more prevalent (47.8%) among children with habitual snoring than in children without habitual snoring (23.6%).

Conclusion:

Prevalence of sleep apnea and snoring identified in our study was mostly consistent with the previous Western reports using questionnaires. As chronic snoring is considered abnormal in a pediatric population, children with signs and symptoms of SDB need to be recognized. Mouth breathing could be one of the additional features which parents/caregivers may easily recognize as a potential marker for SDB. Further community survey using an ambulatory monitoring device trying to identify SDB children requiring medical treatment is ongoing.

074

Sleep-disordered breathing and health-related quality of life among the Japanese community children

Kawasaki, Yuri¹; Oka, Y²; Takahashi, N³; Campos, E¹; Tanno, S¹; Horiuchi, F⁴; Takata, N¹; Tanigawa, T¹

¹Department of Public Health, Ehime University Graduate School of Medicine, Japan; ²Department of Sleep Medicine, Ehime University Graduate School of Medicine, Japan; ³Iyo Dental Association, Japan; ⁴Department of Neuropsychiatry, Neuroscience, Ehime University Graduate School of Medicine, Japan

Background:

Obstructive sleep apnea (OSA) syndrome in children has shown to lead adverse outcomes such as developmental delay and behavior problems. Impact of OSA on a child's quality of life is not only a clinical concern but also an important public health issue. However, most of the caregivers are not aware of the importance of identifying symptoms possibly related to OSA. OSA-18 questionnaire is mainly used to evaluate OSA in young children focusing on disease-specific quality of life.

Objective:

The aim of the study was to investigate the OSA related quality of life among the elementary and junior high-school student using the OSA-18. Comparison among the OSA-18 subscale scores was also investigated to see if symptoms of OSA correlate with caregiver concern.

Subject and Methods:

In this cross-sectional study, 3493 children (49.6% male; elementary school students: 8.38 } 1.51 years (mean } SD) and junior high school students: 13.26 } 1.03 years) were recruited from the community. The OSA-18 was filled out by parents or caregivers. Total and subscale scores of OSA-18 were compared between elementary and junior high-school student. Correlation between the caregiver concern scores and other subscale scores; sleep disturbance (snoring, breath holding, choking and restless sleep), physical symptoms, emotional symptoms and daytime function was also investigated.

Results:

OSA-18 total score of more than 60 has been reported to impact on health-related quality of life; this level was reached in 0.26% of elementary school students and 0.92% of junior high-school students ($p=0.08$). Comparison of subscale scores between the elementary and junior high-school student did not show any statistical difference. In junior high-school students, the caregiver concerns showed strong correlation with emotional symptoms ($r=0.60$) and daytime function ($r=0.56$), and moderate correlation with sleep disturbance ($r=0.32$) and physical symptoms ($r=0.33$). Spearman's rank-correlation coefficient of sleep disturbance subscale with the other subscales was intermediate ($r=0.32-0.43$).

Conclusion:

Our result indicates that caregivers tend to be more concerned about emotional distress and daytime drowsiness than OSA related symptoms such as snoring or breath holdings in children. Although OSA-18 may not be a sufficient tool to identify OSA among the community, this questionnaire could be used for early detection of possible OSA symptoms that are not well recognized by the caregivers.



075

Sleep-Disordered Breathing in children living at an altitude of 2640 m

Panqueva, Patricia

Pediatric Pulmonology, Pontificia Universidad Javeriana, Bogota, Colombia

Objective:

To describe the occurrence of Sleep-Disordered Breathing among pediatric population living at an altitude of 2640m (Bogotá, Colombia).

Methods:

Analysis and description of findings (for 3 years) on the polysomnogram (PSG) of children, ages 0 to 17, referred to a sleep clinic in a general hospital for evaluation of suspected sleep-disordered breathing (SDB).

Results:

245 children, 138 (56.3%) males and 106 (43.2%) females, with suspected SDB underwent diagnostic PSG, which were analyzed according to the 2007 American Academy of Sleep Medicine (AASM) pediatric scoring criteria. The clinical evaluation showed that 90 (36.7%) children had snoring, 52 (22.8%) had apnea, 22 (8.9%) allergic rhinitis, 20 (8.1%) tonsillar hypertrophy, 40 (16.3%) Down syndrome, 9 (10%) obesity, 4 (1.6%) neuromuscular disease and 8 (3.2%) had other medical conditions. The PSG revealed that 113 (46.1%) children had obstructive apnea, 48 (19.5%) had periodic breathing, 31 (16.6%) central apnea, 7 (2.8%) electroencephalographic abnormalities, 20 (8.1%) snoring and 18 (7.3%) had no abnormalities.

Discussion:

The upper airway obstruction remains the most common cause of SDB. In our children the primary risk factor remains adenotonsillar hypertrophy, while obesity does not seem to play an important role. Periodic breathing is an important condition associated with hyperventilation and decreased CO₂ level and oxygen tension. We observed that these children needed oxygen therapy for at least the first 6 months of life and a PSG evaluation every 3 months. After 3 years of follow up 4 patients continued with oxygen therapy: 2 (4.1%) had Arnold Chiari Type I, 1 (2.0%) had Down syndrome and 1 (2.0%) remained undiagnosed. Central apnea was found in children with Chiari malformations, Prader-Willi syndrome, muscular dystrophies and cerebral tumors.

Conclusions:

The obstructive sleep apnea was the most common cause of SDB, but periodic breathing was also an important cause of SDB in children living at an altitude of 2640m.

076

Risk factors and comorbidities in infants with obstructive sleep apnea

Qubty, W; Mrelashvili, A; Lloyd, R; Kotagal, S

Mayo Clinic, USA

Background:

Obstructive Sleep Apnea (OSA) is characterized by recurrent episodes of upper airway obstruction in sleep and is increasingly recognized in infants. Although epidemiologic data is relatively limited, OSA has well established serious complications.

Aims:

We reviewed patients 0-17 months of age with a diagnosis of Obstructive Sleep Apnea via polysomnography at Mayo Clinic Sleep Center between 2000-2011, to (1) Characterize the subset of patients with identifiable risk factors and comorbidities, (2) Assess modes of intervention used and its efficacy based on follow up polysomnographic and/or clinical data.

Methods:

This was a single center retrospective cohort study of patients 0-17 months of age with a diagnosis of Obstructive Sleep Apnea via polysomnography at Mayo Clinic Sleep Center between 2000-2011.

Results:

Out of 238, 41.6 % patients were excluded due to seizures or central apnea being the predominant cause of desaturations. Out of the remaining 139 patients, 60.4 % were male, with a mean age at polysomnography of 0.79 years (standard deviation (SD) = 45.88). Gestational age at birth was known for 92 infants and although most of them (59 patients, 64.13%) were term (>37 weeks of gestational age (WGA)), only 20 (33.9%) had severe obstructive sleep apnea (OSA). It appears that of all infants with known genetic syndromes (41 out of 132, 31.06%), 22 (53.66%) had OSA. Other associated comorbidities were found to be gastroesophageal reflux disorder and craniofacial abnormalities, like laryngomalacia. 69.9% of all infants had reflux and constituted 70.9% of severe cases. Similar results were found for craniofacial abnormalities (58.8 %), once again representing majority of patients (31 out of 48, 64.68%) with severe OSA.

Conclusion:

Early detection of risk factors and associated comorbidities in infants with obstructive apnea might be the cornerstone for preventing further complications, improving outcomes, and quality of life.

077

Body mass index, age and genre in association to respiratory sleep disorders in pediatric patients with Down Syndrome

Renteria-Solis, IE¹; Labra-Herrera, AR¹; Galicia-Polo, L²; Haro-Valencia, R³

¹Sleep Disorders Clinic. Department of Otolaryngology, National Autonomous University of Mexico, Mexico;

²Sleep Disorders Clinic. Department of Polysomnography, National Autonomous University of Mexico, Mexico;

³Sleep Disorders Clinic Chief, National Autonomous University of Mexico, Mexico

Background:

The worldwide prevalence of Down Syndrome (DS) varies between 1/650 1/1000 of live births each year, and their average life expectancy nowadays is 60 years. Several clinical features of DS predispose to



sleep-disordered breathing, such as generalized hypotonia, relative macroglossia, maxillary and midfacial hypoplasia, lymphoid hyperplasia, reduction in pharyngeal muscle tone, and overweight. Nocturnal sleep plays an important role in cognitive development, behavior and daytime function. Therefore, understanding of sleep architecture in DS, and its disrupting factors is crucial to design therapeutic interventions and prevention strategies. Body mass index (BMI), genre and age have been previously described to influence the severity of sleep-disordered breathing in general population, although their role in DS remains yet to be established. The purpose of this study was to determine their association with sleep breathing disorders in Mexican pediatric population with DS.

Methods:

We performed a retrospective chart review of 35 patients aged 2 to 18 years with DS who underwent overnight 8-channel polysomnography from August 2011 to March 2012 in the Sleep Disorders Clinic of the National Autonomous University of Mexico. All patients had been recruited from an educational facility specializing in DS. Cardiovascular and pulmonary comorbidities preventing adequate ventilation were excluded. Data was recorded on age, sex, height, weight, body mass index, upper airway obstruction due to lymphoid hyperplasia, total sleep time, sleep efficiency, sleep latency, REM latency, apnea-hypopnea index, mean and minimal oxygen saturation and number of arousals per hour.

Results:

Records of thirty-five patients with DS between the ages of 2 and 18 years were reviewed. There were 22 (63.35%) males and 13 (37.14%) females. The mean age was 8.12 \pm 5.34 years. Mean BMI was 29.61 kg/m². Mean apnea-hypopnea index was 20.43. Obstructive sleep apnea associated with lymphoid hyperplasia had a prevalence of 25 patients (71.42%).

Conclusions:

Body mass index and age were significantly associated with severity of apnea-hypopnea index. Childhood obesity high prevalence in Mexico and its comorbidities include pediatric patients with DS. Sleep disordered breathing in DS should be addressed as a public health concern.

078

Emfit sleep mattress as measurement of sleep-related breathing problems and daytime attention in children

Saarenpää-Heikkilä, Outi¹; Isokangas, S²; Lapinlampi, AM³; Himanen, SL⁴

¹pediatric neurology / pediatric clinics, Tampere University Hospital, Tampere, Finland; ²medical school, Tampere University, Finland; ³clinical neurophysiology, Pirkanmaa Hospital District, Finland; ⁴physiology, medical school, Tampere University, Finland

Background:

Sleep-related breathing problems are common in children and the diagnostic means are quite complicated and expensive. However, the early detection of sleep-disordered breathing is important because it has been found to impact children's daytime performance. In addition to apneas and hypopneas children often present with prolonged partial obstruction, which can be easily recognized with sleep mattresses. The aim of this study was to find out how

sleep-related breathing disorder detected with the Emfit sleep mattress is associated to children's performance.

Methods:

25 7 to 10-year-old children whose night sleep was investigated by polysomnography and Emfit sleep mattress were included. The daytime attention and reaction times were studied with the computer-based Cognispeed test. Traditional apnea-hypopnea index (AHI) and Emfit-based breathing categories were used to divide children into two groups with both means (normal group, sleep disordered breathing group). AHI over 2/h was considered pathologic whereas in the Emfit-analysis over 10 per cent of sleep-disordered breathing (from total sleep time) was considered abnormal. The groups were compared with the Mann Whitney U-test.

Results:

The reaction times in Cognispeed were markedly longer among the sleep-disordered breathing group defined by the Emfit-signal than among the normal group (387,5 ms versus 347,5 ms, medians, respectively, p-value 0.046). When AHI was used to compose the groups, there were no marked differences in the Cognispeed parameters (reaction time median 376 ms in the group with high AHI versus 368,3 ms in normals).

Discussion:

Our results confirm the previous findings of impaired daytime performance in children with sleep-related breathing problems. We suggest that the Emfit sleep mattress analysis might reveal clinically significant breathing disorders which are not found with traditional study methods. Adding the Emfit-mattress to sleep studies is easy and not disturbing as no wires have to be adjusted to the sleeping patient.

079

Impact of adenotonsillectomy on the link between cardiac vagal activity and delta sleep EEG in children suffering from OSAS.

Scaillet, S¹; Chimanuka, I²; Lanquart, JP³; Groswasser, J¹; Jurysta, F³

¹Sleep Unit, University Children's Hospital Queen Fabiola, Belgium; ²Medical student, ULB, Belgium; ³Sleep unit, Erasme, ULB, Belgium

Objective:

The aim of the study was to investigate the link between cardiac vagal component of heart rate variability (normalised high frequency of HRV or Hfnu) and delta sleep in children suffering from OSAS.

Method:

Sleep EEG and ECG of 11 children with a mean age of 24 months were recorded before and after AT surgery. Adenotonsillectomy (AT) occurred on average 5 weeks after the first polysomnography (PSG). The second PSG took place on average 9 weeks after AT surgery. The average time between PSG1 and PSG2 was 14 weeks. Sleep parameters for the entire night, as well as the cardiac vagal components of HRV (HFnu and LF/HF) and sleep parameters of the first three NREM-REM cycles were compared before and after surgery. A spectral analysis of the EEG was also carried out, to obtain values for delta power. When three sleep cycles were not available, parameters were obtained for the whole nocturnal sleep.

**Results:**

Surgery decreased the obstructive sleep apnea index from 25.4 to 0.5 obstructive apnea per hour of sleep ($p < 0.001$). The arousal index decreased after AT surgery, but the difference was significant only in REM sleep ($p = 0.033$). The three cycle duration was the same in the first and the second PS. The composition of these periods in REM and NREM sleep was similar. Across sleep stages for the three cycle period studied, the mean RR-interval duration (RRi) did not increase significantly ($p = 0.087$). HFnu and LF/HF as well as delta power did not vary significantly. Phase shift (delay between occurrences of modifications in HFnu and delta signals), gain and coherence values were comparable before and after surgery. Within REM sleep, RRi before surgery is significantly shorter ($p = 0.005$), the HFnu is significantly lower ($p = 0.012$), and LF/HF is significantly higher ($p = 0.025$) than after surgery.

Conclusion:

The treatment of OSAS by AT surgery in children is accompanied by a modification of the autonomic balance in favor of the parasympathetic activity during REM sleep. Contrary to what can be observed in young adults, the disappearance of the obstructive events did not influence significantly the link between the vagal cardiac activity and the delta power.

080**Circulating T regulatory lymphocytes (Tregs), Endothelial Function and Insulin Sensitivity in Children With Obstructive Sleep Apnea (OSA).**

Tan, HL; Gozal, D; Samiei, A; Bhattacharjee, R; Wang, Y; Molero-Ramirez, H; Bandla, HPR; Kulkarni, R; Kheirandish-Gozal, L

Section of Pediatric Sleep Medicine, Dept of Pediatrics, The University of Chicago, USA

Background:

There is increasing evidence that OSA is a systemic, low grade inflammatory disease with multiple end-organ involvement including involvement of the cardiovascular and metabolic systems. We have recently found that increasing OSA severity is negatively correlated with percentage of Tregs in the peripheral blood of children with OSA. Tregs, which suppress inflammatory responses, are critical in the prevention of endothelial activation, and migration and adhesion of leukocytes, and can attenuate atherosclerosis development in mice. Conversely, Treg depletion can aggravate atherosclerotic vascular lesion development in rodents. We hypothesized that the decrease in Tregs contributes to the endothelial dysfunction seen in children with OSA.

Methods:

50 consecutively recruited children (aged between 4.8 to 12 years) under evaluation for habitual snoring underwent a standard overnight polysomnography (PSG) and height and weight assessments from which BMI z score was calculated. A fasting blood sample was taken the following morning, fasting insulin and glucose levels were assayed and the homeostatic model (HOMA) was calculated as a measure of insulin resistance. The percentage of Tregs was examined using flow cytometry. Endothelial function was expressed as the time to peak regional blood flow post occlusion release (Tmax) using a modified hyperemic test involving cuff-induced occlusion of the radial and ulnar arteries and a laser Doppler system.

Results:

37 of the subjects were diagnosed with obstructive sleep apnea ($\text{OAHl} > 1$). Circulating Tregs were not significantly associated with either BMI z score or with HOMA. However, a significant inverse correlation between percentage of Tregs and Tmax emerged ($p < 0.0001$, $r = -0.56$).

Conclusions:

The presence of endothelial dysfunction in the context of OSA in children is strongly correlated with concomitant changes in circulating Tregs. Thus, alterations in specific T cell lymphocytes may contribute to cardiovascular morbidity in pediatric OSA. Interestingly, OSA-induced Treg effects appear to be tissue specific, and do not seem to involve mechanisms associated with insulin resistance in the context of pediatric OSA.

081**Alterations in Circulating T-cell Lymphocyte Populations in Children with Obstructive Sleep Apnea (OSA).**

Tan, Hui-leng; Gozal, D; Wang, Y; Bandla, HPR; Bhattacharjee, R; Kulkarni, R; Kheirandish-Gozal, L
Section of Pediatric Sleep Medicine, Pritzker School of Medicine, University of Chicago, USA

Background:

Changes in lymphocyte phenotype and functionality have been described in adult patients with OSA. Their role is less well explored in pediatric OSA. Interestingly, regions within the promoter of FOXP3 gene, a critical regulator of T-regulatory lymphocyte (Tregs) fate, are hypermethylated in pediatric OSA in a disease-severity dependent fashion. We therefore hypothesized that OSA in children can elicit alterations in T lymphocytes, particularly in Tregs, and aimed to characterize circulating T lymphocyte subsets in children with OSA.

Methods:

Consecutively recruited children being evaluated for habitual snoring underwent an overnight polysomnography (PSG) and a morning fasting blood sample was obtained. Flow cytometry was performed on peripheral blood mononuclear cells stained for CD3, CD4, CD8, CD25, FOXP3, IL-4, IFN- and IL-17. Subjects were divided into 3 groups based on their PSG: controls ($\text{AHI} < 1/\text{hr TST}$), mild OSA ($1 \leq \text{AHI} < 5/\text{hrTST}$), moderate/severe OSA ($\text{AHI} \geq 5/\text{hrTST}$)

Results:

Children with moderate/severe OSA had significantly reduced Treg than controls [4.8(3.8-5.7%CD4+) vs 7.8(7.0-9.2%CD4+); $p < 0.001$]. Children with moderate/severe OSA also had increased Th1 cells ($p = 0.001$) and Th1/Th2 ratios ($p = 0.0026$) compared to children with mild OSA and controls. Associations between AHI and Treg ($p = 0.0003$; $r = -0.46$), CD4+ lymphocytes ($p = 0.0047$; $r = -0.37$), and Th1/Th2 ratios ($p = 0.0009$; $r = 0.43$) emerged. In addition, the percentage of Treg was inversely correlated with Th1/Th2 ratios ($p = 0.029$; $r = -0.29$).

Conclusions:

Significant negative correlations between the severity of OSA and the percentage of Tregs, along with a shift in the Th1:Th2 balance towards one of Th1 predominance, occur in the peripheral blood of children with OSA.



These novel findings suggest a shift towards a pro-inflammatory state, and may contribute to the systemic inflammation seen in OSA, along with its attendant increased risk for multiple end-organ morbidity. Future exploration of these pathways may provide unique potential for therapeutic modifications.

082

Upper Airway Morphology In Children With Obstructive Sleep Apnea Syndrome

Verhulst, Stijn¹; Vos, Wim²; Van Holsbeke, Cedric²; Van Hoorenbeeck, Kim³; Boudewyns, An³; De Backer, Jan²; De Backer, Wilfried³

¹Antwerp University Hospital, Edegem, Belgium; ²FluidDA, Belgium; ³Antwerp University Hospital, Belgium

Aim:

The aim of this study was to investigate the effects of age, gender and obstructive sleep apnea (OSA) on upper airway morphology in children. Second, we also assessed the agreement between clinical and CT-based assessment of upper airway patency.

Methods:

Children referred to our sleep lab with suspected OSA were included. All patients underwent a standard physical examination including the Brodsky and Mallampati scores, polysomnography and a low dose CT scan of the upper airway with 3D-reconstruction of the upper airway starting at the nostrils down to Th1. This region was subdivided into the following segments: nostril to bottom of inferior turbinate (1), bottom of inferior turbinate to choanae (2), choanae to uvula (3); uvula to epiglottis (4) and epiglottis to Th1 (5). The following variables were calculated: upper airway volume, upper airway volume for each of the 5 segments and minimal cross-sectional area. Using computational fluid dynamics, the resistance of the upper airway was calculated.

