PWP XXX

The 30nd Congress of Pediatric work Physiology: Celebrating the 50 years of PWP: Pediatric Exercise Science on the top of Olympus

Hosted by:

School of Physical Education and Sport Science, Aristotl Univercity

Sackler School of Medicine, Tel Aviv University

3nd-8th Octomber 2017

Mediteranean Village Hotel,Paralia Katerini

Aristotl University Thessaloniki Greece

Univercity of Tel Aviv,Israel

PWP 50 YEARS

GREETING FROM PIERIA'S DEPUTY REGIONAL GOVERNOR

SOFIA MAVRIDOU

ΧΑΙΡΕΤΙΣΜΟΣ ΑΝΤΙΠΕΡΙΦΕΡΕΙΑΡΧΗ ΠΙΕΡΙΑΣ

ΣΟΦΙΑΣ ΜΑΥΡΙΔΟΥ

I welcome you to Pieria at the World Congress of Paediatric Work Physiology, which undoubtedly holding the prestige of PWP, will constitute a "crossroads" of meeting, informing, exchanging views, suggestions, and ideas.It is an honour for our region to organize a conference by one International scientific organization that deals with issues that are related to the child as well as the teenager, and that also responds to the needs of continuous education and information.I congratulate all those who organized the conference, at which distinguished scientists from all over the world will have a "step" in order to inform, not only about their present research activity, but also about the dissemination of clinical experience.In the Regional Unity of Pieria, we are promoters of actions and acts which relate to man and especially to children, their health, and their good physical condition.Medicine is progressing by leaps and bounds. The health sector is based in a field of continuous scientific search and academic upgrading. Every day, new knowledge, new techniques are added and it is imperative that all of them become the property of all health workers, teachers, coaches, physics teachers through the conferences taking place.Scientific information and better training form a framework for the provision of high quality healthcare services at the level of prevention, diagnosis, and treatment, for the benefit of society; especially for the young people.Finally, I wish you good luck and it is my firm belief that the conclusions to be drawn will contribute towards the fulfilling of the goals you have set so far, expecting similar initiatives in the future.

Σας καλωσορίζω στην Πιερία, στο παγκόσμιο συνέδριο του Pediatric Work Physiology, που αναμφισβήτητα με το κύρος του PWP, θα αποτελέσει ΄΄σταυροδρόμι΄΄ συνάντησης, ενημέρωσης, ανταλλαγής απόψεων, προτάσεων και ιδεών.
Αποτελεί τιμή για την περιοχή μας η διοργάνωση ενός συνεδρίου από ένα διεθνή επιστημονικό οργανισμό, που ασχολείται με θέματα που σχετίζονται με το παιδί και τον έφηβο, που ανταποκρίνεται στις ανάγκες της συνεχούς εκπαίδευσης και ενημέρωσης.
Συγχαίρω όλους όσους επιμελήθηκαν τη διοργάνωση του συνεδρίου, στο οποίο διακεκριμένοι επιστήμονες από όλο τον κόσμο, θα έχουν «βήμα» για ενημέρωση, παρουσίαση ερευνητικής δραστηριότητας αλλά και διάχυση κλινικής εμπειρίας.
Στην Περιφερειακή Ενότητα Πιερίας είμαστε αρωγοί ενεργειών και δράσεων που αφορούν τον άνθρωπο και ειδικότερα τα παιδιά, την υγεία τους και την καλή φυσική τους κατάσταση.

Η πρόοδος της ιατρικής είναι αλματώδης. Ο τομέας της υγείας βασίζεται σε ένα πεδίο συνεχούς επιστημονικής αναζήτησης και αναβάθμισης της εκπαίδευσης. Καθημερινά προστίθενται καινούργια γνώση , νέες τεχνικές και είναι επιβεβλημένο όλα αυτά να γίνονται κτήμα όλων των λειτουργών της υγείας, εκπαιδευτικών, προπονητών, καθηγητών φυσικής αγωγής, μέσα από συνέδρια που λαμβάνουν χώρα.Επιστημονική ενημέρωση και αρτιότερη κατάρτιση διαμορφώνουν ένα πλαίσιο παροχών σε υγειονομικές υπηρεσίες υψηλής ποιότητας σε επίπεδο πρόληψης, διάγνωσης και θεραπείας , προς όφελος της κοινωνίας και ειδικότερα των νέων.Με την πεποίθηση ότι τα συμπεράσματα που θα εξαχθούν θα συμβάλουν στην εκπλήρωση των στόχων που έχετε θέσει, σας εύχομαι καλή επιτυχία προσδοκώντας ανάλογες πρωτοβουλίες και στο μέλλον.

Yours sincerely,
The Deputy Governor of Pieria,
Sofia Mavridou

GREETING FROM THE MAYOR OF KATERINI

SAVVAS HIONIDIS

It is with great pleasure that I welcome you here, in the foothills of the mythical mountain Olympus, to the thirtieth congress of the European Group of Pediatric Work Psysiology which will undoubtedly contribute to its relating field through the exchange of ideas but also through the establishment of relations among its participating countries.As a mayor of Katerini, it is my honor to welcome Greek, as well as world renowed scientists, proving that our city, along with the entire region of Pieria, possesses the necessary facilities to host such prominent conferences.Our Municipality has always been a supporter of every scientific venture, providing a starting point for a joint effort of the medical community, as the one taking place today, aiming towards social cohesion and more specifically towards the preservation of our children's well-being.Besides, the medical profession is and should remain a pan-human value.With that in mind, I would like to congratulate the organizers of this event who have put considerable effort on this conference, among whom is also the Aristotle University of Thessaloniki, an institution present for many years in the scientific field. I wholeheartedly wish you an enlightening and successful conference, and I am confident that your stay in Katerini will be a memorable experience which will in turn encourage you to be ambassadors of our town.

THE MAYOR OF KATERINI

SAVVAS HIONIDIS

Rector Aristotle University of Thessaloniki

Professor Pericles A. Mitkas

Dear Colleagues and Friends,

In my capacity as Rector of Aristotle University of Thessaloniki (AUTh), the hostwinstitution, allow me to extend a warm welcome to all the participants of the 30thCongress of Pediatric Work Physiology.

As the largest and the most multi-thematic University in Greece and one of the largest of its kind in Europe, with rather strong international presence, AUTh actively promotes interdisciplinarity, research and innovation, in a fertile academic environment.

I feel proud of our School of Physical Education and Sports Science, which has co-organized, together with Tel Aviv University, this year's Congress and has chosen a very special and symbolic area, at the base of the legendary Mount Olympus. I am also pleased to learn that the Congres shas attracted scientists, clinicians, professors, students, health fitness professionals, and policy experts on child health and exercise from all over the world. I am certain that your deliberations will draw inspiration from your proximity to an ancient oracle, the mountain of Gods, and the palace of the Great Macedonian Kings.

I would like to commend the Organizing Committee for their efforts to combine a stimulating scientific program with several cultural activities and to congratulate the PWP on its 50th anniversary.

Professor Pericles A. Mitkas

Rector Aristotle University of Thessaloniki

Scientific Committee:

Kotzamanidis Christos, Aristotle University of Thessaloniki, Greece

Bareket Falk, Brock University, Canada

Eloakim Alon, University of Tel Aviv, Israel

Nemeth Dan, University of Tel Aviv, Israel

Patikas Dimitrios, Aristotle University of Thessaloniki, Greece

Local organizing Committee:

Kotzamanidis Christos (chair), Aristotle University of Thessaloniki, Greece

Christoulas Kosmas, Aristotle University of Thessaloniki, Greece

Kambas Antonis, Democritus University of Thrace, Greece

Patikas Dimitrios, Aristotle University of Thessaloniki, Greece

Bogdanis Grigoris, National and Kapodistrian University, Athens

Bassa Eleni, Aristotle University of Thessaloniki, Greece

Panoutsakopoulos Vassilios, Aristotle University of Thessaloniki, Greece

Kara Magdalini, Aristotle University of Thessaloniki, Greece

Zafeiridis Andreas, Aristotle University of Thessaloniki, Greece

Galazoulas Christos, Aristotle University of Thessaloniki, Greece

Paraschos Ilias, Aristotle University of Thessaloniki, Greece

Kotzamanidis Christos

School of Physical Education and Sport Science of Aristotle University

Professor Emeritus in Neuromuscular control and coaching in the Department of Physical Education and Sport Science of Aristotle University Thessaloniki. He was lecturer in European and International Handball Federation and scientific consultant of Greek Handball federation. He gave lectures in various Europeans Univercities,in international post graduated programs and intensive courses. .He is reviewer in several international Journals, author of book for principles of training and peer review research articles in international scientific journal. He teaches coaching in developmental ages, neuromuscular control and handball. His research interests are related with motor development and neuromuscular control of children (fatigue, strength, power, explosive tasks, electromyography and elektrostimulation) and their underlying mechanisms.

Falk Bareket

Department of Kinesiology Brock University, Canada

Bareket Falk is a pediatric exercise physiologist, currently at the Department of Kinesiology at Brock University. She received her PhD from McMaster University (1991) in Canada under the mentorship of Oded Bar-Or. She then worked as the Head of the Physiology unit and the acting director of the Research and Sports Medicine Center at the Wingate Institute in Israel. Her research has spanned various areas in pediatric exercise physiology, including thermoregulation, metabolism during and following exercise and the effects of physical activity and training on growing bone and on muscle function. She has performed her research in clinical and research settings. Her more recent areas of research include the effect of exercise and physical training on bone health and on neuro-muscular function during growth and maturation. She has taught numerous courses in pediatric exercise physiology and sports medicine at the undergraduate and graduate level. She is the current editor of Pediatric Exercise Science and has played an active role in the North American Society of Pediatric Exercise Medicine, as well as in the European Group of Pediatric Work Physiology.

Takken Tim

Wilhemina Children's Hospital, University Medical Center Utrecht, the Netherlands

Tim Takken MSc PhD, is a medical exercise physiologist and associate professor in pediatrics at the Wilhemina Children's Hospital of the University Medical Center Utrecht, the Netherlands. He has a special interest in clinical pediatric exercise physiology. He hosted several international meetings in Utrecht, including the 29th Pediatric Work Physiology Meeting. He is currently director of the Clinical Exercise Testing Laboratory in Utrecht. Further he is the chair of the Dutch chapter of CPX international. Dr Takken published over 190 peer-reviewed papers and authored 4 books.

Barker Alan

Children's Health and Exercise Research Centre (CHERC), University of Exeter,UK

Alan is currently a Senior Lecturer in Paediatric Exercise at the Children's Health and Exercise Research Centre (CHERC), University of Exeter. His primary areas of research are: Limiting factors of oxidative metabolism (e.g. oxygen uptake kinetics, maximal oxygen uptake). Cardiopulmonary exercise testing and exercise training in paediatric groups. The effect of exercise on cardiometabolic risk factors and vascular function in children and adolescents. The benefits and risks of exercise training in children and adolescents Exercise, nutrition and bone health in children and adolescents.He has published in excess of 70 manuscripts on these topics, which includes an expert statement on the measurement and interpretation of aerobic fitness for the British Association of Sport and Exercise Sciences (BASES) and book chapters on the assessment of fitness and performance in children including for the recent Oxford Textbook of Children's Exercise Science and Medicine.

Kourtessis Thomas

School of Physical Education & Sport Science at Democritus University of Thrace,Greece

Thomas Kourtessis is an Associate Professor of Motor Coordination Disorders at the School of Physical Education & Sport Science at Democritus University of Thrace, Komotini, Greece. He is also Director of the Interdepartmental Graduate Program of Studies "Exercise and Quality of Life". From 1978 until 1984 he has been a member of the Greek National Swimming Team. In 1984, he was accepted as a distinguished athlete in the Department of Physical Education & Sport Science at Aristotle University of Thessaloniki, Thessaloniki, Greece, where he completed his undergraduate studies with a major in Swimming Coaching (BSc'90). He completed his graduate studies at the Department of Physical Education at McGill University, Montreal, Canada in "Adapted Physical Activity" (MA'94). In 1997 he received his doctoral Doctoral Degree at the Department of Physical Education & Sport Science at Democritus University of Thrace, Komotini, Greece (PhD'97). His Doctoral Dissertation was titled "Results of an intensive intervention program in water for children with movement difficulties". He has authored and co-authored more than 100 scientific articles, more than 200 presentations and proceedings' articles in international and world Scientific Congresses and numerous scientific book chapters. He has taught in numerous workshops and seminars regarding identification, assessment and interventional management of movement difficulties in children. He is a member of the International Society for Research into Developmental Coordination Disorder (ISR-DCD), of the Hellenic Academy of Physical Education as well as of many national and international Associations and Organizations. His research interests are identification, assessment and interventional management of Developmental Coordination Disorder in childhood and adolescence. He also teaches Research Methods and Motor Learning in undergraduate and graduate level within his home University and as a guest lecturer in many Graduate Programs in various Greek Universities. He has participated either as Coordinator or as a researcher in many National and European Research Programs.

Arampatzis Adamantios

Department of Training and Movement Sciences,Humboldt-University Berlin,Germany

Adamantios Arampatzis is the head of the Department of Training and Movement Sciences at the Humboldt-University Berlin. He finished his PhD in training and movement sciences in 1995 and his habiliation in biomechanics in 2002 at the German Sports University Cologne. His research is focused on the adaptation of the musculosceletal system after long- and short-term mechanical loading, on the understanding the interaction between the adapted musculoskeletal system and the resulted movement control and regulation under healthy and pathological conditions and on the development of interventions aiming to improve the safety and coordination of human movement. He is author and co-author for more than 100 peer review publications in movement science, biomechanics and exercise physiology. He is a member of the editorial board of the Journal of Biomechanics and the Journal of Electromyography and Kinesiology and member of various scientific associations, i.e. the International, European, German and Hellenic Societies of Biomechanics and the European College of Sports Science.

Baltzopoulos Vasilios

Exercise Sciences (RISES), John Moores University, Liverpool,UK

Professor V. Baltzopoulos was appointed as Head of the Research Institute for Sport and Exercise Sciences (RISES) at Liverpool John Moores University in February 2016. His main research interests and work are focused on the biomechanics of the musculoskeletal system. His team have unique expertise in using an innovative combination of modern imaging techniques that include X-Ray video, MRI and ultrasound for studying in vivo muscle-tendon and joint function and the loading of different tissues during various movements, pathological conditions and sports activities. They have a special interest in developmental biomechanics and extensive experience of investigating the biomechanics of musculoskeletal growth and functional outcomes during childhood. He has published over 110 papers with a Citation Index of 4512 and an h-index of 42. He is the author of several book chapters on general muscle function and assessment of muscle strength. He has supervised over 30 PhD and MPhil students, examined more than 10 PhD students at home and abroad and delivered Keynote and other invited presentations at over 40 meetings and Conferences. He was Editor of the Biomechanics Section of the Journal of Sport Sciences (2001-2006) and member of the Editorial Board of various other journals including Frontiers in Bioengineering and Biotechnology (Biomechanics), member of the Advisory Board of the European Journal of Applied Physiology and Consulting Editor of the Journal of Biomechanics.

Zafeiriou I Dimitrios

Child Neurology and Developmental Paediatrics, Aristotle University of Thessaloniki, Greece

Dimitrios Zafeiriou is Professor of Child Neurology and Developmental Paediatrics at the Aristotle University of Thessaloniki, Greece. Professor Zafeiriou graduated from medical school in 1988 and undertook specialist training in paediatrics at the Ludwig Maximilian University (LMU) University of Munich, Germany, achieving his certification in 1993. He achieved his doctoral degree in 1993 on the course and prognosis of epilepsy in children with cerebral palsy from the LMU University of Munich. Returning to Greece in 1993, Professor Zafeiriou took a position as a lecturer at the Aristotle University of Thessaloniki in1997, becoming an Assistant Professor in 2001 and a full Professor in 2012. Professor Zafeiriou's clinical and research interests include neurometabolic disorders, cerebral palsy, clinical neurophysiology, paediatric epileptology, neuromuscular disorders, neonatal neurology, paediatric stroke and autism. He has authored more than 130 peer-reviewed publications in the field of child neurology and is a member of numerous societies including the International Child Neurology Association, the European Paediatric Neurology Society, the Society for the Study of Inborn Errors of Metabolism and the European Society of Paediatric Research. Professor Zafeiriou is a founding member and currently elected President of the Greek Society for the Study of Inborn Errors of Metabolism, past President of the Greek Association of Paediatric Neurology and Board Member of the European Paediatric Neurology Society.Since 2013, Professor Zafeiriou is a Guest Professor at the Department of Paediatric Neurology and Behavioral Paediatrics, at Boston's Children Hospital, Harvard University, USA.

Jorunn Sundgot-Borgen,

Norwegian School of Sport Sciences, Oslo, Norway

Professor in Physical Activity and Sport at the Department of Sports Medicine, the Norwegian School of Sport Sciences, Norway.Research fields: Sports Medicine, female elite athletes' health and performance, eating disorders, the female Athlete Triad, adolescent / youth athletes, body composition and anthropometry. Appointments: Member of theIOC Medical & Scientific Expert Group, Member of the IOC Working Group on Body Composition, Health and performance (2009-2012) and the IOC Working Group on The Female athlete Triad and The RED-s (2013-present).Consultant for The Norwegian Olympic Training center (1995-2004), Head of Nutrition department, The Norwegian Olympic Training center (2004-2009), Visiting Scholar (2003-2004)and visiting Professor (2010, 2011, 2013) at UC Berkeley, President the Norwegian Eating Disorder Society (2013-present), Vice president the Norwegian Council of Physical Activity (2009-2012) and the Nordic Eating Disorder Society (2012-present).Reviewer in a number of international exercise science, medical, psychological and nutrition journals. Author of about 150 international journal articles and book chapters. Yearly invited to numerous of events as a keynote speaker within her research areas.In 2013 she was awarded for Excellence in Communication of Science by The Norwegian Research Council. Practical activities in sports: Scientific and practical support of Olympic level athletes in the fields of the female triad, pregnancy and training in all sports.

Rowland Thomas

School of Medicine, Tufts University, USA

Thomas Rowland, MD, is a pediatric cardiologist at the Baystate Medical Center in Springfield, Massachusetts, and is Professor of Pediatrics, Tufts University School of Medicine. The author of *Children's Exercise Physiology* and past editor of the journal *Pediatric Exercise Science,* he has extensive research experience in the physiological responses of children and adolescents to exercise, with over 200 peer-reviewed publications. Dr. Rowland has served as president of the North American Society for Pediatric Exercise Medicine and was on the Board of Trustees of the American College of Sports Medicine. He is past-president of the New England Chapter of the American College of Sports Medicine and received the Honor Award from that organization in 1993.

Shlomit Radom-Aizik.

Department of Pediatrics, Irvine School of Medicine,USA

Shlomit Aizik is the director of UC Irvine Health Pediatric Exercise and Genomics Research Center (PERC) working to advance pediatric exercise medicine through clinical and laboratory research using genomic and epigenetic approaches, and to promote and foster community partnerships to encourage physical activity in children. She completed her PhD dissertation in the Functional Genomics Unit at Sheba Medical Center, Tel Aviv University and received her PhD degree in Physiology and Pharmacology from Tel Aviv University, Israel. Her research focus on the intersection of functional genomics, exercise physiology, and exercise immunology with the goal to uncover the molecular mechanisms of both acute and long-term health effects of exercise and training during childhood and adolescence on healthy children, and on children with chronic diseases and special needs.

Nemet Dan

Sackler School of Medicine, Tel Aviv University,Israel

Dr. Dan Nemet is aProfessor of Pediatrics at the Sackler School of Medicine, Tel Aviv University, Israel,where he also serves as an Associate Dean. He is the co-founder and Director of the Child Health and Sports Center at the Meir Medical Center. The center is a multi disciplinary center focused on the research and clinical aspects of the interaction between children, development, nutrition, growth and physical activity. He obtained his Medical Degree at The Ben Gurion Medical School, Beer Sheva, Israel. He finished his pediatric residency cum laude, at the Meir Medical Center, Kfar-Saba, Israel.Following his residency Dr. Nemet completed a research and clinical fellowship in Pediatric Exercise Science at The University of California, Irvine (2000-2003), with Prof. Dan Cooper. Dr. Nemetis the Deputy CEO ofthe Meir Medical Center.He holds a Master in Health Administration (MHA)degree, from the Recanati School of Business Administration, Tel Aviv University. Dr. Nemet has authored more than 120 peer reviewed medical articles, and several book chapters in the field of pediatric exercise, growth and nutrition.Heserves as a reviewer and on the editorial board of several medical journals.Dr. Nemet is a former member of the Israeli National track& field team. Dr Nemet is the husband of Michal and a proud father of 3 great kids….

Armstrong Neil

Children's Health and Exercise Research Centre (CHERC), University of Exeter,UK

Neil Armstrong is Professor of Paediatric Physiology and formerly Provost of the University of Exeter. He graduated from Loughborough with BEd and MSc degrees and earned his PhD and higher doctorate (DSc) at Exeter. He has received honorary doctorates from Universities in Portugal (ScD) and Canada (LLD). Neil has authored/edited 16 books, contributed over 350 book chapters and peer-reviewed papers and been invited to make keynote presentations to conferences in 44 countries. He is a Fellow of the British, European and American Colleges of Sport Medicine/Science and has served as chair or member of numerous international 'expert committees' focused on the promotion of children's physical activity, sport, health and well-being. An active sportsman in his youth, Neil represented England at U15, U18, and University level and played professional football for 10 years. He remains a sad but optimistic supporter of Premier League Newcastle United despite the fact that they have not won a domestic trophy since 1955.

Karafilis Grigorios

Department of Primary Education in University of Ioannina, Greece

Grigorios Karafillis is Emeritus Professor of Philosophy in the Department of Primary Education in University of Ioannina, Greece. His research interests are Social Philosophy, Philosophy of Education and Philosophy of Enlightenment. Professor Karafillis has published 10 books in greek (Axiology and Education, Athens 2005, Neohellenic Enlightenment. Philosophical Approaches, Athens 2008, Social Philosophy. Essays on social, political and moral composition, Athens 2010) and over 80 articles. He is a member of the editorial board of the journals: Skepsis, Philosophy Study and US-CHINA Education Review A-B.

Albanidis,Evaggelos

Department of Physical Education and Sport Science Democritus University of Thrace, Greece

Teaching Sports History, Sociology of Sports, Philosophy and Ethics in Sports as well as History of Modern Olympic Games in the Department of Physical Education and Sport Science of Democritus University of Thrace. Teaching also Sports History in Greek antiquity in the post graduate studies program of the International Olympic Academy (I.O.A.) and the University of Peloponnese called "Olympic Studies, Olympic Education, Organization and Management of Olympic Events" in ancient Olympia.
He is the President of the European Committee of Sports History (CESH), Fellow of CESH, President of the Scientific Association: Hellenic Academy of Physical Education, Co-Editor of the peer-reviewed scientific journals: European Studies for Sports History (ESSH) as well as the Exercise and Society: Journal of Sports Science.
He has published 42 papers in international and 50 articles in national scientific journals. He has also published three books on the history of sport in Greek language and two chapters in English language books. His main focus of research is the athletics in Greek antiquity as well as the political and cultural dimension of modern sports and Olympic Games. More specifically he focused on the study of history of sports in northern areas of Greece such as Macedonia, Thrace, Black Sea as well as on the ancient iso-Olympic Games which were held in places apart from Olympia in Peloponnese. Furthermore, he also studied the social origin of ancient Olympic victors and the coexistence of "barbarians" and Greeks in ancient Greek Gymnasium and in the Pan-Hellenic sacred Games. As regards the political and cultural dimension of modern sports he focused on the relationship between sports and politics as well as on sports and fascism.

Dipla Konstantina

School of Physical Education and sport Science,Aristotl Univercity,Thessaloniki,Greece

Dr. Dipla is currently an assistant proffessor at the department of Sports Science at Serres, Aristotle University of Thessaloniki, Greece. She received her Ph.D. degree in Exercise Physiology (1997) from Temple University, Philadelphia PA, USA (1997), and continued for Post-Doctoral studies in the Physiology Department, School of Medicine, Temple University, USA (1998). Next, she was employed as an Ass. Scientist at the Cardiovascular Research Institute, Temple University. Since 2008 she is a faculty member of Aristotle University of Thessaloniki. She is the co-author of >48 articles (>1200 citations, h index 17) and a reviewer for >15 journals. Her research interests focus on clinical exercise physiology and the mechanisms by which exercise can prevent or delay chronic disease. Dr. Dipla is currently involved in projects examining (i) cardiovascular function during exercise in individuals with chronic diseases (hypertension, diabetes, obesity) and (ii) alterations in skeletal muscle microvacular function in response to exercise and inactivity.

Klendrou Panagiota

Department of Kinesiology, Brock Univercity,Canada.