Results:

26 children were included (18 boys) with a mean age of 5.9 ± 3.5 years. 20 patients were diagnosed with OSA with a median *o*AHI of 6 (range: 0.2 – 124.3). Age correlated strongly with total upper airway volume ($r = 0.72$; $p < 0.001$) and with all segmental volumes except for segment 4. Similar correlations were observed for height, weight and BMI. Gender had no effect on airway characteristics.

The Brodsky score correlated negatively with the volume of segment 1 ($r = -0.45$; $p = 0.02$), segment 2 ($r = -0.45$; $p = 0.02$), segment 3 ($r = -0.47$; $p = 0.01$) and with the minimal cross-sectional area ($r = -0.42$; $p = 0.03$). A positive correlation was also found with airway resistance ($r = 0.52$; $p = 0.007$). However, there was no correlation between the Brodsky score and OSA severity.

OAI correlated with volume of segment 3 ($r = -0.54$; $p = 0.008$), airway resistance ($r = 0.5$; $p = 0.02$) and the minimal cross-sectional area ($r = -0.44$; $p = 0.04$). *o*AHI correlated with volume of segment 3 ($r = -0.38$; $p = 0.05$) and airway resistance ($r = 0.48$; $p = 0.02$). Respiratory disturbance index correlated with volume of segment 3 ($r = -0.41$; $p = 0.04$), airway resistance ($r = 0.53$; $p = 0.005$) and the minimal cross-sectional area ($r = -0.39$; $p = 0.05$).

Conclusion:

The severity of OSA in this population is mainly determined by the airway volume at the level of adenoids and tonsils (segment 3). CT-derived parameters correlate better with OSA severity than clinical scales.

083

Blood pressure outcomes in children with sleep disordered breathing: A four-year follow-up

Vlahandonis, Anna¹; Walter, Lisa¹; Nixon, Gillian¹; Davey, Margot²; Horne, Rosemary¹

¹The Ritchie Centre, MIMR, Monash University, Australia; ²Melbourne Children's Sleep Centre, Monash Children's, Southern Health, Australia

Background:

Sleep disordered breathing (SDB) is associated with elevated blood pressure (BP) in children, however, there have been limited studies investigating the long-term BP outcomes. To address this we assessed overnight BP and heart rate (HR) in children with both resolved and unresolved SDB four years after initial diagnosis.

Method:

60 children (12.9 ± 0.2 yo (mean \pm se), 55% male) underwent repeat overnight polysomnography (PSG) with continuous BP measurement 4.0 ± 0.3 y after initial diagnosis. 40 children were originally diagnosed with SDB ($n=21$ Primary Snoring (PS), $n=11$ Mild Obstructive Sleep Apnoea (OSA), $n=8$ Moderate/Severe OSA) and 20 were non-snoring controls. Children were deemed resolved (absence of snoring and obstructive apnoea hypopnoea index (OAHl) ≤ 1) or unresolved (ongoing snoring and/or OAHl > 1) on their repeat PSG.

Results:

At follow-up, 18 children had a complete resolution of SDB, and 22 had SDB (PS $n=16$). Groups were matched for age, sex and BMI z-score. OAHl decreased ($p < 0.05$) in both SDB groups and remained unchanged in controls. At the initial PSG BP was elevated in Wake and all sleep stages in both SDB groups compared to controls ($p < 0.01$ for all). Wake BP remained unchanged between the studies in both SDB groups, however, there was a significant reduction in BP at follow up in all sleep stages ($p < 0.05$ for all). In the control group there was a significant increase in Wake BP at follow up ($p < 0.05$), but no change during sleep. At follow up there was no significant difference in BP between the unresolved, resolved and control groups in Wake or any sleep stage.

Conclusion:

Children with either unresolved or resolved SDB at follow-up exhibited a significant reduction in BP during sleep, with levels similar to controls. This could be attributed to the overall improvement in OAHl, highlighting that even minor improvements in SDB can improve cardiovascular outcome.

084

Childhood sleep disordered breathing can result in long-term sleep and respiratory disturbances

Vlahandonis, Anna¹; Walter, Lisa²; Nixon, Gillian²; Davey, Margot³; Horne, Rosemary²

¹The Ritchie Centre, MIMR, Monash University, Melbourne, Australia; ²The Ritchie Centre, MIMR, Monash University, Australia; ³Melbourne Children's Sleep Centre, Monash Children's, Southern Health, Australia

Introduction:

Research suggests that treatment success for paediatric sleep disordered breathing (SDB) is more variable



than previously thought. Little is known about the natural history of children with primary snoring (PS) who are often not treated. This study aimed to investigate the long-term sleep and respiratory outcomes of children with a range of SDB severities.

Method:

61 children (12.9±0.2yo (mean±se); 56% male) underwent repeat overnight polysomnography (PSG) 4.0±0.3y after initial diagnosis. 41 children had SDB at the original PSG (n=22 PS, n=11 Mild OSA, n=8 Moderate/Severe (MS) OSA) and 20 were non-snoring controls. At follow-up, SDB severity, presence of snoring, sleep and respiratory outcomes were re-assessed. Children were deemed resolved (an absence of snoring and obstructive apnoea hypopnoea index (OAHI) <=1 on their repeat PSG) or unresolved (ongoing snoring and/or OAHI >1). Sleep disturbance questionnaires (paediatric daytime sleepiness score (PDSS); sleep disturbance score (SDSC); OSA-18) were compared between the three groups.

Results:

At follow-up, 54% (n=22) of children were unresolved (PS n=16, Mild OSA n=1, MS OSA n=3) and 46% were resolved. OAHI was significantly reduced for both SDB groups (p<0.05). In the resolved group, snoring frequency and %NREM1 were significantly decreased (p<0.01). In the unresolved group Wake after sleep onset (%WASO) was significantly increased (p<0.05). There were no significant differences for any measures in controls. Both the SDB groups had significantly higher sleep disturbance scores compared to controls on the PDSS, SDSC and OSA-18 (p<0.01 for all) at follow-up.

Conclusions:

Four years after diagnosis there was a significant improvement in respiratory measures and SDB was resolved in 46% of children. However, over half of the children still had SDB, mostly PS (n=16). Furthermore, children with both resolved and unresolved SDB continued to have higher sleep disturbance scores as assessed by questionnaire, a finding which needs to be explored further.

085

Beyond Adenotonsillectomy: Experience with Sleep Endoscopy and the Treatments It Directs In Pediatric Obstructive Sleep Apnea

Wooten, Christopher¹; Chinnadurai, S²; Tylor, DA²; Goudy, SL²

¹Otolaryngology, Vanderbilt University, Nashville, USA; ²Otolaryngology, Vanderbilt University, USA

Background:

Due to a variety of factors, children may continue to demonstrate obstructive sleep apnea (OSA) after tonsillectomy/adenoidectomy (TA), necessitating a secondary treatment. Drug-induced sleep endoscopy (DISE) diagnoses levels of ongoing obstruction, which may in turn be targets for surgical therapy. We review the subjective and objective outcomes in patients undergoing multilevel operations for OSA who were evaluated by DISE.

Methods:

19 consecutive children with OSA following TA underwent DISE, followed by operative management of the

level(s) of ongoing obstruction. Pre- and postoperative OSA was assessed through a detailed history (of nighttime symptoms (NS) and daytime symptoms (DS)), physical examination, and polysomnography (as available). Specifically, NS and DS were identified and scored on a weighted scale designed a priori. A score of 12 for NS and 8 for DS represent maximum severity.

Results:

Age ranged 5-18 years (mean 9.7+/-3.4). Ten of 19 had trisomy 21 (52%). Based on DISE, we performed 16 lingual tonsillectomies, 11 midline posterior glossectomies, 6 revision adenoidectomies, 5 inferior turbinate reductions, 3 palatopharyngoplasties and 3 revision palatine tonsillectomies. Overall, 83% reported subjective improvement. NS improved from 5.8+/-2.9 preoperatively to 2.1+/-2.5 postoperatively (p < 0.05), while DS improved from 2.1+/-1.3 preoperatively to 0.6+/-1.1 postoperatively (p < 0.05). Seventeen of 19 patients (89%) completed preoperative polysomnography, with a mean obstructive index (OI) and oxygen nadir of 7.0+/-5.8 events/hour and 84+/-8.2%, respectively. Only 7 patients (37%) completed postoperative polysomnography, with a mean obstructive index and oxygen nadir of 12.7+/-27.1 events/hour and 80.6+/-13.5%, respectively. However, these data are skewed by one patient whose OSA continues to escalate despite multiple therapies. Excluding her polysomnographic data, mean OI improved from 6.2+/-5.1 events/hour preoperatively to 2.5+/-2.3 events/hour postoperatively.

Conclusions:

Individualized, oftentimes multilevel, operative therapy based on DISE findings is associated with substantial improvement in subjective and objective measures of sleep.

086

The impact of obstructive sleep apnoea on quality of life in obese children

Evans, Carla¹; Baur, LA²; Selvadurai, H³; Waters, KA³

¹Faculty of Medicine, The University of Sydney, Sydney, Australia; ²Weight Management Services, The Children's Hospital at Westmead, Australia; ³Respiratory Medicine, The Children's Hospital at Westmead, Australia

Background:

Obesity and obstructive sleep apnoea (OSA) have been shown, independently, to impair quality of life (QoL) in children. Studies demonstrating that obesity affect physical and psychosocial function have not adjusted for OSA, a known co-morbidity. But OSA itself affects physical and emotional function, and school performance. The aim of this study was to determine if the QoL of obese children is further compromised by the presence of OSA.

Methods:

Sixty four healthy weight (n = 28) and obese children (n = 36) aged between 7 - 13 years were recruited. Polysomnography was used to diagnose OSA (OAHI => 1 hr⁻¹). All children and caregivers completed the PedsQL™ 4.0 generic QoL survey and analysis was performed in accordance with the PedsQL™ guidelines. One-way ANOVA was performed between groups.

**Results:**

Twelve children (19%) were obese without OSA (mean BMI 29.4 ± 4.6 , mean OAH1 $0.5 \pm 0.2 \text{ hr}^{-1}$), and 24 children (38%) were obese with OSA (mean BMI 30.6 ± 6.5 , mean OAH1 $10.3 \pm 10.9 \text{ hr}^{-1}$, $p < 0.001$). Compared to healthy weight children without OSA (mean BMI 16.5 ± 2.1), obese children without OSA self-reported reduced social function ($p < 0.05$) and overall QoL ($p = 0.05$), and obese children with OSA reported poorer physical function ($p < 0.001$), emotional function ($p = 0.05$), social function ($p < 0.005$), school performance ($p < 0.05$) and overall QoL ($p = 0.001$). These self-report outcomes were supported by the caregivers' reports.

Conclusion:

Social function and overall QoL is poor in obese children, but those with co-morbid OSA have impaired QoL in all domains, namely: physical, emotional and social function, school performance and overall QoL

087**Entering parents' bed every night is associated with a lower risk of being overweight among 2-6 year old children. Results from the Sund Start study.**

Olsen, Nanna Julie¹; Händel, MNH¹; Stougaard, M¹; Pedersen, J¹; Mortensen, EL²; Heitmann, BL¹

¹Research Unit for Dietary Studies, Institute of Preventive Medicine, Denmark; ²Institute of Public Health, University of Copenhagen, Denmark

Objective:

Research suggests that childrens' entering their parents' bed after nightly awakenings is associated with short sleep duration and sleep fragmentation. Moreover, obesity has been found to be associated with low sleep quality and quantity. We examined if entering parents' bed during night was associated with an increased risk of child overweight, and if adjusting for parental perception of child sleep quality changed the results.

Methods:

The Sund Start study included 645 children aged 2-6 years, all predisposed to overweight due to either a high birth weight, maternal pre-pregnancy overweight or maternal low socioeconomic status. Of these, 491 children had complete information on BMI, how often the child entered parents' bed during night and parental perception of whether the child sleeps calmly or disturbed. International cut-offs for overweight according to age and gender was applied. Odds Ratio (OR) and 95% Confidence Intervals (CI) were estimated from logistic regression analyses.

Results:

Children entering parents' bed every night had OR = 0.27 (95% CI 0.09-0.82) compared to children never/ almost never entering parents' bed during night. Further adjustment for parental perception of whether the child sleeps calmly or disturbed gave similar results (OR = 0.28 (95% CI 0.09-0.84)). All analyses were adjusted for gender and age of the child and parental educational level.

Conclusion:

Those children never or almost never entering parents' bed during night had a more than 3-fold higher risk

of being overweight than those entering every night. Parental perception of whether the child sleeps calmly or disturbed did not alter the association. The results may suggest that elements of parental social support or other types of positive psychosocial responses if being allowed to enter parent's bed during night may protect against overweight.

088**Sleep microstructure characteristics in otherwise healthy overweight 10-yr-old children**

Chamorro Melo, RA¹; Ferri, R²; Algarín Crespo, CR¹; Garrido, M¹; Lozoff, B³; Peirano, P¹

¹Sleep Laboratory, INTA, University of Chile, Chile; ²Sleep Research Center, OASI Institute, Troina, Italy; ³Center for Human Growth & Development, U. Michigan, USA

Background:

To compare sleep microstructure characteristics in otherwise healthy overweight (OW) and normal weight (NW) children.

Methods:

We studied 28 NW (> -1 BMI z-score < 1) and 45 OW (BMI z-score ≥ 1) children. Subjects (10.3 \pm 0.2 yrs, 65.6% male) participated since infancy in an ongoing cohort follow-up study. Nutritional status was evaluated by body mass index (BMI) z-score adjusted for age and sex, according to WHO criteria. A nighttime polysomnographic recording was performed in the laboratory, and sleep-wake states (non-REM sleep stages N1, N2 and N3, REM sleep, and Wake) were determined. Sleep microstructure was evaluated through the visual analysis of the Cyclic Alternating Pattern (CAP) during non-REM sleep.

Results:

Groups were similar regarding sleep architecture parameters. Furthermore, they all had an apnea/hypopnea index within normal limits. CAP rate (41.9 \pm 2.9%) and CAP A1, A2 and A3 indexes were not different between groups. BMI was positively related to CAP number and CAP time only during N3 ($p < .009$). BMI related to CAP A1 number ($p < .009$) and index ($p < .004$) also during N3. Comparing groups differences were also confined to N3: OW had higher CAP number ($p < .04$), A1 number and index ($p < .02$), and shorter duration of CAP cycles and B phase ($p < .02$).

Conclusion:

This study shows modified CAP features during N3 in OW children. Given that CAP differences were evident in the absence of altered sleep macrostructure, with an oscillatory pattern of EEG slow activity more frequently found in OW children, those results indicates more unstable N3 sleep episodes and could reflect a fragmented slow wave activity thought the night in this group. [Fondecyt 1110513 & NIH HD33487 grants].(*) CONICYT.



089

Sleep Lab Adaptation in Children with ADHD and their Typically Developing Peers

Bessey, Meredith; Richards, J; Corkum, PV
Psychology, Dalhousie University, Canada

Introduction:

There are inconsistent findings regarding the type and frequency of sleep problems in children with attention deficit-hyperactivity disorder (ADHD). High rates of sleep problems are consistently found on parent reports, but are not always verified on polysomnography (PSG). It is hypothesized that this discrepancy may be due to differential sleep lab adaptation (i.e., how well or how poorly children adjust to a sleep lab environment). Research has not investigated this specific question, although one study examined changes in sleep patterns from the first to second night of PSG collection and found that children with ADHD demonstrated a stronger first night effect compared to typically developing (TD) children.

Methods:

Actigraphy variables were compared between the home environment and the sleep lab during PSG collection for children with ADHD (n = 25) and TD children (n = 25). Further, sleep lab adaptation reports from parent, child and PSG Research Assistant (RA) were compared between groups.

Results:

Actigraphy variables revealed that both groups of children slept for significantly less time in the sleep lab than at home. Additionally, TD children, but not children with ADHD, had improved sleep efficiency in the sleep lab. Sleep onset latency did not differ across environments, nor was there a group interaction. Parents of children with ADHD reported that their children's sleep onset latency at the sleep lab was atypical. PSG RAs noted more sleep difficulties for children with ADHD, but children themselves did not report any difficulties.

Conclusions:

For some sleep variables, data collected in the sleep lab may not be representative of children's sleep in the home environment. Based on actigraphy data there was no differential impact on sleep for children with ADHD; therefore, sleep lab adaptation is not a likely reason for the discrepancy between parent report and PSG findings.

090

Screening Sleep in Achondroplasia: A New Regional Service in the UK

Heraghty, J¹; Hulse, JA¹; Irving, M²; Gringras, P¹

¹Paediatrics, Evelina Children's Hospital, United Kingdom; ²Genetics, Evelina Children's Hospital, United Kingdom

Achondroplasia is an autosomal dominant condition that affects around 1 in 25,000 live births. It is characterised by disproportionate shortening of the proximal limbs caused by a mutation in fibroblast growth factor receptor gene 3. Features of achondroplasia include a small thoracic cage, large head, depressed nasal bridge and midfacial hypoplasia. Structures at the base of the skull can cause spinal stenosis with compression of

the medulla and cervical cord leading to hydrocephalus. Unsurprising polysomnography abnormalities are common. Central disorders in the control of breathing and obstructive sleep apnoea can occur in up to 50% of individuals. There is also an increase risk in sudden death within this group which may be due to the problem with the control of breathing. However despite this large incidence there is little evidence regarding the need to serially screen these children and adults for sleep abnormalities. The Royal College Of Paediatrics and Child Health, in the UK published a sleep report in September 2009 recommending that this group of children should be screened for sleep disordered breathing ideally with oximetry and capnography. If the initial assessment is normal then further monitoring should be performed every 6 to 12 months until the child reaches 5 years old. However there is little evidence to support this recommendation. Our Hospital is setting up a new regional achondroplasia service that will annually assess the needs of this group of patients. As part of the review process we will be taking a sleep history, performing outpatient home oximetry and capnography studies and an inpatient respiratory polysomnogram. We will present the data from the first 20 patients within our service.

091

Parental education in children with ADHD and sleep onset insomnia

Hop, Jeannette

Stichting Altrecht, Zeist, Netherlands

Background:

Sleep onset insomnia (SOI) is a highly prevalent symptom in children with Attention Deficit Hyperactivity Disorder (ADHD). Chronic SOI in ADHD can be caused by a delayed sleep phase syndrome (DSPS). This diagnosis is confirmed by assessment of endogenous melatonin levels in saliva, showing a delayed dim light melatonin onset (DLMO). Melatonin treatment effectively reduces sleep onset latency in children with DSPS. Consequently, many children with ADHD and SOI receive melatonin treatment. However, other causes of SOI that are highly prevalent during childhood may be overlooked, such as poor sleep hygiene or behavioral problems. We studied DLMO in a consecutive series of 64 children with ADHD and SOI. Furthermore, we studied the effect of parental education on the insomnia symptoms.

Methods:

A consecutive series of 64 children with ADHD and SOI, merely between 6 and 12 years were studied. They were referred by childpsychiatrists to their colleague with special interest in sleep (JH). In all patients, DLMO was measured, and all parents received education on sleep physiology, sleep hygiene and management of behavioral bedtime problems by a nurse practitioner (RB). Evaluation took place after 6 weeks by means of DLMO results and a parental rating of the insomnia symptoms on a 3-point scale (improved, no change, worsened).

Results:

1 parent reported the insomnia symptoms had worsened since the education. DLMO in this child was normal. 26 / 64 parents (41 %) reported the sleep of the child had improved since the education, in n = 20 (77 %) DLMO was delayed. 37 / 64 (58 %) reported the education had no influence on the symptoms, in this group DLMO was delayed in n=30 children (81 %). In summary, in this population of children with ADHD and SOI, DLMO was delayed in 80 %. Parental education improved the symptoms in 40 %.



092

Use of Ball Blanket in Attention Deficit Hyperactivity Disorder sleeping problems

Hvolby, Allan¹; Bilenberg, N²

¹child and adolescent psychiatric department ent, psychiatry of Region of Southern Denmark, Esbjerg N, Denmark; ²child and adolescent psychiatric department ent, psychiatry of Region of Southern Denmark, Denmark

Objectives:

Based on actigraphic surveillance, ADHD symptom rating and sleep diary, this study will evaluate the effect of Ball Blanket on sleep for a sample of 8-13 year old children with Attention Deficit/Hyperactivity Disorder.

Design:

Case-control study. Setting: A child and an adolescent psychiatric department of a teaching hospital. Participants: 21 children aged 8 to 13 years with a diagnosis of ADHD and 21 healthy control subjects. Intervention: Sleep was monitored by parent-completed sleep diaries and 28 nights of actigraphy. For 14 of those days, the child slept with a Ball Blanket. Main Outcome Measures: The sleep latency, number of awakenings and total length of sleep will be measured, as will the possible influence on parent and teacher rated ADHD symptom load.

Results:

The results of this study will show that the time it takes for a child to fall asleep is shortened when using a Ball Blanket. The time it takes to fall asleep when using the Ball Blanket is found to be at the same level as the healthy control subjects. Teacher rating of symptoms show an improvement in both activity levels and attention span of approx. 10% after using the Ball Blankets.

Conclusions:

The results of this study show that the use of Ball Blankets is a relevant and effective treatment method with regard to minimising sleep onset latency. We find that the use of Ball Blankets for 14 days improves the time it takes to fall asleep, individual day to variation and the number of awakenings to a level that compares with those found in the healthy control group. Furthermore, we find that the use of Ball Blankets significantly reduces the number of nights that the ADHD child spends more than 30 minutes falling asleep from 19% to 0%.

093

Nocturnal haemoglobin oxygen saturation in urban and rural East African paediatric populations with sickle cell anaemia

L'Esperance, Veline¹; Ajala-Agbo, T²; J Makani, J³; Cox, S⁴; Newton, CRJ⁵; Williams, TN⁵; Marsh, K⁵; Kirkham, FJ⁶; Hill, CM⁷

¹Division of Clinical Experimental Sciences, Faculty of Medicine, University of Southampton, Southampton, United Kingdom; ²Division of Clinical Experimental Sciences, University of Southampton, Southampton, United Kingdom; ³Muhimbili University of Health and Allied Sciences, Tanzania; ⁴London School of Tropical Medicine and Hygiene, United Kingdom; ⁵Kenya Medical Research Institute (KEMRI), Kenya; ⁶UCL Institute of Child Health, London, United Kingdom; ⁷Division of Clinical Experimental Sciences, Faculty of Medicine, University of Southampton, United Kingdom

Homozygous sickle cell anaemia (SCA) is one of the most common monogenetic conditions in the world, with more than 70% of sufferers living in sub-Saharan Africa. Episodic and continuous nocturnal hypoxaemia are common in SCA and predict neurological complications and painful vaso-occlusive crises. Overnight pulse oximetry with signal extraction technology (Masimo®) provides an inexpensive and accessible method of recording nocturnal haemoglobin oxygen saturation. We were interested to characterise overnight the haemoglobin oxygen saturation in African children with SCA and compare those living in rural and urban settings. We assessed 149 children from rural Kenya (Kilifi) and urban Tanzania (Dar-es-Salaam). 95 Kenyan 6.4 years [IQR 3.7-10.1] and 54 Tanzanian children SCA (median age 7.3 years [5.1-10.6]) with haemoglobin SS confirmed by haemoglobin electrophoresis (homozygous SCA) were screened regardless of symptoms of sleep-disordered breathing. Daytime and overnight recordings of SpO₂ were recorded by pulse oximetry (Masimo®). Mean daytime SpO₂ was greater in Kenyan SCA children compared with Tanzanian SCA (99.0 [98-100.0 and 97 [94.8-99.1] %]; $p < .0001$). Overnight mean SpO₂ was higher in Kenyan SCA compared with Tanzanian SCA (99.0 [96.7-99.8] % and (97.9 [95.4-99.3] %) respectively; $p = .006$). The percentage of time spent with SpO₂ < 90% overnight was lower in Kenyan SCA (0 [0-0.05] %) compared with Tanzanian SCA (1.1 [0-4.0] %); $p < .0001$). The overnight oxygen-carrying capacity in the Kenyan SCA was significantly greater compared with Tanzanian SCA (10.0 [9.1-11.0] vs 9.4 [8.2- 10.2] $p = .028$). Tanzanian children with SCA experience greater exposure to low nocturnal oxyhaemoglobin saturation in comparison to Kenyan children with SCA. This may indicate that these two very similar populations may each follow a different clinical course of disease, perhaps related to environmental exposures such as nutrition or pollution. Assessment and management of low nocturnal oxyhaemoglobin saturation may have a role in prevention of SCA complications.

094

Polysomnography in children with sickle cell anaemia referred for symptoms of sleep-related breathing disorder

L'Esperance, Veline¹; Marshall, M²; Gavlak, JCD³; Laverty, A³; Kirkham, FJ²; Abel, F³

¹Neurosciences Unit, UCL Institute of Child Health, London, United Kingdom; ²Neurosciences Unit, UCL Institute of Child Health, United Kingdom; ³Portex Unit, UCL Institute of Child Health, United Kingdom

Background:

Sickle Cell Anemia (SCA; HbSS) is the most prevalent inherited disorder in inner cities in the UK and affects >10,000 patients of African origin in London alone. Sleep-disordered breathing (SDB), particularly intermittent and sustained nocturnal oxyhemoglobin desaturation, has been shown in SCA with a prevalence of up to 40%. A few studies have also documented OSAS with apparently greater severity than other susceptible populations. The aim of the present study was to describe characterise the polysomnography values of a sample of children with SCA referred to Great Ormond Street hospital for evaluation of sleep disordered breathing. A secondary aim was to investigate the association between sleep variables including ETCO₂ and clinical data and including, age group, BMI, haemoglobin levels and adenotonsillectomy status.

Methods:

This was a retrospective audit of children with SCA referred by their paediatricians or haematologists to Great Ormond Street Hospital for Children NHS Trust for overnight cardio-respiratory sleep studies between 1999 and 2005.

**Results:**

A total of 90 (49 boys) children with HbSS aged 2.1 to 18.2 (median 8.0) years were studied between 1999 and 2007. The prevalence of Sleep Related Breathing Disorder is defined as the combined definition of obstructive apnea index >1 or obstructive apnea hypopnea index (AHI) >5 . In this cohort 41% of children had an AHI greater than 5. The AHI was also higher in younger children ($p=.02$) and in boys ($p=.04$).

Discussion:

Sleep related breathing disorder is common in sickle cell disease. Identification of risk factors for sleep related breathing disorder may lead a better understanding of the underlying pathophysiology in this population.

095**Sleep characteristics in children with sickle cell disease- comparison with a control group**

Loureiro, Helena¹; Mascarenhas, I²

¹paediatrics, Hospital Prof Fernando Fonseca, Amadora, Portugal; ²Pediatrics, Hospital Prof Fernando Fonseca, Portugal

Introduction:

Sleep in children with sickle cell disease (SCD) is frequently disturbed. It is important to study it, to prevent complications and co-morbidities in these children.

Objective:

To compare the results of Polysomnography (PSG) in a sample of children and adolescents with SCD (group A) and the results of a similar control group regarding age, sex and Apnea-Hypopnea Index (AHI) that performed a PSG for clinical Obstructive Sleep Apnea Syndrome investigation (group B).

Methods:

Clinical and PSG parameters were analyzed in 2 groups of children in order to study differences between sleep architecture. Mean and minimum SaO₂ were also analyzed. We performed a descriptive statistics and a Student's T-test analysis.

Results:

A PSG was done in 65 children with SCD and 65 control children. The mean age was 9.4 years (SD \pm 4.6) in both groups, 53.8% were males. Children were divided in 2 age groups, considering prevalence of lymphoid tissue hypertrophy, 2-8 years (n= 30-younger) and 9-17 years (n=35-older) and compared with the control group. Sleep efficiency was mean 86.3% (SD \pm 9.5) in group A and 85.9% (SD \pm 8.8) in group B. Sleep phases were compared between groups A and B and in younger and older children. The AHI, similar in both groups, had a mean of 3.7/h (SD \pm 1.7) in younger and a mean of 3.3/h (SD \pm 1.9) in older children. Mean SaO₂ was also similar in both groups, but the minimum SaO₂ was lower in group A (SCD) and the difference was statistically significant ($p<0.01$). The presence of enuresis was higher in group A, 29/65 (44.6%), versus 4/65 (6.1%) in group B.

Conclusions:

With similar AHI, we found a similar sleep pattern between the SCD and control group. Minimum oxygen saturation during sleep is significantly lower in SCD group. Enuresis is more frequent in the SCD group in children of same age.

096**Clonidine for sleep: a survey of prescribing practices of UK Paediatricians and Child and Adolescent Psychiatrists**

MacLeod, R¹; Keen, D¹; Gringras, P²

¹Department of Developmental Paediatrics, St George's Healthcare NHS Trust, United Kingdom; ²Paediatric Sleep Group, Evelina Children's Hospital, United Kingdom

Aims:

To ascertain UK clinician practice and experience of Clonidine 'off label' in treating paediatric sleep problems in the absence of an evidence base for its use in sleep.

Methods:

Electronic survey sent to all Child and Adolescent Psychiatrists (CAPs) and specialist Paediatricians.

Results:

389 respondents (30% Paediatricians, 70% CAPs). Of the 172 (44%) respondents currently prescribing Clonidine (for tic, behavioural & sleep disorders), 50 (13%) had prescribed specifically for sleep problems in the previous year.

Patients per current prescribers ranged from 0-30 (mode: 1), age range 2-18 years (mean 10.1). Indications (in order of frequency) were sleep onset difficulties, night waking, non-specific sleep problems and carer respite. Patients generally had significant co-existing neurodevelopmental disorders (intellectual disability, autism, ADHD).

Before using clonidine, 94% had tried sleep behavioural therapies and 63% another medication. Over 75% of both historical and current prescribers reported initial effectiveness, reducing to 53% long term. Drug tolerance was reported by 73%. Dose escalation was sometimes an effective strategy, but often temporarily. Adverse effects, reported by 66%, were most often considered mild or transient. 94% perform an initial cardiovascular examination, but far fewer an electrocardiogram. 78% regularly monitor blood pressure. Over 75% initiate treatment with doses between 25-50mcg. Mean maintenance nightly dose reported is 105mcg. Maximum doses used vary greatly (up to 800mcg). In general, there are no significant differences in practice evident between Paediatricians and CAPs.

Conclusions:

1. Clonidine is used widely in the UK as in the US, and the majority of prescribers experience initial satisfactory results.
2. Clonidine is generally used second line after behavioural and other medication interventions.
3. Adverse effects are considered mild or transient.



4. In the absence of a substantial evidence base, there is a need for good quality RCTs to consider the use of Clonidine in paediatric sleep disorders.

097

Sleep Disorders in children with Lysosomal Storage Disorders

Rajdev, Shiv¹; Hendriksz, CJ²; Wassmer, E³

¹Neurorehabilitation, Birmingham Children's Hospital, Birmingham, United Kingdom; ²Adult Inherited Metabolic Disorders, Salford Royal NHS Foundation Trust, United Kingdom; ³Neurology, Birmingham Children's Hospital, United Kingdom

Background:

Different sleep disorders can be seen in children with Lysosomal Storage Diseases (LSD) due to various factors like airway obstruction (eg. Hunters and Hurlers) or neurobehavioural problems (e.g. Sanfilippo)

Objective:

To determine the incidence of sleep disorders in children with and categorise the different type of sleep disorders in this group.

Methods:

Children were ascertained through the database of a tertiary Inherited Metabolic disorders unit in UK. It is a retrospective study and parents of all 89 children with LSD were sent sleep disturbance scale for children (SDSC) questionnaires by mail. They were asked to assess their child's sleep over the previous six months using SDSC, from which six sleep "disorder" factors and a total sleep problem score were obtained.

Results:

A total of 47 (19 Females: 28 Males) responses were received. 37/47(79%) had a total sleep problem score indicative of sleep disturbance. Individual Factor analysis showed 25/47 (53%) had difficulty in initiating and maintaining sleep (DIMS), 20/47(43%) had sleep breathing disorder (SBD), 14/47 (30%) had sleep-wake transition disorder, 11/47(23%) had disorder of excessive somnolence, 7/47(15%) had disorder of arousal and 6/47(13%) had sleep Hyperhydrosis.

In 19/47(40%) there was co-existence of 2 or more types of disorders. There was no clinically significant difference between the median total score of the boys and girls ($P = 0.19$). LSD were grouped into 3 Clinical categories ie. 1. Mucopolysaccharidosis III (MPS III) 2. Mucopolysaccharidosis (MPS) excluding MPS III 3. Sphingolipidosis and there was no significant difference in the median total Sleep score of the 3 groups ($P = 0.62$). According to us there has been no previous study which has reported sleep disorders in a variety of LSD as in our study.

Conclusions:

Sleep disturbance is common in children with LSD and DIMS and SBD were amongst the commonest disorders.

098

Sleep quality in paediatric inpatient settings

Sankey, Ruth¹; Clayton, Ester²; Hill, Catherine³; McCaughey, Elizabeth⁴; Stickland, Alice²

¹University of Southampton, Bristol, United Kingdom; ²University of Southampton, United Kingdom; ³Child Health, University of Southampton, United Kingdom; ⁴Child Health, Solent NHS Trust, United Kingdom

Background:

Sleep promotes emotional control, healing and healthy immune-function so should be promoted when children are sick. In a previous study parents identified sound as a key sleep-disturbing factor on children's wards. The WHO recommends that mean nocturnal sound levels in hospital should not exceed 35dB.

Aims:

To compare the sleep quality of children and co-sleeping carers in hospital to home.
To quantify the amplitude and variability of nocturnal sound levels in each environment.

Methods:

23 paediatric inpatients aged 3-12 years and 11 co-sleeping parents had sleep monitored with actiwatches (AMI, New York) for up to five nights in hospital and five nights at home. Bedside sound-level monitoring (Bruel and Kjaer 2236) was undertaken in 4 children for up to two nights in hospital and two nights each at home.

Results:

Children's total sleep time was significantly lower in hospital compared to home: mean 473 versus 552 minutes, $p < 0.001$. Sleep quality was also reduced: mean sleep efficiency 75% in hospital versus 86% at home, $p < 0.001$. No significant differences were demonstrated between children with acute medical conditions ($n = 13$) and those with chronic conditions ($n = 10$) who were familiar with the hospital environment. While co-sleeping carers' total sleep time did not significantly differ between hospital and home, sleep efficiency was lower in hospital: 75% versus 88%, $p < 0.001$. Median sound levels were higher in hospital than at home (52.0dB versus 33.8dB) and showed greater variance (33.1dB versus 18.4dB).

Conclusion:

In this study children slept on average over an hour less in hospital compared to home and both children and co-sleeping carers experienced significantly reduced sleep quality. Median noise levels in hospital exceeded thresholds in WHO guidelines and were equivalent to a noisy office environment. Noise is a potent trigger for arousal from sleep and is a modifiable environmental factor in hospital settings.



099

Sleep quality and body composition in elite female athletes

Silva, Maria-Raquel G¹; Paiva, Teresa²

¹Inst. Molecular Medicine, Medical Faculty of Lisbon, Oporto, Portugal; ²Inst. Molecular Medicine, Medical Faculty of Lisbon, Portugal

Background:

Gymnastics requires gracefulness and technique. Young gymnasts are under a great pressure of keeping a lean body while they are undergoing important processes of growth and development for their future life. Although athletes often have a poor sleep quality and, since it is known that sleep influences body composition, its relation to sleep quality deserve extended research. Our main purpose was to evaluate sleep quality and body composition in young female gymnasts before an international competition.

Methods:

67 rhythmic gymnasts [18.67 (2.93) years old] of high performance level [36.60 (7.56) hours of training/week] were evaluated by a questionnaire, which collected: training data; medical and gynecological history; sleep assessed by the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index; body composition (weight, height, body mass index (BMI), fat mass (FM), muscle mass (MM) and total body water) was measured by anthropometry and bioelectrical impedance. Descriptive, linear regression analysis and correlation analysis were used. The significance level was 5%. Data was analyzed using SPSS, version 18.0.

Results:

Gymnasts showed a high body density [1.074(0.009) g/cc] and reduced fat mass [9.06(2.09)%], muscle mass [13.97 (5.10)Kg] and total body water [51,41 (6,13)%]. Athletes weight was [48.39 (4.93)Kg; height: 1.66 (0.05)m; BMI: 17.39 (1.14)Kg/m²]. Those with a good sleep quality had a BMI \bar{y} 18.5 kg/m², while those with a bad sleep quality had a lower BMI, $p = 0.005$). Gymnasts presenting a FM equal to or lower than 8% slept longer than those with lower FM ($p = 0.014$). However gymnasts with lower BMI showed better results in competition ($p = 0.018$).

Conclusion:

Sleep duration and quality influences body composition and anthropometric characteristics in young female athletes. Balancing success and health is a crucial, and the long term consequences of body composition abnormalities at young ages in females deserve further research.

100

Sleep quantity and energy intake in female athletes during two athletic seasons

Silva, Maria-Raquel G

Faculty Health Sciences-University Fernando Pessoa, Oporto, Portugal

Background:

An adequate amount of sleep and a balanced diet promote an optimal athletic performance, because sleep

and energy intake can maximize the benefits of training process during the athletic season. However female gymnasts are under a great pressure of keeping a lean body. Although gymnasts seem to be at a low level of energy intake and suffer from insufficient sleep, few investigations have examined this concern, especially in female athletes. The main purpose of this study was to evaluate the amount of sleep and energy intake during two consecutive seasons in female gymnasts into the three periods: preparatory, competitive and transitory.

Methods:

70 competition female gymnasts [11.1 (2.8)years old; 35.8 (10.4)Kg; 140.4 (13.6)m] taking part in the Portuguese Gymnastic Federation were evaluated by a questionnaire, which collected: training data; number of sleep hours in weekdays and weekend days; energy and nutrients intake by a three days consecutive food record and; anthropometric measures (weight, height and body mass index). Descriptive linear regression analysis and Pearson correlation coefficients were used. The significance level was 5%. Data was analyzed using SPSS, version 18.0.

Results:

Gymnasts slept more in the weekend days than in weekdays during the athletic season, but sleep quantity decreased in both competitive periods [8.0 (1.1) hours/day] and increased in preparatory [8.5 (1.2) hours/day] and transitory [8.4 (2.0) hours/day] periods. Gymnasts energy intake decreased from preparatory periods [1603 (487) Kcal/day] to transitory periods [1400 (461) Kcal/day]. The gymnasts mean height and weight increased among the season.

Conclusion:

Gymnasts presented an insufficient sleep quantity for their age and physical requirements and an unbalance and hypo caloric diet, which can compromise their athletic performance and efficiency.

101

Reported sleep problems and daily functioning in children with Attention Deficit Hyperactive Disorder and in controls

Sorensen, Anne

Center for Child and Adolescent Psychiatry, Risskov, Denmark

Background:

Adhd (attention deficit/ hyperactive disorder) is a neurodevelopmental disorder with a prevalence of 2-5 %. Co-morbidity appears in up till 75% of children and 2/3 of parents report significant sleep related problems. Daily function of children with ADHD is impaired compared to normal controls. Functional impairment is measured on family, school, peer and social factors, but whether the degree of functional impairment and sleep related problems are correlated is not known. The aim of this study is to investigate how daily function and sleep are reported in children with ADHD compared to a matched control group and how the relation of impairment and sleep is correlated.



Method:

A case control study. All consecutive patients age 6-14 years from the school department of Child Psychiatric Department, Risskov, are assessed with a rigorous diagnostic interview (Development and Well-Being Assessment) and validated questionnaires about sleep related problems (Children's Sleep Habits Questionnaire), daily functioning (Weiss Functional Impairment Rating Scale) and ADHD symptoms score (ADHD Rating Scale).

Results:

Data collection is still ongoing so results are preliminary. We have results from 150 people in each group and there is at the moment statistical significant difference on all parameters between patients and controls. Baseline data and correlations will be presented in tables and graphs.