Dr. Panagiota (Nota) Klentrou is a professor of Exercise Physiology in the Department of Kinesiology, and the current Associate Dean Research and Graduate Studies of the Faculty of Applied Health Sciences at Brock University in Ontario, Canada. She received her BSc (1984) from University of Athens, and her MSc (1987) and PhD (1991) from Université de Montréal. Prior to holding the Associate Dean position, she served two terms as Chair of the Department of Kinesiology. Nota's research focuses on the effects of exercise and training on the health and performance of young athletes. Her current research focuses on bone development, and the interactions between bone metabolism and exercise-induced endocrine and inflammatory changes. Through funding support from multiple Canadian agencies, Nota leads an interdisciplinary research program with 80+ publications covering a range of topics in pediatric and sport physiology, including musculoskeletal development, hormonal responses to exercise during puberty, temperature regulation, and exercise immunology. Recently, she introduced the first rehabilitative gymnastics program for children with Cerebral Palsy supported by the Ontario Federation of Cerebral Palsy. Dr. Klentrou is the Chair-elect of the Canadian Society for Exercise Physiology, and she is involved with Osteoporosis Canada and other international Education, Health and Sports programs. A retired rhythmic gymnast herself, she has a particular interest on the health of young athletes that has led to her involvement with the International Federation of Gymnastics (FIG), the 2004 Olympic Games in Athens, and the 2015 Pan-American Games in Toronto.

Kember CG Han

Faculty of Human Movement Sciences at the University of Amsterdam and the Vrije University in Amsterdam

Han CG Kemper is born in 1941 in Amsterdam and married with G. Bertheke Post. He is the father of two daughters: Ilse and Birgit and a grandfather of five grandchildren: Ruben, Sten, Kirsi, Tom and Jim.Han CG Kemper changed career from teaching in physical education (St Ignatius College in Amsterdam1963-1973) to an academic position as exercise physiologist at the University of Amsterdam (1965-1980). He teached sports physiology at the Central Institute for Sport Coaches (CIOS) in Overveen (1968-1971) and at the Higher Institute for Physical Education (KALO) in Tilburg (1971-1985).He finished his PhD at the Free University in Brussels (Belgium) in 1968. Title of his thesis is: Experimental research into the effects of differential training (force, speed, coordination and endurance) methods on standardized arm movements. In 1985 he was appointed as full professor at the Faculty of Human Movement Sciences at the University of Amsterdam and the Vrije University in Amsterdam. His chair was teaching and research of Health Science with respect to Physical Activity".
In 1996 he joined the VU University Medical Center in the EMGO+ Institute for Care and Health Research. He was the principle investigator of the Amsterdam Growth and Health Longitudinal Study from 1974 till 2004.With his research group he published more than 350 articles in (inter)national journals and 10 books (or chapters in books). His most recent textbook is The influence of physical activity and sport on the health of youth. (in Dutch: Fitte kinderen, sportieve tieners- over de invloed van bewegen en sport op de gezondheid van jongeren. Elsevier Gezondheidszorg, Reed, Amsterdam 2011).He is Associate Editor of Pediatric Exercise Science (USA) since 1995. From 1998 till 2012 he was member of the Health Council of the Netherlands (Gezondheidsraad) and president of two standing committees about "Prevention of overweight and obesity" and "Relationship between physical activity and physical environment" Han CG Kemper received three honorary degrees from universities in London in 1998 (UK), Budapest (Hungary) in 2001 and Riga (Latvia, Radins University) in 2004.In 2002 he received in St Louis (USA) the citation award from the prestigious American College of Sports Medicine based upon his publication records in the field of Sports and Exercise Sciences.His citation records in 2016 from the ISI Web of Knowledge amounts more than 5000 citations from 200 articles. The average citation per article is 25 and his Hirsch Index (H) is 42 (meaning: 42 articles with more than 42 citations).Since his official retirement in April 2004, he reduced his scientific non-fiction writing in favour of fiction; something which started as a hobby- writing fairy tales for his grandchildren- and which he hopes to develop. Presently he is writing his "memoires".

PWP 2017

Timetable	Tuesday 03/10/2017	Presenter	Chair
18:30-19:00	Opening Ceremony & Joseph Rutenfranz Lecture		
19:00-19:45	**Muscular Activation and children fatigability, Central and peripheral Factors**	Kotzamanidis C	Armstrong N Ratel S

Timetable	Wednesday 04/10/2017	Presenter	Chair
08:00-09:00	Poster presentation		
09:00-09:30	**Hydration for young athletes: When, what, how much.**	Falk B	Rowland T
09:30-11:00	Oral session: Exercise and disease		Kotzamanidis C, Nixon P
9:30	The hemodynamic and pulmonary effects of acute high altitude exposure at rest and during exercise in children, adolescents and young adults with complex congenital heart disorders	Takken T	
9:45	The oxygen uptake efficiency slope is not a valid measure of aerobic capacity in children with cystic fibrosis	Williams C A	
10:00	Anaerobic test as a useful tool for evaluation of Growth Hormone secretion	Dror N	
10:15	Scaling maximum oxygen uptake for thigh muscle volume in children with cystic fibrosis	Tomlinson O	
10:30	Exercise intensity and post-exercise endothelial function in children	Sletten N	
10:45	Biomechanical characteristics of overweight and obese children during five different walking and running velocities	Steinberg N	
11:00-11:30	Coffee break		
11:30-13:15	Oral session: Competitive sports		Williams C A Malm C
11:30	Examining the influence of the relative age effect on team selection during adolescence	Donovan D	

11:45	Aerobic and anaerobic fitness in school-age children: are they metabolic non-specialists?	Caldwell H	
12:00	The genetic basis for the dominance of Israeli long-distance runners of Ethiopian origin	Ben-Zaken S	
12:15	Comparison of cardiorespiratory responses to continuous and intermittent exercises in children	Baquet G	
12:30	Noise or Signal? Cardiorespiratory Stability and Volatility During Exercise in Pre- and Late-Pubertal Boys	Bar-Yoseph R	
12:45	Acute effects of high and moderate intensity interval running on the neural and vascular components of baroreflex in adolescents	Oliveira R	
13:00	Evaluation of the 3-min all-out running field-test and calf-muscle deoxygenation in adolescent orienteers	Nimmerichter A	
13:15-14:15	Lunch		
14:30-15:00	Poster presentation		
15:00-16:00	**Tools to assess fitness and performance in children: Laboratory vs. field testing**	Takken T Barker A	Armstrong N
16:00-16:30	Coffee break		
16:30-18:30	Oral session**:** Movement patterns and rehabilitation in children		Vrabas I Cristoulas K
16:30	Musculoskeletal biomechanics changes in children during growth and development and implications for muscle strength assessment and performance	Baltzopoulos V	
17:00	Imbalanced adaptation between muscle and tendon in adolescent: Increase the risk of tendinopathy?	Arampatzis D	
17:30	Developmental Coordination Disorder: The, not so magical world, of young Mr. Bump, Associate Professor (Motor Coordination Disorders).	Kourtesis T	
18:00	Movement disorders in children: the path from diagnosis to successful rehabilitation	Zafeiriou D	
19:00-20:00	Dinner		
20:00-20:30	Continental Greek folk Dances		

	Society for Pierian studies ”Estia Pieridon Mousson”		

Timetable	Thursday 05/10/2017		
	All day trip visiting Dion Museum, Olympus and Meteora Monasteries. Box Lunch will be available		
20:00	Dinner		

Timetable	Friday 06/10/2017	Presenter	Chair
07:00- 08:00	PES Editorial board meeting	(invited by Prof. Falk)	
08:00-09:00	Poster presentation		
09:00-09:30	**Nutrition and eating disorders in young athletes**	Sundgot-Borgen J	Klentrou P
09:30-10:30	Oral session: Exercise & Bone		Baxter-Jones A Sundgot-Borgen J
9:30	The role of body composition and physical activity in adolescence on bone accrual in young adulthood.	Baxter-Jones A	
9:45	The impact of weight-bearing and aquatic sports on bone density gains among male adolescents: 18 months of follow-up	Fernandes Romulo A	
10:00	Longitudinal adaptations of bone mass, geometry, and metabolism in adolescent male athletes: The PRO-BONE Study.	Vlachopoulos D	
10:15	Effect of a 9-month progressive jump intervention programme on bone outcomes in adolescent male athletes: The PRO-BONE study	Vlachopoulos D	
10:30-11:00	Coffee break		
11:00-12:00	**Legend session: The biological basis of physical activity during childhood**	Rowland T	Falk B
12:00-13:00	Oral session: Physical activity		Pfeiffer K A

			Barker A
12:00	Prevalence of objectively measured sedentary behaviour in toddlers and preschoolers: A systematic review	Pereira J R	
12:15	Characterizing preschoolers' indoor physical activity: Validation of bluetooth proximity tagging	Clevenger K	
12:30	The role of growth on fundamental movement skills development.	Tait T	
12:45	Correlates of preschool children's objectively measured physical activity and sedentary behavior: a cross-sectional analysis of the SPLASHY study	Schmutz E	
13:00-14:00	Lunch		
14:00-14:30	Poster presentation		
14:30-15:00	**The promise of genomics and epigenetics studies in pediatric exercise research**	Radom-Aizik S	Nemet D
15:00-16:15	Oral session: Exercise in children with disabilities		Takken T McManus A
15:00	A novel tool to quantify and promote physical activity in youth and ambulatory youth with a motor disability	Lankhorst K	
15:15	Biomechanical differences in low obstacle clearance between children with and without Cerebral Palsy	Kotzamanidou M	
15:30	Children and adolescents with moderate to severe intellectual disabilities have poor physical fitness	Wouters M	
15:45	Holistic fitness intervention program for persons with intellectual disabilities – a community pilot programme with SG Enable	Lim M C M	
16:00	Child Maltreatment and Motor Coordination Deficits among Preschool Children	Wade T	
16:15-16:45	Coffee break		
16:45-19:00	**Year That Was – Coordinated by Bareket Falk**		Falk B
19:00-20:00	Dinner		
19:45-20:30	PWP Board Meeting	(invited by Prof. Armstrong**)**	
20:30	Greek Folk Dances (Pontian Group)		

Timetable	Saturday 07/10/2017	Presenter	Chair
08:00-09:00	Poster presentation		
09:00-09:30	**The Oded Bar- Or lecture: Exercise and childhood obesity – 15 years of clinical experience**	Nemet D	Kemper H
09:30-10:45	Oral session: Adiposity		Jürimäe J Katzmarzyk P
9:30	Effectiveness of individual versus group programs to treat obesity and reduce cardiovascular disease risk factors in pre-pubertal children	Farpour-Lambert N	
9:45	Does childhood and adolescent physical activity influence fat mass accrual in emerging adulthood?	Barbour-Tuck E	
10:00	Tibial impact accelerations in gait of primary school obese children: the effect of age, speed and visual biofeedback	Orland G	
10:15	Effect of the “Girls on the Move” intervention on adiposity outcomes among underrepresented girls: A group randomized trial	Pfeiffer K A	
10:30	Association between physical activity, sedentary behaviour and adiposity and retinal microvasculature in children and adolescents: A systematic review	Sousa-Sá E	
10:45-11:15	Coffee break		
11:15-12:15	**Legend Session: Controversies and future directions in youth aerobic fitness**	Armstrong N	Williams C A
12:15-13:30	Oral session: Neuro-muscular		Zaferidis A Panoutsakopoulos V
12:15	Does plyometric training affect stiffness during drop jumps in prepubescent girls?	Bassa E	
12:30	Does Plyometric Training Increase Motor-Unit Recruitment Capacity in Children?	Dotan R	
12:45	The H-reflex during a sustained submaximal isometric fatiguing contraction in girls and women	Papavasiliou A	
13:00	Cerebral and muscle oxygenation during maximal and submaximal isometric	Antonopoulos C	

	fatiguing contraction in children and young adults		
13:15	Dynamic gear ratio in children and adults during walking and implications for muscle mechanical efficiency	Baltzopoulos V	
13:30-14:15	Lunch		
14:15-14:45	Poster presentation		
14:45-15:15	**The ideal model of a citizen in the Ancient Greece**	Karafillis G	Bassa E Kara M
15:15-15:45	**Youth's physical activity in moderation: Health perspectives of Helenic antiquity.**	Albanidis E	Bassa E Kara M
15:45-16:15	**Exercise and diabetes during the developmental years**	Dipla K	Patikas D
16:15-16:45	Coffee break		
16:45-18:15	Oral session: Physical activity		Tremblay M Biltz G
16:45	The crux of the cut-point choice for the objective assessment of preschoolers' physical activity	Leeger-Aschmann C	
17:00	Relationship Between Meeting 24-hour Movement Guidelines and Cardiometabolic Risk Factors in Children	Katzmarzyk P	
17:15	Peak oxygen uptake cut points for identification of increased cardiometabolic risk in children aged 9–11-years – the PANIC Study	Haapala E	
17:30	Associations between patterns across the activity spectrum and children's and adolescents' cardio-metabolic health: A Systematic Review	Verswijveren Simone J.J.M.	
17:45	Associations between physical fitness and health among school-aged youth: An analysis using the Canadian Health Measures Survey	Tremblay M	
18:00	Correlates of cardiorespiratory fitness and their interrelationships in children and adolescents	Joensuu L	
18:15-18:45	Award presentation		
20:00	Dinner & Social party until the morning		

Timetable	Sunday 08/10/2017	Presenter	Chair
08:30-9:00	**Bone turnover during exercise in children: what bone resorption/formation markers and exercise-induced osteokines can tell us?**	Klentrou P	Baltzopoulos V
9:00-09:30	**A short history of PWP: 30 conferences in 50 years.**	Kemper H	Eliakim A Kotzamanidis C
09:30-10:30	Closing remarks	Kotzamanidis C	

Poster sessions

Below please find the timeline for poster presentation.

Posters should be posted up to 15 minutes before each morning poster session.

The poster will be open for questions and discussions during a mid-day poster presentation session. The presenter is expected to attend and present his poster during this session.

During this session a scientific committee will elect the Best Poster Student Awards.

Poster should be removed by the end of each day.

Recommended poster size: 33.1 X 46.8 inch or 84.1 x 118.9 cm

Poster presentation October 4, 2017

	Name	**Abstract**
1	Hay John	Sex differences in the relationship between self-efficacy and motor performance in young children
2	Piponnier Enzo	Sex-related specificity of the neuromuscular adaptations to youth obesity
3	Takken Tim	Fitness, adiposity, sports participation, and arterial stiffness in youth with chronic diseases or physical disabilities.
4	Bloemen Manon	Physical activity in wheelchair-using youth with spina bifida: an observational study
5	Nixon Patricia	Antenatal steroid exposure, physical activity, and arterial stiffness in persons born with very low birth weight
6	Mahon Anthony	Cardiac vagal activity in boys and men at rest, during the onset of exercise and during recovery
7	Barker Alan	Low-flow vasoreactivity in adolescents: Measurement reliability and the effect of exercise intensity
8	Tallon Christine	Ventilatory and cerebrovascular responses to hypercapnia in children: Insight into the central respiratory chemoreflex
9	McManus Ali	Assessment of dynamic cerebral autoregulation in children.
10	Hillis Doug	The effects of team selection on short-term sports participation.
11	Arturo Osorio	Assessment of skeletal maturation among adolescent female soccer players: agreement between FELS and TW3 protocols

Poster presentation October 6, 2017

	Name	Abstract
1	Farkas Anna	Young swimmers and pentathletes - A compariative study of the physique
2	Bloemen Manon	Determinants of physical activity in wheelchair-using youth with spina bifida
3	Bloemen Manon	Evidence for increasing physical activity in children with physical disability: A Systematic Review
4	Illescas Calvin	Preparticipation physical evaluation of youth in sports development program in Guatemala.
5	Biltz George	Time series variability of steady state RER, tidal volume and VO2 show a common response to marathon training in older adolescents
6	Donti Olyvia	Acute and long-term improvement of range of motion using intermittent and continuous static stretching training in preadolescent female athletes
7	Bretter Shiri	The effect of a six-week program using unstable surfaces for upper body, on shoulders proprioceptive capability and strength among young competitive swimmers
8	Patikas Dimitrios	The H-reflex after a maximal sustained isometric fatiguing contraction in boys and men
9	Nilsson Robert	Lack of performance predictive ability in common physiological tests in junior alpine skiers
10	Panoutsakopoulos Vassilios	Sport specificity background affects the principal component structure of vertical squat jump performance of post-pubertal adolescent male athletes
11	Panoutsakopoulos Vassilios	Gender differences in ergometer rowing biomechanics and pacing strategies of club level adolescent rowers
12	Milena Mikalački	Analysis of body composition changes in physically active women relative to their age
13	Cokorilo Nebojsa	Aerobic programme effects on anthropometric characteristics of female students

Poster presentation October 7, 2017

	Name	Abstract
1	Prusov Petr	Change of growth and maturing rates of boys in puberty period, some determinants.
2	Szmodis Márta	Reference data for ultrasound bone characteristics in Hungarian children aged between 7-19 years
3	Howe Cheryl	Children's Physical Activity Step Rates: Activity Tracker vs. Direct Observation
4	Machado-Rodrigues Aristides	Sedentary behaviour and its association with waist-to-height racio in a sample of female Portuguese children
5	Moore Sarah	Is Somatic Maturity Delayed in Adolescents Living with Perinatally Acquired HIV?
6	Machado-Rodrigues Aristides	Academic achievement and moderate-to-vigorous physical activity
7	Zhang Zhiguang	The association of meeting physical activity, screen time and sleep guidelines with cognitive development among toddlers.
8	Armstrong Victoria	Lower limb vascular response to an acute bout of prolonged sitting in children
9	Miliotis Panagiotis	A new reliable laboratory based performance test for adolescents
10	Siegel Shannon	Can child motor performance tasks predict high school sport participation?
11	Baltzopoulos Vassilios	Musculoskeletal biomechanics changes in children during growth and development and implications for muscle strength assessment and performance.
12	Jürimäe J	Chronic exercise training does not influence inflammatory markers in pubertal girls: A comparison study between athletes and non-athletic controls

Pediatric Work Physiology meeting XXX, 3rd – 8th October 2017

Proceeding Book

Celebrating 50 years of PWP: Pediatric exercise science on top of Olympus

Tuesday 03/10/2017 19:00

Chair: Armstrong N, Ratel S

Muscular Activation and children fatigability, Central and peripheral Factors

Kotzamanidis C

Children‘s neuromuscular function is a topic that has not been thoroughly studied. The present analysis will focus on cases of strength and fatigue. The *question “who are stronger: children or adults?”* in relative force values has not been clarified yet, as it depends mainly on the applied normalization method. From a neuromuscular point of view, children demonstrate lower electromyographic activity during a Maximal Voluntary Contraction (MVC). However, there is no apparent age-related difference in antagonistic activity and in fast Fourier transform analysis that seem to be joint dependent.

In early childhood children are not able to fully recruit their motor units. However, the results are contradictory during prepubescence. There are no child-adult differences in terms of in motor unit recruitment for the ankle joint whilst the results are conflicting for the knee joint. Furthermore, there is no age differentiation regarding the excitability of the α-motor neurons as examined by the method of the H-reflex.

Concerning fatigue, three kinds of protocols have been applied: protocols of maximal intensity (isometric or dynamic), of submaximal intensity (isometric) and stretch shortening cycle fatigue protocols.

During protocols of maximal intensity, fatigue was greater in adults and this was attributed to the greatest concentration of metabolic products, to the decrement of electromyographic activity and H-reflex, to the increased presynaptic inhibition and peripheral and central oxygenation. However, in terms of central fatigue the results are contradictory because in other cases there were no differences, while in others fatigue was greater in children. In submaximal protocols of varying intensities no differentiation was observed in all indicators.

In stretch shortening cycle protocols, fatigue was greater in adults. This was attributed to the greater concentration of metabolic and inflammatory byproducts, the impaired neuromuscular function, the lower musculotendinous stiffness and regulation of the stretch reflex.

However, it is very important to be mentioned that regardless of the level of fatigue, children recovered faster.

Due to the small number of studies, the issue of the children's neuromuscular function requires further investigation.

Wednesday 04/10/2017 09:00

Chair: Rowland T

Hydration for young athletes: When, what, how much?

Falk B

Faculty of Applied Health Sciences, Brock University, St Catharines, Ontario, CANADA

Adequate hydration can play a pivotal role in the performance of young athletes. It is an important factor in thermoregulation during exercise, reducing the risk of heat injury and facilitating optimal performance.

Since children's sweating rate is consistently lower than that of adults', one may argue that maintenance of euhydration may be less of a problem. However, young athletes do sweat profusely during exercise, especially in hot environments, and they often do not consume adequate amounts of fluids.

While the inadvertent dehydration of young athletes may be similar to adults', children appear to be more sensitive to the negative effect of hypohydration on thermoregulation, physical endurance, and skill performance.

Hydration strategy may be affected by beverage characteristics (*e.g*., composition, palatability), environmental factors (*e.g*., heat stress, type of sport), as well as by individual athletes' characteristics (*e.g*., fitness level, acclimation status, typical sweat losses), which may differ with age and maturity. There are numerous guidelines available for adult athletes and to a limited extent, also for youth athletes. However, in view of the large inter-individual variability in sweat losses and fluid intake preferences, these guidelines are difficult to apply on an individual basis.

In recent years, educational efforts resulted in enhanced awareness of the importance of hydration among young athletes, their parents and coaches. This knowledge has been shown to be beneficial but often insufficient in affecting behavior and hydration practices.

Wednesday 04/10/2017 09:30-11:00 Oral session: Exercise and disease

Chair: Kotzamanidis C, Nixon P

Wednesday 04/10/2017 09:30

The hemodynamic and pulmonary effects of acute high altitude exposure at rest and during exercise in children, adolescents and young adults with complex congenital heart disorders

M.F.L. Kuijpers[1], M.E. Sporenberg[1], A. Evertse[1], H. Hulzebos[1], G.T. Sieswerda[2], T. Takken[1], [1]Wilhelmina Children's Hospital, and [2]Department of Cariology, University Medical Center Utrecht, Utrecht, the Netherlands.

Background: Exposure to high altitudes has increased substantially in the last decades. When staying at higher altitude, the partial pressure of oxygen drops, resulting in high altitude related hypoxia. Healthy subjects are able to compensate for altitude hypoxia, however, adults and children with congenital heart disorders (CHD) are more vulnerable because of a limited compensatory mechanism. This study investigate the hemodynamic and pulmonary effects of acute high altitude exposure at rest and during maximal exercise in patients with complex congenital heart disorders.
Methods: 15 patients with CHD (mean age 19.5 ±9.3, 7 male) and 8 matched controls underwent two cardiopulmonary exercise tests with breath-by-breath respiratory gas analyses combined with non-invasive impedance cardiac output measurements at sea level (± 6 m) and a hypoxic stress test at high altitude (± 2500 m).
Results: In patients, peak exercise capacity decreased with 6.7% (130.4 W (± 52.7 W) at sea level to 121.6 W (± 47.7 W after altitude exposure). Peak exercise in controls declined with 8.0% (307.5 W (± 69.7 W) to 283.0 W (± 56.0 W)), resulting in a significant difference between both groups (p=0.034). Less desaturation was observed in patients (6.4%) compared with controls (9.2%). In rest, VO_2, VO_2/kg, heart rate and minute ventilation were significantly increased in the patient group after exposure to high altitude ($p<0.05$). No significant effect was seen in these parameters during maximal exercise. Resting values of VO_2, VO_2/kg, heart rate and minute ventilation were not significantly different in controls. During maximal exercise, VO_2 and VO_2/kg decreased significantly in controls ($p<0.05$).
Discussion: The employed hypoxic stress test seems a feasible method to assess the response to acute altitude exposure. Reduction in peak exercise capacity, VO_2, VO_2/kg and saturation were more pronounced in controls when compared to patients. Exercise at high altitude was well tolerated in patients with CHD. Therefore, it seems safe for patients with CHD to exercise at altitudes up to an altitude of least 2500 meters.

Wednesday 04/10/2017 09:45

The oxygen uptake efficiency slope is not a valid measure of aerobic capacity in children with cystic fibrosis

Craig Anthony Williams [1, 2], Owen William Tomlinson [1, 2], Lucy Chubbock [1], Daniel Stevens [3], Zoe Louise Saynor [1, 4], Patrick John Oades [2], Alan Robert Barker [1]

(1) Children's Health and Exercise Research Centre, Sport and Health Science, University of Exeter, Heavitree Road, Exeter, EX1 2LU, United Kingdom. (2) Royal Devon and Exeter NHS Foundation Trust Hospital, Barrack Road, Exeter, EX2 5DW, United Kingdom. (3) School of Health and Human Performance, Faculty of Health Professions, Dalhousie University, Stairs House, 6230 South St., Halifax, NS B3H 4R2, Canada. (4) Department of Sport and Exercise Science, Faculty of Science, University of Portsmouth, Cambridge Road, Portsmouth, PO1 2ER, United Kingdom.

Background: Increased aerobic fitness ($\dot{V}O_{2max}$) is clinically beneficial to children with cystic fibrosis (CF). However, establishing $\dot{V}O_{2max}$ is not always possible due to patients being unable, or unwilling, to reach volitional maximum. This study investigated the validity of the oxygen uptake efficiency slope (OUES) as an alternative, submaximal parameter of aerobic fitness in children with CF.