102

Overnight oximetry in African children with Human Immunodeficiency Virus

Sunderland, Nicholas¹; Dlamini, N²; Collinson, J¹; Eley, B³; Wilmshurst, J⁴; Kirkham, FJ⁵

¹University of Oxford, United Kingdom; ²Paediatric Neurology, Evelina Children's hospital, United Kingdom; ³Red Cross War Memorial Hospital, South Africa; ⁴Paediatric Neurology, Red Cross War Memorial Hospital, South Africa; ⁵Neurosciences Unit, UCL Institute of Child Health, United Kingdom

Background:

Obstructive sleep apnoea (OSA) has been described in 2 small studies of adults with human immunodeficiency virus (HIV) and appears to be associated with higher body mass index[1] and adenotonsillar hypertrophy.[2] However, there are few data on the prevalence of OSA or overnight oximetry abnormalities in children and the possibility of an association with cerebrovascular disease has not been addressed. The aim of this prospective study, was to examine the prevalence of OSA and overnight haemoglobin oxygen desaturation in South African children with HIV and any association with basilar and middle cerebral artery velocity (MCAV) measured using transcranial Doppler (TCD) ultrasound.

Methods:

We undertook TCD and overnight pulse oximetry using the Masimo motion-resistant portable oximeter in 22 unselected African children (12 male; median age 4; range 0.5-10 years) with HIV. We analysed the data using Download 2001, which includes delta12, a measure of OSA if >0.4, as well as mean and minimum haemoglobin oxygen saturation (SpO₂), the percentage of the total sleep study spent with SpO₂<95% and the number of desaturations per hour.

Results:

Median (range) for mean and minimum overnight SpO₂ were 98.6 (94.6-99.8)% and 81 (33-94)% respectively, while the percentage of the total study with SpO₂<95% was 0.67 (0.02-29.2)%. The median number of dips in SpO₂ >4% per hour was 3.5 (0.3-19.8) and the median delta12 index was 0.50 (0.29-1.15). Eleven children (50%) had delta12>0.4, consistent with a diagnosis of OSA.[3] There was a trend for delta12 to be correlated with the CD4% (r=0.43, p=0.08). Minimum SpO₂ was correlated with respiratory rate (r=-0.71, p=0.01). None of the oximetry indices were correlated with body mass index. Right MCAV correlated with mean overnight

SpO₂ (r=-0.52, R² 0.27; p=0.016) but left MCA and basilar velocities did not.

Discussion:

Our data suggest that OSA is common in African children with HIV, especially those with a high CD4%, while overnight haemoglobin oxygen desaturation may be associated with cerebrovascular disease.

[1] Lo Re V 3rd et al. Obstructive sleep apnoea among HIV patients. *Int J STD AIDS*. 2006;17:614-20. [2] Epstein LJ et al. Obstructive sleep apnea in patients with human immunodeficiency virus (HIV) disease. *Sleep*. 1995;18(5):368-76. [3] Magalang UJ et al. Prediction of the apnea-hypopnea index from overnight pulse oximetry. *Chest*. 2003;124(5):1694-701.

103

Low-dose melatonin treatment of sleep disorders in children with neurodevelopmental disorders

Gnidovec Stražičar, B; Perkovic Benedik, M

Dept. of child, adolescent & developmental neurology, University Children's Hospital Ljubljana, Slovenia

Background:

Sleep problems are common in children with neurodevelopmental disorders and there is a growing body of evidence that they can be treated successfully by exogenous melatonin. However the doses of melatonin used in the majority of studies were rather high and the effect of treatment on many occasions based only on the parental observation reports. The aim of our study was to actigraphically assess the effect of low dose melatonin treatment in a heterogeneous group of children with neurodevelopmental disorders.

Methods:

Ten consecutive children (eight males, two females, age range = 2 – 14.5 years, mean 8.7) with neurodevelopmental disorders were included. Four had multiple disabilities with symptomatic epilepsy and one of them was also blind. Four were diagnosed with autistic spectrum disorder and two had known chromosomal aberrations. Their sleep patterns were assessed by actigraphic recording before and after the introduction of melatonin treatment. In case of prolonged sleep onset latency alone 1 mg of fast release melatonin was used 30 min before child's most desirable bedtime, while children with accompanied fragmented sleep and/or disturbed circadian rhythm pattern were treated with 2 mg of sustained release melatonin.

Results:

Most children (80 %) had a remarkable response to melatonin treatment while in two autistic children there was no effect of melatonin on their early morning awakenings. Using fast release melatonin sleep latency decreased by a mean of 21 min (t-test, p<0.01). Sleep latency was significantly shorter (p<0.05) also after administration of sustained released melatonin where we could additionally observe increased total sleep time by a mean of 43 minutes (p<0.01). This was achieved mainly by shorter duration and less so by reduced number of night-time wakes. All children tolerated melatonin treatment well and no serious adverse events were observed during the course of treatment.



Conclusion:

Low dose melatonin treatment provides a safe, well-tolerated and effective treatment of sleep disorders in children with neurodevelopment disorders.

104

Sleep in children with high functioning autism: a questionnaire and polysomnography study in a non complaining sample.

Godbout, Roger¹; Lambert, A²; Tessier, S²; Chevrier, É²; Mottron, L³

¹Psychiatry, Université de Montréal, Montréal, Canada; ²Sleep Laboratory & Clinic, Hop. Rivière-des-Prairies, Canada; ³Autism Clinic, Hop. Rivière-des-Prairies, Canada

Background:

Sleep disorder is a frequently reported comorbidity in children with autism, together with mental retardation. Most of the published data comes from questionnaire and there is a paucity of polysomnography reports. The aim of this research was to characterize sleep in autistic children without comorbidities.

Methods:

11 children with autism (10.3±2.2 years) diagnosed with ADI-R and ADOS criteria and 13 typically-developing children (10.2±2.0 years) were recruited. Exclusion criteria comprised the use of psychotropic medication, a full IQ lower than 75, obesity, a history of epilepsy and spontaneous complaints of sleep disorders from the parents. After their children were recruited, parents filled a sleep agenda for 2 weeks and the Child Sleep Habit Questionnaire (CSHQ); children were then recorded for 2 consecutive nights in a sleep laboratory. Sleep stages were scored according to Rechtschaffen and Kales (1968) using 20 sec. epochs. Stage 2 sleep spindles and K-complexes as well as REM sleep rapid eye movements were also scored. Variables were log transformed when abnormally distributed. Groups were compared on data from night 2 using t-tests for independent samples.

Results:

The agenda and CSHQ results were not different except a trend toward longer sleep latency for autistic children in the former (0.52±0.17 h vs 0.20±0.08 h, p=.07) and toward a shorter total sleep time in the latter (6.6±0.8 h vs 7.9±0.9 h, p=.07). Polysomnographically recorded sleep latency was longer in autistic children (33.0±8.3 min vs 14.4±4.6 min, p=.05), the duration of stages 3 and 4 (slow-wave sleep: SWS) was shorter (18.2±3.2 % vs 23.6±5.7 %; p=.009) but total sleep time was similar (539.7±16.7 vs 560.8±16.4; p=.94). Sleep spindle density (per hour of Stage 2) was similar in both groups at central electrodes and Fp1 but it was lower at Fp2 (119.2±97.7 vs 225.5±122.2, p=.03). The density of K-complexes was lower at the four electrodes (.0001 to .01). REM sleep parameters (latency, duration, distribution, eye movement density) were not different.

Conclusions:

These results show that autistic children without subjectively reported sleep difficulties show polysomnographic signs at variance with typically-developing children. Most differences were found in nonREM sleep, raising the hypothesis of a difficulty for autistics to synchronize their cortical activity and possibly leading to impaired cortical sleep protective mechanisms such as sleep spindles and K-complexes.

105

Different Willis Ekblom Disease (WED) phenotypes?

Ipsiroglu, Osman¹; Hung, YHA²; Soo, S²; Ho, Gloria²; Barbosa, AV³; Vatikiotos-Bateson, Eric³; McKellin, W⁴

¹Pediatrics, Sleep Research Lab -Sunny Hill Health Center, Canada; ²Pediatrics, Sleep Research Lab-Sunny Hill Health Center, Canada; ³Linguistics, University of British Columbia, Canada; ⁴Anthropology, University of British Columbia, Canada

Background:

Sleep related day- and night-time symptoms may not be recognized or may be missed in children with neurodevelopmental disabilities/disorders (NDD/D), as NDD/D are usually associated with challenging behaviour and insomnia. Results of sleep assessments suggest that optimizing our clinical understanding before triaging patients for further diagnostic/therapeutic care would be helpful.

Methods:

We use an ethnographic approach adapted from medical anthropology to explore parent(s)/caregiver(s) perceptions of 'challenging behaviour' and of sleep problems (SP). In addition, we developed and piloted home-based over-night-video-sleep-studies to clinically understand and describe SP.

Results:

We are presenting day- and night-time related symptoms and behaviours in 25 children and youth (2-17 years) with global developmental delay or intellectual disability with familial WED and diagnoses like fetal alcohol and autism spectrum disorders, cerebral palsy, and additional syndromes (e.g. Trisomy-21, cri-du-chat, 22q-deletion, 13x chromosome deletion). The challenging behaviours of these patients were given diagnoses such as attention deficit hyperactive, anxiety, obsessive compulsive, oppositional defiant disorders, emotional lability, and/or depression. However, WED-related discomfort/urge-to-move/pain had been missed. We identified WED as one main cause of both insomnia and aggravated challenging behaviour over the day. At quite a young age these children have developed movement-based adaptive strategies to overcome difficulties in sitting still and falling asleep. These strategies range from subtle to quite extreme and can even result in passing out from exhaustion, hiding typical well-known symptoms that may indicate WED. However, all parents/caregivers generally described the sleep quality of their child as restless and light with major problems in sleep maintenance.

Conclusion:

History and analysis of behavioural patterns in conjunction with family sleep history seems to be a key in understanding WED of patients with NDD/D. These observations open our understanding of SP causality and diagnostic/therapeutic options.

106

High incidence of sleep problems in children with developmental disorders: Results of a questionnaire survey in a Japanese elementary school

Matsuishi, Toyojiro¹; Matsuoka, M²; Nagamitsu, S³; Iwasaki, M⁴; Iemura, A⁴; ,X,,,,"^,%o,",, Y⁴; ,X,,,,"^,%o,",, Y⁴; Maeda, M⁵; Kakuma, T⁶; Uchimura, N⁵



¹Pediatrics & Child Health, Kurume University, Fukuoka, Japan; ²Neuropsychiatry, Kurume University School of Med, Japan; ³Department of Pediatrics and Child Health, Kurume University School of Medicine, Japan; ⁴Pediatrics & Child Health, Kurume University, Japan; ⁵Neuropsychiatry, Kurume University, Japan; ⁶Biostatistics Center, Kurume University, Japan

Objective:

The aim of the present school-based questionnaire was to analyze the sleep problems of children with developmental disorders, such as pervasive developmental disorder and attention deficit hyperactivity disorder.

Methods:

The sleep problems of 43 children with developmental disorders were compared with those of 372 healthy children (control group). All children attended one public elementary school in Kurume, Japan; thus, the study avoided the potential bias associated with hospital-based surveys (i.e. a high prevalence of sleep disturbance) and provided a more complete picture of the childrens academic achievement and family situation compared with a control group under identical conditions. Childrens sleep problems were measured with the Japanese version of the Childrens Sleep Habits Questionnaire (CSHQ-J).

Results:

The total CSHQ-J score was significantly higher for children with developmental disorders, as were mean scores for the parasomnias and sleep breathing subscales. The total CSHQ-J score, bedtime resistance, sleep onset delay, and daytime sleepiness worsened with increasing age in children with developmental disorders; in contrast, these parameters were unchanged or became better with age in the control group. In children with developmental disorders, there was a significant association between a higher total CSHQ-J score and lower academic performance, but no such association was found in the control group. For both groups, childrens sleep problems affected their parentsf quality of sleep. There were no significant differences in physical, lifestyle, and sleep environmental factors, or in sleep/wake patterns, between the two groups.

Conclusions:

Children with developmental disorders have poor sleep quality, which may affect academic performance. It is important for physicians to be aware of age-related differences in sleep problems in children with developmental disorders. Further studies are needed to identify the association between sleep quality and school behavioral performance.

107

Some kinds of developmental disorders in children and adolescents may be found by sleep specialist.

Matsuzawa, Shigeyuki

Pediatrics, Hyogo Prefectural Rehabilitation Hospital, Kobe, Japan

Background:

We have the outpatient department and the word for the children and adolescents with sleep-related problems

aged 20 and below. Many of our efforts have focused on circadian rhythm sleep disorders (CRSD) and behaviorally induced insufficient sleep syndrome (BISS). The aim of the study was to find the characteristics of the children with developmental disorders who come to sleep clinic.

Methods:

We studied of the patients with the sleep-related complaints from April 2009 to December 2011. The type of the sleep disorders and the developmental disorders, and the timing of diagnosis in developmental disorders were picked up from medical records.

Results:

The subjects were 94 (boys 49, girls 45, age 0.7-20 years). Their sleep disorders are 57 CRSD (12 CRSD with long sleep time), 13 BISS, 9 idiopathic hypersomnia with long sleep, 8 disorder of maintaining sleep since infancy. We diagnosed developmental disorders definitely (GD) by 29.8% and almost certainly by 11.9%. The type of developmental disorders in the patients of GD were 22 autism spectrum disorder (ASD), 9 attention-deficit/hyperactivity syndrome (AD/HD), and 7 mental retardation (MR) and/or language delay. The rate of the patients having already been made the diagnosis or been suspected developmental disorders before consulting us is 48.0% at the GD (44.4% of AD/HD, 45.5% of ASD, 100% of MR and/or language delay, 83.3% of the patients with developmental coordination disturbance, 57.1% of the patients with sensory hyperresponsiveness). The diagnosis of developmental disorders is usually made by pediatrician or psychiatrist in Japan. But in some children and adolescents, such as AD/HD that their hyperactivity and impulsiveness are not full noticed, ASD with high level intelligence and a certain level of social skill, ASD with serious sensory hyperresponsiveness, or disorder of maintaining sleep since infancy, the characteristics of developmental disorders may be found by sleep specialist.

108

The effects of traumatic brain injury on sleep in children: A systematic review

Sadaka, Y¹; Sud, S²; Webber, TA³; Hung, R⁴; Weiss, S³

¹Soroka Medical Center, Israel; ²University of Toronto, Canada; ³The Hospital for Sick Children, Canada; ⁴Holland Bloorview Hospital, Canada

Background:

traumatic brain injury (TBI) is common cause of death and permanent disability in the pediatric population. Sleep disturbance is one of the most common yet least studied sequelae of children post TBI across all levels of severity. In this study we systematically review the current literature regarding the relationship between TBI and sleep disturbance in children.

Methods:

A search based on Cochrane methodology was conducted evaluating available literature in the MEDLINE, EMBASE, PsycINFO and Web of Science databases. Relevant articles were classified for the strength of evidence based on Newcastle Ottawa Scale (NOS).

**Results:**

Cochrane style search yield total of 1618 articles (WOS 423, EMBASE 742, MEDLINE 375, PsycINFO 78). Only 14 articles examined directly or indirectly whether TBI correlate with sleep disorder in children. Most of these studies received relatively low NOS score. In general, shortly post TBI (up to 6 mo) studies suggested an increase in occurrence of sleep disorders, however six month post mild TBI, children did not demonstrate sleep disorders on studies with higher NOS score. Only one study was conducted specifically on children post severe TBI. This study demonstrate sleep disorders both shortly after and long after TBI

Conclusion:

This review emphasizes that there is a lack of methodologically appropriate studies on the relationship between TBI in children and associated sleep disturbance.

109**Intrathecal baclofen pump, it's not all roses! - Series of case reports**

Turcu, Simona¹; Heraghty, J²; Perides, S³; Lin, J-P³; Kaminska, M³

¹General Paediatrics, Evelina Children Hospital, London, United Kingdom; ²General Paediatrics, Evelina Children Hospital, United Kingdom; ³Neurology Department, Evelina Children Hospital, United Kingdom

Background:

Intrathecal baclofen (ITB) has been used since 1984 to reduce severe spasticity and dystonia. There is a potential for baclofen to cause respiratory depression at high doses, but little is known about the impact of ITB therapy on sleep disorder breathing (SDB).

Case description:

We present a series of 3 children with severe dystonic cerebral palsy (CP) who required ITB therapy. Improvement of pain/discomfort, seating tolerance and care burden was achieved in all. In the first 2 cases as the baclofen dose was increased, their pre-existing but not investigated earlier, obstructive sleep apnoea (OSA) deteriorated with hypercapnia leading to non-invasive ventilation (NIV). First patient did not tolerate NIV and despite of reduction of ITB dose and adjustment of ventilation pressures, he deteriorated gradually and died at home 3.5 years after pump insertion. In the second case, reduction of ITB dose was facilitated by adding clonidine and NIV was initiated successfully. In the 3rd case, sleep study assessment pre-insertion revealed obstructive sleep apnoea and adenotonsillectomy was performed with significant improvement. Sleep studies are planned to monitor OSA during ITB dose titration.

Discussion:

Clinical observations suggest worsening OSA symptoms with higher ITB doses in children. Multiple factors may influence OSA in CP including age and body growth. Facial non-invasive ventilation can be offered in cases with significant OSA causing hypercapnia. Tolerance is difficult but can be improved by inpatient titration of the baclofen dose, ventilation pressures and by adding Clonidine when reducing the baclofen dose.

Conclusion:

Sleep studies before and after ITB pump insertion are recommended in patients with SDB to monitor the impact of ITB therapy. ENT opinion should be sought before ITB where appropriate. Formal studies are needed to assess the impact of ITB therapy on sleep disorder breathing in children and to develop therapeutic protocols.

110**Stories of the night: Exploring the experience and meaning of sleep for children with cerebral palsy and their siblings.**

Underhill, Jessica

Research, Chailey Heritage Clinical Services, North Chailey, United Kingdom

Background:

Within the field of sociology sleep has been recognised and placed firmly within the social context of people's lives. However, such research has rarely included the multiple perspectives of members of the same family, nor has it extended to the sleep of children with disabilities and their families.

Children with cerebral palsy (CP) form the largest group of children with a physical disability in the UK. Despite 'sleep problems' being common there has been no in-depth exploration of the experience of sleep from the perspective of the child with CP or that of their siblings.

Aim:

To explore the meaning of sleep for children with CP and their siblings.

Method:

The paper examines interview data collected as part of a larger multi-method based study that explored the sleep of children with CP, their parents and their siblings.

Participants:

10 children with CP (7 male; aged 6-13 years) and 7 siblings (5 male; aged 6-13 years).

Procedure:

Following a 2 week data collection period (including actigraphy and sleep diaries) the children were interviewed at their homes. Communication was assessed and where necessary individual augmentative communication systems were used. The children could choose to be interviewed alone or with someone else present. Interviews were audio and/or video recorded and, where appropriate, interviews were conducted over a number of visits. Analysis: Interviews were transcribed verbatim, coded and analysed thematically.

Results:

The key themes emerging from the initial analysis for children with CP and their siblings include: routines and rituals; the meaning or 'non-meaning' of sleep for self and others; bedrooms and artefacts of sleep. The emerging themes will be discussed in the context of providing an understanding of sleep at both an individual level but also at a level embedded in family life and the relationships, roles and the home this encompasses.

**Polysomnographic characteristics in patients with Prader-Willi syndrome: 6-year longitudinal follow-up in a tertiary hospital in Taiwan**

Wong, Shi-Bing¹; Wei, SH²; Tsai, WH¹; Yang, MC³; Tsai, LP¹

¹Pediatrics, Buddhist Tzu Chi General Hospital, Taipei branch, Taiwan; ²Pediatrics, E-Da Hospital, Taiwan;

³Pulmonology, Buddhist Tzu Chi General Hospital, Taipei branch, Taiwan

Background:

Patients with Prader-Willi syndrome are reported to have higher incidence of sleep-disordered breathing. In this study, we retrospectively reviewed overnight polysomnography (PSG) data in patients with Prader-Willi syndrome from 2006 to 2012.

Methods:

Overnight PSG is performed for all patients with Prader-Willi syndrome annually in Tzu-Chi general hospital, Taipei branch. Age at time of study, genotype, use and dose of GH, normalized body-mass index (BMI SDS), weight-length index (WLI), total sleep time, sleep stage percentages, apnea-hypopnea index (AHI), central apnea/hypopnea, obstructive apnea/hypopnea, oxygen saturation nadir, presence of snoring were evaluated.

Results:

There were 28 patients with Prader-Willi syndrome undergone 53 PSG studies (16 male, 12 female, age 10.2;04.5 years) from 2006 to 2012. In all 53 PSG studies, their mean sleep efficiency was 85;010%. Mean percentages of sleep stage I, II, slow wave sleep and REM sleep were 8.6%, 46.2%, 24.4% and 17.5%, respectively. Sleep-disordered breathing was found in 23 of 28 patients (82%) and 48 of 53 PSG studies (91%). Median AHI per hour was 4.4 (IQR 2.1-8.0), which REM AHI was 13.0 (IQR 7.5-23.3) and NREM AHI was 2.0 (IQR 0.7-5.2). Airway obstruction responded for most of apnea and hypopnea that median obstructive AHI was 4 (IQR 1.3-7.4). Mean oxygen saturation nadir was 78.3;013.4%. BMI SDS had a negative correlation to central apnea (Pearson, $r=-0.40$, $p<0.001$) and had a positive correlation to REM AHI ($r=0.33$, $p=0.017$). Those studies performed before 5 year-old disclosed more central apnea/hypopnea (2.4 vs. 0.4, $F=11.28$, $p=0.001$) and lower oxygen saturation nadir (55% vs. 79%, $F=13.49$, $p=0.001$).

Conclusion:

Patients with Prader-Willi syndrome in Taiwan had high incidence of sleep-related breathing disorder and most of them were obstructive sleep apnea syndrome. Central apnea/hypopnea tends to occur in patients younger than 5 years and may lead to severer hypoxemia.

Analyzing Home Based Sleep Assessment (HBSA) Videos: Qualitative and Quantitative Analysis

Hung, Amy¹; Ho, Gloria¹; Soo, Sonja¹; Barbosa, Adriano²; Vatikiotis-Bateson, Eric²; Black, Alec³; Ipsiroglu, Osman¹

¹Pediatrics, Sleep Research Lab Sunny Hill Health Center, Canada; ²Linguistics, University of British Columbia,

Canada; ³Pediatrics, Shriners Gait Lab Sunny Hill Health Centre, Canada

Introduction:

Home-based over-night-video-sleep-studies are helpful for the diagnosis of Willis Ekbohm Disease (WED) among children with neurodevelopmental disabilities/disorders (NDD/ D). Reproducibility of individual symptoms and their description are major challenges in clinical diagnosis, particularly when the patients themselves are unable to verbally express discomfort/urge-to-move/pain. Often, movement patterns remain unrecognized as an indication of possible WED. In addition, effects of medication are described globally and are difficult to reproduce.

Methods:

We developed standardized descriptions using home-based-over-night-video-sleep-studies. The periods of interest were analyzed qualitatively by individual research assistants and quantitatively with Optical Flow, which measures movement by computing horizontal and vertical pixel displacements between consecutive frames of a video. Specific regions of interest were chosen, the amount of motion (over time) was quantified, and the magnitudes and frequency of movements were plotted on time graphs.

Results:

Based on our standardized descriptions, we generated qualitative analysis of home- based-over-night-video-sleep-studies (i.e. Total Sleep Time, Sleep Efficiency, Restful/Restless Sleep). By extracting 2D pixel displacements, Optical Flow results identify differences in the magnitude of motion during the falling asleep, restful sleep, and restless sleep periods. Specific body parts (i.e. legs, feet, toes) can also be selected to determine the frequency of movements. Automatic quantification of motions provides us with reproducible results and offers a method of quality control for the clinical descriptions.

Conclusion:

The HBSA videos validate caregivers' narratives about sleep problems. The quantitative analysis of the video sleep studies can validate the standardized descriptions of the sleep technicians and quantifies movement magnitude and frequency.

Insomnia Diagnostics in Children with Neurodevelopmental Disabilities/Disorders (NDD/ D): Low-cost Equipment for Home Based Sleep Assessment Videos

Hung, Amy¹; Barbosa, Adriano²; Vatikiotis-Bateson, Eric²; Ipsiroglu, Osman¹

¹Pediatrics, Sleep Research Lab Sunny Hill Health Center, Canada; ²Linguistics, University of British Columbia, Canada

Introduction:

Many children and adolescents with NDD/D have global developmental delay and/or intellectual disability, often causing difficulties in verbally expressing discomfort. Up to 90% of children with NDD/D suffer from chronic insomnia. Using home-based over-night-video- sleep-studies as a screening tool, we identified familial Willis Ekbohm Disease (WED) as one main cause of insomnia and challenging behaviour. Advanced video technology is available for sleep- laboratories. However, low-cost equipment which can be sent out for screening and quantitative analyses has not been identified and tested.



Methods:

Different combinations of hardware /software were tested and used for clinical purposes. Prerequisites for in-vitro testing were: 1) low cost/physical bulkiness/weight, durability for infrared-light camera and netbook; and 2) synchronized audio/video software with live time- stamp, constant frame-rates, automatic splitting of the recordings into multiple smaller files.

Results:

We suggest an “ideal set of hardware/software” that is reliable, affordable (~\$500) and portable (= 2.8kg) to conduct non-invasive home-based-overnight-video-sleep-studies. The equipment consists of a netbook, a camera with infra-red optics, and a video capture device. The recording software and video encoder provide consistent frame rate (>29 fps), are time- stamped for analysis, and allow standardized qualitative and automatic quantitative analyses. The equipment can be couriered to patient's home and since September 2011 we have had 14/15 successful recordings; problems occurred in one case due to software programming. In order to optimize results of clinical observations and to facilitate equipment setup at their homes, patients should have internet connection for remote access from the research lab.

Conclusion:

Home Based Sleep Assessment (HBSA) Videos allow us to observe the sleep patterns of patients in their normal sleep environment. The strategy of using sleep videos opens the floor for a new ‘observational sleep medicine’ that has been useful in describing discomfort/urge-to-move/pain-related behavioural movement patterns in patients with NDD/D and WED.

114

Automated detection of sleep breathing patterns in healthy children polysomnograms

Causa, Leonardo¹; Held, CM¹; Jaillet, F²; Chamorro, RA³; Garrido, M³; Algarín, CR³; Peirano, PD³

¹Electrical Engineering, Universidad de Chile, Chile; ²Laboratoire d'Informatique en Image et Systèmes d'information, Université Claude Bernard Lyon 1, France; ³Laboratorio de Sueño - INTA, Universidad de Chile, Chile

Objective:

To present a new methodology to detect sleep breathing patterns (SBPs), apnea and hypopnea events, in the respiration signal of the polysomnographic recordings.

Methods:

All-night sleep polysomnogram recordings from 30 healthy children were included in this study. The recordings were acquired in the Sleep Laboratory of the INTA-Universidad de Chile. The proposed SBPs detection system is based on advanced signal processing tools as empirical mode decomposition (EMD), fuzzy logic, feature extraction and context analysis. The EMD and fuzzy logic are used to detect the respiration signal zones with significant variations in the amplitude of the signal, and the feature extraction and context analysis are used to characterize and validate the respiratory events. The system parameters were adjusted using the training set and fine-tuned applying the validation set, the testing data set was used to measure the final performance of the system.

Results:

An annotated database of 30 all-night polysomnographic recordings was divided in a training set of 15 recordings, including 485 SBPs marked by an expert, a validation set of 5 recordings with 109 SBPs marked by an expert, and a testing set of 10 recordings with 281 marked SBPs. The overall SBP detection performance on the testing data set of continuous all-night recordings was 88.3% sensitivity and 22.0% false-positive rate.

Conclusion:

Our system shows good results for respiratory events detection. The next step is to perform classification between apneas and hypopneas. [Fondecyt 1110513 & 1120319 grants]

115

Deriving respiratory data from overnight pulse oximetry plethysmogram recordings in infants

Seiddon, P¹; Wertheim, D²; Parsley, C³; Burgess, S³; Dakin, C³

¹Respiratory Care, Royal Alexandra Children's Hospital, United Kingdom; ²Faculty of Science, Engineering and Computing, Kingston University, United Kingdom; ³Department of Respiratory and Sleep Medicine, Mater Children's Hospital, Brisbane, Australia

We have previously shown respiratory data can be derived from oximetry plethysmogram (pleth) traces in newborn infants (Wertheim, D. et al., Arch Dis Child Fetal Neonatal Ed. 2009; 94: F301-F303); the method allowed accurate respiratory rate estimation in sections from 2 minute recordings. The aim of this study was to compare respiratory rate from inductive bands with that extracted from oximetry pleth during overnight recordings for routine polysomnography. A Somnologica N7000 system (Embla, USA) was used to record respiration from thoracic and abdominal inductive bands as well as oxygen saturation, heart rate and pleth data in 7 infants of median age 5 (range 1 to 7) months with suspected sleep disordered breathing. Pleth data were obtained using a Nonin Xpod pulse oximeter (Nonin Medical Inc., USA). Pleth traces were low pass filtered (LPF) to extract respiratory data using software we developed with MATLAB (The MathWorks Inc., USA). Median respiratory rate was computed over 2 minute epochs from thoracic and abdominal respiratory effort belts (RIP); this was compared with data derived from the pleth trace in sections with little or no artefact (selected recordings 82 to 294 minutes) and the median difference calculated (RIP-LPF) for each recording. The range of respiratory rates recorded was 22 to 65 breaths per minute and the largest RIP-LPF median difference was -2 and largest interquartile range 5 breaths per minute. We observed that pleth derived traces showed a reduction in amplitude associated with apnoeas greater than 5 seconds. These results suggest that the pleth trace may enable additional respiratory monitoring data to be derived using standard oximetry sensors.

116

Is online sleep education better than traditional delivery?

Blunden, Sarah¹; Braithwaite, T²

¹Appleton Institute, Central Queensland University, Adelaide, Australia; ²Department of Education and Children's Services, Australia



Background:

Previous trials of sleep education in schools have been delivered via traditional pen and paper delivery methods with most of these studies in adolescents (1). This paper presents data from a study to assess whether sleep education disseminated via an online model in a junior school population would show similar results.

Methods:

An experienced junior school teacher adapted the Philip's SimplyHealthy@schools online sleep education module to a year 4/5 class (n= 26) [mean (SD) age 9yrs 6mths (2mths)] in South Australia. Sleep education content and teaching templates were downloaded and adapted by the teacher to be incorporated into the existing curriculum. Sleep duration was assessed at T1 (sleep diary at baseline; n= 24), T2 (classroom online collation of self reported sleep duration changes; n= 24) and Time 3 (sleep diaries 12 weeks after baseline; n= 10). Sleep knowledge was tested at T1 (n=24) and T2 (n= 23) with a previously utilised sleep knowledge questionnaire (1).

Results:

Data analyses are ongoing but to date, 92% of students reported increased sleep duration at T2 but at T3, sleep duration was not significantly different from T1 ($p > 0.05$). Sleep knowledge improved significantly between T1 and T2 ($p < 0.05$). Over 90% of students and parents suggested that sleep education should be ongoing.

Conclusions:

Preliminary self report data suggest that, similar to traditional methods, an online delivery of sleep education for junior school children can engage students, improve sleep knowledge and potentially (at least initially) increase sleep duration. If this proves to be true with further analyses and ongoing trials, online modules of sleep education, which are more cost effective than traditional methods, could prove beneficial.

(1) Blunden S, Chapman J, Rigney G. (2011). Are sleep education programs successful? The case for improved and consistent research efforts. *Sleep Medicine Reviews* <http://dx.doi.org/10.1016/j.smrv.2011.08.002>

117

Does sleep knowledge differ across Australian rural and urban children?

Benveniste, Tessa¹; Blunden, SL¹; Camfferman, D²

¹Appleton Institute, Australia; ²University of South Australia, Australia

Background:

Sleep/wake times differ between rural and urban children, especially for Australian rural Indigenous children (RIC). Due to the likely relationship between sleep patterns and sleep knowledge, it is proposed that rural and urban differences also occur in sleep knowledge. Further, we propose that there will be differences in sleep knowledge between Australian rural Indigenous (RI), rural non Indigenous (RNI) and urban non Indigenous (UNI) children.

Method:

Self-report sleep data were collected on a Monday morning from two urban schools and an area school in a

rural community in South Australia, using the adapted Sleep Timing Questionnaire (1), and a general 'Health and Wellbeing' questionnaire developed for this study. It is expected that we will compare existing data from RI (n=19) and RNI (n=49) to data to be collected from UNI (expected n=20) children.

Results:

Preliminary results from the Sleep Timing Questionnaire confirm that differences exist between RNI and RI group's sleep behaviour in bedtimes and waketimes, with RI children going to bed earlier [$F(1,64)=4.69$, $p=0.34$] and having more unstable wake times before school days [$X^2(9, N = 52) = 20.18$, $p = .017$] compared to RNI. Ongoing data collection and analysis is hypothesised to also reveal differences in sleep knowledge scores of RI, RNI and UNI children.

Conclusions:

Whilst data analysis is incomplete, these data, which already show differences in sleep/wake schedules between ethnic groups in rural areas, may help us understand more clearly the differences in sleep wake patterns in rural children compared to urban children and their further relationship to sleep knowledge. This information could indicate potential identification of areas in need of sleep education.

118

Sleep Habits among Japanese Nursery School Children : Findings from TOON Pediatric Sleep Study

Eto, Hiromi¹; Horiuchi, F²; Takata, N³; Tanno, S⁴; Oka, Y⁵

¹Graduate School of Biomedical Sciences, Nagasaki Univ., Nagasaki, Japan; ²Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Japan; ³Institute of Nursing, Ehime Prefectural University of Health Science, Japan; ⁴Department of Public Health, Ehime University Graduate School of Medicine, Japan; ⁵Center for Sleep Medicine, Ehime University Hospital, Japan

Introduction:

Sleep habits and sleep problems among children ranging from infant to adolescents have rarely been studied comprehensively in Japan. We have previously reported our finding among kindergartener, elementary school children and high-school children in the community using a questionnaire. At this time, we described sleep characteristics and sleep behavior of nursery school children, as a part of our project.

Methods:

This study was conducted at Toon City, a local city of Japan, and involved all nursery school children. Child and Adolescent Sleep Checklist (CASC) was used to identify sleep habits and sleep problems. CASC was filled out by the caregivers and 452 subjects (mean age: 3.9 SD 1.58) responded to the questionnaire properly. This study was approved by the Institutional Review Board.

Results:

Mean bedtime was 21:09 (weekday) and 21:20 (weekend), and mean wake time was 6:44 (weekday) and 7:21 (weekend). Number of awakenings during sleep was 0.4 times. Total sleep period was 10.3 hours (weekday) and 10.1 (weekend). The frequency of nap per week was 5.9 times, and mean of nap duration was 96.4



minutes. Bedwetting was experienced almost nightly in 3.6 percentage of children, and 51.7% of children cannot sleep alone. 3.6 percent of children experienced bedwetting almost every night, and 51.7% of children cannot sleep alone. In terms of sleep problem, 34.6 % of children snored habitually, and bruxism was found in 33.9% of children. Restlessness/uncomfortable leg feeling of the leg was experienced in 7.8% of children.

Conclusion:

There were gap between weekdays and weekends on sleep habit among nursery school children. Also some sleep problem that may require medical attention was found from this study. Our finding could contribute to the better management of sleep problems in children.

119

Does bedtime restriction reduce anxiety in school-aged children diagnosed with Behavioural Insomnia of Childhood?

Gradisar, Michael¹; Leahy, E²; Oliver, M²; Slater, A²

¹Psychology, Flinders University, Adelaide, Australia; ²Psychology, Flinders University, Australia

Background:

Significant associations exist between sleep problems (ie, insomnia) and anxiety in children. Cognitive-behaviour therapy (i.e., bedtime fading, cognitive therapy, exposure therapy) has demonstrated significant reductions in both insomnia and anxiety in school-aged children. One mechanism may be that reduced wakefulness in bed does not afford opportunities to worry. The present study tests this concept using a bedtime fading paradigm for children experiencing significant anxiety and insomnia.

Methods:

12 children (age=9.4±2.6 yrs, 83% girls) diagnosed with Behavioural Insomnia of Childhood (Sleep-Association Subtype) underwent 2 weeks of manualised bedtime fading treatment. Measures included self-reported sleep diaries (including daily ratings of children's fears of sleeping alone), the Paediatric Daytime Sleepiness Scale, and the Spence Children's Anxiety Scale. Measures were completed continuously from pre-treatment to the final week of treatment (21 days). Treatment consisted of psychoeducation (sleep need, sleep homeostasis), and the development of an individualised bedtime fading plan for each child. Children attended sessions with at least 1 parent, with treatment implemented by clinical postgraduate psychology students.

Results:

Children complied with bedtime fading, with significant reductions in time in bed ($p=.018$), which were accompanied with improvements in sleep latency, wake after sleep onset and sleep efficiency (all $p<.02$). However, no significant changes occurred for total sleep time or daytime sleepiness ($p>.05$), suggesting sleep was not restricted by the bedtime fading procedure. Nevertheless, significant reductions in anxiety and fears of sleeping alone also occurred during bedtime fading treatment ($p<.05$). Changes in sleep efficiency were directly related to reductions in fears of sleeping alone ($r=0.51$), with cross-correlational analyses using a best-fitted curve ($R^2=0.90$) indicating that reductions in such fears occurred 2-3 nights after improvements in sleep efficiency.

Conclusion:

Restricting wakefulness in bed may have the potential to reduce children's anxiety and nighttime fears. Controlled studies are needed to confirm this link. If confirmed, bedtime fading may be a brief treatment component to not only assist in the amelioration of insomnia and anxiety, but may also be used as an adjunct treatment for cognitive-behaviour therapy for children's anxiety disorders.

120

Change of sleep habits and sleep problems across kindergarten, primary school, junior and senior high-school

Horiuchi, Fumie¹; Oka, Y²; Takahashi, N³; Takata, N⁴; Tanno, S⁴; Kawasaki, Y⁴; Campos, E⁴; Kawabe, K⁵; Tanigawa, T⁴; Ueno, S⁵

¹Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Toon-city, Japan; ²Department of Sleep Medicine, Ehime University Graduate School of Medicine, Japan; ³Iyo Dental Association, Japan; ⁴Department of Public Health, Ehime University Graduate School of Medicine, Japan; ⁵Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Japan

Objective:

Sleep problems are common in children and adolescents, and sleep affects various aspects of child development. As characteristics of sleep changes dramatically during childhood, it is difficult to determine the pathological level of sleep disturbance in each age group. The aim of this study was to elucidate the change of sleep habits and sleep related behaviors across age groups; from kindergarten, primary school, junior and senior high-school.

Methods:

All children from kindergartners to senior high-school students (age range: 3-18years) at a local city of Japan ($n=3891$) were involved and screened for sleep habits / sleep related behaviors using the Child and Adolescent Sleep Checklist (CASC, 36 items) (response rate: 86%). Subjects were divided into 4 age groups: kindergartners, primary school students, junior and senior high-school students, and the sleep habits were compared between sleepiness and sleep duration was also elucidated among the 4 groups.

Results:

Of the 36 items screened, several sleep habit / sleep behavior measures showed marked difference among the age groups. Percentage of students who spend more than 10 minutes before leaving the bed was 7.5% in primary school students, and 34.0% in senior high-school students. The rates of students who feel tired when they wake up were 3.4% in primary school students, and 16.3% in senior high-school students. In addition, 16.3% of senior high-school students felt sleepy in classes while 1.5% of primary school children felt sleepy. In terms of relationship between sleepiness and sleep duration, primary school and junior high school children with shorter sleep duration felt significantly sleepy than children with longer sleep duration ($p<.05$).

Conclusion:

We found significant change of sleep habit / behavior including the difficulty in waking up, tiredness in the



morning and daytime sleepiness as children grow up. Shorter sleep duration had strongly related to daytime sleepiness especially in primary and junior high school student. Change of sleep habit / behavior with growth should be taken into consideration in the screening of sleep disturbance especially in school-aged children.