Methods: Cardiopulmonary exercise tests were conducted in 36 children with CF and 36 age- and gender-matched controls (CON), using an incremental test to volitional exhaustion on a cycle ergometer. $\dot{V}O_{2max}$, gas exchange threshold (GET) and respiratory compensation point (RCP) were identified. OUES was determined at parameters of exercise intensity ($\dot{V}O_{2max}$, 75% $\dot{V}O_{2max}$, 50% $\dot{V}O_{2max}$, GET and RCP) and time (100%, 75% and 50% duration), and allometrically scaled to body surface area (BSA). Pearson's correlations between $\dot{V}O_{2max}$ and OUES/BSA and independent samples t-tests were conducted. Factorial ANOVAs identified differences in OUES and $OUES_{GET}$ between and within groups split by tertiles for $\dot{V}O_{2max}$.

Results: Significant correlations between OUES/BSA and $\dot{V}O_{2max}$ were observed for most parameters of intensity and time (CF: $r = 0.331 – 0.474$; CON: $r = 0.583 – 0.892$, $P < 0.05$). Independent t-tests revealed no differences between groups for each OUES parameter ($P > 0.05$). Factorial ANOVAs identified significant ($P < 0.05$) interaction effects for OUES at peak exercise, with differences between all fitness tertiles in CON (high: 1411 ± 211; mid: 1219 ± 108; low: 957 ± 206, $P < 0.05$), but only between high-(1271 ± 241) and low- (1020 ± 281) fitness tertiles in CF. For $OUES_{GET}$, significant differences ($P < 0.05$) were found within CON between high- (1221 ± 336) and low- (798 ± 273) fitness tertiles, but no differences were evident in CF (high: 1017 ± 273; mid: 1006 ± 324; low: 854 ± 290, $P > 0.05$).

Conclusions: OUES and $\dot{V}O_{2max}$ are significantly correlated, albeit to differing magnitudes in CF and CON, and no differences in OUES and $OUES_{GET}$ are evident between groups. Furthermore, OUES cannot discriminate between individuals with CF of differing fitness levels. Therefore, OUES is not a valid alternative measure of aerobic fitness in children with CF.

Wednesday 04/10/2017 10:00

Anaerobic test as a useful tool for evaluation of Growth Hormone secretion

M. Pantanowitz, A. Eliakim, D. Nemet & N. Dror.

Pediatric department, Child Health sport center, Meir medical center, Sackler School of Medicine, Tel Aviv University, Israel.

Background: The diagnosis of growth hormone (GH) deficiency in children with short stature is complex and commonly done by pharmacologic provocation tests. There is a need for a physiological stimulation test such as exercise. We previously demonstrated that the traditional Wingate anaerobic test (WAnT) cannot be used as a GH provocation test. Therefore, we transformed the WAnT test; to include shorter repetitions with recovery periods between them to mimic the usual physical activity performed by children. We hypothesized that the GH response to anaerobic test would be similar to the GH response to commonly used pharmacologic provocation test.

Methods: Thirteen children (11 males and 2 females, age range 5.0–16.2 years) participated in the study. Each participant performed a modified WAnT including 10 cycles of all-out cycling for 15 seconds against constant resistance followed by 60 seconds of cycling without resistance. Blood samples for GH were collected before and 15, 30, 45, and 60 minutes after the beginning of exercise. In addition, we collected pre and post exercise blood lactate and cortisol levels. Children with abnormal GH secretion preformed also standardized pharmacologic test (clonidine or glucagon).

Results: There was normal GH secretion in 4 out of 13 children and 9 had subnormal GH secretion in the anaerobic test. Seven out of nine (77.8%) children with subnormal GH secretion had also a low GH secretion in the pharmacological test.

Discussion: The modified WAnT has a good correlation with the standard pharmacological GH provocation test and can be used as physiologic test for GH secretion. Preforming an exercise test to evaluate GH secretion may prevent the need to perform the commonly unpleasant provocation GH secretion tests in children.

Wednesday 04/10/2017 10:15

Scaling maximum oxygen uptake for thigh muscle volume in children with Cystic Fibrosis

Owen William Tomlinson [1, 2], Alan Robert Barker [1], Jonathan Fulford [3], Paul Wilson [1], James Shelley [2, 4], Patrick John Oades [2], Craig Anthony Williams [1, 2]

1 Children's Health and Exercise Research Centre, Sport and Health Science, University of Exeter, Heavitree Road, Exeter, EX1 2LU, United Kingdom. 2 Royal Devon and Exeter NHS Foundation Trust Hospital, Barrack Road, Exeter, EX2 5DW, United Kingdom. 3 Institute of Biomedical and Clinical Science, University of Exeter Medical School, University of Exeter, Heavitree Road, Exeter, EX1 2LU, United Kingdom. 4 Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, L3 3AF, United Kingdom.

Background: Maximal oxygen uptake ($\dot{V}O_{2max}$) is impaired in children with cystic fibrosis (CF), with an intrinsic metabolic deficiency being proposed within CF muscle. However, previous research has not appropriately accounted for muscle size when assessing $\dot{V}O_{2max}$, using only muscle cross-sectional area (CSA) and ratio-standard scaling. This study utilised allometric scaling procedures on muscle volume (MV), to establish whether impaired aerobic function in CF is size independent, once residual effects of body size are removed.

Methods: Seven children with mild-to-moderate CF (age: 14.8±2.1 y, FEV_1: 104.7±11.3 %) and age- and gender-matched controls (CON, age 14.6±2.4 y, FEV_1 98.1±21.8 %) undertook validated cardiopulmonary exercise tests to volitional exhaustion to elicit $\dot{V}O_{2max}$. Thigh CSA and MV were obtained using a 1.5 T MRI scanner. The relationship between $\dot{V}O_{2max}$ and body mass (BM), fat free mass (FFM), CSA and MV was established using Pearson's correlations and $\dot{V}O_{2max}$ was scaled using allometric methods for each body size variable.

Results: Absolute $\dot{V}O_{2max}$ was not significantly reduced in children with CF (2.28 ± 0.76 v 2.57 ± 0.69 $L{\cdot}min^{-1}$, $p = 0.47$). Absolute $\dot{V}O_{2max}$ was correlated with BM (CF: $r = 0.69$, $p = 0.042$; CON: $r = 0.61$, $p = 0.073$), FFM (CF: $r = 0.84$, $p = 0.017$; CON: $r = 0.79$, $p = 0.035$) and MV (CF: $r = 0.88$, $p = 0.010$; CON: $r = 0.79$, $p = 0.035$), but not CSA ($p > 0.05$). Body mass relative $\dot{V}O_{2max}$ was significantly reduced in CF (40.0 ± 8.5 v 50.7 ± 9.7 $ml{\cdot}kg^{-1}{\cdot}min^{-1}$, $p = 0.049$), a difference that remained when allometrically scaled for MV (1273.3 ± 207.1 v 1652.7 ± 390.9 $ml{\cdot}L^{-1}{\cdot}min^{-0.71}$, $p = 0.043$). When allometrically scaled for BM and FFM, no differences in $\dot{V}O_{2max}$ are observed between CF and CON (1961.8 ± 641.8 v 2222.5 ± 588.7 $mL{\cdot}kg^{-0.04}{\cdot}min^{-1}$, $p = 0.44$; 1834.5 ± 592.0 v 2084.5 ± 544.5 $mL{\cdot}kg^{-0.06}{\cdot}min^{-1}$, $p = 0.43$).

Discussion: $\dot{V}O_{2max}$ is significantly related to MV and was significantly reduced in CF when allometrically controlled. These data show aerobic fitness is not size-dependent in children with mild-to-moderate CF and that intrinsic metabolic defects may be present.

Wednesday 04/10/2017 10:30

Exercise intensity and post-exercise endothelial function in children.

Nathan R Sletten1, Ryan G Simair1, Kevin Castilloux1, Laura M Morris1, Victoria A Armstrong1, Ali M McManus1

1Centre for Heart, Lung and Vascular Health, School of Health and Exercise Sciences, University of British Columbia, Kelowna, Canada

In adults, a negative relationship exists between intensity and acute post-exercise changes in endothelial function (flow-mediated dilation, FMD), but little is known about the effect of intensity on post-exercise FMD in children. We examined superficial femoral artery (SFA) endothelial function before and following exercise of differing intensities in nine children (10.5 ± 1.5 y, 6 girls). SFA FMD and shear rate area under the curve (SRAUC) were assessed Pre-exercise, immediately after (Post), and 60 minutes after (Post60): 1) high-intensity interval exercise (HIIE)- 6x60s cycle sprints (60s active recovery) at 90% peak power (Wmax), and 2) moderate intensity exercise (MIE)- 15 min moderate intensity cycle exercise (workload matched to HIIE). Data were analyzed using RM ANOVA testing the effect of time (Pre, Post, Post60) and condition (MIE, HIIE) on SFA diameter, FMD, SRAUC and corrected FMD. Compared to Pre-exercise, Post baseline diameter and SRAUC were elevated ($p<0.05$) and FMD was attenuated in HIIE (Δ-2.5%) and MIE (Δ-2.8%) (both $p<0.05$), recovering to Pre-exercise values at Post60. When corrected for exercise-mediated changes in arterial diameter, the decline in FMD Post was negligible for both HIIE and MIE. When appropriately scaled, workload-matched exercise, irrespective of intensity, exerts minimal impact on SFA FMD in children. This suggests the mechanisms which govern the acute FMD response in adolescents and adults may be dissimilar in children.

Wednesday 04/10/2017 10:45

Biomechanical characteristics of overweight and obese children during five different walking and running velocities

Nili Steinberg[1]; Meron Rubinstein[1]; Dan Nemet[2]; Michal Pantanowitz[2]; Alon Eliakim[2].

[1]The Wingate College of Physical Education and Sport Sciences, Wingate Institute, Israel; [2]Child Health and Sport center, Pediatric Department, Meir Medical Center, Sackler School of Medicine, Tel Aviv University, Israel. Email:knopp@wincol.ac.il

Background: The characterization of activity patterns of overweight and obese (OW) children and adolescents is essential, and should be carried out before they join an exercise training program and increase their physical activity in order to maintain or reduce body weight. The purpose of this study is to verify whether biomechanical parameters characterizing frequently-used walking and running speeds vary between OW and normal-weight (NW) children.

Methods: Thirty-one prepubescent OW children (9.9 y ±1.3) and 10 prepubescent NW children (9.9 y ±1.2) participated in this study. All participants were evaluated for temporal parameters (e.g., cycle length, cycle time, stance phase time, double support phase time, etc.) and for foot pressure parameters (e.g., contact area, duration of contact, peak pressure, etc.) in six different foot areas, at three walking velocities and two running velocities.

Results: A group effect ($p<.05$) was found for peak pressure, duration of contact percentile, maximum force, foot pressure-time integral, cycle length, cycle time, stance phase time, double support phase time, relative stance phase, and relative double support phase, indicating that the OW children manifested significantly higher values compared with the NW children.

Discussion: Assessment of movement characteristics of OW children indicated an elongation of gait parameters, such as step cycle and support stage, compared to NW children, in different walking and running speeds. These changes suggest that OW children develop different walking/running patterns with increased foot pressure, which may predispose them to foot pain and overuse injuries.

Wednesday 04/10/2017 11:30-13:15 Oral session: Competitive sports

Chair: Williams C A, Malm C

Wednesday 04/10/2017 11:30

Examining the influence of the relative age effect on team selection during adolescence

D. Dale[1], E. Barbour-Tuck[1], M. Erlandson[1], M., L.B. Sherar[2], W. Proctor[3], M.L. Humbert[1], A.D.G. Baxter-Jones[1],

[1]College of Kinesiology, University of Saskatchewan, [2] School of Sport, Exercise and Health Sciences, Loughborough University, [3]Sask Sport Inc,

Background: Sport Canada's Long Term Athlete Development (LTAD) model acknowledges that there are limitations to ensuring appropriate development of youth team sports. One limitation is the grouping and selection of adolescents based on their chronological age (CA). This can be problematic as adolescent athletes of the same CA can be years apart developmentally. Furthermore, within the 1 year age bands individuals can be up to 11 months different in chronological age, which could contribute to the physical development differences between players and thereby influence selection. This effect of birthdate has been termed the relative age effect (RAE). The purpose of this study was to determine if the RAE played a role in team selection onto sport teams.

Methods: 851 participants (580 males, 271 females) aged 11 to 17 were recruited from Saskatchewan (Canada) youth sport team tryouts: hockey, soccer, basketball, football, volleyball, and baseball. Date of test and birthdate were used to calculate CA. Lists of selected athletes were provided by the sport organizations. Date of birth was used to assign participants to one of four quartiles (Jan-Mar=1, Apr-Jun=2, Jul-Sep=3, Oct-Dec=4). Distribution of birthdate quartiles was compared between selection groups, sexes and within sports using Chi Squared analysis.

Results: Comparison of the total sample showed the first two quartiles are over represented (60% in Q1 and Q2) ($p<0.05$), and this held true for both male and female samples ($p<0.05$). The first 2 quartiles are also over represented in both selected (61%) and non-selected (58%) athletes ($p<0.05$). No significant differences were found in birthdate distributions when looking within each sport except for males who were selected for hockey and basketball ($p<0.05$). This lack of significance is likely due to comparatively small samples for within sport data.

Discussion: A RAE has been found in many professional sports teams, and these results suggest that this phenomenon is present as early as invitation to team tryouts. It is concluded that coaches should be aware of possible RAE during adolescent team selection and recognize many young athletes are not even present at tryouts due to a possible RAE.

Wednesday 04/10/2017 11:45

Aerobic and anaerobic fitness in school-age children: are they metabolic non-specialists?

Hilary A.T. Caldwell[1,2], Natascja A. Di Cristofaro[1], Brian W. Timmons[1,2].

[1]Child Health & Exercise Medicine Program, Department of Pediatrics, McMaster University, Hamilton, ON, Canada; [2]Deaprtment of Kinesiology, McMaster University, Hamilton, ON, Canada

Background It has been hypothesized that children appear to be “metabolic non-specialists”, suggesting children who perform well on aerobic fitness tests will also perform well on anaerobic fitness tests. The extent to which this relationship is influenced by growth and motivation is unknown. Our goal was to examine the relationship between alternate measures of aerobic and anaerobic fitness in healthy children.

Methods Children (n=269, 48% girls) participated in year 1 of the School-age Kids health from early Investment in Physical activity (SKIP) Study (6-11 years old; average age: 8.7±1.0 years). Aerobic fitness was assessed on a treadmill with a progressive test, the Bruce Protocol. Time to exhaustion (TM time) and 60-sec heart rate recovery (HRR) were indicators of aerobic fitness. Muscle power was measured with the 30-sec Wingate Anaerobic Test (WAnT). Participants completed two WAnTs with 1-min rest in between. Muscle power was expressed as peak power (PP) and mean power (MP), relative to body mass (kg). PP recovery was calculated as (PP_2/PP_1)*100 and MP recovery was calculated as (MP_2/MP_1)*100. TM time and HRR were divided into quartiles. Analysis of variance was carried out to determine differences in muscle power and muscle power recovery between TM time or HRR quartiles. All models were adjusted for age and sex.

Results Average PP was 6.8±0.8 W/kg and PP recovery was 101.1±4.4%. Average MP was 4.9±0.8W/kg and MP recovery was 96.5±8.3%. Average TM time was 16.0±2.5 minutes and HRR was 60±14 bmp. PP and MP both increased with increasing TM time ($p<0.001$). PP recovery and MP recovery were not different between TM time quartiles ($p>0.05$). PP, MP, PP recovery and MP recovery were not different between HRR quartiles ($p>0.05$).

Discussion The participants who performed well on the treadmill test also performed well on the WAnT, in agreement with the “metabolic non-specialist” hypothesis. However, recovery data, which may be less influenced by growth and motivation, do not align with this hypothesis. More research is needed on the concept of children being metabolic non-specialists.

Wednesday 04/10/2017 12:00

The genetic basis for the dominance of Israeli long-distance runners of Ethiopian origin

Sigal Ben-Zaken[1], Yoav Meckel[1], Alon Eliakim[2]

[1]The Zinman College of Physical Education and Sports Sciences at the Wingate Institute, Genetics and Molecular Biology Laboratory, Netanya 42902, Israel;
[2]Meir Medical Center, Child Health and Sports Center, Pediatric Department, Sackler School of Medicine, Tel-Aviv University, Israel

Israeli long-distance runners of Ethiopian origin have a major influence on the track and field long-distance record table. The aim of the present study was to determine whether genetic characteristics contribute to this long-distance dominance. We assessed polymorphisms in genes related to endurance (PPARD T/C), endurance trainability (ACSL A/G), speed (ACTN3 R/X), power (AGT T/C), and the recovery from training (MTC1 A/T and IL6 G/C) among top Israeli long-distance runners of Ethiopian origin (n=37) and of those who are Israeli natives of Caucasian origin (n=76). Israeli runners of Ethiopian origin had a greater frequency of the PPARD CC polymorphism, associated with improved endurance performance, compared to Israeli natives (24% vs. 9%, respectively, $p<0.01$); a lower frequency of the ACSL AA polymorphism, favoring endurance trainability (8% vs. 24%, respectively, $p<0.05$); a greater frequency of the ACTN3 RR polymorphism, associated with sprint performance (35% vs. 17%, respectively $p<0.05$); a greater frequency of the *MCT1* AA genotype, associated with improve lactate transport (65% vs. 34%, respectively $p<0.05$); and a lower frequency of IL-6 174C carriers, associated with reduced post-exercise muscle damage (27% vs. 40%, respectively, $p<0.01$). There was no difference in the frequency of AGT T/C gene polymorphism between the long-distance runners of Ethiopian origin and the native-born Israelis. Taken together, the results suggest that genetically, the dominance of Israeli long-distance runners of Ethiopian origin relates not only to endurance polymorphisms, but also to polymorphisms associated with better speed performance and better training recovery ability.

Wednesday 04/10/2017 12:15

Comparison of cardiorespiratory responses to continuous and intermittent exercises in children

Baquet G[1], Gamelin FX[1], Aucouturier J[1], Berthoin S[1].[1]Pluridisciplinary Research Unit ‘‘Sport, Health and Society’’ (URePSSS), EA 7369, Lille University, France.

Background: There is growing evidence that both continuous submaximal intensity exercise (CE) and High Intensity Intermittent Exercise (HIIE) training protocols are effective in improving peak oxygen uptake (peakVO_2) in children, which raise the question of the relative efficacy of these two modalities of exercise training. The aim of the present study was to characterize aerobic responses to HIIE and CE in prepubertal children.

Methods: Twenty-five 8 to 11-year-old children took part to a preliminary visit to determine peakVO_2 and Maximal Aerobic Velocity (MAV). During the 5-following experimental visits, the participants completed 2 CE and 3 HIIE sessions in a randomized order. The HIIE consisted of short intermittent 10 and 20-s running bouts from 100 to 130% of MAV, interspersed with recovery periods of equal duration (S-HIIE1 and S-HIIE2 respectively) and 5-s sprinting and jumping at maximal intensity with 15-s recovery periods (S-HIIE3). Continuous submaximal exercises consisted of two 10-min running periods at 80% and 85% of MAV with a 5-min recovery period.

Results: CE protocols elicited higher average VO_2 and exercise time spent above 95% of peakVO_2 than HIIE protocols. S-HIIE 1 and S-HIIE 2 elicited similar average VO_2 response and higher than S-HIIE 3.

Discussion: Our study has shown that CE activated the aerobic system to a greater extent than S-HIIE in prepubertal children, as reflected by exercise time above 95% of peakVO_2. However, isotime S-HIIE protocols of either 10 or 20-s exercise bouts at an intensity above MAV result to similar exercise times at high oxygen consumption rates (above 95% VO_2peak).

Wednesday 04/10/2017 12:30

Noise or Signal? Cardiorespiratory Stability and Volatility During Exercise in Pre- and Late-Pubertal Boys

Ronen Bar-Yoseph[1], Shlomit Radom-Aizik[1], Abraham Chiu[1], Dan M Cooper[1]

[1] Pediatric Exercise and Genomics Research Center (PERC), Department of Pediatrics, UCIrvine, Irvine, California, USA

Background: Breath-by-breath gas exchange (GE--$\dot{V}O_2$, $\dot{V}CO_2$, $\dot{V}E$) during cardiopulmonary exercise testing is noisier in children compared with older participants. We hypothesized that the GE "noise" signals a biomarker of exercise. We: 1) compared heart rate (HR) variability with GE variability; 2) scaled these to work; and 3) measured surrogates of tissue oxygen consumption (oxyhemoglobin desaturation, HHB–measured noninvasively by near-infrared spectroscopy).

Methods: Four early pubertal (mean age 9.6±1.4 y/o) and five late pubertal boys (16.8±1.3 y/o) performed cycle ergometry consisting of ten, 2-min bouts at 80% peak work interspersed with 1-min rest. We measured the GE cost of each bout and coefficient of variation for GE, heart rate (HR) and HHb.

Results: Mean GE variability was significantly higher for the early pubertal boys (15.9±1.3%, 14.0±1.2%, 13.8±1.4%) than late pubertal boys (7.6±0.9%, 6.9±0.8%, 6.9±0.8%). Variability was very small in both groups for HR (early 0.9±0.2%, late 0.5±0.04%, NS) and HHb (early 1.5%±0.7%, late 3.7%±2.0%, NS). Similarly, the variability of the O_2 cost of each exercise bout was roughly the same in both groups (6.2% vs. 7.0%). Mean O_2 cost of each bout was significantly higher in the younger compared with the older subjects (0.28±0.004 vs. 0.22±0.006 ml O_2/joule, $p<0.005$), and tended to increase as exercise progressed even though the bout work did not change.

Discussion and Conclusion: Higher volatility of GE in the younger participants contrasts to the stability of the HR response and surrogate variables of tissue oxygen consumption. HR is controlled primarily autonomically and is influenced by metabolically driven neuroadrenergic factors (e.g., catecholamines). At the tissue level, oxygen delivery depends predominantly on the work performed by the muscle. GE, however, is regulated by a complex interaction between executive function and autonomic mechanisms. Increased GE volatility in the younger subjects may indicate neural and physiological "learning." During development, the systems must learn to link environmental GE (at the mouth) with rapidly changing tissue demands during exercise in the most efficient manner. GE volatility may reflect successful or unsuccessful linkage of these demands across the lifespan or in health and disease.

Supported by NIH P01HD-048721 & PERC Systems Biology Fund

Wednesday 04/10/2017 12:45

Acute effects of high and moderate intensity interval running on the neural and vascular components of baroreflex in adolescents

Ricardo S Oliveira[1], Alan R Barker[1], Florian Debras[2], Alexandra O'Doherty[1], Craig A Williams[1]

1 Children's Health and Exercise Research Centre, Sport and Health Sciences, College of Life and Environmental Sciences, University of Exeter, Exeter, United Kingdom.

2 Physics and Astronomy, College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter, United Kingdom.

Background: The baroreflex is composed of vascular and autonomic components. In adults, acute moderate intensity cycling decreases baroreflex sensitivity (BRS) via changes in the vascular component, but returns to baseline 60-min later. As BRS increases throughout adolescence due to maturation of the autonomic component, the response of BRS to acute exercise may be different in youth. This study aimed to investigate the time course of changes in the vascular and autonomic components of BRS, whilst controlling for exercise intensity, in adolescents.
Methods: Thirteen male adolescents (age = 14.8±2.1 y) randomly completed: 1) high-intensity interval exercise (HIIE): 8x1-min running at 90 % of maximal aerobic speed with 75-s of active recovery; 2) moderate-intensity interval exercise (MIIE): 10-12 bouts of 1-min running at 90 % of gas exchange threshold with 75-s of active recovery; and 3) resting control (CON). In the supine position, electrocardiogram and blood pressure were monitored continuously, and BRS measured as the cross-spectrum between blood pressure and RR intervals in the low-frequency range (0.04-0.15 Hz - LFgain). Arterial compliance (AC) was assessed as changes in carotid diameter per changes in blood pressure and used as the BRS vascular component. LFgain was divided by AC (LFgain/AC) and used as the neural component. All measures were performed at baseline, 20-min post, and 60-min post the conditions.
Results: Compared to baseline, LFgain decreased 20-min post HIIE (P<0.001; ES=3.17) and MIIE (P=0.002; ES=2.22), and was significantly lower compared to CON (P=0.002, ES=2.63; and P=0.011, ES=1.56, for HIIE and MIIE, respectively). Compared to baseline and regardless of condition, AC increased at 20-min post (P=0.048; ES=0.96), but not 60-min. LFgain/AC decreased 20-min post HIIE (P=0.001; ES=2.93) and MIIE (P=0.004; ES=2.02) compared to baseline, and was lower compared to CON (P=0.011, ES=4.75; and P=0.025, ES=1.54 for HIIE and MIIE, respectively). At 60-min post, all significant differences disappeared.
Discussion: This study provides novel data on the interplay of the autonomic and vascular components of BRS after acute exercise in adolescents. BRS decreased 20-min after MIIE and HIIE due to a lowered contribution of the autonomic component, explained by a decreased LFgain/AC. These changes were independent of exercise intensity and returned to baseline 60-min later.

Wednesday 04/10/2017 13:00

Evaluation of the 3-min all-out running field-test and calf-muscle deoxygenation in adolescent orienteers

A. Nimmerichter, C. Wartbichler; University of Applied Sciences Wiener Neustadt, Training and Sports Sciences, Wiener Neustadt, Austria.