121

Relationship between sleep insufficiency and behavioral/emotional problems

Horiuchi, Fumie¹; Oka, Y²; Takahashi, N³; Takata, N⁴; Tanno, S⁴; Kawasaki, Y⁴; Campos, E⁴; Kawabe, K⁵; Tanigawa, T⁴; Ueno, S⁵

¹Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Toon-city, Japan; ²Department of Sleep Medicine, Ehime University Graduate School of Medicine, Japan; ³Iyo Dental Association, Japan; ⁴Department of Public Health, Ehime University Graduate School of Medicine, Japan; ⁵Department of Neuropsychiatry, Ehime University Graduate School of Medicine, Japan

Objective:

Sufficient sleep is important to physical and mental development and characteristic of sleep changes dramatically in childhood. We have previously reported a marked reduction of sleep duration with advancing age in Japanese children. Although adequate sleep duration may vary for each person, short sleep duration affects children's behavioral / emotional development. The aim of this study was to evaluate the relationship between sleep duration and behavioral / emotional problems in adolescents.

Methods:

All junior and senior high-school students at a local city of Japan (n=1385) were involved and screened for sleep habits, sleep problems, and behavioral / emotional problems using the Child and Adolescent Sleep Checklist (CASC) and the Strengths and Difficulties Questionnaire (SDQ). Behavioral / emotional problems were compared between subjects with shorter (below the mean) sleep duration and longer sleep duration, and also between subjects larger (>2 hours) and smaller (<2 hours) difference of sleep duration between weekdays and weekends.

Results:

There were not significant differences of the total and subscales score of SDQ between subjects with shorter sleep duration and with longer sleep duration. In terms of the difference of sleep duration between weekdays and weekends, the total SDQ scores of subjects with larger difference of sleep duration (7.8)4.7) were significantly higher than that of subjects with smaller difference of sleep duration (7.1)4.6) (p<.001). Among the 5 subscores of SDQ, the score of emotional problems were also significantly higher among subjects with larger difference of sleep duration than that of subjects with smaller difference of sleep duration (p<.005). Among 5 items of emotional problems, the score of often complains of headaches, stomach-aches or sickness was higher in subjects with larger difference of sleep duration than with smaller difference.

Conclusion:

The difference of sleep duration between weekdays and weekends, not the sleep duration itself, had larger influence on the behavioral / emotional problems. The difference of sleep duration between weekdays and

weekends should be taken into consideration as an possible cause of behavioral / emotional problems in adolescents.

122

Child patients in a sleep clinic in Japan.

Kohyama, Jun

Tokyo Bay Urayasu/Ichikawa Medical Center, Urayashu, Japan

Background:

Sleep medicine has not yet been recognized as a standard medical section in Japan. I opened a sleep clinic 6 years before in a general hospital. For these 3 years, the clinic has accepted outpatients three times a month in the afternoon (13:00-17:00). To know the role of sleep clinic in supporting child sleep problems, profiles of child patient in my sleep clinic was analyzed.

Methods:

The data on the sleep clinic was obtained from the medical chart of Tokyo Kita Shakai Hoken Hospital under the permission of medical information section of the hospital. The recent two years data could be extracted, which was used for the current analysis.

Results:

Totally, 931 visits by 229 patients were obtained in my sleep clinic. Since the clinic was opened for 70 times during this period, an average number of patients who visited the clinic in each time was 13.3. Among these patients, 66 (28.8%) (<1 yr; 4, 1 yr<=; 11, 3 yrs<=; 11, 6<=; 19, 12<=; 21) were aged less than 18. Sixteen patients complained of sleep disordered breathing (8 months-10 yrs, mean age; 3.9 yrs), 13 rhythm disruption (8-17 yrs, mean; 12.9 yrs), 12 hypersomnia (8-17 yrs; mean; 13.6 yrs), 12 insomnia (3 months-11 yrs, mean; 3.3 yrs), 10 parasomnia (2-12 yrs, mean; 7.0 yrs), and 3 complained of sleep related movements (6-9 yrs, mean; 7.3 yrs), respectively.

Discussion:

My clinic has accepted all patients from neonates to the elderly. In such situation, 28.8% were occupied by child patients. High expectation for the sleep clinic from child patients was ascertained. The range of sleep problems among child ages is wide. Indeed, the current analysis revealed that complaints of patients covered all six major classifications of sleep disorders. Further efforts to support this area of medical services are expected.

123

The Effects of Short-term Nap Restriction on Cognitive Function in Preschoolers

Lam, Janet¹; Mahone, EM²; Scharf, SM³; Koriakin, Taylor²; Mason, TBA⁴

¹Neurology and Developmental Medicine, Kennedy Krieger Institute, Baltimore, USA; ²Kennedy Krieger Institute, USA; ³Univ of MD, USA; ⁴Children's Hospital of Philadelphia, USA



Background:

Early childcare centers have increasingly reduced or eliminated napping without evidence-based guidelines for when such restriction is developmentally appropriate. This practice is controversial, since it is unknown what role napping plays in neurobehavioral development. Further clarification is needed in order to establish curricula that will optimize the learning capacity of preschoolers.

Methods:

After IRB approval, sleep patterns and neurocognitive function nap restriction were measured in 21 typically developing, healthy preschoolers. Sleep patterns were measured for 2 weeks by a Respironics Actiwatch-2 watch on the non-dominant wrist and sleep logs. During the first week, the children napped in their regular classrooms. At the end of the week, they completed the Auditory Continuous Performance Test for Preschoolers, NEPSY-II Statue, KABC-II Number Recall, KABC-II Hand Movements, and Stanford Binet-IV Bead Memory. For the second week, half of the children were randomized to have their typical nap opportunity while the other half did not during the weekdays. Children were re-tested twice during the intervention week.

Results:

Children in the nap restriction group increased nighttime sleep while children who napped more decreased nighttime sleep

Table 1. Sleep Patterns				
	Nap Opportunity (n = 9)		No Nap Opportunity (n = 12)	
	Baseline Week	Intervention Week	Baseline Week	Intervention Week
Average Daily Napping (min)	78.2	94.4	59.9	7.9
Average Daily Night Time Sleep (min)	522.0	509.6	538.5	553.3
Average Total Daily Sleep (min)	600.2	609.3	560.4	558.7

After short-term nap restriction, there was a trend towards improved number recall and mean reaction time on the ACPT(Figure 1). Across both groups, napping was negatively correlated with number recall (Figure 2).

Conclusion:

The restriction of naps increased nighttime sleep, but not total sleep. Increasing night time sleep may have a positive effect on attention-related skills, but needs further exploration.

124

The role of culture in perceptions of child sleep problems in the Balkans.

Loutzenhiser, Lynn¹; Vracar, Nikolina²

¹Psychology, University of Regina, Regina, Canada; ²Psychology, University of Regina, Canada

Background:

While the prevalence of child sleep problems varies across cultures (Sadeh et al., 2011), the role of culture in parents' perceptions of sleep problems is not known. Culture is related to values and expectations, thus

examining dimensions of parental values (i.e., individualism versus collectivism) and expectations regarding child sleep behaviours may help explain cultural differences. In this study, we investigated the prevalence of sleep problems in children living in the Balkans and its association with cultural values and expectations.

Methods:

288 Balkan parents with children 6 to 24 months of age completed on-line questionnaires. Variables in this study included sleep problems (BISQ; Sadeh, 2004), cultural values (AICQ; Shulruf et al., 2007) and questions assessing the extent to which child sleep behaviours matched parental expectations.

Results:

38% of Balkan parents indicated that their child had a "small sleep problem" and 6% indicated that their child had a "severe sleep problem". A hierarchical logistic regression was conducted with parental perception of sleep problems as the outcome variable. The regression equation was statistically significant, $x^2(4, N = 288) = 51.96, p < .005$, with a Nagelkerke R² of 60%. Significant predictors included sleep behaviours and the discrepancy between number of night-wakings and time to first fall asleep and parents' expectations regarding these behaviours. Cultural values (individualism-collectivism) were not significantly associated with sleep problems.

Conclusion:

Conceptualizing cultural values along an individualism-collectivism dimension may not be the best way to understand the role of culture in the perception of sleep problems. While discrepancies between parent expectations of sleep behaviours and their child's sleep were significantly associated with sleep problems, it is not clear whether these expectations are culturally-based. Future research could investigate the origins of parent expectations regarding sleep behaviours, as well as consider alternative conceptualizations of culture.

125

An iPhone application for infant and toddler sleep: Characteristics and concerns of users

Mindell, Jodi¹; Leichman, E²; Walters, R³; Bhullar, Bula⁴

¹Saint Joseph's Univ/Children's Hospital of Phila, Philadelphia, USA; ²Lehigh University, USA; ³Johnson & Johnson Consumer Products Company, USA; ⁴Giant Sky, USA

Objective:

The aim of this study was to investigate demographic characteristics of users of an iPhone based application for sleep in young children, as well as the types of concerns submitted to an Ask the Expert.

Methods:

Data were collected from 7889 consecutive users of a free publicly-available app for the iPhone over a 3-month period.

Results:

Users were primarily mothers (69%; M age = 28 years). The designated child was predominantly infants (3-11



months, 68%) followed by toddlers (12-36 months, 20%), and newborns (0-2 months; 12%). There were 365 questions submitted (4.6% of users). Questions about infants were most frequent (65.3%), followed by toddlers (23.5%) and newborns (11.3%), with the average age of the child 11.9 months (SD=22.43). The primary concerns of users regarded night wakings (22.7% of all questions submitted), sleep problems (22.2%), and general sleep questions (21.9%). Less frequently, questions related to napping (15.3%), bedtime (13.4%), and sleep safety (4.4%). Questions were submitted most frequently between midnight and 6am (37%), followed by between 6pm and midnight (22%).

Conclusions:

Overall, an iPhone app for sleep issues in young children is quite popular, with almost 8000 users in a short period. Questions were primarily regarding infants and almost half were about sleep problems. Interestingly, one-third of questions were submitted during the middle of the night, and over half between 6pm and 6 am, indicating that parents often seek sleep-related advice at times when information is usually not readily available, thus attesting to the need for accessibility of health-related information.

126

Patients complained of abnormal nocturnal behaviors and senses.

Miyata, Rie¹; Kohyama, J²

¹Pediatrics, Tokyo-Kita Social Insurance Hospital, Tokyo, Japan; ²Pediatrics, Tokyo Bay Urayasu-Ichikawa Medical Center, Japan

Background:

Nocturnal abnormal behaviors or senses were caused not only by parasomnias but by epilepsy. We investigated and classified the cause of them.

Methods:

We retrospectively examined the medical records of 12 patients who came to our hospital to consult of nocturnal abnormal behaviors or senses during past 8 years. We excluded those with fever and involuntary movements. Diagnosis was made by history, electroencephalograms and blood examinations.

Results:

The age of patients ranged from 1 to 13 years old. Five were female and 7 were male. Three patients were diagnosed as having sleep walking, 2 were sleep terror, and 3 were frontal epilepsy. Another diagnosis was restless legs syndrome, sleep related rhythmic movement disorder, parietal epilepsy, and ornithine transcarbamoylase(OTC) deficiency, respectively. Although patients with abnormal behaviors or senses tend to be considered as parasomnias, almost half of our patients were diagnosed as having epilepsy, especially frontal epilepsy. It took time to diagnosed OTC deficiency. She had several episodes of crying with saying the same sentences. Her electroencephalogram demonstrated high voltage slow waves, and the value of ammonia in serum at the episode was found to be high. She was diagnosed as OTC deficiency by the analysis of amino acids metabolic systems and gene analysis.

Conclusion:

Epilepsy was existed at high rates in patients who complained of abnormal nocturnal behaviors and senses. Metabolic disorder could also reveal these symptoms. Detailed interviews and examination are important for adequate treatment.

127

The Pediatric Daytime Sleepiness Scale (PDSS) : Portuguese validation

Moreno, Teresa¹; Paiva, T²; Rebelo Pinto, H³

¹Neuropediatrcs, Hospittal Santa maria, Lisboa, Portugal; ²Faculdade Medicina Lisboa, CENC, Portugal;

³Faculdade de Psicologia e de Ciências da Educação, Portugal

Introduction:

Daytime sleepiness and bad sleep habits have important impact upon quality of life and school performance. Sleep questionnaires are valid evaluation tools and permit large population studies; they require however national validation studies.

Objectives:

To validate the sleep self-report questionnaire "Pediatric Daytime Sleepiness Scale" (PDSS) (Drake 2003) in Portuguese.

Materials and Methods:

After authorization of the Author, a first translation was done and corrected by two different sleep experts, a trial version was applied in a pilot group and an independent retroversion was asked. At last a final version was applied to 470 children between 11 and 15th years old from 5th till 9th grades. Mean age was 13.05 years old, 53,8% females. The questionnaire included a Portuguese version of PDSS, items on socio economic data, sleep habits, school performance and Sleep Self Report (Owens 2000).

Results:

The PDSS Portuguese version results showed a normal distribution: mean score was 13.76 (median 14) and distributed between 0 and 30. Internal consistence (Chronbach's alpha) was 0.71, slightly inferior to the original study, similar to other posterior validations of the questionnaire : 0,74 in Argentina (Perez- Chada et al 2007), 0,68 in Korea (Rhie et al, 2001) e 0,66 in China (Yang et al 2010) and inter-item correlation of the PDSS was 0,24 (0,26 in Argentine study).. The Validity was tested against external factors, expected by the literature likely to be associated with increased diurnal sleepiness (sleep hoursduration, bedtime, sleep problems) and showed the expected consistent significant results.

Conclusion:

The Portuguese version of PDSS is a valid questionnaire for diurnal Ssleepiness evaluation in adolescents aged 11 to 15 years old. and ; its reability was similar to the original study and to posterior validations.



References:

Drake C, Nickel C, Burduval E, Roth T, Jefferson C, Badia P. The Pediatric Daytime Sleepiness scale (PDSS): Sleep habits and school outcomes in Middle-school children-. *Sleep* 2003;26 (4):455-458 Perez-chada D, Perez-lloret S, Videla A, Cardinali D, Bergna M, Fernandez-acquier M, Larrateguy L, Zabert GE, Drake C. *Sleep* 2007; 30 (12): 1698-1703 RhieS, Lee Sihoung L, Chae K Y. *J Pediatr* 2011;54(1):29-35 Yang CM, Yuang YS, Song YC. *Psychiatry Clin Neurosci.* 2010;64(2):134-40

128

Are sleep habits different between children attending routine and specialized out patient clinics?

Oliveira, Lia¹; Ferreira, Rosário²

¹Pediatrics Department, Sta Maria's Hospital, Lisboa, Portugal; ²Pediatrics Department, Sta Maria's Hospital, Portugal

Introduction:

Poor sleep habits are common among children but their characterization as well as the prevalence of sleep disorders have been poorly evaluated in health care visits. The aim of this study is to investigate differences in sleeping behaviors in children attending a sleep center (SC) in a tertiary hospital and children at a regular health care visit (RC) in a healthcare center.

Methods:

A cross-sectional questionnaire survey was conducted to identify sleep habits among 132 children, over 6 months (July-December2012). The questionnaire focused on socio-demographic characteristics, sleep habits and problems. Descriptive statistics and nonparametric tests ($\alpha=5\%$) were performed.

Results:

SC group included 59 children (35males;59,3%), median age: 91,0(6,0-196,0)months and RC group included 73 children (31males;42,5%), median age: 52,0(6-201)months ($p=0,01$). In SC group bedtime occurs earlier on weekdays ($p<0,01$) and on weekends ($p<0,01$), most at 20-22h(72,2%) and 22-00h(50%), respectively; time to wake up occurs earlier among these children, most before 8h on weekdays ($p<0,01$) and before 10h on weekends ($p<0,01$). SC group sleeps more time on weekdays (9,53[SD1,18]; $p<0,01$) and weekends (10,52[SD1,47]; $p<0,05$). Among SC group in-room television is more frequent ($p<0,01$), RC group children more frequently share bedroom ($p<0,01$) and sleeps with light ($p<0,01$). To have transition object ($p>0,05$), fall asleep without company ($p>0,05$), awakenings at night ($p>0,05$), nap-time ($p>0,05$) and wake-up without auxiliary on weekdays ($p>0,05$) was not different among both groups. Sleep problems were referred in 41,1% of RC children; the most frequent were nightmares (40,0%). Only in 12 cases (16,3%) the parents discussed sleep problems in the healthcare surveillance visit.

Conclusions:

Sleep issues were rarely discussed in child's health care visits, although poor sleep hygiene and sleep disorders were present in a high rate among these children. It is necessary to increase the educational measures and explain the importance of sleep among primary care professionals.

129

Evaluation of a Sleep Education project – The Sleep School project 4 years after

Paiva, T; Rebelo-Pinto, T; Rebelo-Pinto, H

Sleep Medicine Center, CENC, Portugal

Introduction:

Considering programs for children and adolescents health specialists often face their relative inefficiency, especially when compared with well-developed commercial marketing campaigns influencing youngsters worldwide. Evaluation of educational programs deserves special attention since they involve marked resources, the educational targets are not easy to measure in the short term and the characteristics of a conventional research project are difficult to implement in field long term studies.

Methods:

Evaluation of the Sleep School project was implemented taking into account both the objectives and the resources, comparing data prior and after the project start in 2009-2012 Resources were evaluated in terms of budget and number of participants. The objectives fulfillment indicators were assessed as follows: 1) Awareness rising was measured through the following variables: number of news in the media concerning sleep in children; number of meetings having pediatric sleep as a topic; number of joint actions with other institutions; number of participating schools; number of school students projects; questionnaire addressed to schools with and without Sleep School project intervention; impact of developed materials; 2) Scientific impact in studies involving instruments validation, epidemiologic data or research in pediatric sleep medicine; 3) Impact upon sleep habits of children and adolescents in the country

Results:

The project resources were meager both in terms of budget and involved personnel. All the items concerning awareness rising were markedly improved in recent years with statistically significant differences. The same applies for the scientific projects development with a significant increase in the number of abstracts, publications and academic thesis in recent years. The collaboration with other institutions grew especially during 2011 and 2012 and further developments are foreseen. Data from item 3 will be obtained only in 2014.

Conclusions:

The Sleep School project in spite of its low budget and small resources achieved important objectives in a quantitative evaluation.

130

Depression and marital intimacy level among the parents of infants with sleep onset association disorder

Rhie, Seonkyeong; Lee, Sihyoung; Chang, Sunjung; Chae, Kyu young

Pediatrics, CHA hospital, Korea, Republic of



Introduction:

Infants with sleep onset association disorder (SOAD) wakes according to normal sleep cycle and cannot fall asleep by themselves and constantly demand parents; behavioral intervention and disturb sleep of both the parents and themselves. Especially in Korean culture most of the infants sleep with their parents and if they wake up during the night negative sleep associations such as feeding and soothing are frequently executed and parents complain of persistent lack of sleep. We investigated depression and marital intimacy level among the parents of infants with SOAD to understand the influence to the family.

Methods:

We conducted surveys of modified Beck depression inventory (BDI) and modified Waring intimacy questionnaire (WIQ) on 62 parents of the infants (n=47) with sleep problems who visited the sleep clinic of Bundang CHA medical center from January of 2011 to June of 2012. After successful training, BDI and WIQ were re-evaluated.

Results:

62 parents and 25 parents were followed before and after sleep training. From the BDI score 15 parents (24.2%) belonged to the normal group, 12 parents (19.4%) were in a mildly depressive state, 23 parents (37%) were in a moderately depressive state and 12 parents (19.4%) belonged to a severely depressive state and the mean WIQ score were 10.8, 14.2, 17.5 and 21.8 points for each BDI group and it indicated that as the level of depressive state got higher marital intimacy level decreased ($p < 0.001$).

Conclusion:

Sleep onset association disorder of infants deteriorates the quality of sleep of the infants, disturbs the sleep of parents and affects emotional stability of mothers especially the ones who co-sleep with the infants and aggravates the intimacy level of the couple. Through executing aggressive diagnosis and treatment of infant's SOAD, the parents could be secured and contribute to healthy family life.

131

Sleep education is successful in increasing time in bed: promising results for sleep health

Rigney, G¹; Olds, T¹; Maher, C¹; Petkov, J¹; Blunden, S²

¹University of South Australia, Australia; ²Central Queensland Univeristy, Australia

Background:

Sleep education programs aim to promote an increase in sleep duration. For sleep duration change to occur, one must spend a greater amount of time in bed (TIB). The current study aimed to analyse preliminary sleep data to assess whether an ongoing sleep education program has been successful in bringing about an increase in TIB, and in turn, improved sleep duration.

Method:

In a randomised controlled trial, 1 Year 6/7 class from 6 schools participated. 4 schools were Intervention (N=59), 2 were Control (N=27). The study employed a 2 (group: Intervention and Control) x 3 (time: baseline, immediately post-intervention (6 weeks post-baseline) and follow-up (18 weeks post-baseline)) mixed model

design. Intervention schools received 4 classroom lessons about sleep and undertook a project on sleep after the formal sessions. Sleep quantity was measured with 7 days actigraphy at each time point. Primary outcome measures obtained were TIB and total sleep time (TST).

Results:

Linear mixed model analyses revealed that between the start and end of the intervention, TIB increased by 14 min in the Intervention group ($p = 0.02$) compared to a 9 min decline in the Control group. At follow-up the Control group had returned to just 2 min below baseline while the Intervention group had fallen to 12 min below baseline. There was a significant interaction between group and time for TIB ($F(2)=5.567$, $p=0.005$) and a trend for TST ($F(2)=5.567$, $p=0.06$). There was a significant group x time effect at follow up ($p = 0.005$).

Discussion:

Preliminary results are promising, showing an increase in TIB from baseline to immediately post-intervention, although such improvement was not sustained. The increase in TIB signifies that the sleep education program is successful, showing that participants are attempting to make changes to their sleep behaviour. This is important, as it is the first step needed for sleep duration changes to occur.

132

Psychometric Properties and Population Based Distributions of Scores of A Japanese Version Sleep Questionnaire for Pre-School Aged Children

Shimizu, Sachiko¹; Kato-Nishimura, Kumi²; Mohri, Ikuko³; Kagitani-Shim, Kuriko³; Tachibana, Masaya³; Ohno, Yuko³; Taniike, Masako³

¹Graduate School of Medicine, Osaka University, Suita, Japan; ²Ota Sleep Center, Japan; ³Graduate School of Medicine, Osaka University, Japan

Background:

Although sleep problems are common and often under-diagnosed symptoms in children, suitable screening instruments for Japanese culture are still in development. This study reports the psychometric properties and the score distribution of a screening questionnaire designed for assessing preschool aged sleep disturbance and problematic behavior in Japanese culture, Japanese Sleep Questionnaire for Toddler (JSQ-T).

Method:

A cross-sectional study was conducted on 2998 children in community sample and 102 patients diagnosed with sleep disorders in clinics. The guardians of participants completed thirty nine item scales of JSQ-T consisting of 1) obstructive sleep apnea syndrome (OSAS), 2) restless legs syndrome (RLS)-sensory, 3) RLS-motor, 4) morning symptoms, 5) sleep habit, 6) parasomnias, 7) insufficient sleep, 8) daytime excessive sleepiness, 9) daytime behavior, and 10) insomnia / circadian rhythm disorders. Exploratory previous factor analysis was performed to confirm factor structure of JSQ-T. The instrument's validity was assessed by comparing scores between clinical and community populations. The instrument's reliability was assessed by internal consistency. Finally, we showed the distribution of standardized JSQ-T scores.

**Results:**

The factor analysis revealed ten underlying factors of JSQ-T with eigenvalues above 1. Items were classified into ten subscales, which was the same interpretation that we previously reported. The internal consistency of entire JSQ-T was 0.86 for the community sample and 0.86 for the clinical sample. Analysis of covariance, covarying age and schooling status, indicated that the clinical group was higher scores (worse) than community sample on factor I. RLS-sensory, II. OSAS, III. Morning symptoms, IV. Parasomnias, VI. Daytime excess sleepiness, VII. Daytime behavior, and X. RLS-mortor. There was no significant difference in only three subscales, that is, V. Insomnia / circadian rhythm disorders, VIII. Sleep habit, and IX. Insufficient sleep.

Conclusion:

JSQ-T is proven to be an economic, well-accepted and valid instrument to assess sleep issue of preschool children by a large epidemiological study in Japan.

133**Sleep habits in Portuguese children from 2 to 10 years - preliminary results**

Silva, Filipe Glória¹; Braga, Lúcia Barbosa²; Neto, Ana Serrão³

¹Development Clinic, Cuf Descobertas Hospital, Lisbon, Portugal; ²Pediatrics Department, Faculty of Medical Sciences, Lisbon, Portugal; ³Pediatrics Department, Cuf Descobertas Hospital, Lisbon, Portugal

Background:

We validated the Portuguese version of the Children's Sleep Habits Questionnaire (CSHQ) for the evaluation of sleep habits and sleep disturbances in children aged 2 to 10 years old. Epidemiologic population-based studies are needed in order to gather Portuguese norm data and to support further research and community intervention in this area. Objective: To present preliminary results from the evaluation of sleep habits in Portuguese children from 2 to 10 years.

Methods:

The CSHQ was delivered to the parents of 2257 children recruited in daycare centers, kindergarten and schools from 2 convenience and 15 random school groups.

Results:

1559 (69%) questionnaires were returned and 1450 valid questionnaires entered the study. The children's mean age was 6.5 ± 2.3 years. The mean CSHQ scores were: Total Score 46.5, Bedtime Resistance 8.4, Sleep Onset Delay 1.9, Sleep Duration 3.8, Sleep Anxiety 5.8, Night Wakings 3.9, Parasomnias 9.0, Sleep Disordered Breathing 3.6, and Daytime Somnolence 13.1. The mean total sleep duration was 11.2h for 2-3 year-olders (y.o.), 10.1h for 4-5 y.o. and 9.6h for 6-10 y.o. Parents recognized a sleep problem in 10.4% of children, who had significantly higher total and subscale mean scores ($p < 0.001$) except for the Sleep Onset Delay subscale. 64% of children who "rarely sleep the right amount of time" were not considered by parents as having a sleep problem.

Discussion:

We describe sleep habits prevalence data for a wide age band of Portuguese children. Comparing to literature normal sleep data, there is evidence of sleep deprivation among younger children, particularly 4-5 y.o. Globally, CSHQ scores were higher than previously described, indicating more sleep difficulties. These findings contrast with the lower prevalence of sleep problems reported by parents which sets an opportunity for health promotion actions.

134**Sleep, precompetitive stress and achievements in young high performance gymnasts**

Silva, Maria-Raquel G¹; Paiva, Teresa²

¹Inst. Molecular Medicine, Medical Faculty of Lisbon, Oporto, Portugal; ²Inst. Molecular Medicine, Medical Faculty of Lisbon, Portugal

Background:

It is known that high quality sleep and adequate rest periods have an important contribution in the athlete's ability to respond to stress. During a competition 2 abilities are critical for athletic success - attention and memory, which are very sensitive to stress and regulated by sleep. The main purpose of this study was to evaluate sleep quality and stress levels before an international competition.

Methods:

67 rhythmic gymnasts [18.67 (2.93) years old] of high performance level [36.60 (7.56) hours of training/week] were evaluated by a questionnaire, which collected: training data; sleep assessed by the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index and pre-competitive stress: Competitive Anxiety Test (Sport Competition Anxiety Test Form A - SCAT-A) or Illinois Competition Questionnaire. The final competition results were recorded. Descriptive linear regression analysis and Pearson correlation coefficients were used. The significance level was 5%. Data was analyzed using SPSS, version 18.0.

Results:

Most athletes presented poor sleep quality ($n = 52$; 77.61%), mild somnolence ($n = 45$; 67.2%) and a minority had severe somnolence ($n = 9$; 13.5%) and good sleep quality ($n = 15$ athletes; 22.39%). The total average score obtained by the gymnasts in SCAT-A was 22.68 (3.17) points, and varied between 13 and 30 points, which means the average of the sample showed a level of moderate pre-competitive stress. Gymnasts having normal daytime levels and a good sleep quality showed medium levels of precompetitive stress; on the other hand, gymnasts with poor sleep quality demonstrated high levels of pre-competitive stress ($p = 0.000$). Gymnasts with low or moderate stress levels before competition had better ratings than those who experienced high levels of pre-competitive stress ($p = 0.017$).

Conclusions:

Sleep characteristics influences both precompetitive stress and competitive achievements, with negative consequences when curtailed.



135

To sleep or not sleep: an African American child's story

Spruyt, Karen¹; Alaribe, Calista²; Nwabara, Odochi²

¹Vrije Universiteit Brussel, Brussel, Belgium; ²Chicago State University, USA

Introduction:

Previous studies have shown that children in our society are likely to obtain insufficient sleep. To date the vast amount of sleep studies however are based on parental reports. African American sleep's has been described by a more gradual age-decline in napping. We aim to objectively describe the sleep patterns of African American children.

Methods:

Sleep patterns in 29 African American children living in the South Side of Chicago aged 3-9 years old were measured objectively with an actiwatch for 14 days.

Results:

Children were 5.2±1.8 years old of which 15 were girls (51.7%). The actiwatch was worn 11 days by 93.1% of the sample. At night children spend 498.2 ± 99.7 minutes in bed. Average nighttime sleep duration was 378.7 ± 91.9 minutes while napping took about 96.4 ± 69.7 minutes. Their sleep onset latency was 44.0 ± 49.6. Sleep was mostly variable in terms of sleep offset latency and wake time during the sleep period time, which is suggestive of poor sleep. Stratified on median Chicago income (<\$38,625) and poverty level (<\$10,830) our sample consisted of 32.1% Lower Class (LC), 35.7% Middle Class (MC) and 32.1% Upper Class (UC) families. No differences in sleep parameters were found between the social classes. Being a single mom and social class were unrelated [Chi2(2)=4.6, p=0.10] with 46.6% of the sample being a single mom (i.e., never married and living alone with child). When controlling for age, children of single moms exhibited a significantly lower TST in comparison to children of non-single moms.

Discussion:

This study is the first to show objectively that minority children's sleep is insufficient in spite of their napping habits when compared to the National Sleep Foundation recommendation. Forthcoming analyses will help to determine if their sleep patterns are based on necessity or choice.

136

The UK paediatric sleep videoconferencing network

Urquhart, DS¹; Kilner, D²

¹Department of Paediatric Respiratory and Sleep Medicine, Royal Hospital for Sick Children, United Kingdom;

²Department of Paediatric Respiratory and Sleep Medicine, Great Ormond Street Hospital, United Kingdom

Background:

Paediatric sleep medicine is an expanding area of clinical practice. A UK report ¹ highlighted heterogeneity in service provision and training among UK paediatric sleep centres. A forum for regular peer review and

discussion of cases, as well as 'hot topics' in paediatric sleep was lacking, and to this end a UK paediatric sleep videoconferencing (VC) network was proposed. The Australasian and Pacific paediatric sleep centres have been conversing monthly using a VC network since 2001, and our group was modelled on their experience. AIMS: To institute a VC network of all interested parties working in the field of UK paediatric sleep medicine.

Methods:

We canvassed all interested nurses, respiratory/sleep physiologists, EEG technicians, and paediatricians working in the field of paediatric sleep medicine and its' related disciplines via group emails using the British Paediatric Respiratory Society mailing list, and by posting information on the British Sleep Society website and in its' newsletter. International VC is facilitated via NHS Grampian.

Results:

To date, a total of 91 individuals, representing 32 UK and 7 overseas centres have expressed an interest in the network and make up our mailing list. An initial test conference was held in February 2010 between Edinburgh and Great Ormond Street Hospitals, since when a total of 9 meetings at 3-monthly intervals have been held. The meetings have each hosted a median (range) of 11 (5-16) centres participating, with 28 paediatric sleep centres taking part in at least 1 meeting. Topics covered have included: Workshop on technical and scoring issues: Non-respiratory sleep workshop: Case discussions of a variety of central and obstructive sleep disorders, behavioural sleep problems, and difficult to manage respiratory failure: Research presentations: Feedback from international sleep conferences and Presentations on aspects of quality assurance and sleep database management.

Summary:

The paediatric sleep videoconference is a forum which has allowed peer review and discussion of scoring rules, technical issues, and difficult cases within the field of paediatric sleep medicine. Furthermore, it has proved an opportunity to present research or research proposals to like-minded doctors, nurses and scientists.

References:

1. Primhak R, et al. RCPCH Working Party on Sleep Physiology and Respiratory Control Disorders in Childhood 2009.

137

CBFV and SpO₂ Awake and Asleep in Bolivian Children Native to High Altitude

Gaviak, J; L'Esperance, V²; Bucks, R³; Kirkham, FJ²; Hill, CM⁴

¹UCL Institute of Child Health, London, UK, ²Neurosciences Units, UCL Institute of Child Health, London, UK,

³Department of Psychology, University of Western Australia, Australia, ⁴Division of Clinical Experimental Sciences, University of Southampton, Southampton, UK

Background:

There are few data on control of cerebral haemodynamics at altitude in children and there may be differences between the posterior and anterior circulations. Cerebral blood flow velocity (CBFV) increases in middle (MCA),

anterior (ACA) and posterior (PCA) cerebral arteries but not in the basilar artery (BA) in Caucasian children resident at sea level on acute exposure to an altitude of 3500 metres.¹ BA CBFV is lower in Bolivian children resident above 3500m but there are no consistent differences for MCA, ACA and PCA CBFV and few data on the relative importance of hypoxia and hypocapnia.²

Methods:

As part of the DeSAT expedition, we examined the effect of daytime and nocturnal haemoglobin oxygen saturation (SpO₂) and daytime end-tidal carbon dioxide (ETCO₂) on right and left MCA and on BA CBFV in 35 Bolivian children (18 girls) aged 4-11 (median 6.4) years resident above 3500m.

Results:

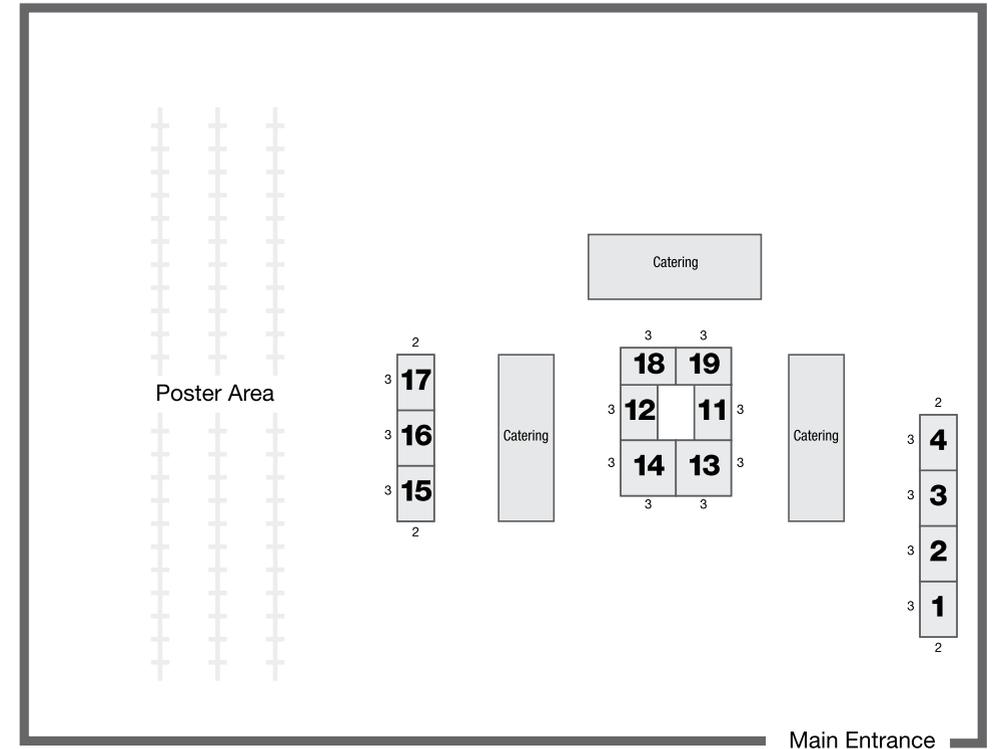
BA and left MCA CBFV correlated with daytime SpO₂ (r=-0.42, p=0.01; r=-0.37, p=0.04 respectively) and for right MCA CBFV there was a trend for a correlation (r=-0.3, p=0.09). There were no correlations with ETCO₂. Right and left MCA CBFV were not correlated with mean nocturnal SpO₂ but for BA CBFV there was a trend for a correlation (r=-0.39, p=0.07). In stepwise multivariable linear regression, daytime SpO₂ and median nocturnal SpO₂ were independently associated with BA CBFV (beta=-0.646, t=-4.1, p=0.001 and beta=-0.347, t=-2.2, p=0.04 respectively) and predicted 58% of the variation.

Discussion:

Basilar CBFV in children resident at high altitude is dependent on overnight as well as daytime haemoglobin oxygen saturation but MCA CBFV is not. There may be differences for the anterior and posterior circulations in the relative importance of controlling factors, e.g. blood pressure, cardiac output, sympathetic drive, oxygen and carbon dioxide tension.

¹ Gavlak JCD et al. The Young Everest Study: Changes in sleep and cerebral blood flow velocity during slow ascent to altitude in non-acclimatised children. Submitted to Arch Dis Child

² Hogan AM et al. Development of aptitude at altitude. Dev Sci. 2010 May;13(3):533-44.



Alphabetical List of Exhibitors and Sponsors

Organisation	Stand Number
Ambulatory Monitoring, Inc	11
Cadwell	14
CamNTech	2
Genzyme Therapeutics	12
Handsel Project	18
KLS Support UK	15
NOX Medical ehf	13
Optima Medical Ltd	1
Sleep Scotland	17
Somnomedics/ S-Med	3
Solent NHS Trust: Southampton Sleep Training Courses	19
Stowood	16



Ambulatory Monitoring Inc

Stand 11

731 Saw Mill River Road, Ardsley, New York 10502, USA

AMI is the pioneer in actigraphic based sleep assessment with hundreds of peer-reviewed publications and several validated sleep scoring algorithms including validations in pediatric populations and a special infant sleep algorithm which discriminates between active and quiet sleep. Over 30 years of expertise have gone into the development of AMI's two latest models which have recently received the CE mark. Features include, 100M water resistance, multi-mode triaxial activity recording, off-wrist detection, and channels for ambient light and temperature change. All available at a very competitive price!

Cadwell

Stand 14

909 North Kellogg Street, Kennewick, Washington 99336, USA

Tel: +1-509-735-6481

Fax: +1-509-783-6503

www.cadwell.com

Established by brothers Carl Cadwell, DDS and John Cadwell, MD, BSEE in 1979, Cadwell designs, manufactures and sells neurodiagnostic and neurophysiological monitoring instruments to laboratories, hospitals, physicians, and others worldwide. Clinical diagnostic products include the Sierra® Wave EMG/NCV/EP, the Easy® III EEG for clinical EEG, ICU Neurological and Epilepsy Monitoring, Easy III PSG, Easy Ambulatory EEG & PSG. For Intraoperative neuromonitoring, the Cascade line features the 32 channel Cascade Elite and the Cascade Pro 16 or 32 channel system.

CamNtech

Stand 2

Upper Pendrill Court, Ermine Street North, Papworth Everard, Cambridge, CB23 7JY, UK

Tel: +44 (0) 1480 831223

Fax: +44 (0) 1480 831733

www.camntech.com

admin@camntech.co.uk

CamNtech have been manufacturing and selling compact, lightweight medical devices since 1995. CamNtech continued its tradition for innovative engineering with the launch this year of their MotionWatch (MW8) product.

Following the acquisition of the Actiwatch range by Philips/Respironics in April 2008 and the discontinuation of their Actiwatch product, the MotionWatch (MW8) has been launched as a successor to the Actiwatch. CamNtech has utilised the advances in accelerometer technology to produce the MotionWatch (MW8) with a tri-axial digital accelerometer

The size and weight of the MotionWatch (MW8) make it particularly suited for use with children.

Genzyme Therapeutics

Stand 12

4620 Kingsgate, Cascade Way, Oxford, OX4 2SU, UK

Genzyme has pioneered the development and delivery of transformative therapies for patients affected by rare and debilitating diseases for over 30 years. With a focus on rare diseases and multiple sclerosis, we are dedicated to making a positive impact on the lives of the patients and families we serve.

Handsel Project

Stand 18

3 Baskerville Court, Clyro, Hereford, HR3 5SS, UK

Tel: 01497 831550

E-mail: joanne@handselproject.org.uk

In 2007 the Handsel Trust published Sleep? What's that? The incidence and impact of sleep problems in families of disabled children. This combined a literature review and a report of a questionnaire- and interview-based survey. Since then, having learned of the size of what was largely a hidden problem and realising that there was very little help available, we have been running 2-day workshops for health practitioners in England, Wales and Ireland.