Background: The end-test speed (ES) obtained from a single 3-min all-out run is considered to reflect the critical speed (CS) and concentration changes of deoxygenated haemoglobin (HHb) measured by near-infrared spectroscopy (NIRS) provide a proxy for oxygen extraction at the muscle level. The reliability and validity of ES compared with traditionally determined CS remains to be shown. Also, measures of HHb in field conditions are not yet available. Therefore, the aim of this study was to evaluate ES and NIRS derived HHb in adolescent orienteers.

Methods: Twelve youth elite orienteers (mean±SD: age 17.3±1.7 years; body mass 60.5±6.1 kg; stature 175.5±6.4 cm; $\dot{V}O_{2max}$ 60.5±6.1 $mL \cdot min^{-1} \cdot kg^{-1}$) completed a single-visit protocol to determine CS from 3, 7 and 12 min runs and two 3-min all-out runs on a 400-m outdoor athletic track on separate occasions. CS was estimated using the linear speed/inverse-of-time model and ES was taken as the mean speed of the last 30 s. Relative changes in HHb were measured on the lateral head of the right Gastrocnemius muscle with a portable continuous-wave NIRS device. Second-per-second data, normalised to 100% of the response, were used to resolve the amplitude, the time delay and the time constant of the exponential response. A repeated measure ANOVA was used to compare ES and CS and HHb was compared with a paired samples t-test. **Results:** The ES was 4.39±0.43 and 4.37±0.34 $m \cdot s^{-1}$ ($p=0.997$) during trial 1 and 2 and significantly different from CS (3.92±0.34 $m \cdot s^{-1}$; $p<0.001$). No significant differences between the two trials were found for the amplitude (85.9±8.6 vs. 84.1±9.1%; $p=0.110$) and the time constant (3.2±0.9 vs. 3.5±0.9 s; $p=0.104$), whereas the time delay was 3.9±0.7 and 4.5±0.7 s ($p=0.010$).

Discussion: The present study shows, that the ES obtained from a 3-min all-out run is reliable but significantly higher than CS estimated from 3 runs during a single visit protocol. Caution should be taken implementing ES as its sustainability is currently unclear in highly-trained youth athletes. The parameter estimates of the HHb response at the transition to a maximal running effort are reproducible, despite a small but significant difference in the time delay. Assessment of muscle deoxygenation in field conditions might be a useful tool by increasing the ecological validity under “real-world” sports environments.

Wednesday 04/10/2017 15:00

Chair: Armstrong N

Tools to assess fitness and performance in children: laboratory vs. field testing

Alan R. Barker[1] and Tim Takken[2]

[1]Children's Health and Exercise Research Centre, Sport and Health Sciences, College of Life and Environmental Sciences, University of Exeter, Exeter, United Kingdom.
[2]UMC Utrecht, Utrecht, Netherlands.

The quantification of fitness or performance outcomes are some of the most routinely measured variables in paediatric exercise science. Indeed, the measurement of fitness or performance variables has widespread application, including: 1) understanding changes in fitness or performance during growth and maturation; 2) establishing the efficacy of exercise training programmes and informing their design and implementation; 3) examining the impact of disease on fitness and performance capacity; and 4) exploring the relationships between fitness, physical activity and health. Given this strong rationale for measuring fitness and performance outcomes in children and adolescents, it is important to consider which methods of assessment (i.e. tools) should be used. While laboratory-based exercise tests are considered as the gold-standard approach for testing fitness and performance these laboratory tests are not always feasible or are lacking specificity for sports performance. By contrast, field-based tests for fitness and performance in children and adolescents offer a promising alternative. Therefore, the purpose of this session is to provide a critical appraisal of laboratory- and field-based methods to determine fitness and performance outcomes in children and adolescents. Issues with regard to measurement validity, reliability, specificity and practicality will be considered, and where possible, examples will be provided in the health and sport settings. The presentation will focus on the common underlying concepts, strengths and shortcomings of the different tools available and end with a summary of recommendations for measuring fitness and performance outcomes in in the laboratory and field settings. The session will be of relevance for researchers and practitioners working in this area.

Wednesday 04/10/2017 16:30-18:30 Oral session: Movement patterns and rehabilitation in children**.**

Chair: Vrabas I , Cristoulas K

Wednesday 04/10/2017 16:30

Musculoskeletal biomechanics changes in children during growth and development and implications for muscle strength assessment and performance

V. Baltzopoulos[1], - [1]Research Inst. for Sport &Exerc. Sci., Liverpool John Moores Univ., UK**.**

During growth and development in children or following training and as we age later in life, there are significant changes in the musculoskeletal system that alter the structural, mechanical and functional characteristics of muscles and tendons. This plasticity in the neuromuscular system can affect performance across a range of activities but can also be targeted for the prevention of injuries in young athletes. This presentation is an overview of our research on mechanical factors that influence movement in children and the quest to develop techniques and biomechanical tools for improving performance and reducing injuries. We have developed biomechanical models of the musculoskeletal system to study muscle forces and moments and the loading of different tissues during various movements, pathological conditions and sports activities. The muscle moment, which generates joint rotation, is the product of muscle force and moment arm, so this leverage represents the mechanical advantage of the muscle. Muscle moment arms also play an important role within the context of muscle function. For a given movement they dictate muscle length and shortening velocity, which in turn determine muscle force generation and transmission to the skeleton for the production of movement. Skeletal growth during childhood and adolescence affects these joint mechanics parameters, with likely changes both in the joint centre of rotation and the distance of the tendon attachment point, so the moment arm will also be affected with significant implications for muscle force, joint moment and thus joint strength. These effects and important functional interactions are poorly understood, so the focus of our work has been to explore some fundamental biomechanical and physiological mechanisms of muscle function and to test related important hypotheses about how muscle operation, their leverage in particular, is affected by the changing dimensions of the skeleton with growth and maturation in children. This has led to significant advancements in muscle-tendon mechanics knowledge and applications in the areas of human movement, and musculoskeletal development.

Wednesday 04/10/2017 17:00

Imbalanced adaptation between muscle and tendon in adolescent: Increase the risk of tendinopathy?

Adamantios Arampatzis

Humboldt-University Berlin, Department of Training and Movement Sciences

Adolescence may be regarded as a critical phase of tissue plasticity, as the adaptation process of the muscle-tendon unit is affected by both environmental mechanical stimuli and maturation. Therefore, it can be suggested that young growing athletes might be at an increased risk to develop imbalances between muscle and tendon. To date, however, no detailed information exists on the time-course of muscle-tendon unit adaptation during adolescence and the effect of athletic training. In a series of experiments we investigated the question how athletic training increases the risk of developing imbalances between muscle and tendon during adolescence. Magnetic resonance imagingwas used for the assessmentof vastuslateralis, intermedius and medialis muscle as well as of patellar tendon morphology. Muscle strengthand tendon mechanical properties were measured usingdynamometry/ultrasound sessions.First we provided evidence of an imbalanced development of muscle strength and tendon mechanical and morphological properties in mid-adolescent volleyball athletes (~16 y). Whereas muscle strength was similar to middle-aged competitively active former elite volleyball athletes (~47 y), tendon hypertrophy has not yet been equally manifested, which results in greater tendon stress. In a second step weinvestigated the development of the morphologicaland mechanical properties of muscle and tendon of volleyball athletes in a time period of 2 years from midadolescence (~16 y) to late adolescence (~18 y). We found a pronounced hypertrophy of the patellar tendon (27%) compared to the quadriceps muscles (6%). The pronounced hypertrophy of the patellar tendon led to a mechanical strengthening of the tendon, compensating the unfavorable relation of muscle strength and tendon loading capacity in mid-adolescence. Finally we investigated the development of muscle and tendon properties in 3-month intervals during 1 year in adolescent athletes and non-athletes. We found lower uniformity in the development of tendon force and stiffness and higher fluctuations of muscle strength in athletes.The resulted imbalances between muscle strength and tendon stiffness increased the demand on the tendon (athletes demonstrated greater maximum tendon strain and strain fluctuations).In conclusion we provided for the first time evidence that athletic training during adolescence can disrupt the uniformity of muscle and tendon adaptation and therefore we recommend the establishment of specific training interventions to facilitate tendon adaptation and thus restoring the balance of muscle and tendon development in athletes.

Wednesday 04/10/2017 17:30

Developmental Coordination Disorder: The, not so magical world, of young Mr. Bump

Thomas Kourtessis

Democritus University of Thrace

School of Physical Education & Sport Science

A fact that is widely accepted is that learning environment and movement are strongly associated. Thus, the child's movement ability determines, highly, its personal participation both in in-school physical education and activity as well as in off-school leisure/recreation physical activity. This results in a situation where children who are clumsy or have not the appropriate motor coordination are excluded from a large part of the educational process. Motor clumsiness has been recognized as one of the most frequent developmental disorders in childhood and has been defined as the child's inability to acquire or to develop fundamental motor skills.In 1994 the American Psychiatric Association recognized motor clumsiness as a unique motor learning disorder under the term "Developmental Coordination Disorder" (DCD). Its incidence varies between 5 and 7 % of the total school population (APA, 1994; 2013). Children with DCD compose a heterogeneous group. There is a significant variability regarding both the severity of the disorder as well as the type of the motor difficulties. Some children face difficulties in almost every movement while others have very specific motor problems. Furthermore, recent research has showed that comorbidity is a frequent situation and motor learning disabilities, such as DCD, frequently coexist with other learning disabilities, such as dyslexia and ADHD. This is very important considering the high incidence of the children with specific learning disabilities whose movement disorders have not yet identified. Therefore, the adoption of a more holistic approach to identification, assessment and interventional management is highly proposed. School seems to be an ideal environment for this kind of approach since it provides the means for a multi-disciplinary action.

Wednesday 04/10/2017 18:00

Movement disorders in children: The path from diagnosis to successful rehabilitation

Dimitrios I Zafeiriou, MD, PhD

Pediatric movement disorders is a relatively new and growing field of child neurology. Whereas hypokinetic disorders such as Parkinson disease predominate in adults, children more commonly demonstrate hyperkinetic disorders such as tics, tremor, chorea, and dystonia. There are a large number of genetic and heredodege nerative diseases which cause secondary movement disorders in childhood. Advances in pediatric movement disorders have been made by solidifying movement disorder definitions, expanding the spectrum of clinical phenotypes, understanding genetic causes of movement disorders, and rigorously evaluating treatment efficacy for common movement disorders.

For years, lack of a common language surrounding childhood motor disorders hampered diagnosis, medication management, and ability to create clinical rating scales, and made selection of a homogenous population for research challenging. To address this concern, the NIH-funded Taskforce on Childhood Motor Disorders was created in 2001. The Taskforce includes specialists from developmental pediatrics, neurology, neurosurgery, orthopedic surgery, physical therapy, occupational therapy, physical medicine and rehabilitation, neurophysiology, muscle physiology, and biomechanics. One of the initial goals of the taskforce was to define consistent terminology across multiple clinical and research disciplines. Such terminology would facilitate communication between clinicians and researchers and allow for clear entry and outcome criteria for research in childhood motor disorders.

Thus, terms such as tics, chorea, dystonia, myoclonus, sterotypies, tremor, parkinsonism, were properly defined and subsequently various therapeutic modalities, both interventional as well as non-interventional were critically reviewed (rehabilitation, pharmacological, behavioral, surgical). Moreover, this common language used worldwide, paved a new research area, which led to new therapeutic approaches but also to critical reappraisal of older ones, based mainly on the principles of evidence-based medicine.

Poster presentation October 4, 2017

Sex differences in the relationship between self-efficacy and motor performance in young children

John Hay, PhD. Brock University Canada and Marybeth Grant-Beuttler, PhD. Chapman University USA

Backgound: There is considerable evidence that by age nine boys face higher social expectations than do girls to demonstrate mastery in physically active settings. This is seen in much higher referral rates of boys for Developmental Coordination Disorder (DCD) and in higher mean teacher evaluations of motor competence. It is also well established that motor competence is highly linked to generalized self-efficacy for physical activity and, subsequently, to participation in physical activity. What is not understood is at what age higher social expectations begin to influence perceptions of self-efficacy. Is the perceived self-efficacy of boys shaped to their detriment by social expectations at an early age.

Methods: In this paper we report the relationship between motor competence and self-efficacy, contrasting boys and girls with normal gestation age, age of independent gait, and BMI between the ages of 4 and 9 (27m,27f). Each child's motor proficiency was assessed with the full Bruininks-Oseretsky (BOT2) motor assessment. Children's self-efficacy was determined using a newly developed electronic version of the Children's Self-perceptions of Adequacy in and Predilection for Physical Activity scale (eCSAPPA) suitable for pre-literate children.

Results: There was NSD sex difference in performance on the BOT2 or the eCSAPPA. Consistent significant moderate relationships between motor performance and self-efficacy were evident for boys only. The BOT2 total motor composite score correlated at .38 ($p<0.05$) with the total CSAPPA, and .53 ($p<.0.01$) with the predilection factor for boys, and at .04 and .11 respectively for girls. Interestingly girl's total CSAPPA scores rise consistently with age (52.8-66.3) while boys fall (70-65.3)).

Discussion: This result is highly suggestive that the social expectations placed upon boys may begin to exert considerable pressure on the formation of their self-perceptions at a very young age. Since perceived self-efficacy has been shown to be quite stable with time among older children and highly predictive of future physical activity these findings have ramifications for developing programs designed to promote activity in young boys.

Sex-related specificity of the neuromuscular adaptations to youth obesity

E. Piponnier[1], S. Garcia-Vicencio[1], V. Kluka[1], C. Lanhers[3], A-V. Fourot[2], E. Coudeyre[3], V. Martin[1*] and S. Ratel[1*] - [1]Université Clermont Auvergne, AME2P, F-63000 Clermont-Ferrand, France, [2]MECSS Tza Nou, La Bourboule, France, [3]Clermont University Hospital, Clermont-Ferrand, France, * equal contributions.

Background: The purpose of the present study was to test the hypothesis that the central adaptations to obesity of the muscles highly involved in weight bearing, *i.e.* the Plantar Flexor (PF) and the Knee Extensor (KE) muscles, could be greater in girls compared to boys owing their reduced potential for muscle hypertrophy.

Methods: 24 non-obese and 21 obese (mean Body Mass Index: 33 ± 4 $kg \cdot m^{-2}$) adolescent girls and boys (12-15 years) performed Maximal Voluntary isometric Contractions (MVC) of the PF and KE muscles. Voluntary Activation (VA), assessed with the twitch interpolation technique, the antagonist Co-Activation (%Co-Act) level and the normalized EMG of the agonist muscles were measured to account for central adaptations.

Results: The results revealed a weight status effect ($p < 0.001$) on the absolute MVC torque and VA of both KE and PF muscles. Moreover, these differences were also related to the sex of the participants ($p < 0.05$) for the PF muscles. While the VA, the absolute and specific MVC torque were greater in obese compared to non-obese girls, no difference was found between boys. Finally, a similar %Co-Act level was observed between groups whatever the sex and muscle group considered.

Discussion: This study highlighted a favourable effect of obesity on the central mechanisms (VA) responsible for force production among the lower limb muscles. Moreover, this central adaptation was mainly observed in obese girls for the PF muscles. The excess of body mass supported by the muscles involved in weight bearing could act as a chronic training stimulus responsible for these specific adaptations. However, these adaptations seem to be greater in girls, potentially because of their reduced potential for muscle hypertrophy.

Fitness, Adiposity, Sports Participation, And Arterial Stiffness in Youth With Chronic Diseases Or Physical Disabilities.

E.A. Haapala, K. Lankhorst, J.F. de Groot, M. Zwinkels, O. Verschuren, H. Wittink, F. Backx, A. Visser-Meily, T. Takken, on behalf of the HAYS study group.

University of Jyväskylä, Jyväskylä, Finland; University of Eastern Finland, Kuopio Campus, Finland; Wilhelmina Children's Hospital, Utrecht, the Netherlands, University Medical Center Utrecht, the Netherlands, Institute of Human Movement Studies, University of Applied Sciences, Utrecht, The Netherlands, Center of Excellence in Rehabilitation Medicine, University Medical Center Utrecht, and De Hoogstraat Rehabilitation, Utrecht, the Netherlands.

Background: Children and adolescents with chronic diseases or physical disabilities may have an increased risk of arteriosclerosis. The evidence suggest that children and adolescents with chronic diseases or physical disabilities have lower cardiorespiratory fitness, higher prevalence of overweight and obesity, lower levels of physical activity, and participate less often in organized sports, than their normally developing peers. Children and adolescents with chronic disease or disabilities may also have increased arterial stiffness. The aim of the present study was to investigate the associations of cardiorespiratory fitness, body adiposity, and sports participation, with arterial stiffness in 140 children and adolescents with chronic diseases or physical disabilities.

Methods: Cardiorespiratory fitness was assessed using maximal exercise test with respiratory gas analyses either using shuttle run, shuttle ride, or cycle ergometer test. Cardiorespiratory fitness was defined as peak oxygen uptake (VO_{2peak}) by body weight or fat free mass (FFM). Body adiposity was assessed using waist circumference, body mass index standard-deviation score (BMI-SDS), and body fat percentage. Sports participation was assessed by a questionnaire. Aortic pulse wave velocity PWV (PWVao), as a measure of arteria stiffness, and augmentation index (AIX%), as a measure of peripheral arterial tone, were assessed by a non-invasive oscillometric tonometry device.

Results: VO_{2peak} / body weight (standardized regression coefficient β=-0.222, 95% CI=-0.386 to -0.059, *P*=0.002) and VO_{2peak} / FFM (β=-0.173, 95% CI=-0.329 to -0.017, *P*=0.030) were inversely and waist circumference directly (β=0.245, 95% confidence interval (CI)=0.093 to 0.414, *P*=0.002) associated with PWVao. However, the associations of the measures of cardiorespiratory fitness with PWVao were attenuated after further adjustment for waist circumference. A higher waist circumference (β=-0.215, 95% CI=-0.381 to -0.049, *P*=0.012) and a higher BMI-SDS (β=0.218, 95% CI=-0.382 to -0.054, *P*=0.010) were related to lower AIX%.

Discussion: poor cardiorespiratory fitness and higher waist circumference were associated with increased arterial stiffness in children and adolescents with chronic diseases and physical disabilities. The association between cardiorespiratory fitness and arterial stiffness was partly explained by waist circumference.

The study was funded by an unconditional grant of the Dutch Organization of Health Research (ZONMW) grant number: 525001005.

Physical activity in wheelchair-using youth with spina bifida:

An observational study

Manon AT. Bloemen MSc[1], Rita HJG. vd Berg-Emons PhD[2], Matthijs Tuijt PhD[3], Carla F.J. Nooijen PhD[2,4], Tim Takken PhD[5], Frank JG. Backx MD PhD[6], Marleen Vos MSc[1], Janke F. de Groot PhD[1,5]

1 Research Group Lifestyle and Health, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands. 2 Department of Rehabilitation Medicine, Erasmus MC University Medical Center Rotterdam, Rotterdam, the Netherlands. 3 Research Group Human Movement and Adaptation, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands. 4 Department of Public Health, Karolinska Institutet, Stockholm, Sweden. 5 Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht, The Netherlands. 6 Department of Rehabilitation, Physical Therapy Science and Sports, University Medical Center Utrecht, The Netherlands

Background: Even though typically developing youth is already at risk for physical inactivity, youth with spina bifida (SB) may be even at higher risk as a consequence of their reduced mobility or time spent in the wheelchair. A lack of physical activity (PA) in this population may lead to secondary complications that have major negative health effects such as obesity, hypertension, orthopedic concerns, coronary heart disease, and type 2 diabetes. Even though we expect that wheelchair-using youth with SB spend more time sedentary and less time physically active compared to typically developing peers and that the majority does not comply to guidelines for PA, we do not have any objective evidence to truly understand the seriousness of the problem of physical inactivity in this population. So the aim of this study was to quantify physical activity in wheelchair-using youth with spina bifida and evaluate the intensity of activities.

Methods: VitaMove data of 34 participants were used to assess time spent in several types of activities. The types of activities were presented as time spent sedentary and time spent physically active and were compared to reference data. Actiheart data of 36 participants were used to assess time spent in several intensities according to the percentage of heart rate reserve. The intensities were categorized according to the American College of Sports Medicine and ranged from very light intensity to near to maximal intensity. Data of 25 participants could be used to combine type of activity and intensity.

Results: Participants spent more time sedentary (94.3% per 24 hours versus 78.0% per 24 hours, $p<0.00$) and less time physically active (5.0% per 24 hours versus 12.2% per 24 hours, $p<0.00$) compared to typically developing peers. Physical activity during weekend days was worse compared to school days; 19% met the Guidelines of Physical Activity during school days and 8% during weekend days. The intensities per activity varied extensively between participants.

Discussion: The physical inactivity problem in wheelchair-using youth with spina bifida is extensive and demands our attention. The different intensities during activities indicate the importance of individually tailored assessments and interventions.

Antenatal Steroid Exposure, Physical Activity, and Arterial Stiffness in Persons born with Very Low Birth Weight

P. Nixon[1,3], H. Shaltout[2], L. Washburn[2,3] – [1]Department of Health & Exercise Science, Wake Forest University, [2]Hypertension and Vascular Research Center, and [3]Department of Pediatrics, Wake Forest School of Medicine, Winston Salem, NC, USA

Background: Antenatal corticosteroid exposure (ANCS) has been associated with altered cardiovascular (CV) development and adverse CV outcomes in animal models, but studies examining long-term effects of ANCS on CV outcomes are limited in humans. Physical activity (PA) levels tend to be lower in persons born with very low birth weight (VLBW), but its role in CV outcomes in this population has not been studied. The objective of this study was to compare markers of arterial stiffness between exposed (ANCS+) and unexposed (ANCS-) in a cohort born with VLBW in the post-surfactant era, and determine if PA levels influence the ANCS – stiffness association.

Methods: Participants were 68 (36 ANCS+, 37F) 18 – 23 yrs olds born with VLBW. Neonatal characteristics were retrieved from an ongoing research database. Habitual PA was assessed using the Modifiable Activity Questionnaire from which average time spent per week in overall PA (TOThrs) as well as vigorous (> 6 METs) PA (VIGhrs) were determined for the past year. Arterial stiffness was determined via applanation tonometry (Sphygmocor SCOR-PX) from radial arterial waveforms from which both peripheral and aortic parameters (using a transfer function) were determined. The augmentation index standardized for a heart rate of 75 bpm (Aix-75) was used to reflect aortic stiffness. Multivariate regression analysis was performed to examine ANCS group differences adjusting for height and blood pressure.

Results: Neonatal characteristics as well as age, weight, and BMI at follow-up did not differ between ANCS+ and ANCS-, however ANCS+ were significantly taller than ANCS- by 5.65 $\pm$ 2.32 cm. TOThrs of PA did not differ between groups but VIGhrs tended to be higher in ANCS+ (p=.08). Unadjusted mean Aix-75 was not different between groups; however, multivariate analysis revealed significantly higher Aix-75 in the ANCS+ (3.11 $\pm$ 1.57) vs. ANCS- (-3.06 $\pm$ 1.67) when adjusting for height and systolic BP. Addition of VIGhrs to the model did not alter the results appreciably.

Conclusion: The results suggest that ANCS exposure is associated with greater aortic stiffness which may contribute to greater risk for developing cardiovascular disease in this at-risk VLBW population.

Support: NICHD PO1 HD047584, WFUBMC MCRR/NIH MO1-RR07122, Forsyth Medical Center, WFUSOM Pediatrics Dept. Research Fund

Cardiac Vagal Activity in Boys and Men at Rest, during the Onset of Exercise and during Recovery

A.D. Mahon, J.P. Guilkey, B.J. Dykstra, J.M. Erichsen, and C.E. Heidorn. Human Performance Laboratory, Ball State University, Muncie, IN 47306, USA.

Background: Cardiac vagal activity (CVA) dominates at rest, decreases with the onset of exercise and recovers following exercise. However, variations in the CVA responses under these conditions between children and adults is unclear. This study examined CVA at rest, during two low-intensity exercise bouts and during recovery from maximal exercise in 9 boys (10.1±2.0 yrs) and 10 men (24.1±2.0 yrs).

Methods: In the first testing session, peak exercise responses were assessed on a cycle ergometer. In a second visit, HR and CVA, using heart rate variability (HRV; root mean square of successive RR differences[RMSSD] and high-frequency [HF] domain), were measured at rest, during exercise at 50% and 65% of peak HR, and for 25 minutes during recovery from peak exercise. An independent t-test and 2-way group by time ANOVA were used to analyze the data. RMSSD and HF were log transformed because the responses were not normally distributed.

Results: Peak VO_2 and HR in the boys and men were 50.2±5.7 and 48.5±7.4 ml/kg/min ($p>0.05$) and 195±10 and 191±9 bpm ($p>0.05$), respectively. HR at 50%, 65% and 100% of peak were similar between groups during exercise on the second day. lnRMSSD responses from rest to 65% peak HR to the end of recovery were 4.48±0.59, 2.06±0.46, and 3.85± 0.61 ms in boys and 4.01±0.58, 1.79±0.61, and 2.72±0.77 ms in men, respectively. lnHF responses over the same time were 7.57±1.39, 2.73±0.99, and 6.63±1.31 ms^2 in boys and 6.51±1.09, 1.39±1.03, and 3.86±1.64 ms^2 in men, respectively. A significant group effect indicated that lnRMSSD and lnHF were higher in boys. There also were significant time effects for lnRMSSD and lnHF with values at rest higher than all other time points. There was a significant interaction for lnRMSSD with higher values in boys at 50% of peak HR and during recovery.

Discussion: Despite exercising at similar HR, men demonstrated a greater decline in CVA from rest to exercise and maintained lower CVA during recovery. The higher CVA during recovery in the boys is consistent with a faster recovery from intense exercise observed in this population.

Supported with a grant from the Indiana Academy of Science

Low-flow vasoreactivity in adolescents: Measurement reliability and the effect of exercise intensity

Alan R. Barker, Bert Bond, Craig A. Williams and Sascha H. Kranen, Children's Health and Exercise Research Centre, Sport and Health Sciences, College of Life and Environmental Sciences, University of Exeter, Exeter, United Kingdom.

Background: Macrovascular endothelial function is commonly assessed using flow-mediated dilation (FMD) and is nitric oxide (NO) dependent. However, the vasoreactivity to low-flow during the FMD protocol may provide complementary information regarding endothelial function and is NO independent. This study examined the following in adolescents: 1) the day-to-day reliability of low-flow-mediated reactivity (L-FMR) and its relationship with FMD (*Part 1*); and 2) the effect of exercise intensity on the acute changes in L-FMR (*Part 2*).

Methods: A retrospective analysis of data on 27 adolescents (14.3 ± 0.6 y, 12 male) was performed for *Part 1*. Participants had two repeat measures, on separate days, of macrovascular function for assessment of L-FMR, FMD and composite vessel reactivity (CVR). For *Part 2*, 15 adolescents (6 males) had performed, on separate days, a bout of high-intensity interval exercise (HIIE) and work-matched continuous moderate-intensity exercise (MIE) on a cycle ergometer. FMD, L-FMR and CVR measures were assessed pre, immediately post, and 1 and 2 h post exercise.

Results: *Part 1*: Cohen's Kappa revealed poor agreement for classifying the L-FMR measurement (vasodilation, vasoconstriction or no change) between visits (k=0.04, P>0.05). The between-day correlation coefficient was r=0.18, r=0.96 and r=0.52 for L-FMR, FMD and CVR respectively. No significant correlation was evident between L-FMR and FMD for both visits (r=-0.06 and r=-0.07, both P>0.05). *Part 2*: L-FMR increased from baseline immediately after MIE and HIIE (both P<0.01) but returned to baseline 1 h and 2 h post (all P>0.05). FMD was not significantly different following MIE (all P>0.05), but was significantly reduced immediately post (P<0.01) and augmented 1 h and 2 h post (both P<0.01) HIIE. Compared to baseline, CVR increased immediately after MIE and HIIE (both P<0.01), returned to baseline 1 h and 2 h post MIE (both P>0.05) but remained elevated 1 h and 2 h post HIIE (both P<0.01).

Conclusion: In adolescents, the measurement of L-FMR has poor between-day reliability compared to FMD, and is not significantly correlated with FMD. Despite no change in FMD following MIE, both HIIE and MIE augmented L-FMR suggesting an NO independent mediated change in vascular endothelial function following exercise.

Ventilatory and Cerebrovascular Responses to Hypercapnia in Children: Insight into the Central Respiratory Chemoreflex

C. Tallon[1], D. Flueck[1], N. Lewis[1], P. Ainslie[1], A. McManus[1] – Centre for Heart, Lung, and Vascular Health, Faculty of Health and Social Development, Univ. of British Columbia Okanagan, Kelowna, B.C., Canada, V1V 1V7[1]

Background: Previous work in children has shown an attenuated cerebrovascular vasodilation to hypercapnia. This physiological response, termed cerebrovascular carbon-dioxide (CO_2) reactivity (CVR), is a vital homeostatic function that helps regulate and maintain central pH and, therefore, affects the respiratory central chemoreceptor stimulus. At rest in adults, a blunting of cerebral blood flow (CBF) responsiveness to elevations in CO_2 augments the ventilatory response to CO_2. While children have shown a greater ventilatory sensitivity to CO_2 than adults, there are no data simultaneously documenting CVR and ventilatory responsiveness to hypercapnia in children. Previous assessment of CVR in children used short intermittent bouts of hypercapnia (45s 45mmHg $P_{ET}CO_2$, 60s 40mmHg $P_{ET}CO_2$). Given the time-course for changes in respiratory gases at the mouth to result in cerebral hemodynamic changes, it is conceivable that longer duration continuous hypercapnic stimulus will better reflect CVR in children. The objective of this study therefore was to compare CVR and ventilatory responsiveness to 4-minutes of 6% inspired CO_2 stimuli between children and adults.

Methods: 24 children (mean age 9.9±0.7, 13 girls) and 24 adults (mean age 24.5±1.9, 13 girls) completed baseline measures of ventilation (V_E), CBF (indexed by transcranial Doppler insonation of the middle cerebral artery; $MCAV_{mean}$) and end-tidal CO_2 ($PETCO_2$) for 2 minutes, following 10 minutes of supine rest. Inspiratory gas was then switched to 21% O_2, 6% CO_2 and the participants completed 4 minutes, with continuous assessment of V_E, $MCAV_{mean}$ and $PETCO_2$. CVR was calculated as $\Delta MCAV_{mean}$ from baseline divided by Δ $PETCO_2$ ($cm.s^{-1}$/mmHg). Delta change in V_E from baseline was expressed as a percentage. Independent t-tests were used to compare adults and children.

Results: CVR was not significantly different between children (3.19±.88 $cm.s^{-1}$/mmHg) and adults (3.44±1.01 $cm.s^{-1}$/mmHg). ΔVE(%) was also similar between the children (205±102%) and adults (169±107%).

Discussion: These findings show that CVR and ventilatory responsiveness to hypercapnia are similar in children and adults, when the hypercapnic stimulus is continuous as opposed to intermittent. Our data suggest that cerebral perfusion may be regulated by the same mechanism in the child as the adult, but may be protocol dependent.

Assessment of dynamic cerebral autoregulation in children

AM McManus, RS Simair, N Sletten, VA Armstrong, CM Tallon, L Morris, D Fluck–

Centre for Heart, Lung and Vascular Health, Faculty of Health and Social Development, University of British Columbia, Kelowna, BC, Canada, V1V 1V7.

Background: There is a growing interest in the impact exercise and sedentary behavior have on cerebrovascular function of the child. In adults, methods to assess cerebrovascular function are well established. Of these cerebral autoregulation, the process that maintains cerebral blood flow (CBF) during changes in arterial blood pressure, can be assessed dynamically using squat stand maneuvers. Evidence in adults suggests dynamic cerebral autoregulation is age dependent, particularly when challenged such as during exercise; however, the cerebral autoregulatory process is less well-understood in children, perhaps because the most appropriate method to assess dynamic autoregulation in children has yet to be developed. We therefore examined whether squat-stand maneuvers would provide adequate assessment of dynamic cerebral autoregulation in prepubertal children by comparing the change in CBF in response to arterial blood pressure during squat-stand induced transient hyper- and hypotension.
Methods: Twenty 8-9 year olds completed squat stand maneuvers performed at 0.05 Hz (20s cycles: 10s squatting, 10s standing) and 0.10 Hz (10s cycles: 5s squatting, 5s standing) each for 3 minutes, the order of which was counterbalanced. Mean arterial blood pressure (MAP) was measured by finger photoplethysmography. CBF was indexed by middle cerebral artery mean velocity (MCAvmean), insonated using a 2-MHz Doppler probe. To characterize the change in MCAvmean in response to transient hypertension and hypotension (%ΔMCAvmean/%ΔMAP), we averaged the maximum and minimum ΔMCA_{vmean} and the maximum and minimum ΔMAP respectively and compared these at 0.5 and 0.10 Hz.
Results: Of the 20 children only 8 could complete the squat-stand protocol. There was no significant difference in %MCAvmean/%MAP during transient hyper- and hypotension at 0.5 Hz (1.5% and -4% respectively) or at 0.10 Hz (2% and -1% respectively).
Discussion: The percent change in MCAvmean in response to percent changes in MAP during squat-stand induced hyper- and hypotension was very variable in children. This is likely largely due to the child's inability to successfully perform the squat-stand task for 3 minute cycles. Other dynamic approaches need to be tested which physiologically induce transient hypertension and hypotension in the child, allowing for adequate examination of the dynamic cerebral autoregulatory process.

The effects of team selection on short-term sports participation.

D. Hillis[1], D. Dale[1], O.Morozova[1], L.B. Sherar[2], W. Proctor[3], A.D.G. Baxter-Jones[1]

[1]College of Kinesiology, University of Saskatchewan, [2] School of Sport, Exercise and Health Sciences, Loughborough University, [3]Sask Sport Inc,

Background: Youth sport participation is influenced by a dynamic array of factors, some systemic and others individual, some physical and some social. The specific ways in which these factors influence 'getting' youth into sport and 'keeping' them in sport over time require further attention. Perception of sport competence is a known motivational factor promoting sport enjoyment and perpetuating sport commitment. One obvious sport competence outcome is the selection onto age banded teams. However, the long-term effect of team selection on sports participation, is not well studied and is the purpose of this study.

Methods: Data is taken from a 4-year longitudinal study investigating youth team sport participation. 851 participants (580 males, 271 females) aged 11 to 17 were recruited from Saskatchewan youth sport team tryouts: hockey, soccer, basketball, football, volleyball, and baseball. Date of test and birthdate were used to calculate CA. List of selected athletes were provided by the sport organizations. Follow-up questioners on sports participation were collected at 6 and 36 months. The Sports Participation Activities (SPA) module from the 2010 Statistics Canada General Social Survey was used. SPA collects (a) type, frequency and level of sports participation and (b) other contextual information such as participation in tournaments, reasons for participating in sports, other involvements in sports (as a coach, official, administrator, spectator) and age of sport initiation.

Results: Follow-up data at three years was obtained on 245 participants (63 Hockey; 62 soccer; 27 Basketball; 28 football; 51 volleyball and 14 baseball); 52% were selected on to teams. Of those selected 87% were still involved in the sport three years later, this was significantly more ($p<0.05$) than those who were not selected where 76% remained participating.

Discussion: These result would appear to support the assertion that selection during adolescence on to sports teams can have a long term effect on sports participation. In this group of athletes this was particularly true in the short-term for for football, volleyball and baseball players.

Assessment of skeletal maturation among adolescent female soccer players: Agreement between FELS and TW3 protocols

A. Osório-Gutierrez[1], J. Valente-dos-Santos[1,2,3], J.P. Duarte[1,4], D. Martinho[1,5], P. Sousa-e-Silva[1], D. Costa[1], L. Luz[1,6], J. Castanheira[1,7], M. Coelho-e-Silva [1]

[1]CIDAF (uid/dtp/04213), University of Coimbra, Portugal; [2]SFRH/BPD/100470/2014, Portugal; [3]University Lusofona Humanities and Technology, Portugal; [4] SFRH/BD/101083/2014, Portugal; [5]SFRH/BD/121441/2016, Portugal; [6]Federal University of Alagoas, Brazil; [7]School of Health and Technology, Coimbra, Portugal.

Background: Fels and TW3 are the most used methods to determine skeletal age (SA) in athletes. Skeletal age tends to be advance in adolescents in reference with chronological age (CA) (Malina, 2011). Differences between Fels and TW3 methods have been reported in adolescent male soccer players (Malina et al., 2007). This study aimed to examine SA determined by Fels and TW3 methods in female soccer players.

Methods: The sample was composed of 92 players aged 12.0-13.9 years. All participants were registered in a competitive soccer clubs in Portugal. Players were grouped according to CA (U14: 12.0-12.9 yr, n=21; U15: 13.0-13.9 yr, n=71). SA was assessed using Fels (Roche et al. 1988) and TW3 (Tanner et al. 2001) protocols. Each participant was individually classified as late, on time or early maturing (Malina et al. 2012). Players classified as already mature (Fels: n=2; TW3: n=24) were not considered in the analyses. Agreement among maturity classifications derived from concurrent SA methods was calculated using Cohen kappa coefficient and Spearman rank order correlation.

Results: SA values obtained by Fels were, in general, higher compared to CA for all age groups. Means of SA by Fels and TW3 methods were always substantially different across pubertal years with a consistent trend to produce higher values by Fels protocol. Female soccer players presented poor agreement between maturity status (Fels vs TW3): U14: k=0.22, r_s=0.35; U15: k=0.15, r_s=0.36.

Discussion: SA differed when determined using Fels or TW3. Moreover, there is lack of concordance in the maturity status classification between the methods. The proportion of adolescent players classified as mature is higher when using TW3 compared to Fels.

Friday 06/10/2017 09:00

Chair: Klentrou P

Nutrition and eating disorders in young athletes

Jorunn Sundgot-Borgen (Norway)

Optimal energy and nutrient intake are important for the health and performance of adolescent athletes. Studies focusing on nutrition and adolescent athletes are limited and there are currently no specific nutrition guidelines for young athletes. However, it has been suggested that suboptimal intake of protein, calcium, iron, and zinc may be prevalent in young athletes, particularly during growth spurts or in those who have restricted energy intakes. Special considerations for optimizing energy and intake in young athletes will be in focus.

The prevalence of eating disorders is about 13% among adolescent female elite athletes, and 3% in adolescent male elite athletes, respectively. The prevalence is higher in young elite athletes as compared to controls and differs significantly between sports.

We tested the effect of a one-year multifaceted intervention program on the development of symptoms associated with eating disorders and disordered eating among adolescent elite athletes. First-year students representing the total number of Elite Sport High Schools were randomized at school level to intervention or control. A total of 465 (94%) athletes completed the study. Results showed that there were no new cases of eating disorders among girls in the intervention schools while there were 8 (13%) at the control schools. The methods used in this intervention program will be presented.

Friday 06/10/2017 09:30-10:30, Oral session: Exercise & Bone

Chair: Baxter-Jones A, Sundgot-Borgen J.

Friday 06/10/2017 09:30

The role of body composition and physical activity in adolescence on bone accrual in young adulthood

Baxter-Jones, A.D.G., Barbour-Tuck, E., Erlandson, M. College of Kinesiology, University of Saskatchewan, Canada

Background: During growth, physical activity is known to confer skeletal benefits, that may or may not be expressed in young adulthood. The effects of soft tissue during the same time-period are more controversial, particularly the role of fat tissue. The purpose of the present study was to investigate the role of physical activity (PA) and fat and lean mass accrual during childhood and adolescence on total body bone mineral content (TBBMC) and bone mineral density (TBBMD) development during emerging adulthood (18 to 28 years of age).
Methods: 157 (89 females) individuals were serially measured between 1991 and 2005 (age range 8 to 28 years). Annual measures included age, anthropometrics, body composition (DXA) and questionnaires of physical activity (PA) and diet (calcium intake, CI). From -6 to + 6 years from peak height velocity, age specific z-scores for PA, CI and total body fat mass / lean mass (TBFM/TBLM) were calculated and yearly values averaged to provide individual childhood and adolescence mean z-scores. Multilevel random effects models were built to identify independent predictors (Estimates ± Standard Error Estimate) of TBBMC/TBBMD trajectories in emerging adulthood.
Results: Once the confounders of adult age ($1.2 \pm 0.9 \times 10^{-3}$), height ($-1.0 \pm 0.9 \times 10^{-3}$), TBLM ($2.2 \pm 0.6 \times 10^{-6}$), TBFM ($1.1 \pm 0.3 \times 10^{-3}$) and PA ($p>0.05$) were controlled it was found that sex (0.08 ± 0.02) and childhood/adolescent TBLM z-scores (0.04 ± 0.01) predicted TBBMD. Childhood/adolescent z-scores for PA, CI and TBFM were not significant predictors ($p>0.05$) of BMD development. The model for TBBMC development showed the same results, once the confounders of adult age, height, TBLM, TBFM, and PA were controlled only sex (545.9 ± 58.3) and TBLM z-scores (215.4 ± 26.1) were significant predictors of TBBMC development.
Discussion: These results identify strong relationships between bone parameters and adult and adolescent TBLM. Once the confounders of age, size and body composition are controlled, it was found that there was no relationship between emerging adulthood bone accrual and adolescent PA. It is speculated that PA in adolescence increases TBLM and thus masks the effects of adolescent PA on bone accrual in young adulthood.

Friday 06/10/2017 09:45

The impact of weight-bearing and aquatic sports on bone density gains among male adolescents: 18 months of follow-up

K. Lynch[1], R. Agostinete[1], S. Mailane-Vanegas[1], I. Ito[1], R. Luiz-de-Marco[1], M. Rodrigues-Junior[1], B. Turi-Lynch[1], and R. Fernandes[1] [1]- Laboratory of InVestigation in Exercise - LIVE, Sao Paulo State Univ., Presidente Prudente city, Sao Paulo, Brazil.

Background: Sports participation promotes cardiovascular and metabolic benefits during pediatric ages, as well as improves bone health among adolescents. Studies have shown that young athletes involved in weight-bearing sports have greater bone density than non-athletes, but it is not clear the impact of aquatic sports on bone density due to its practice in hypogravity. Thus, the objective of this study was to verify the impact of weight-bearing and aquatic sports on changes in bone density among male adolescents during 18 months of follow-up.
Methods: Participants were 47 boys (12.5±1.6) stratified into three groups: Control (12 boys), Swimming (11 boys) and Weight-bearing sports (24 boys). Weight-bearing sports (kung-fu, judo, karate, soccer, and basketball) were gathered. Adolescents were assessed in three different time-points: baseline (Bas), 9 months (9m) and 18 months (18m). Whole-body bone mineral density (BMD, g/cm^2) was determined using a densitometry scan, while peak height velocity was estimated using anthropometric measurements. Chronological age, lean soft tissue, peak height velocity, training volume and engagement in resistance training were treated as covariates.
Results: Sports participation explained 19.7% (p-value= 0.035) of changes in BMD. BMD gains in control (6.5%), swimming (7.3%) and weight-bearing (9.8%) groups were similar (p-value= 0.078). However, the control group (Bas: 1.041±0.031 g/cm^2, 9m: 1.115±0.033 g/cm^2, 18m: 1.143±0.035 g/cm^2) presented higher BMD than swimming (Bas: 1.031±0.025 g/cm^2, 9m: 1.055±0.027 g/cm^2, 18m: 1.098±0.028 g/cm^2), while the weight-bearing group presented the highest gains (Bas: 1.088±0.015 g/cm^2, 9m: 1.135±0.016 g/cm^2, 18m: 1.183±0.017 g/cm^2).
Discussion: The present findings suggest that adolescent engaged in swimming had lower BMD even when compared to sedentary adolescents. Although swimming is effective in the improvement of cardiovascular and metabolic outcomes, its role in bone health remains unclear.

Friday 06/10/2017 10:00

Longitudinal adaptations of bone mass, geometry, and metabolism in adolescent male athletes: The PRO-BONE Study.

Dimitris Vlachopoulos[1,*], Alan R. Barker[1], Craig A. Williams[1], Esther Ubago-Guisado[2], Brad Metcalf[1], Karen M. Knapp[3], Luis Gracia-Marco[1,4]

[1]Children's Health and Exercise Research Centre. Sport and Health Sciences, University of Exeter, Exeter, United Kingdom. [2]IGOID Research Group, University of Castilla-La Mancha, Toledo, Spain. [3]University of Exeter Medical School, Exeter, United Kingdom. [4]Growth, Exercise, Nutrition and Development Research Group, University of Zaragoza, Zaragoza, Spain.

Background: To assess the effect of a 9-month progressive jump intervention programme on bone geometry outcomes in adolescents males participating in weight-bearing (football, FOO) and non-weight bearing sports (swimming, SWI and cycling, CYC) compared to a control group (CON).

Methods: One hundred and five adolescent males aged 13-15 years were measured pre and post the intervention. The sport groups were randomised to intervention and sport (INT+SWI=19, INT+FOO=15, INT+CYC=14) or to sport only (SWI=18, FOO=15, CYC=12) groups and compared with a control group (CON=12). The intervention consisted of a progressive jump training programme of 3 levels (3 months each) using weight vests (Level 1= 20 jumps, 0 kg, 3 sets/day, 3 times/week; Level 2= 20 jumps, 1 kg, 4 sets/day, 3 times/week; Level 3= 20 jumps, 2.5 kg, 4 sets/day, 4 times/week). Bone mineral content (BMC) and bone geometry outcomes were measured using dual-energy x-ray absorptiometry (DXA), Hip Structural Analysis (HSA) estimates and Trabecular Bone Score (TBS) at the femoral neck (FN) and lumbar spine (LS) skeletal sites respectively. Significance was set at $p<0.05$.

Results: FOO+INT gained significantly higher BMC at LS and FN compared to SWI (5.8%, only FN), and CYC (6.1-7.3%), and significantly higher HSA and TBS compared to SWI (5.5-14.6%), CYC (5.7-16.2%) and CON (6.1-17.8%). SWI+INT gained significantly higher BMC at FN compared to SWI (6.0%) and CYC (7.6%), and significantly higher HSA and TBS compared to SWI (11.0%), CYC (9.8%) and CON (4.2-11.7%). CYC+INT gained significantly higher BMC at FN compared to SWI (6.0%) and CYC (7.6%), and significantly higher HSA and TBS compared to SWI (5.5–14.6 %), CYC (10.0–10.9%) and CON (4.5–9.9%). FOO gained significantly higher HSA and TBS compared to SWI (5.3–10.4%), CYC (5.5–19.9%) and CON (5.9%, only TBS).

Conclusions: This progressive jumping intervention programme enhanced bone geometry outcomes in both weight-bearing and non-weight bearing sports suggesting that jump training can be implemented by sports clubs to improve bone health of adolescent athletes. **Funding sources:** The research leading to these results has received funding from the European Union Seventh Framework Programme ([FP7/2007-2013] under grant agreement n°. PCIG13-GA-2013-618496.

Friday 06/10/2017 10:15

Effect of a 9-month progressive jump intervention programme on bone outcomes in adolescent male athletes: The PRO-BONE study.

Dimitris Vlachopoulos[1,*], Alan R. Barker[1], Craig A. Williams[1], Esther Ubago-Guisado[2], Brad Metcalf[1], Karen M. Knapp[3], Luis Gracia-Marco[1,4]

[1]Children's Health and Exercise Research Centre. Sport and Health Sciences, University of Exeter, Exeter, United Kingdom. [2]IGOID Research Group, University of Castilla-La Mancha, Toledo, Spain. [3]University of Exeter Medical School, Exeter, United Kingdom. [4]Growth, Exercise, Nutrition and Development Research Group, University of Zaragoza, Zaragoza, Spain.

Background: To assess the effect of a 9 month progressive jump intervention programme on bone parameters in adolescents males participating in weight-bearing (football, FOO) and non-weight bearing sports (swimming, SWI and cycling, CYC) compared to a control group (CON).

Methods: One hundred and five adolescent males aged 13-15 years were measured pre and post the intervention. The sport groups were randomised to intervention and sport (INT+SWI=19, INT+FOO=15, INT+CYC=14) or to sport only (SWI=18, FOO=15, CYC=12) groups and compared with a control group (CON=12). The intervention consisted of a progressive jump training programme of 3 levels (3 months each) using weight vests (Level 1= 20 jumps, 0 kg, 3 sets/day, 3 times/week; Level 2= 20 jumps, 1 kg, 4 sets/day, 3 times/week; Level 3= 20 jumps, 2.5 kg, 4 sets/day, 4 times/week). Bone mineral content (BMC) was measured using dual-energy x-ray absorptiometry (DXA) at total body less head (TBLH), legs and arms, and bone stiffness was measured using quantitative ultrasound (QUS). Bone outcome changes were controlled for initial bone parameters and the change in lean mass. Significance was set at $p<0.05$.

Results: FOO+INT gained significantly higher BMC at TBLH and legs and bone stiffness compared to SWI (8.3-15.6%), CYC (6.8-16.6%) and CON (4.3-11.2%). SWI+INT gained significantly higher BMC at legs and bone stiffness compared to SWI (5.4-12.5%), CYC (4.0-13.6%) and CON (8.2%, only bone stiffness). CYC+INT gained significantly higher BMC at legs and bone stiffness compared to SWI (6.6-11.5%) and TBLH and legs BMC and bone stiffness compared to CYC (5.2-12.6%). FOO gained significantly higher BMC at legs and bone stiffness compared to SWI (5.6-11.3%) and TBLH and legs BMC and bone stiffness compared to CYC (5.2-12.6%). There were no significant differences at the arms BMC.

Conclusions: This novel intervention programme enhanced bone parameters in both weight-bearing and non-weight bearing sports suggesting that jump training can improve bone status of non-weight bearing sport adolescent athletes and can be implemented by sports clubs.

Funding sources: The research leading to these results has received funding from the European Union Seventh Framework Programme ([FP7/2007-2013] under grant agreement n°. PCIG13-GA-2013-618496.