KLS Support UK

Stand 15

37 Norrice Lea, London, N2 0RD, UK

E-mail: kleine.levin.syndrome.uk@gmail.com

www.kls-support.org.uk

Kleine-Levin Syndrome (KLS) is a rare disorder characterised by recurrent bouts of excessive sleep (lasting days, weeks or months) associated with reduced understanding of the world and altered behaviour. KLS usually starts in the teenage years but can occur in younger children and adults. Between episodes people with KLS have normal sleep, understanding and behaviour.

KLS Support UK is a small charity started by parents of KLS children. Our aims are to provide support, raise awareness, and support medical research into KLS.

We are pleased to be associated with the KLS Foundation.

www.klsfoundation.org



NOX Medical ehf

Stand 13

Kim Medical Park, Vatnagardar 18, Reykjavik 104, Iceland

Behind the revolutionary design of the Nox Medical products are decades of clinical and engineering excellence. The NOX-T3 was designed from a clean slate, using the latest and most sophisticated technology available. With innovative thinking, knowledge, experience and input from world leading physicians, Nox Medical is continuing its work on the next generation of sleep diagnostic systems. It's our main goal to bring to the market a new generation of products to support the growth of sleep medicine with easy to use solutions, embraced by established practitioners.

Optima Medical Ltd

Stand 1

1 Archway News, 241 Putney Bridge Road, London, SW15 2PJ, UK

Tel: 020 8874 4770

Email: sales@optimamedical.com

Website: www.optimamedical.com

Optima Medical is a leading supplier of EEG and sleep diagnostic systems to hospitals in the UK and Ireland. Our product range includes both the Xitek and Nicolet ranges of equipment. Systems may be configured for either clinic or home based studies. We also supply a select range of sleep electrodes. Based in London, our team has built an excellent reputation for supplying high performance equipment combined with outstanding technical support. For more information please visit www.optimamedical.com

Sleep Scotland

Stand 17

8 Hope Park Square, Edinburgh, EH8 9NW, UK

Established in 1998 this charity supports parents/carers of children with additional support needs who experience sleep problems. We provide sleep counselling training in behavioural and cognitive techniques and helping trainees develop a sleep service in their local area. Sleep Scotland recently developed Sound Sleep, an educational resource for secondary schools.

Somnomedics/ S-Med

Stand 3

31 Wheelleys Road, Birmingham, B15 2LF, UK

Tel: 0121 446 6953

Email: sales@s-med.co.uk

Web: www.s-med.co.uk

SOMNOmedics and their UK distributor welcome you to IPSA and invite you to visit our booth to see the latest innovations Paediatric Sleep Diagnostics. The SOMNOscreen System continues to offer many exciting features for patients of all ages. We will also be showing our PIMS Patient and Inventory Management System.

Solent NHS Trust: Southampton Sleep Training Courses

Stand 19

Southampton Children's Sleep Disorder Service, Ashurst Education Centre, Lyndhurst Road, Ashurst, Southampton, SO40 7AR. www.solent.nhs.uk/sleeptraining

Southampton Children's Sleep Disorder Service comprises a multi-disciplinary team of health professionals. Our clinical service routinely assesses and manages children's sleep disorders and works with the University in clinical sleep research. We have a track record in delivering high quality, practical evidence based training for professionals who want to help children with sleep problems. We love sharing our knowledge and experience through our courses. Visit our website to learn more at www.solent.nhs.uk/sleeptraining

Stowood

Stand 16

Royal Oak Cottage, Beckley, Oxford, OX3 9UP

Stowood Scientific Instruments are the distributors of the full range of Embla sleep systems and Konica Minolta wristwatch oximeters.

We:

- are Technical rather than salespeople and proud to be in Stowood's 20th year continuing to work with the UK's paediatric sleep experts.
- produce VisiDownload software for downloading oximeters and capnometers including Masimo Radicals, Konica Minolta, Bitmos, GE (Ohmeda) Radiometer Tosca, BCI etc
- are the Designers and Manufacturers of the Visi-lab respiratory sleep system and the Black Shadow series sleep recorders with Masimo oximetry"

LIST OF PARTICIPANTS



Title	Forename	Surname	Company	Country	Position	Title	Forename	Surname	Company	Country	Position
Dr	Christine	Acebo	Jazz Pharmaceuticals	USA	Medical Scientist	Miss	Pauline	Décima	PériTox-INERIS	France	Researcher
Mrs	Elizabeth	Adair	Royal Hospital For Sick Children	United Kingdom	Specialist Paediatric Physiologist	Dr	Archana	Desurkar	Sheffield Children's Hospital NHS Foundation Trust	United Kingdom	Consultant Paediatric Neurologist
Miss	Ceren	Ahmet	Great Ormond Street hospital for children NHS foundation Trust	United Kingdom	Clinical Sleep Physiologist trainee	Dr	Julia	Dewald-Kaufmann	University of Amsterdam	Netherlands	Psychologist
Dr	Muslim Mohammed	Al Saadi	King Saud University	Saudi Arabia	Consultant in Pediatric Pulmology and Sleep Medicine	Prof	Derk-Jan	Dijk	University of Surrey	UK	Professor of Sleep and Physiology, Director Surrey Sleep Research Centre
Dr	Cecilia	Algarin	University of Chile	Chile	Adjuncted Professor	Mrs	Moira	Draper	Cerebra	United Kingdom	Sleep Practitioner
Dr	Maria Luisa	Alonso Alvarez	Universitario De Burgos	Spain	Neumolgy	Ms	Mali	Einen	Center For Narcolepsy Research, Stanford University	USA	Clinical Coordinator, Center For Narcolepsy Research
Dr	Ainhoa	Alvarez Ruiz de Larrinaga	Hospital Universitario de Araba	Spain	Neurophysiology	Dr	Dawn	Elder	University of Otago, Wellington	New Zealand	Associate Professor
Dr	Isabelle	Arnulf	Centre de référence national: narcolepsie, hypersomnie et syndrome de Kleine-Levin Hôpital Pitié-Salpêtrière	France	Assistant Professor	Ms	Carla	Evans	The University of Sydney	Australia	PhD Student
Miss	Anna	Ashworth	Institute of Education	United Kingdom	PhD Student	Mrs	Pattie	Everitt	Cerebra	United Kingdom	Sleep Practitioner
Dr	Jane	Austin	NHS Tayside	United Kingdom	Paediatrician	Mrs	Jackie	Fakes	Flynn Pharma Limited	United Kingdom	
Mrs	Véronique	Bach	PériTox-INERIS	France	Researcher	Ms	Kristy-Lee	Feilds	The University of Sydney	Australia	Honours Student
Mrs	Jacqueline	Bennett	The James Cook University Hospital	United Kingdom	Highly Specialised Clinical Physiologist	Mrs	Ofra	Flint-bretler	Haifa University	Israel	Researcher
Dr	Annie	Bernier	Psychology, University of Montreal	Canada	Associate Professor	Miss	Tamarin	Foy	Alder Hey Childrens Hospital	United Kingdom	Clinical Physiologist
Dr	Rakesh	Bhattacharjee	University of Chicago	USA	Assistant Professor of Pediatrics	Dr	Patricia	Franco	Pediatric Sleep Unit	France	MCU-PH
Miss	Claire	Bibey	John Radcliffe Hospital	United Kingdom	Clinical Neurophysiologist	Mrs	Louise	Freeland	Sirona Care and Health	United Kingdom	Children's Learning Disability Nurse
Miss	Rachel	Bigwood		United Kingdom	Medical Student	Dr	Simon	Freilich	NHNN and Royal Free Hospitals	United Kingdom	SpR in Clinical Neurophysiology
Dr	Wiebe	Braam	s Heeren Loo	Netherlands	Physician	Miss	Sarah	Gait	Cerebra	United Kingdom	Sleep Practitioner
Miss	Emma	Brogli	University of Birmingham	United Kingdom	Research Associate	Prof	Ahmed	Gamal	Mansoura University Hospital	Egypt	Professor of Neurology
Mrs	Elise	Buchan	Royal Hospital for Sick Children Yorkhill	United Kingdom	Respiratory Physiologist	Mrs	Jackie	Garwood	Millpond Sleep Consultation Service	United Kingdom	Children's Sleep Therapist, Independent Health Visitor
Ms	Marie	Burke	Oxfordshire University Hospitals NHS Trust	United Kingdom	Clinical Psychologist	Dr	Angelos	Gerontas		Greece	Doctor
Mr	Paul	Burns	Yorkhill Royal Hospital for Sick Children	United Kingdom	Respiratory Physiologist	Mr	Mohammad	Ghani	Pediatric Sleep Lab, Stollery Children's Hospital	Canada	Sleep Technologist
Dr	Juan	Carrillo	Hospital Clínico Félix Bulnes	Chile	Unidad de Estudios del Sueño	Prof	Roger	Godbout	Dept Psychiatry, Université de Montreal	Canada	Professor, Researcher, Psychologist
Dr	Lawrence	Carter	Jazz Pharmaceuticals	USA	Medical Scientist	Dr	Aviv	Goldbart	Soroka University Medical Center	Israel	Pediatric Sleep Specialist
Dr	Kyu-Young	Chae	CHA Bundang Medical Center	South Korea	Pediatric Neurologist	Dr	Michael	Gradisar	Flinders University	Australia	Senior Lecturer in Clinical Child Psychology
Dr	Samantha	Chan	UCL Institute of Child Health	United Kingdom	Clinical research fellow	Dr	Peter	Greally	National Children's Hospital	Ireland	Doctor
Dr	Vineeth	Cheruvalli	Leeds General Infirmary	United Kingdom	ST6 Trainee Paediatric Respiratory Medicine	Dr	Kendra	Grim	Mayo Clinic	USA	Physician
Prof	Orna	Chishinski (Tzischinsky)	Emek Yezreel College	Israel	Associate Professor	Mrs	Mandy	Gurney	Millpond	United Kingdom	Nurse
Dr	Heather	Coughtrey	Nepean Hospital	Australia	Staff Neonatologist	Dr	Fahed	Hakim	Rambam Health Care Campus	Israel	Pediatric Pulmonologist
Dr	Aimee	Coulombe	Dalhousie University	Canada	Post-Doctoral Fellow	Dr	Wendy	Hall	University of British Columbia School of Nursing	Canada	Professor
Mrs	Debbie	Cox	John Radcliffe Hospital	United Kingdom	Clinical Physiologist	Dr	Phil	Hallwood	Flynn Pharma Limited	United Kingdom	Medical Director
Dr	Olga	Crawford	East Kent Hospitals University NHS Foundation Trust	United Kingdom	Associate Specialist	Dr	Oswald	Hasselmann	Ostschweizer Kinderspital	Switzerland	Neuropediatrics
Prof	Helen	Cross	UCL/Institute of Child Health	United Kingdom	The Prince of Wales's Chair of Childhood Epilepsy	Dr	Philippa	Haywood	Hampshire Hospitals NHS Trust, Winchester	United Kingdom	Consultant Community Paediatrician
Prof	Leopold	Curfs	Maastricht University Medical Centre - Governor Kremers Centre	Netherlands	Professor of Intellectual Disabilities	Prof	John	Henderson	University of Bristol	UK	Professor of Paediatric Respiratory Medicine
Dr	Benjamin	Davies	Nottingham Children's Hospital	United Kingdom	ST3 Paediatric Trainee	Mrs	Daniëlle	Hendriks	Medisch Centrum Haaglanden	Netherlands	Orthopedagoog
Mr	Ed	de Bruin	University of Amsterdam	Netherlands	Researcher/PhD Candidate	Dr	Jane	Heraghty	Guys and St Thomas NHS Trust	United Kingdom	Consultant
Dr	Al	de Weerd	Sleepcenter SEIN Zwolle-Groningen	Netherlands	Head Sleepcenter SEIN	Dr	Kerstin	Hoedlmoser	University of Salzburg	Austria	Psychologist
						Dr	Yu-Shu	Huang	Chang Gung Memorial Hospital	Taiwan	Associate Professor
						Dr	Allan	Hvolby	Child and adolescent psychiatric department	Denmark	Consultant, PH.D



Mrs	Tiina	Ikävälko	University of Eastern Finland	Finland	Clinical Teacher	Dr	Norzila	Mohamed Zainudin	Hospital Kuala Lumpur	Malaysia	Consultant Paediatrician & Paediatric Respiratory Physician
Miss	Clara Odilia	Inocente	CRNL, INSERM U1028, UMR 5292 - Equipe Wake, University Lyon 1	France	DVM, PhD student	Dr	Ikuko	Mohri	Osaka University	Japan	Associate Professor
Dr	Osman	Ipsiroglu	University of British Columbia	Canada	Clinical Associate Professor	Dr	Enza	Montemitto	Bambino Gesù Paediatric Hospital	Italy	Pediatrician
Dr	Shaikh Mohammed	Iqbal	King Saud University	Saudi Arabia	Assistant Prof & Consultant	Prof	Sona	Nevsimalova	Charles University in Prague	Czech Republic	Professor
Mr	Patrick	Jamieson	Yorkhill RHSC	United Kingdom	Specialist Respiratory Physiologist	Mrs	Juliet	Newson	Millpond	United Kingdom	Nurse
Dr	Fan	Jiang	Shanghai Children's Medical Center	China	Pediatrician	Dr	Titus	Ninan	Heart of England Foundation Trust	United Kingdom	Consultant Paediatrician
Dr	Chetana	Kallappa	Heart of England foundation hospitals trust	United Kingdom	Consultant	Dr	Tali	Nir	Neurim Pharmaceuticals	Israel	VP Clinical and Regulatory Affairs
Dr	Jaap	Karsten	Sionsberg	Netherlands	Pediatrician	Dr	Lia	Oliveira	Santa Maria's Hospital	Portugal	Lia Oliveira
Dr	Asiah	Kassim	Hospital Kuala Lumpur	Malaysia	Paediatrician	Miss	Nanna	Olsen	Institute of Preventive Medicine	Denmark	PhD-student
Prof	Ineko	Kato	Saitama Medical Center, Saitama Medical University	Japan	Doctor	Dr	David	Osoba	Bromley Healthcare CIC	United Kingdom	Community Paediatrician
Dr	Daphne	Keen	St George's, London	United Kingdom	Consultant Paediatrician	Dr	Kathryn	Padoa	Solent NHS Trust	United Kingdom	Consultant Community Paediatrician
Dr	Declan	Kennedy	Women's and Children's Hospital/ University of Adelaide	Australia	Thoracic and Sleep Physician	Prof	Riitta	Pahkala	University of Eastern Finland	Finland	Professor
Prof	Leila	Kheirandish-Gozal	The University of Chicago	USA	Director of Clinical Sleep Research	Prof	Teresa	Paiva	CENC	Portugal	Clinical Director
Ms	Caroline	King	RHSC Yorkhill Hospital	United Kingdom	Respiratory and Sleep Physiologist	Prof	Markku	Partinen	Helsinki Sleep Clinic	Finland	Research Director
Prof	Fenella	Kirkham	University hospital Southampton	United Kingdom	Consultant Paediatric Neurologist	Dr	Els	Peeters	MCH Westeinde, sleep/wake centre	Netherlands	Child Neurologist
Dr	Jun	Kohyama	Tokyo Bay Urayasu/Ichikawa Medical Center	Japan	CEO	Dr	Patricio	Peirano	INTA, University of Chile	Chile	Professor and Head, Sleep Laboratory
Mr	Sijo	Kollannur	Great Ormond Street Hospital	United Kingdom	Snr Sleep Physiologist	Dr	Rosa	Peraita-Adrados	University Hospital Gregorio Marañón	Spain	Head Sleep and Epilepsy Unit
Dr	Janet	Lam	Kennedy Krieger Institute	USA	Assistant Professor of Pediatric Neurology	Dr	Natalia	Petrova	Almazov Federal Heart, Blood and Endocrinology Centre	Russia	Neonatologist
Miss	Ruth	Lamb	Great North Children's Hospital	United Kingdom	Specialist Clinical Physiologist	Dr	Sabine	Plancoulaine	INSERM U1018 - CESP	France	Senior Researcher
Dr	Zsofia	Lendvai	Ist Department of Paediatrics, Semmelweis University	Hungary	Physician	Mrs	Carol	Pratt	Leicestershire Partnership Trust	United Kingdom	Health Visitor
Dr	Lynn	Loutzenhiser	University of Regina	Canada	Associate Professor	Dr	Alexander	Prehn-Kristensen	Center for Interative Psychiatry	Germany	Research Assistant
Prof	Robert	Lucas	University of Manchester	UK	Professor of Neurobiology	Dr	Iva	Prihodova	Dpt of Neurology	Czech Republic	Child Neurologist
Dr	Bryan	Lynch	Children's University Hospital	Ireland	Consultant Paediatric Neurologist	Dr	Elaine	Purcell	Mater Private Hospital	Ireland	Consultant in Sleep Medicine
Dr	Joanna	MacLean	University of Alberta	Canada	Assistant Professor	Dr	Naheed	Qadeer	Leeds CommunityHealthcare NHS Trust	United Kingdom	Associate Specialist Community Paediatrics
Dr	Rebecca	MacLeod	St George's NHS Trust	United Kingdom	SpR Community Paediatrics	Miss	Laury	Quaedackers	Kempnaeaghe	Netherlands	Health Psychologist
Dr	Mohannad	Mannaa	King Faisal Specialist Hospital & Research Center	Saudi Arabia	Onsultant pediatric Pulmonary& Sleep Medicine	Dr	William	Qubty	Mayo Clinic	USA	Resident
Mrs	Leanne	Markland	Sleep Solutions	United Kingdom	Senior Practitioner	Dr	Shiv	Rajdev	Birmingham Community NHS Healthcare Trust	United Kingdom	Registrar in Community Paediatrics
Prof	Toyojiro	Matsuishi	Kurume University School of Medicine	Japan	Professor and Chairman	Dr	Aude	Raoux	Hopital femme mere enfant -EFN	France	Paediatrician
Dr	Shigeyuki	Matsuzawa	Hyogo prefectural rehabilitation hospital	Japan	Assistant Chief	Dr	Teresa	Rebello-Pinto	CENC	Portugal	Doctor
Prof	Jennifer	Maul	UWA/PMH	Australia	Assistant Professor/Senior Scientist	Dr	Paul	Redding	South Tees NHS Trust	UK	Consultant
Ms	Sue	McCabe	The Centre for Cerebral Palsy, Perth, Western Australia	Australia	Senior Occupational Therapist	Dr	Graham J.	Reid	Western University	Canada	Associate Professor
Dr	Aileen	McCafferty	NHS Tayside	United Kingdom	Clinical psychologist	Miss	Claire	Reid	RHSC Yorkhill, Glasgow	United Kingdom	Respiratory Physiologist
Dr	Neal	McCathie	Birmingham Community Health Care NHS Trust	United Kingdom	Consultant Community Paediatrician	Miss	Iris Ethel	Renteria-Solis	University of Mexico	Mexico	MD
Prof	Anne Marie	Meijer	University of Amsterdam	Netherlands	Assistant Professor	Miss	Gabrielle	Rigney	University of South Australia	Australia	PhD Candidate
Dr	Lisa	Meltzer	National Jewish Health	USA	Assistant Professor	Mrs	Bethan	Roberts	Cerebra	United Kingdom	Sleep Practitioner
Dr	Elise	Merry	NHS Tayside	Scotland	Consultant Paediatrician	Dr	Anstella	Robinson	Stanford University	USA	Clinical Associate Professor Psychiatry
Dr	Silvia	Miano	E Meeting & Consulting	Italy	Doctor	Dr	Outi	Saarenpää-Heikkilä	Tampere University Hospital	Finland	Pediatric Meurologist
Dr	Rie	Miyata	Tokyo-Kita Social Insurance Hospital	Japan	Doctor	Dr	Yair	Sadaka	Soroka Medical center	Israel	Pediatric neurology fellowship
						Miss	Ruth	Sankey	University of Southampton	United Kingdom	Medical Student
						Dr	Nathalie	Sannikoff	Saint-Pierre Ottignies	Belgium	Pédiatrician
						Dr	Oscar	Sans Capdevila	Hospital Sant Joan De Deu	Spain	Sleep Unit Coordinator