Friday 06/10/2017 11:00 **Legend session**

Chair: Falk B

The biological basis of physical activity during childhood

Thomas Rowland

There exists abundant evidence from multiple sources that daily energy expenditure via physical activity is at least to some extent biologically driven by a central controller within the central nervous system. Such biological control, acting in a classic feedback loop mechanism, might serve to contribute to the defense of body energy balance. Still, many questions remain unanswered. In particular, the degree to which one's level of habitual physical activity can be altered by both intrinsic and extrinsic factors, as well as the extent that a central controller of physical activity might respond to traditional strategies for promoting physical activity, remain unclear. Central to the issue of biological control of activity is the intuitively attractive but unproven role of such regulation as an "activity-stat." The current body of information is sufficiently compelling to conclude that the importance of biological factors in controlling level of habitual physical activity, particularly as this might relate to health outcomes, needs to be considered in future research efforts.

Friday 06/10/2017 12:00-13:00 Oral session: Physical activity

Chair: Pfeiffer K A, Barker A

Friday 06/10/2017 12:00

Prevalence of objectively measured sedentary behaviour in toddlers and preschoolers: A systematic review.

Pereira, J.R.[1,2]; Cliff, D.[1]; Zhang, Z.[1]; Sousa-Sá, E.[1]; Okely, A.D.[1]; Santos, R.[1,3]

[1] Early Start; University of Wollongong, Australia

[2] Research Unit for Sport and Physical Activity (CIDAF)

[3] Research Centre in Physical Activity, Health and Leisure; University of Porto, Portugal.

Background: Physiologically, distinct effects are observed between prolonged sitting or sedentary time and too little physical activity. This has been described as “inactivity physiology”**.** Excessive sedentary behaviour has deleterious health effects in adults, although evidence of the prevalence or the impact of sedentary behaviour on health in children is less consistent. Most of the studies assessing the levels or health consequences of sedentary behaviour in young children have focused on screen-based forms of sedentary behaviour. Even though these are common sedentary behaviours among young children, they do not necessarily represent the total amount of time children spend sitting throughout the day. Thus, the aim if this study is to systematically review the prevalence of objectively measured sedentary behaviour in toddlers and pre-schoolers.

Methods: Using a comprehensive search strategy, five electronic databases (CINAHL, SportDiscus, Scopus, MedLine and PsycInfo) were search. No restriction for publication dates were made. All papers that result from the search ran until March 2017 were considered.

Results: Twenty-nine studies representing 13 countries and including 7316 children aged 2.0 ± 0.1y to 5.2 ± 0.8y met the inclusion criteria for this review. The prevalence of objectively measured sedentary behaviour varied between 25.0% to 82.6%. Prevalence in boys varied between 37.3% to 81.8% and in girls from 38.7% to 84.4%. In all studies, girls spent more awaking time being sedentary than boys.

Discussion: Evidence from this data suggests that young children spend the majority of their awaking hours being sedentary. Given that, (i) Sedentary behavior seems to establish at young ages, (ii) tracks throughout life, and (iii) some data indicates that excessive sedentary behavior has deleterious health effects in young children, there is an urgent need to address sedentariness in early childhood, especially in girls.

Friday 06/10/2017 12:15

Characterizing Preschoolers' Indoor Physical Activity: Validation of Bluetooth Proximity Tagging

K. Clevenger[1] and K. Pfeiffer[1] [1]- Department of Kinesiology, Michigan State University, East Lansing, MI, USA

Background: Limited research exists on where children play in the indoor preschool environment, but a novel monitor-based approach (proximity tagging) may provide a more feasible method to measure physical activity (PA) by location. Our purposes were to use proximity tagging to identify differences in the duration and intensity of play by indoor location, and investigate the preliminary validity of proximity tagging compared to video observation.

Methods: Preschoolers (N=20; 14 males; 4.6 y) wore an Actigraph wGT3x-BT for three school days, which determined time in total PA (light-to-vigorous). To determine location, the worn monitor acted as a "receiver," which recorded the serial numbers of nearby "beacons" at an epoch of 15-sec. Beacons continuously broadcasted their serial number from their location in each classroom area. Location was determined by recorded signal strength, and a one-way ANOVA was used to determine differences in total PA by location ($p<0.05$). For a sub-sample of children (n=8), one school day was videotaped, and location was coded using Datavyu software. Kappa statistic, sensitivity, and specificity were calculated to evaluate the validity of proximity tagging compared to video-determined location.

Results: According to proximity tagging, children spent the most time in pretend (24.4%) and group (31.2%) centers and spent the least time in book (8.4%) and art (6.0%) centers. Children elicited significantly more PA in loft/climbing (65.4%) compared to snack (38.2%), art (40.8%), science (39.7%), group (44.7%), math (52.5%), or sensory (35.3%) areas. Books (53.6%) elicited more PA than snack (38.2%) or manipulative (33.2%) areas. Mean absolute difference between time in each location according to proximity tagging and video was 16.4 min. Overall kappa was 0.21, but varied by center, from 0.07 (math) to 0.33 (group). Sensitivity was 43.9% and specificity was 90.9%.

Discussion: While proximity tagging was feasible and identified differences in PA by location, additional data will provide further insight to the validity of this method. We identified several issues with using proximity tagging in this setting, including limitations when used in small, ill-defined, or centrally located centers.

Funding: North American Society for Pediatric Exercise Medicine, Michigan State College of Education, Midwest American College of Sports Medicine

Friday 06/10/2017 12:30

The role of growth on fundamental movement skills development

T.J. Tait, L. Humbert, D. Hillis, A.D.G. Baxter-Jones. College of Kinesiology, University of Saskatchewan, Canada.

Background: Fundamental Movement Skills (FMS) consist of locomotor skills that are used to propel a human body through space and object control skills that include manipulating an object in action situations. It is known that FMS are imbedded by 8 years of age, less is known about their development through adolescence. This is of particularly interest given the suggestion that during adolescence there is a perceived period of physical awkwardness. Both sports participation (SP) and habitual physical activity (PA) have been shown to positively correlate with FMS. The purpose for this study was to identify the effect growth had on FMS development, whilst controlling for PA and SP.

Methods: Eighty-four individuals (23 male, 61 female) were recruited from sports camps and teams. Age, height, sitting height and weight were measured and a biological age (BA) (years from peak height velocity [PHV]) predicted. Three maturity groups were identified: pre-PHV (n=21), peri-PHV (n=12) and post-PHV (n=51). SP and PA were assessed by questionnaire. The Test of Gross Motor Development 2 (TGMD-2) was used to assess the quality of FMS performance. Mean differences between groups were tested with an ANOVA and ANCOVA.

Results: Significant differences were found between BA groups and FMS scores, with post-PHV having significantly greater FMS Scores (82±6) than pre-PHV (74±6) and peri-PHV (74±11) ($p<.05$). Physical activity was only significantly different between pre-PHV (3.2±.7) and post-PHV (2.6±.4) ($p<.05$). Sports participation was not significantly different between groups ($p>0.05$). A regression analysis found that sex, age, and SP ($p<.05$) were significant predictors of FMS scores.

Discussion: There was no observable decline in performance during rapid growth, the period of potential physical awkwardness. It was found that the most mature individuals performed the best. This is not unexpected as post-PHV participants were significantly older and therefore would have had more time to be taught, learn and practice their FMS through PA and sports participation. Interestingly, males outperformed females when adjustments were made for age and sports participation. These results do not support the contention that FMS are negatively impacted during the period of rapid adolescent growth.

Friday 06/10/2017 12:45

Correlates of preschool children's objectively measured physical activity and sedentary behavior: A cross-sectional analysis of the SPLASHY study.

Einat A. Schmutz, Claudia S. Leeger-Aschmann, Thomas Radtke, Stefanie Muff, Tanja H. Kakebeeke, Annina E. Zysset, Nadine Messerli-Bürgy, Kerstin Stülb, Amar Arhab, Andrea H. Meyer, Simone Munsch, Jardena J. Puder, Oskar G. Jenni and Susi Kriemler

Background: Identifying ways to promote physical activity and decrease sedentary time during childhood is a key public health issue. Research on the putative influences on preschool children's physical activity (PA) and sedentary behavior (SB) is limited and has yielded inconsistent results. Our aim was to identify correlates of PA and SB in preschool children.

Methods: Cross-sectional data were drawn from the Swiss Preschoolers' Health Study (SPLASHY), a Swiss population-based cohort study. Of 476 two to six year old children, 394 (54% boys) had valid PA data assessed by accelerometry. Information on exposure data was directly measured or extracted from parental questionnaires. Multilevel linear regression modeling was used to separately assess associations between 35 potential correlates and total PA (TPA), moderate-to-vigorous PA (MVPA) and SB.

Results: In total, 12 correlates from different domains were identified. TPA and MVPA were greater in boys than girls, increased with age and were positively associated with gross motor skills. Children from single parent families had a higher level of TPA and spent less time sedentary than those living with two parents. Time spent outdoors was positively associated with TPA and negatively with SB. The child's activity temperament was related all three outcomes, whereas parental sports club membership, living area per person and neighborhood safety were associated with SB only. Fixed and random factors in the final models accounted for 28%, 32% and 22% of the total variance in TPA, MVPA and SB, respectively. Variance decomposition revealed that age, sex and activity temperament were the most influential correlates of both, TPA and MVPA, whereas the child's activity temperament, time outdoors and neighborhood safety were identified as the most important correlates of SB.

Conclusions: A multidimensional set of correlates of young children's activity behavior has been identified. Personal factors had the greatest influence on PA, whereas environmental-level factors had the greatest influence on SB. Moreover, we identified a number of previously unreported, potentially modifiable correlates of young children's PA and SB. These factors could serve to define target groups or become valuable targets for change in future interventions.

Friday 06/10/2017 14:30

Chair: Nemet D

The Promise of Genomics and Epigenetics Studies in Pediatric Exercise Research

Shlomit Radom-Aizik

Pediatric Exercise and Genomics Research Center (PERC), Department of Pediatrics, University of California, Irvine USA

Children, like most mammals during growth and development, are naturally physically active. Developmental biologists, pediatricians, and other child health care specialists have long suspected that exercise during infancy, childhood, and adolescence is not merely play, but is essential for healthy growth and development. Many of the hormones and mediators (e.g., GH, IGF1, glucocorticoids, IL-6 and BDNF) involved in natural growth in children also appear to play substantial roles in the adaptive responses to physical activity. The pattern and intensity of physical activity during key stages of growth and development can provide the organism with mechanical and other metabolic and thermodynamic inputs, essential information that could optimally adapt the growing child to his or her specific environment. Precisely how the molecular transducers of physical activity interact with the molecular transducers of normal growth and development and the role of exercise in different clinical conditions remains poorly understood. But recent advances in genomics and epigenetics platforms now provide exciting approaches and tools that can be used for the first time to address this gap. This lecture will provide an introduction to the evolving field of genomics and epigenetics and highlight promising new discoveries in the genomic and epigenetic leukocyte response to exercise in healthy children and adolescents. In addition, the talk will highlight how this approach may be useful in specific disease states, in particular, children who have survived acute lymphoblastic leukemia. These data may generate useful and clinically relevant insights into the mechanisms that link exercise with growth during critical periods of growth and development in healthy children and in children with different clinical conditions.

Friday 06/10/2017 15:00-16:15 Oral session: Exercise in children with disabilities

Chair: Takken T, McManus A

Friday 06/10/2017 15:00

A novel tool to quantify and promote physical activity in youth and ambulatory youth with a motor disability

K. Lankhorst [1,2], R. van den Berg-Emons[3], J. Bussmann[3], H. Horemans[3], J. de Groot[1,2]

[1]Research Group Lifestyle and Health, Institute of Human Movement Studies, University of Applied Sciences, Utrecht, The Netherlands, [2]Partner of Shared Utrecht Pediatric Exercise Research (SUPER) Lab, The Netherlands,[3]Dept. of Rehabilitation Medicine, Erasmus MC University Medical Centre Rotterdam, The Netherlands

Background: Promoting physical activity (PA) is increasing to prevent health related problems later on in life in typically developing youth and peers with motor disabilities. To evaluate interventions aimed at improving PA it is important to measure this objectively. Although, several device-based instruments have been validated in the adult population, none of these are validated in youth or provides feedback about the actual PA. A recently developed accelerometer (Activ8) is promising for that purpose. The Activ8 measures postures and movements (lying, sitting, standing, walking, bicycling and running), gives real-time feedback, is easy to use and is low-priced.
Purpose: To investigate the criterion validity of the Activ8 measuring PA.

Methods: Ten typically developing children (mean age, 14 years; SD 2.5) and ten ambulatory children with motor disabilities (mean age, 12.9 years; SD 2.1) were recruited. Participants performed a series of consecutive and representative daily life activities according to a standardized protocol either at home or at school. During the test, Activ8 and a hand-held digital camera measured the activities of the participant. For criterion validity, Activ8 output was compared with the synchronized video recordings. Primary outcome was relative time differences in seconds between video and Activ8 activity output.

Results: The criterion validity of Activ8 ranging from excellent-good for measuring postures and movements (range from -0.17% to -14.72%) and excellent-poor for measuring daily life activities (range from 3.38% to -42.06%) in typically developing youth. Standing was underestimated generally. In youth with motor disabilities, the criterion validity ranged from excellent – poor (range 3.35%-39.67%) for classifying postures and movements. Activ8 overestimated cycling, while standing and walking were underestimated. Classifying daily life activities, criterion validity ranged from excellent – poor (range from -85.57% to 265.22%), running was overestimated and standing underestimated.

Conclusions: In typically developing youth, Activ8 is valid for use in measuring the type of PA. In youth with motor disabilities, the presence of a ‘crouched posture and gait pattern’ influences the correct classification of daily life activities. Because measurement validation is an ongoing process that happens across a volume of studies, future research should focus on this.

Friday 06/10/2017 15:15

Biomechanical differences in low obstacle clearance between children with and without Cerebral Palsy

M.C. Kotzamanidou[1], V. Panoutsakopoulos[2], D. Patikas[3], and D.I. Zafeiriou[4]

[1]– Faculty of Health and Human Sciences, Metropolitan College of Thessaloniki, Thessaloniki, Greece; [2]– Biomechanics Laboratory, School of Physical Education and Sport Science, Aristotle University of Thessaloniki, Thessaloniki, Greece; [3]– Department of Physical Education and Sport Science, Aristotle University of Thessaloniki, Serres, Greece; [4]– School of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece

Background: Gait needs to be adaptable in order to confront complex environments of daily life, as for example when stepping across obstacles. Obstacle clearance reflects the activities of daily living such as stair climbing, ascending a pavement and obstacle management in general. Previous research suggests that gait adaptability in adolescents with cerebral palsy is reduced in comparison to typically developed peers. The purpose of the present study was to examine the neuromuscular, kinetic and kinematic differences of the lower limb between children with and without Cerebral Palsy during a low obstacle clearance task.

Methods: 16 children without (CG; boys: *n*=8, girls: *n*=8, 10.6±3.0yrs, 1.37±0.16cm, 34.9±11.5kg) and 12 children with cerebral palsy (CPG; boys: n=6, girls: n=6, 10.6±2.6yrs, 1.32±0.16cm, 31.8±11.0kg) were examined. Participants walked barefooted at a self-selected pace through an 8-m corridor, in the middle of which an obstacle at a height equal to 10% of their leg length was placed perpendicular to the walking direction. Data were recorded from a Bertec 4060 force plate (Bertec Corporation, Columbus, OH), a BTS Telemg EMG device (BTS, Milano, Italy) and a six-camera 3D motion analysis system (VICON 612, Oxford Metrics Ltd, Oxfordshire, UK), with a sampling frequency of 1kHz, 1kHz and 100Hz, respectively. Differences between CPG and CG were investigated with independent samples T-test using the SPSS 10.0.1 software (SPSS, Chicago, Il).

Results: No differences existed concerning the distance of take-off and touchdown, the vertical ground reaction force, the clearance height, the swing leg's knee and ankle angles and the agonist muscles' EMG activity. CPG had significantly ($p<.05$) larger impulse time, higher antagonist muscles' EMG activity and lesser knee flexion of the push-off leg.

Discussion: CPG did not prepare effectively their neuromuscular system during the support phase prior to the obstacle, since a higher activation of their antagonist muscles was observed. CPG seemed to adopt an insecure movement pattern as shown from the deficit observed at the landing phase. This finding could be attributed to CPG inability to optimally organize complex movements.

Friday 06/10/2017 15:30

Children and adolescents with moderate to severe intellectual disabilities have poor physical fitness

M. Wouters[1,2], H.M. Evenhuis[1], T.I.M. Hilgenkamp[1]

[1] Intellectual Disability Medicine, Department of General Practice, Erasmus MC, University Medical Center Rotterdam, the Netherlands; [2] Reinaerde, Utrecht, the Netherlands

Background: Children with intellectual disabilities (ID) are more vulnerable for health problems than typically developing (TD) peers. Since physical fitness is an important indicator for health, it is important to study the physical fitness of children with moderate to severe ID.

Methods: Field-based physical fitness tests were selected based on literature review and a focus group. One hundred and thirty one Dutch children with moderate to severe ID (83 male; age 9;6 ± 4;1 yrs) performed the following tests: body weight, height, waist circumference, overarm throwing, stairs climbing and the modified six minute walk test. Scores were compared to reference values of TD children. A multiple logistic regression analysis was used to study which children were more at risk for low physical fitness.

Results: High rates of overweight (23-25%) and obesity (10-15%) were found in our sample. Moreover, 71-91% of the participants score below the 5th or 10th percentile of the reference values of TD children for strength and endurance tests. Females, children with higher chronological age and lower adaptive age were more at risk for low physical fitness.

Discussion: Children with moderate to severe ID have striking low physical fitness levels. Priority should be given in policy and practice to increase the physical fitness of this vulnerable population. Special attention should be paid to females, younger children and children with low adaptive age.

Friday 06/10/2017 15:45

Holistic fitness intervention program for persons with intellectual disabilities – A community pilot programme with SG Enable

MCM Lim[1], JSM Gao[1], T Shiu[2] and SH Yip[3]

[1] Sports Medicine Programme, KK Women's and Children's Hospital, Singapore

[2] School of Health, Leisure and Sport, Republic Polytechnic, Singapore

[3] Community Integration Department, SG Enable, Singapore

Introduction: Persons with intellectual disabilities are not immune to the health issues related to a sedentary lifestyle. Physical activity has been shown to improve fitness, health and quality of life for individual with intellectual disabilities (1). The aim of this study is to evaluate the effectiveness of a holistic fitness intervention program for persons with intellectual disabilities.

Methodology: Eighteen participants (10 males 8 females, Age: 18±0.7 years, BMI: 22.6 kg/m^2) enrolled in SG Enable's School-to-Work program, were recruited. They participated in a 30-week fitness intervention program designed by clinical exercise specialist, which consists of holistic movement and fitness exercises aimed at improving fundamental movement skills, aerobic and muscular endurance. At baseline and post-intervention, a fitness assessment battery comprising of body composition, aerobic fitness, muscle strength, balance and fundamental movement skills was administered. Aberrant behavior checklist (ABC) was administered to evaluate changes in behaviours. Paired t-test was used and significance was set at $p<0.05$.

Results: There were significat improvements in core endurance ($p<0.043$), muscular strength ($p < 0.00$), aerobic fitness ($p<0.003$) and fundamental movement skills ($p<0.000$). There were no changes observed in body composition and balance. Improvements were observed for ABC and these were supported by subjective feedback from job coaches.

Conclusion: The holistic fitness intervention program has been shown to improve fitness and behavior in individuals with intellectual disabilities, and these were independent of significant weight and body composition changes. Participation in regular physical activity is important and can help these individuals improve their fitness, health and overall quality of life.

Friday 06/10/2017 16:00

Child Maltreatment and Motor Coordination Deficits among Preschool Children

T.J. Wade[1], J. Bowden[2], H.J. Sites[2] – [1] Department of Health Sciences, Brock University, St Catharines, ON, Canada, L2S 3A1 [2] - Division of Child and Adolescent Psychiatry, Cincinnati Children's Hospital, Cincinnati, OH, USA 45229.

Background: Deficits in emotional, cognitive and social development have been key concerns linking child maltreatment and ACEs (Adverse Childhood Experiences) to school-readiness. However, one domain for school readiness, physical development (i.e., motor coordination), has been overlooked. Aware of no other published study examining the link between maltreatment and motoric coordination in young children, this study examines the prevalence of fine and gross motor deficits among a sample of high-risk, maltreated preschool children.

Methods: The data come from 78 children referred to the Therapeutic Interagency Preschool (TIP) during a program evaluation of which 44 (54.6%) were reported by the caregiver to have experienced maltreatment such as sexual or physical abuse, domestic violence, or emotional neglect. Fine and gross motor development was assessed by Physical and Occupational Therapists using the Peabody Developmental Motor Scale (PDMS-2).

Results: Overall, children reported by their caregiver to have been exposed to maltreatment showed rates of impaired motoric development five to seven times higher than expected compared to the published norms of the PDMS-2. A greater percentage of children scored above the clinical and subclinical threshold in fine motor coordination than gross motor coordination. Those exposed to sexual or physical abuse had the highest rates across both fine and gross motor coordination.

Discussion: Deficits in motoric development resulting from child maltreatment can have a detrimental effect on school readiness and future school performance further cementing a negative lifecourse trajectory for abused children. This study provides some of the first evidence for the need to move beyond emotional, cognitive, and social development to consider physical developmental deficits among high risk preschool children in assessing school readiness.

Poster presentation October 6, 2017

Young swimmers and pentathletes - a compariative study of the physique

Farkas, A., Szmodis, M., Martony, G., Almási G., University of Physical Education, Budapest, Hungary

Backgroud: By the results of the anthropometric studies the advantageous physique could be connected with the swimming performance. It was also proved in Hungarian young swimmers, though it has not been studied between swimming and combined sports (including swimming). The aim of our present study was to reveal the difference, if any, between the effects of the training load or proper selection of swimming and the combined sports. It was supposed to have significant age-dependent and gender differences between the body parameters and the physique of young swimmers and pentathles. **Methods:** Our sample contains altogether 80 young prepubertal athletes (girls=39, boys=41). Subgroups were formed by age, by sport and gender (swimmers and pentathletes, 11 and 12 year-old girls and boys). The mean group values were compared to the Hungarian National Growth Standards. When taking body measurements the suggessions of the International Biological Program (Weiner and Lourie 1969) were followed. Altogether 24 body parameters were registered. On that base biological age was assessed, body composition was estimated by Drinkwater and Ross body fractionation technique (1980) and body fat content was calculated by Parizková's method (1961). Basic statistics and Student *t*-test was used for independent samples to compare sport, age and gender groups ($p \leq 0,05$).

Results: The only significant difference between swimmers and pentathles in the 12-year-old-boys occured in wrist circumference. In the 11-year-olds the upper arm girth proved to be significantly larger in girl swimmers. Those differences could be explained by the larger volume of physical workload performed against water resistance. When comparing genders numerous evident differences had occured in the physique or in body composition characteristics. Mostly the means of the athletes exceeded of that of the Hungarian National Growth Standards.

Discussion: Our results showed that even in young athletes, significant bodily differences could be occured as a result of the different sport-specific training load, even though the limited subject number. For confirming our results we need further, larger sample and/or longitudinal studies.

Determinants of physical activity in wheelCHAIR-using youth with spina bifida.

Manon AT Bloemen MSc[1,2,3], Tim Takken PhD[2], Janke F de Groot PhD[1,2], Cas LJJ Kruitwagen MSc[4], Rosanne A Rook MSc[1,3], Rita HJG. vd Berg-Emons PhD[5], Frank JG Backx MD PhD[6]

1 Research Group Lifestyle and Health, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands. 2 Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht, The Netherlands. 3 Master Program Pediatric Physical Therapy, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands. 4 Department of Biostatistics and Research Support, Julius Center, University Medical Center Utrecht, The Netherlands. 5 Department of Rehabilitation Medicine, Erasmus MC University Medical Center Rotterdam, Rotterdam, the Netherlands. 6 Department of Rehabilitation, Physical Therapy Science & Sports, University Medical Center Utrecht, The Netherlands

Background: Physical activity (PA) of wheelCHAIR-using youth (using a wheelCHAIR for daily life or long distances or sports participation) with SB is substantially less compared to typically developing peers. Bouchard and Shephard have described a model in which relationships between PA, health related fitness and health are being presumed, while at the same time genetics and other determinants play an important role in this interaction. Cardiorespiratory fitness is part of health-related fitness, with peak oxygen uptake (VO_{2peak}) as the gold standard outcome measure. It is important to explore and understand the presumed relationships between PA and its determinants, in order to develop specific interventions for this population. The aim of this study was to explore associations between PA and VO_{2peak}, age, gender, and severity of the physical disability in wheelCHAIR-using youth with SB.

Methods: VitaMove data of 34 and Actiheart data of 36 wheelCHAIR-using youth with SB were used to assess PA. Time spent sedentary, time spent physically active and time spent in moderate to vigorous PA was analyzed. The Shuttle Ride Test, using a mobile gas analysis system, was assessed to measure VO_{2peak} directly. Univariate and multivariate regression analyses were performed with PA as the dependent variable. Independent variables were VO_{2peak}, age, gender, and severity of the physical disability.

Results: Time spent sedentary and time spent physically active during a school day was influenced by both age (β=0.326 / β=-0.320) and severity of the physical disability (β=0.409 / β=-0.534) and during a weekend day by severity of the physical disability (β=0.617 / β=-0.428) alone. Time spent in moderate to vigorous PA was influenced by severity of the physical disability (β=-0.527) during a school day and by age (β=-0.600) during a weekend day.

Discussion: PA is associated with age and severity of the physical disability, with older age and the inability to walk influencing PA negatively. Gender and VO_{2peak} seem not to be associated with PA in wheelCHAIR-using youth with SB. This implies that increasing cardiorespiratory fitness alone will not improve PA in wheelCHAIR-using youth with SB.

Evidence for increasing physical activity in children with physical disability: A Systematic Review

Manon Bloemen[1,4], Leontien van Wely[2,4], Jurgen Mollema[1], Annet Dallmeijer[2,4], Janke de Groot[1,3,4]

1Research Group Lifestyle and Health, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands. 2Department of Rehabilitation Medicine and EMGO Institute for Health and Care Research, VU University Medical Center, Amsterdam, The Netherlands. 3Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht, The Netherlands. 4On behalf of the Fit for the Future! Consortium.

Background: Increasing physical activity (PA) has been a hot topic in pediatric research, with alarmingly growing rates of obesity and inactivity in youth. A physically active lifestyle is known to achieve fundamental health benefits including improved health-related quality of life, enhanced psychological well-being, improved physical functioning and prevention of non-communicable disease. While being active is important for healthy children, children with physical disabilities could benefit even more from regular PA in the prevention of not only comorbidity, but of functional decline and fatigue as well. Despite these obvious benefits of PA, children with a physical disability are known to be at higher risk for an inactive lifestyle. While the evidence for effectiveness of interventions aiming to improve PA is still limited in healthy children, the knowledge regarding children with physical disabilities seems even more limited and an overview of effective interventions is lacking. The objective of this study is to summarize best evidence of interventions to increase physical activity (PA) in children with physical disabilities.

Methods: A systematic review was conducted using an electronic search executed in in Academic Search Elite, Academic Search Premier, CINAHL, Embase, Medline, PeDro, PsychINFO and SPORTDiscus up to February 2016. Selection of articles has been performed independently by two researchers according to predetermined eligibility criteria. Data extraction, methodological quality and Levels of Evidence were independently assessed by two researchers using a data-collection form from the Cochrane Collaboration and according to the guidelines of the American Academy for Cerebral Palsy and Developmental Medicine.

Results: Seven studies were included. Five Randomized Controlled Trials ranged from strong Level-I to weak Level-II studies and two pre-post design studies were classified as Level-IV. There is Level-I evidence for no effect of physical training on objectively measured PA, conflicting Level-II evidence for interventions with a behavioral component on the increase of objectively measured PA directly after the intervention and Level-II evidence for no effect during follow-up. Results are limited to children with Cerebral Palsy as no other diagnoses were included.

Discussion: Increasing PA in children with physical disabilities is very complex and demands further novel development and research.

Preparticipation physical evaluation of youth in sports development program in Guatemala.

Dr. Calvin Illescas, FACSM. Director of Accompaniment to Sports Development.

Unit of Sports Medicine and Applied Sciences.

Confederación Deportiva Autónoma de Guatemala – Comité Olímpico Guatemalteco

Background: For the inclusion and training of underprivileged youth athletes in emergent countries, support programs in different sports disciplines are needed; this will help them improve a healthy growth and development, health, education and better sociability; in spite of, a program was created by the Guatemalan Olympic Committee.

Objective: Describe the preparticipation evaluation of youth in sports development program in Guatemala.

Methods: a descriptive study of 77 athletes, 28 female, 49 male, age $\overline{X}$ 12.3 ±3.5 years, in sport disciplines of Boxing 10 (2 Females), Judo 13 (2), Athletics 15 (5), Badminton 13 (4), Gymnastics 14 (13), Taekwondo 12 (2); A pediatric sports medical clinic record was created for sports preparation physical evaluation, performed by physician; Complementary exams, Hemogram with VS, Urine, Stool; Visual Acuity, Evaluation of degree of development, pubic hair (PH) according to Tanner criteria, Body mass index, anthropometric measurements for nutritional status analysis and electrocardiogram (ECG) at rest, all in order to perform clinical diagnosis of the Health condition to give prior treatment to the sport program.

Results: of the 77 athletes, ≤12 years, 45 (58.4%), 13 to 15y, 20 (26%), ≥18y, 12 (15.6%); 30 (39%) presented clinical pathology, Urinary Infection 9 (11.7%), Intestinal Parasitism 8 (10.4%), Anemia 7 (9.1%), Dermatomycosis 4 (5.2%), Warts 1, Deafness 1; Decreased Visual acuity 13 (17%); ECG Normal 100%; Nutrition status, Obesity 5 (6.5%), Overweight 9 (11.7%), Low Weight 7 (9.1%), Malnutrition 2 (2.6%), Height for age, high, ≥ 95pcl, 0, Low ≤ 5pcl, (31.2%); Degree of Development PH, (Tanner) Grade I, 39 (51%), II, 21 (27%), III, 7 (9%), IV, 3 (4%), V7 (9%).

Conclusion: to perform programs for youth in emergent countries, it is necessary to make a pediatric sports medical clinic record, laboratory tests, nutritional status analysis and visual acuity because there are high incidence of medical pathologies; ECG although the incidence Is low or null is this group is necessary to rule out cardiac pathologies with risk of sudden death.

Time Series Variability of Steady State RER, Tidal Volume and VO_2 Show a Common Response to Marathon Training in Older Adolescents

G. Biltz, N. Pierret, and C. Lundstrom – School of Kinesiology, University of Minnesota, Minneapolis, MN.

Background: Aerobic Exercise (AEX) training effects on steady state, breath-to-breath (btb) variability of respiratory exchange ratio (RER) and tidal volume (TV) have been previously reported. This study assesses concurrent directional changes in time series variability of RER, TV and VO_2 during steady state exercise. Sample entropy (SampEn) scores and Poincare plot SD1 and SD2 were calculated on concurrent RER, TV and VO_2 time series data to characterize their initial pattern and compare changes with training.

Methods: Thirty five runners (24 female, 11 male, average age 19.4±0.6 years) enrolled in a marathon training course and volunteered to participate in the study. Subjects underwent 16-weeks of AEX training along with pre-and post-training testing, which included: 2-mile time trial and aerobic capacity (VO_2 max). RER, TV, and VO_2 variability were determined pre- and post-training by a 6-minute steady state run at 75% of their 2 mile velocity. Gas exchange data was collected using a Medgraphics Ultima (MGC Diagnostics, St. Paul, MN) metabolic cart. SampEn and Poincare Plot analysis of RER, TV and VO_2 variability were calculated using Kubios software, Version 3 (University of Eastern Finland, Kuopio, Finland). Paired t-tests compared pre- and post-training RER, TV and VO_2 time series for the entire cohort. Delta scores were calculated for each variable and Pearson's *r* was used to assess correlations between the changes.

Results: Training did not significantly change cohort steady state RER, TV or VO_2 variability. Changes in SampEn scores for RER, TV, and VO_2 were all positively correlated: (RER and TV: r =0.498, p = 0.002; RER and VO_2: r =0.472, p = 0.006; TV and VO_2: r =0.443, p = 0.010). Poincare Plot TV SD2 was inversely related to SampEn RER (r =-0.400, p = 0.017) and positively correlated with RER PPSD2 (r =0.800, $p \leq$ 0.001).

Discussion: AEX training had a consistent directional effect on time series variability of RER, TV and VO_2, reflecting their physiologic integration. RER and TV data sequences exhibit positive correlation in the same dimension- PPSD2 and negative correlation on contrasting measurements of regularity. Variability analysis may provide a marker for the adaptability of physiologic sub-systems coupling.

Acute and long-term improvement of range of motion using intermittent and continuous static stretching training in preadolescent female athletes

Olyvia Donti[1], Konstantina Papia[1], Anargyros Toubekis[1], Anastasia Donti[1], William A. Sands[2], Gregory C. Bogdanis[1] - [1] School of Physical Education and Sport Science, National and Kapodistrian University of Athens, Greece - [2] Ski and Snowboard Association, High-Performance, Park City, Utah, United States

Background: Few studies examined the acute effect of static stretching on joint range of motion (ROM) in preadolescent athletes and longitudinal data on stretching interventions are sparse. Furthermore, there is lack of evidence linking long-term changes in ROM to different stretching protocols. The aim of this study was to compare the effects of intermittent and continuous static stretching training on straight leg raise ROM in preadolescent athletes.

Methods: Seventy-seven preadolescent female gymnasts were divided into a stretching (n=57), and a control group (n=20). The stretching group performed static stretching of the hip extensors of both legs, three times per week for 15 weeks, in addition to their regular training. One leg performed intermittent (3x30 s with 30 s rest) while the other leg performed continuous stretching (90 s). ROM pre- and post-stretching and stretching intensity (applied force on the limb) were measured at baseline, every 3 weeks for 15 weeks, and following 2 weeks of detraining. The acute and long-term effects of the two stretching protocols on ROM and stretching intensity in the stretching and the control group, were examined by 2-way repeated measures ANOVA and Tukey HSD post-hoc tests.

Results: In the stretching group, intermittent stretching conferred a larger improvement in ROM compared to continuous, from week 3 until week 15 ($p=0.001$). During detraining, ROM of the leg that performed intermittent stretching decreased significantly ($p=0.001$), while in the leg that performed the continuous protocol ROM was maintained ($p=0.18$). Acute increases in ROM during intermittent stretching were also larger than continuous stretching ($p=0.038$). Stretch intensity increased significantly ($p=0.001$) over time with no difference between protocols ($p=0.08$)**.** In the control group ROM and stretch intensity of both legs remained unchanged throughout the observation period.

Discussion: Both static stretching protocols conferred significant improvements in joint ROM. However, intermittent stretching was more effective than continuous, for both acute and long-term joint ROM enhancement in preadolescent female athletes. The results of this study may help coaches to design the most appropriate flexibility programs for preadolescent athletes.

The effect of a six-week program using unstable surfaces for upper body, on shoulders proprioceptive capability and strength among young competitive swimmers

S. Bretter, M. Ayalon, N. Steinberg – The Wingate college of physical education and sports sciences at the Wingate institute, IL

Background: Swimming requires a large number of repetitive overhead movements that may expose the competitive swimmers to pain and muscle injuries in the upper limbs. The importance of training the proprioceptive system on pain reduction, performance improvement, and injury prevention has been extensively documented in many knee and ankle joint studies. Those studies include exercises on unstable surfaces. Despite the importance of the proprioceptive system, swimmers training routine does not include specialized proprioceptive training. The aim of the study was to investigate the effect of implementing exercises with unstable surfaces, on proprioceptive abilities and strength of the shoulders of young competitive swimmers.

Methods: Fifty five young competitive swimmers, divided into two age and gender matched training groups. Both intervention group (GRP1) and control group (CO) performed an upper body strength-training program 3 sessions per week for 6 weeks. GRP1 performed the exercises on unstable surfaces and CO performed them on stable surfaces. The training program included six upper body drills, three sets of each drill in a varied range of repetitions. The participants started the program in a given difficulty level according to their abilities and were assessed each week. If their abilities improved in a certain drill the difficulty level was raised. All swimmers were assessed for shoulder peak torque and proprioceptive ability before and after training.

Results: A significant difference was found in the proprioceptive ability (that was improved) after the training program for CO in the right hand ($p<.05$). In the other variables, the differences were not significant. There was no significant differences in shoulder strength between pre-training and post-training.

Discussion: Shoulder strength and shoulder proprioception were mainly unchanged in both groups. It is necessary to continue seeking for the appropriate training program for the improvement of strength and proprioception of the shoulder in young swimmers.

The H-reflex after a maximal sustained isometric fatiguing contraction in boys and men

D.A. Patikas, E. Bakaloudi, I. Kosmidis, V. Mougios, C. Kotzamanidis

School of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece

Background: Muscle fatigue is a complex phenomenon that limits performance and may involve peripheral (muscular) and central (neural) mechanisms. Recovery after fatigue may also be attributed to such mechanisms. It is well accepted that children recover faster than adults; however, the underlying contributing mechanisms are still under investigation. The purpose of this study was to evaluate the H-reflex amplitude in boys and men after a sustained maximal isometric fatiguing contraction.

Methods: Thirteen men (mean±SEM age 22.8±1.4 years) and 14 prepubertal boys (age 11.7±0.4 years) participated voluntarily and performed a maximal isometric plantar flexion for 150 s. Maximal voluntary contractions were executed before, at the end of the fatigue protocol, as well as at the 3rd and 6th minutes of recovery. Blood lactate was measured before, immediately after fatigue, as well as at 2.5 and 5.5 minutes of recovery. Soleus H-reflex was recorded during voluntary activation at 10% of maximum voluntary isometric contraction before fatigue and during the 1st, 2nd, 4th, 5th, and 7th minutes after fatigue. All variables were statistically analyzed using a two-way (group by time) ANOVA model with repeated measures on time.

Results: After fatigue, torque decreased and blood lactate increased more in men than in boys, and boys recovered faster than men. The H-reflex amplitude decreased significantly during the 1st minute after fatigue but no difference between groups was observed. The recovery of the H-reflex occurred within 2 minutes for both groups.

Discussion: The decrease of the H-reflex amplitude immediately after fatigue agrees with previous studies performed in adults and could be attributed to post-activation depression, i.e., a presynaptic spinal mechanism ascribed to neurotransmitter depletion in the Ia afferent terminals. Furthermore, after fatigue, changes in the muscle milieu may induce inhibitory input on α-motoneurons from type III and IV afferents. Despite the greater increase in blood lactate observed in men compared to boys, the findings of the present study suggest that men and boys show similar recovery patterns in α-motoneuron excitability through the Ia afferent pathway.

Lack of performance predictive ability in common physiological tests in junior alpine skiers

Nilsson, Robert[a*], Lindberg, Ann-Sofie[b], Theos, Apostolos[b], Ferguson, Richard. A[c] and Malm, Christer[aa.] - Department of Community Medicine and Rehabilitation, Sports Medicine Unit, Umeå University, Sweden; [b]Winternet, Boden, Sweden; [3c] School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK

Background: The aim of this study was to investigate the predictive power of metabolic and anthropometric variables on FIS-ranking in junior elite alpine skiers.
Methods: Competitive racing results were correlated to aerobic and anthropometric test results from twenty-three male and female alpine skiers. Physical work capacity was determined by V̇O2peak, blood lactate concentration [HLa]b (mM·L-1), and heart rate measurements during ergometer cycling. Orthogonal Partial Least Squares (OPLS) multivariate statistical modeled physical performance test variables to predict performance.
Results: Pre-season physical tests and anthropometric data could not predict end-season FIS-ranking. No significant correlation between competitive performance and aerobic work capacity or anthropometric data was observed in either male or female adolescent skiers. The best prediction (R2) and predictive power (Q2) of FIS SL and GS rank reached R2 = 0.51 to 0.86, Q2 = -0.73 to 0.18, indicating no validated models.
Discussion: This study could not establish V̇O2peak and other variables as predictors of competitive performance. Thus, the usefulness of these tests for alpine skiers seems limited, and prediction of future performance are not accurately conducted using standardized aerobic tests and calculated anthropometric values currently used by athletes, coaches and ski federations. Performance-specific pre-season tests must be developed and validated for prediction of future performance.

Sport specificity background affects the principal component structure of vertical squat jump performance of post-pubertal adolescent male athletes

V. Panoutsakopoulos[1], and I.A. Kollias[1]

[1]– Biomechanics Laboratory, School of Physical Education and Sport Science, Aristotle University of Thessaloniki, Thessaloniki, Greece

Background: Vertical jumping tests are considered as essential conditioning tests to evaluate strength and power production capability. Long-term training specificity is thought to be a factor that modifies the parameters defining vertical jumping performance among athletes of different sporting activities. The purpose of the present study was to investigate the possibility that post-pubertal adolescent male athletes from different sports utilize a force- (FPD) and time-dependency (TPD) pattern that is representative of their sporting background when executing a vertical squat jump (SQJ).

Methods: Elite level adult (AMG, n = 275, 22.3 ± 4.1 yrs, 1.84 ± 0.09 m, 83.2 ± 9.7 kg) and post-pubertal adolescent (PPA, n = 115, 16.0 ± 0.7 yrs, 1.78 ± 0.08 m, 72.3 ± 9.2 kg) male athletes engaged in track and field, soccer, handball, basketball, martial arts, racquet and aquatic sports executed SQJ on a AMTI OR6-5-1 force plate (AMTI, Newton, MA). FPD and TPD of SQJ performance were extracted using principal components analysis (PCA) with Varimax rotation using the SPSS 10.0.1 software (SPSS, Chicago, Il). Differences were checked using a two-way ANOVA and Scheffe *post hoc* analysis with Bonferroni adjustment on the extracted individual factor regression scores.

Results: AMG jumped significantly (p < .05) higher than PPA (30.7 ± 6.3 cm vs. 25.4 ± 8.5 cm, respectively). PCA revealed the existence of two principal components that explained 82.7% of the variance (TPD = 56.5%, FPD = 26.2%). Average TPD regression scores for PPA soccer players were significantly (p < .05) larger than basketball players and racquet athletes. PPA track and field athletes had significantly (p < .05) greater FPD values than team sport players, being in accordance with the trend observed in AMG.

Discussion: The present findings suggest that the factor differentiating SQJ performance among groups of young athletes with different sporting backgrounds was the force/time structure of the jump. In conclusion, PCA is a suitable method to detect the reliance upon FPD or TPD of SQJ performance of post-pubertal adolescent athletes from different sports and could be used for talent identification and sport orientation by recognizing sport-specific force/time profiles of vertical squat jumping.

Gender differences in ergometer rowing biomechanics and pacing strategies of club level adolescent rowers

E. Dimakopoulou[1], D. Kourbetis[2], V. Panoutsakopoulos[2], A.S. Theodorou[1], and I.A. Kollias[2]

[1]– School of Physical Education and Sport Science, National and Kapodistrial University, Athens, Greece; [2]– Biomechanics Laboratory, School of Physical Education and Sport Science, Aristotle University of Thessaloniki, Thessaloniki, Greece

Background: Rowing ergometers are considered to simulate the rowing movement comprising a widely used training modality for rowers. Pacing strategies have significant effects on performance and it is suggested that variations in pace may be detrimental to performance. The gender difference in rowing performance is largely explained by the difference in body size between male and female rowers. Differences have been observed concerning the trunk and pelvic kinematics between adolescent male and female rowers in prolonged ergometer rowing. The aim of the study was to detect possible performance and biomechanical differences between male and female adolescent rowers in separate sectors of a simulated 2000-m race on a fixed rowing ergometer.

Methods: Eight male and eight female post-pubertal adolescent club level rowers (15.2±0.3 yrs) with similar training history were examined. Participants performed an all-out 2000-m simulated race on a Concept2 Model D (Concept2 Inc., Morrisville, VT) rowing ergometer. Performance parameters for each 500-m sector of the race were retrieved using the Concept2 Utility 6.94 software. The angular kinematical parameters of the lower extremity joints were extracted with a 2D-DLT analysis which was conducted using the KAPA-MOTION v.15 software (Kapa-Invent, Orsay, France) after recording the participants with a Casio Exilim-Pro-EX-F1 (Casio Computer Co. Ltd, Shibuya, Japan) video camera (sampling frequency: 30 fps). Differences were checked with a 2 (gender) x 4 (sector) repeater measures ANOVA, using the SPSS 10.0.1 software (SPSS, Chicago, Il).

Results: Male rowers had greater values (p<0.05) in average stroke rate (30.3±1.0 vs. 28.7±1.2 spm), length (1.52±0.05 vs. 1.45±0.09 m), force (408±32 vs. 329±31 N) and power (290±23 vs. 209±23 W) compared to females. A main effect of sector was revealed for 500-m duration, handle velocity, hip extension velocity and the range of motion for the ankle and the knee. A significant interaction between gender and time was observed as male and female rowers performed the rowing technique with differences in force, work, power and ankle angular kinematics from sector to sector.

Discussion: No gender difference was observed concerning the pacing strategy. Differences in stroke kinetics and kinematics are likely related to males having greater capabilities to produce power.

Analysis of body composition changes in physically active women relative to their age

Milena Mikalački[1], Nebojša Čokorilo[1], Milan Cvetković[1]

[1]Faculty of Sport and Physical Education, University of Novi Sad, Novi Sad, Serbia

A body composition assessment was conducted on a sample composed of 90 female subjects, aged 20 to 49, all from Novi Sad. The subjects were divided into three age-based subsamples, categorised per each decade of life. Division of female subjects per their age groups was conducted based on some previous studies (Nasis and Geldas 2003; *Flag et al.* 2005; Heyward 2006). Univariate (ANOVA) and multivariate (MANOVA) analyses of variance were used to observe the existence of statistically significant differences among all age groups, both in the common system of variables and in terms of the majority of individual variables. For the purposes of additional determining of differences in the individual system of variables, a t-test was conducted verifying the findings of the univariate analysis of variance.

Aerobic programme effects on anthropometric characteristics of female students

Nebojša Čokorilo[1], Milena Mikalački[1], Milan Cvetković[1]

[1]Faculty of Sport and Physical Education, University of Novi Sad, Novi Sad, Serbia

The sample was composed of 52 female students in their first year of studies at the Faculty of Sport and Physical Education in Novi Sad, regularly attending lectures, divided into two groups being a control group (K) (27 students) which worked based on the regular Curriculum for the first year of studies, and an experimental group (E) (25 students) which worked based on the model ”Body Workout”. Changes which occurred in students, covering the period of two months, were monitored via thirteen anthropometric measures. The study results have shown that significant effects in transforming anthropometric characteristics in the experimental group were established, which was not the case with the control group. This only indicates that the experimental programme ”Body Workout“ has had a significant effect on the aforementioned characteristics. Concurrently, it was established that the experimental aerobics programme had more adequate effects on the reduction of the subcutaneous fat tissue.

Saturday 07/10/2017 09:00 The Oded Bar- Or lecture

Chair**:** Kemper H

Exercise and childhood obesity – 15 years of clinical experience

Nemet D, MD, MHA,

Child Health and Sports Center, Pediatric Department, Meir Medical Center, Kfar-Saba, Sackler School of Medicine, Tel-Aviv University, Israel

Israel, as many other countries throughout the world faces an alarming increase in the number of obese children and adolescents. Long-term follow-up indicates that obese children and adolescents tend to become obese adults. Moreover, obesity is associated with increased risk of insulin resistance and non-insulin dependent diabetes, hypertension, hyperlipidemia and atherosclerosis, as well as gastrointestinal, endocrine, orthopedic and respiratory morbidity and mortality. In addition, adults who were obese children have increased morbidity and mortality independent of their adult weight. Thus, effective prevention and treatment of obesity must start during childhood.

The child health and sports center was established at the Meir Medical Center in Kfar-Saba, Israel in 1999, as a clinical and research center that uses exercise for the treatment of pediatric diseases. Clearly, treating childhood obesity was one of the centers initial missions. The center developed and implemented successful childhood obesity prevention and treatment programs. In this presentation, we will share insights from our in-hospital multi-disciplinary intervention (dietary, behavioral and exercise) as well as our community based intervention to prevent and treat childhood obesity.

Saturday 07/10/2017 09:30-10:45 Oral session: Adiposity

Chair**:** Jürimäe J, Katzmarzyk P

Saturday 07/10/2017 09:30

Effectiveness of individual versus group programs to treat obesity and reduce cardiovascular disease risk factors in pre-pubertal children: A randomized controlled trial

Farpour-Lambert N.J., Martin X.E., Bucher Della Torre S., Von Haller L.; Ells L.J., Herrmann F.R., Aggoun Y. Department of Community Medicine, Primary Care and Emergency & Department of Child and Adolescent; University Hospitals of Geneva and University of Geneva, Switzerland.

Background: Childhood obesity can result in non-communicable diseases (NCDs) and requires early intervention. This study compares a medium-intensity individually delivered family-based behavioural therapy (FBT) with a high-intensity group-based FBT on body mass index (BMI) and cardiovascular disease risk factors.

Methods: A 6-month randomized controlled trial with 6-month follow-up was conducted. 74 pre-pubertal children with obesity (7.5-11.9 years) were assigned randomly (2:1) to intervention or control (standard care). Families in the intervention arm choose between individual FBT (A: 3h with paediatrician + 4h. with dietician) or group FBT (B: 35h, multidisciplinary team). Both groups participated in a physical activity program (44h). At 0, 6 and 12 months: BMI, BMI-z score; waist circumference (WC); total and abdominal fat; blood pressure; common carotid artery intima-media thickness and incremental elastic modulus (Einc); endothelium-dependant and independent dilation (NTGMD) of the brachial artery; fasting plasma glucose, insulin, lipids, high-sensitivity C-reactive protein (hs-CRP) were measured.

Results: Compared to control at 6 months, both treatments resulted in significant reductions in abdominal fat and hs-CRP. In reducing BMI and BMI-z, treatment B was more successful than treatment A: BMI:-0.55 (95%CI -1•16-0•06) vs -0.21 (-0•89-0•46); BMI-z: -0•08 (-0•15- 0•00) versus -0.06 (-0•13-0•03). For treatment B, improvements in BMI, BMI-z, WC, NTGMD, total and abdominal fat were observed at 12 months. Einc was reduced at 12 months in treatment B versus A.

Conclusion: High-intensity group FBT was more successful than medium-intensity individual FBT in reducing BMI and BMI-z in pre-pubertal children. At 12 months changes were maintained, and an improvement in vascular reactivity and arterial stiffness was observed in the high-intensity group. Reductions in abdominal fat and low grade inflammation were also demonstrated in both groups. These findings are important for the promotion of cardiometabolic health and NCDs prevention.

Funding: Swiss National Science Foundation; Geneva University Hospitals Research and Development Fund.

Saturday 07/10/2017 09:45

Does childhood and adolescent physical activity influence fat mass accrual in emerging adulthood?

E. Barbour-Tuck[1], M. Erlandson[1], N. Muhajarine[2], H. Foulds[1], A.D.G. Baxter- Jones[1]

[1]College of Kinesiology and [2]Department of Community Health and Epidemiology, University of Saskatchewan, Canada

Background: Being overweight and obese (OWO) during critical growth periods (infancy, young childhood and adolescence) increases the risk of being OWO in adulthood. Normal weight (NW) children and adolescents may also be at risk of becoming OWO adults due to fat mass gains occurring during emerging adulthood (18 to 25 years of age). Fat mass accrual can be ameliorated by physical activity (PA). The purpose of the present study was to investigate the role of PA during adolescence on fat accrual during emerging adulthood.

Methods: 157 (89 females) individuals were serially measured between 1991 and 2005 (age range 8 to 28 years). Annual measures included age, anthropometrics, body composition (DXA) and questionnaires of PA and diet (total energy intake -EI). For each year, from -6 to +6 years after peak height velocity, z-scores for PA, EI, total body fat and trunk fat mass (TBF/TF) were calculated and yearly values averaged to provide a composite childhood/adolescent z-score. Sex specific multilevel random effects models were built to identify fat mass trajectories from 18 to 28 years. Alpha was set to 0.05.

Results: Once the confounders of adult age, height, fat free mass (FFM) and EI were controlled it was found that both adult PA (-0.06 ± 0.02) and TBF z-score (0.30 ± 0.05) predicted males TBF accrual, neither PA nor EI z-scores during childhood/adolescence were significant ($p>0.05$). Similar results were found for male TF accrual. For TBF accrual in females, once age, height and FFM were controlled adult PA was not a significant predictor and neither were childhood/adolescent PA and EI z-scores ($p>0.05$). Childhood/adolescent TBF z-score was a significant predictor of TBF accrual (0.30 ± 0.03). Similar results were found for female TF accrual.

Discussion: The results indicate that those with greater fat mass during childhood/adolescence will have higher trajectories of fat mass accrual in emerging adulthood. In males' the trajectories were lowered by current PA. This was not the case in females. Childhood/adolescent PA did not independently affect fat mass accrual in emerging adulthood. It is speculated this is because childhood/adolescent PA influenced childhood/adolescent fat mass accrual.

Saturday 07/10/2017 10:00

Tibial impact accelerations in gait of primary school obese children: the effect of age, speed and visual biofeedback.

Guy Orland[1]; Nili Steinberg[1]; Oren Tirosh[3]; Dan Nemet[2]; Michal Pantanowitz[2]; Aviva Zeev[1]; Alon Eliakim[2]. [1]The Wingate College of Physical Education and Sport Sciences, Wingate Institute, Israel; [2]Child Health and Sport center, Pediatric Department, Meir Medical Center, Sackler School of Medicine, Tel Aviv University, Israel.

Background: Tibial stress fractures are associated with increased lower extremity loading at initial foot-ground contact, reflected in high peak positive acceleration (>8 g) of the tibia in adults. The use of visual biofeedback has been suggested to reduce peak positive acceleration of the tibia. There is no reported data on peak positive acceleration of the tibia in children and obese children during walking and running. The aim of this study was to establish tibial peak positive acceleration responses in obese children across a range of age and gait speeds and determine the real-time visual feedback effects on lower extremity loading.

Methods: Twenty-five obese children aged 8.5 ± 1.4 years with no known gait pathology comprised two age groups; Intervention (with feedback, n=14) and Control (without feedback, n=11). Wireless Inertial Measurement Unit comprising a tri-axial accelerometer was securely taped to the anteromedial aspect of the distal tibia to measure peak positive acceleration responses while walking and running on the treadmill at 3 different speeds (comfortable walking, threshold walking and jogging).
Results: Results showed significant effect ($p<.05$), decrease in peak positive acceleration in the intervention group in slow walking and jogging.

Significant effect ($p<.05$), and decrease in peak positive acceleration between groups in fast walking and jogging for the intervention group.

Discussion: The study suggests that visual feedback may be beneficial in reducing peak positive acceleration in obese children during fast walking and jogging.

Saturday 07/10/2017 10:15

Effect of the “Girls on the Move” intervention on adiposity outcomes among underrepresented girls: a group randomized trial

K.A. Pfeiffer[1], L.B. Robbins[1], J. Ling[1], D.B. Sharma [1], D.M. Dalimonte-Merckling[1], V. Voskuil [2] *[1]-Michigan State University, East Lansing, MI, USA [2]-Hope College, Holland, MI, USA*

Background: Although adolescent girls from underrepresented groups have a higher prevalence of overweight and obesity and are less physically active than their White counterparts, few researchers have implemented interventions in this population. The purpose of this study was to examine the effect of the Girls on the Move Intervention on maintaining or decreasing body mass index z-scores (BMI-z) and percent body fat in 5^{th}-8^{th} grade underrepresented girls.

Methods: A group randomized trial, including 24 schools, pair matched and assigned to intervention (n=12) or control (n=12) conditions, was conducted. Participants were 1,519 low-active girls (12.0 years (mean) ± 1.0 (SD); 54% Black, 26% White, 20% Other (mostly mixed race)) in racially diverse public schools in underserved areas in the Midwestern U.S. The intervention included: (1) a 90-minute after–school PA club offered three days/week at each girl’s school; (2) two face-to-face motivational interviewing sessions with a counselor; and, (3) an interactive Internet-based session at intervention midpoint. BMI-z was determined from measured height and weight. Percent body fat was assessed using foot-to-foot bioelectric impedance analysis. Other variables including demographics, minutes of physical activity/week measured via accelerometer, cardiorespiratory fitness, and pubertal development were collected. Mixed model analyses were conducted to examine differences at post-intervention, controlling for pre-intervention values.

Results: Post-intervention BMI-z did not differ (B = -.01, p=.64), but post-intervention percent body fat increased less in intervention versus control girls (B = -.32, p=.03). Post-hoc analysis showed a greater effect for girls who attended more PA club sessions than those who attended fewer sessions. At post-intervention, intervention girls had BMI-z of .94 and 29.8 % body fat compared to 1.033 and 31.0 % among controls, respectively.

Discussion: This study was one of few to examine effects of a physical activity intervention in underserved, adolescent girls and showed less increase in percent body fat for intervention vs. control girls. Results were similar to other studies that showed positive impact on percent body fat, but not necessarily BMI, suggesting that percent body fat may be more amenable to change than BMI. Funded by NIH R01HL109101.

Saturday 07/10/2017 10:30

Association between physical activity, sedentary behaviour and adiposity and retinal microvasculature in children and adolescents: A systematic review.

Eduarda Sousa-Sá[1], João R. Pereira[1], Zhiguang Zhang[1], Anthony Okely[1], Rute Santos[1,2]. 1: Early Start Research Institute, UOW (Australia); 2: Research Centre in Physical Activity, Health and Leisure, University of Porto (Portugal).

Background: Changes in retinal vessel structure can be seen as the first sign of microvascular harm from cardiovascular disease. As retinal microvasculature can be assessed as a non-invasive procedure, it presents an exclusive opportunity to look into the health and disease of the human microcirculation. Not much is known about the effects of specific fat mass measures, physical activity and sedentary behaviour on microvasculature damage in children and adolescents. This review summarizes the current literature on the associations between physical activity, sedentary behaviour and/or adiposity and retinal microvasculature, in children and adolescents, aged 0 to 18 years.

Methods: A systematic literature search was conducted within six electronic databases (MEDLINE with Full Text, SCOPUS, WEB OF SCIENCE, SCIENCE DIRECT, PSYCINFO and CINAHL), until January, 10, 2017. A meta-analysis was performed, using the Meta-Analyst software. Fixed-effect model was applied.

Results: 1833 studies were screened and 18 studies were included representing 18 710 children and adolescents, aged 34 months to 18 years, from 10 different countries. Fifteen studies report results on weight status, while physical activity and sedentary behaviour were assessed in two studies. One study looked at weight status and sedentary behaviour. 89% of the included studies assessed adiposity through objective measures, whereas physical activity and sedentary behaviour were assessed subjectively. Retinal microvasculature was assessed with 4 different tools. Meta-analysis was performed for 2 studies and it showed that, between non obese and obese children, there were a 2.38 µm difference in retinal arteriolar diameter and a 2.74 µm difference in retinal venular diameter.

Conclusion: Our findings suggest that excess of adiposity associates with microvascular alterations, in children and adolescents.

Saturday 07/10/2017 11:15-12:15 Legend Session

Chair**:** Williams C A

Controversies and future directions in youth aerobic fitness

Neil Armstrong

Children's Health and Exercise Research Centre, University of Exeter, UK

Peak oxygen uptake ($\dot{V}O_2$) is internationally recognized as the criterion measure of youth aerobic fitness. Itis the most comprehensively documented laboratory-determined variable in pediatric exercise physiology but its development in relation to sex, chronological age, growth, biological maturation, and health remain shrouded in controversy. Unequivocal evidence of the fallacy of ratio scaling peak $\dot{V}O_2$ in childhood and adolescence has been documented and regularly reinforced by critical reviews for 68 years but researchers persist in reporting and academic journals continue to publish ratio-scaled peak $\dot{V}O_2$(i.e. in $mL \cdot kg^{-1} \cdot min^{-1}$) as the primary (or often the only) descriptor of youth aerobic fitness regardless of context. In health-related studies the development of aerobic fitness in youth is seldom elucidated and often misinterpreted. The issue is confused further by the use of performance test data to replace or predict physiological variables. Credible international norms for young people's peak $\dot{V}O_2$ are not available and there is no compelling evidence to support the well-publicised existence of 'thresholds' of peak $\dot{V}O_2$ (usually expressed in $mL \cdot kg^{-1} \cdot min^{-1}$) which define youth health and well-being. It remains to be demonstrated that the current generation of youth have low levels of peak $\dot{V}O_2$or that it has significantly decreased over time. Ubiquitous data from performance tests such as 20m shuttle running and the use of ratio-scaled peak $\dot{V}O_2$have clouded the conceptual foundation of youth aerobic fitness and confounded putative relationships with health-related variables. Progress in understanding youth aerobic fitness requires researchers to rigorously explain and justify the assessment and interpretation of the physiological variables investigated. This is crucial if the intention is to use them in subsequent statistical analyses with other health-related variables and avoid spurious recommendations or policy statements impacting on the promotion of young people's health and well-being.

Saturday 07/10/2017 12:15-13:30 Oral session: Neuro-muscular

Chair: Zaferidis A, Panoutsakopoulos V

Saturday 07/10/2017 12:15

Does plyometric training affect stiffness during drop jumps in prepubescent girls?

Bassa E.[1], Paraschos I. [1], Papadopoulou S.D. [1], Patikas D.[1], Katsikari K. [1], Kotzamanidis C.[1] [1-]Laboratory of Coaching and Sports Performance, School of Physical Education and Sports Science, Aristotle University of Thessaloniki Greece.

Background: Calculating stiffness during drop jumps may provide a better understanding on the mechanisms responsible for the adaptations after a plyometric training program. Considering that such information concerning prepubescent girls is not available, the aim of this study was to investigate the effect of plyometric training on the jumping ability and the stiffness during drop jumps (DJs) in prepubescent girls.
Methods: Twenty-four untrained girls (age: 9-11 years) were assigned to a training and a control group. The training group followed a plyometric training program for 10 weeks, 2 times a week. The number of jumps per training session increased gradually from 60-140. The selected exercises were 1-2 level of difficulty. The control group followed 2 times a week the physical education class at school. DJs performed from heights of 20, 35 and 50 cm were tested before and after the 10 weeks. Jump height and stiffness were evaluated using a motion analysis system VICON 612 (Oxford Metrics) and a Force plate (Bertec 4060). Mean and standard deviation of the mean was assessed for the dependent variables. An.O.Va. with repeated measurements was used for the statistical analysis. Alpha was set at 0.05.
Results: Jumping height increased significantly after the 10-week plyometric training program for the training group while stiffness remained unchanged. No differences were observed in the control group.
Discussion: The present findings are in accordance with previous reports in prepubescent boys and they indicate that prepubescent girls do not adapt to plyometric training the same way as adults do.

Saturday 07/10/2017 12:30

Does Plyometric Training Increase Motor-Unit Recruitment Capacity in Children?

Raffy Dotan, Brandon McKinlay, Bareket Falk

Faculty of Applied Health Sciences, Brock University, St Catharines, Ontario, CANADA

Background: The capacity to maximally recruit one's motor-unit (MU) pool (voluntary activation) is lower in children than in adults. In both, plyometric contractions are known to elicit greater force and explosiveness than can be attained voluntarily otherwise. Aside from the actual loading, this phenomenon is mediated by the stretch reflex, which accelerates and synchronizes the initial MU-activation burst and possibly increases MU recruitment over what is voluntarily attainable. According to Henneman's hierarchical size-principle, the additionally-recruited MUs should primarily consist of higher-threshold, type-II MUs.

Purpose: To compare plyometric- and resistance-training effects on jump performance, neuromotor, and strength-related variables, and elucidate possible training-induced effects on MU-recruitment.

Methods: Forty one 11–13 year-old male soccer players were assigned to 8-week resistance- (RT), plyometric- (PL), or control (CON) training. Measured pre- and post-training were: vastus-lateralis thickness (VL_T), Isometric and dynamic (240º/s) knee-extension peak torques (pTi, pTd, respectively), peak rates of torque development (pRTDi, pRTDd, respectively), initial rates of muscle activation (EMG rise in the first 50ms) (iQ_{50}, dQ_{50}, respectively), and squat-jump height.

Results: VL_T increased 6.7±7.5 and 8.1±9.1% in RT and PL, respectively ($p<0.001$); pTi increased in both training groups (RT=23.4±18.6, PL=15.8±8.5%; $p<0.001$), but RT's 48% advantage did not reach significance. pTd increased in both groups, but only RT's (12.4±13.9%) reached significance ($p<0.01$). Both groups improved their pRTDi (RT=15.0±22.7, PL=17.6±16.5%, $p<0.02$), but only PL's reached significance vs. CON ($p<0.03$). pRTDd improved non-significantly (PL=6.1±17.5, RT=9.6±11.1%). Only PL showed iQ_{50} improvement (44±39%, $p<0.05$). No dQ_{50} improvements were observed. Both training groups improved jumping performance (RT=10.0±12.3%, PL=16.2±8.2%; $p<0.001$), but the 62% group difference was non-significant.

Conclusions: RT appears to better affect muscle strength, while PL appears advantageous in improving stretch-reflex-associated jump performance. However, PL's lack of significant pT and pRTD improvement in the fast dynamic contractions, where contractility would have benefited most from additional fast-twitch MUs, suggests that no additional MU recruitment took place. PL's increased iQ_{50} was likely due to the stretch-reflex-mediated augmentation of MU synchronization and activation rate. Thus, we suggest that plyometric-induced performance improvements were due to increased MU activation rates, intra-muscular coordination, as well as muscle hypertrophy, but not to increased MU-recruitment.

Saturday 07/10/2017 12:45

The H-reflex during a sustained submaximal isometric fatiguing contraction in girls and women

A. Papavasiliou[1], P. Karatzovalis[1], A. Xenofondos[2], V. Hatzitaki[1], E. Bassa[1], C. Kotzamanidis[1], and D.A. Patikas[1]

[1] – School of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece.

[2] – Aspetar Orthopaedic Sport Medicine Hospital, Doha, Qatar

Background: The H-reflex technique provides a non-invasive estimate of the α-motoneuron (αMN) excitability through the monosynaptic reflex pathway and can assess the response of the nervous system in conditions such as fatigue. Differences in fatigability between adults and children have been attributed to differences in their neuromuscular and metabolic profile, however, no data exist regarding the H-reflex during submaximal isometric fatigue. The purpose of this study is to evaluate the changes in the H-reflex, during a submaximal sustained contraction in women and prepubescent girls.

Methods: Fourteen women (age 22.2±3.2 years) and 17 prepubertal girls (age 11.2±1.0 years), participated voluntarily. The fatigue protocol consisted of a sustained isometric plantar flexion at 30% of their maximal voluntary contraction torque, until the participant could not reach the target torque. The soleus H-reflex was measured before and during the fatigue protocol every 10 s and the maximum M-wave (M_{max}) every 30 s. Variables were statistically processed using a two-way (GROUP and TIME) repeated measures ANOVA model.

Results: During the fatigue protocol, girls had higher H-reflex/M_{max} ratio ($F=6.3$, $p=0.019$) and this ratio increased in the mid-time of the protocol and decreased at the end ($F=7.1$, $p<0.001$). This pattern was observed in both groups (GROUP x TIME interaction $F=1.6$, $p=0.196$).

Discussion: The increased H-reflex in the middle of the protocol suggests that as fatigue develops the nervous system tends to recruit new motor units probably by increasing their excitability and/or reducing the level of presynaptic inhibition. The reduction of H-reflex at the end of the protocol could be attributed to the peripheral afferent feedback triggered by the increased concentration of metabolic by-products in the muscle during fatigue development. In the absence of interaction, it is concluded that the αMN excitability as examined by means of the H-reflex cannot explain the differences in fatigability between women and girls during a sustained isometric fatigue protocol.

Saturday 07/10/2017 13:00

Cerebral and muscle oxygenation during maximal and submaximal isometric fatiguing contraction in children and young adults

C. Antonopoulos, S. Papadopoulos, A. Zafeiridis, F. Arabatzi, I. Vrabas, D.A. Patikas, C. Kotzamanidis. School of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece

Background: Cerebral and muscle oxygenation may play a crucial role in fatigue development. During sustained isometric contraction, the increased intramuscular pressure impedes or even occludes blood flow to the muscle, whereas the cerebral blood flow is expected to increase because of enhanced cortical activation. The reduction in blood flow to exercising muscle may precipitate fatigue development. Several studies indicate that children are more resistant to fatigue when compared to adults. Muscle oxygenation could in part explain this difference. This issue, however, has not been examined yet. The objective of this study was to compare the muscle and cerebral oxygenation between children and young adults during sustained exhausting isometric protocols.

Methods: Fifteen boys (12-12.5 years) and 15 young males (19-29 years) performed in random order two isometric handgrip protocols until exhaustion in two separate visits: one at 20% and the other at 100% (Fatigue20 and Fatigue100) of maximal voluntary contraction. Near infrared spectroscopy continuously monitored the relative changes in oxygenated (O_2Hb), deoxygenated (HHb), and total (tHb) hemoglobin in ipsilateral forearm flexors muscle and at the frontal lobe of the contralateral side. Mean changes in O_2Hb, HHb and tHb were measured along 4 equal segments of the endurance time.

Results: Cerebral tHb and O_2Hb increased significantly more in men than in boys, for both fatiguing protocols. Cerebral HHb decreased for both groups only during Fatigue20 protocol, with no differences between men and boys. Muscle O_2Hb decreased to a greater extend in men compared to boys during Fatigue100 and remained unchanged during Fatigue20. In both protocols muscle HHb increased similarly for both groups, whereas muscle tHb was higher in boys compared to men.

Discussion: The results suggest that fatigue effects on the muscle oxygenation were more evident during Fatigue100 than during Fatigue20 possibly due to the increased intramuscular pressure. Furthermore, men were more fatigued possibly because of their greater muscle mass and hence greater exerted forces. The evidence of greater oxygenation at the frontal cortex in men compared to boys and the suggestion that children rely less on their anaerobic metabolism, could better explain the difference in fatigability between these two age groups.

Saturday 07/10/2017 13:15

Dynamic gear ratio in children and adults during walking and implications for muscle mechanical efficiency.

V. Baltzopoulos[1], C. Waugh[2], N. Theis[3], T. Korff[4] - [1]*Research Inst. for Sport & Exerc. Sci., Liverpool John Moores Univ., UK*, - [2]*Centre for Hip Health and Mobility, Robert H.N. Ho Research Centre, Vancouver, BC, Canada,* -[3]*Univ. of Gloucestershire, UK,* -[4]*Frog Bikes, UK*

Background: Skeletal gearing is a measure of the mechanical leverage provided by the lever arm ratio of an input (muscle) to output (point of application) force. The internal moment arm influences the musculoskeletal system's functional properties by amplifying muscular forces and dictating the extent of joint rotation, but it is not known how this ratio changes dynamically during gait in children or adults.

Methods: Participants were 12 adults (26.8±2.5 yrs) and 10 children (8.9±1.4 yrs) who walked on an instrumented dual belt treadmill (Bertec) at their preferred walking speed. Three-dimensional kinematic analysis using a Vicon system was combined with the GRF measurements from the two treadmill force plates. Nine markers were attached on anatomical landmarks in each leg for calculating segmental kinematics. Two markers were also positioned approximately 5 and 10 cm proximal to the calcaneus to represent the Achilles tendon (AT) line of action. Two ultrasound probes were fixed on the right calf one imaging the gastrocnemius medialis (GM) muscle belly and the second the GM myotendinous junction (MTJ) during the gait cycle. This protocol allowed the calculation of dynamic changes in the Achilles tendon (internal) and GRF (external) moment arms around the ankle joint during the stance phase of walking gait. The dynamic gear ratio during gait was then calculated as external/internal moment arm at each instant of the stance phase.

Results: The average AT moment arm ranged from 0.045 to 0.048m over the stance in adults and from 0.038 to 0.041m in children showing a slight decreasing trend over the stance phase in both groups. The average external moment arm ranged from 0.016 to 0.120m in adults and from 0.016 to 0.084m in children. The gear ratio in adults ranged from 0.3 to 2.6 whereas in children the range was from 0.4 to 2.2.

Discussion: These findings suggest that the gear ratio is affected mainly by the change in external moment arm given its large variation and the relatively constant AT moment arm. The external moment arms and gear ratios were maximum near the end of the stance phase and minimum at ~25% stance phase in adults and ~35% in children.

Saturday 07/10/2017 14:45

Chair**:** Bassa E, Kara M

The Model of Citizen in Ancient Greek Democracy

Karafillis G

Professor Emeritus

University of Ioannina, Greece

Athens was the center of Ancient Greek Democracy. In this system of government being a *citizen* means to have all of the rights that come with that, mainly the certain political rights. The priority was to have a share in the polis and this was very important to the Greeks from early on, otherwise they were not citizens but only idiotes-who keep to their own affairs. In particular, the concept of *democracy* was a system of government in which the members all have a share in the polity. In general, citizens had to be born in that polis. They also had to be free, meaning that slaves were not citizens and, therefore, did not have to be treated as equals. Finally, they had to be males. Females were not legally considered citizens. So, citizens in ancient Greece were free, native-born males, but Greek citizenship meant having more rights than practically anyone else in the world at that time. The following terms*, politeia*, *polites*, *polis, democratia, genos, phratria, phyle, demos, isonomia, isegoria, atimia, metoikoi*were the main political terms in Ancient Greek Democracy.

Saturday 07/10/2017 15:15

Chair**:** Bassa E Kara M

Youth's physical activity in moderation: Health perspectives of Helenic antiquity

Evangelos Albanidis

The ancient Greek ideals of exercise and health have influenced the attitude of modern western culture toward exercise and physical activity and played an important role in the practice of preventive hygiene. The purpose of this study is to select and process information regarding views of Greek philosophers, educators and physicians about the sanitary role of physical activity and their objections to the over-training of athletes. We have focused on the salutary speech of philosophers, educators and physicians in antiquity from the classical to Imperial times. The doctrine of the "mean" was one of the main characteristics of Greek thought. So, it was natural for Hippocratic physicians, Plato and Aristoteles to follow the spirit of moderation expressing views about sport. They claimed that any exaggeration could turn against nature and clearly declared that over training is always wrong. Hippocratic physicians formulated the everlasting principle according to which human health depends on the balance between diet and physical activity. Aristoteles as an advocate of moderation considers that any excess of the mean is against obtaining health and happiness. In particular, he sears the early sports specialization of children and recommends the use of lighter exercises until puberty as well as the avoidance of any special and enforced diet and specialized exercise because, as he considers, all these prevent the normal development of the body. The Stoican philosophy and the Second Sophistics Movement during the Imperial era contributed to the development of a philosophical sanitary reflection. During this era, the movement of self caring (*ἐπιμέλεια ἑαυτοῦ*) and the anxiety and concern for the body was developed. During the Imperial period, the sports of the era imposed excessive exercise and excessive and specialized body development, as well as specialized diet for the sole purpose of improving athletic performance. Galenus was sharply critical, often by using derogatory characterizations towards athletes and *paidotribes*. He also criticized athletic exercise - at least when it was practiced - for its lack of moderation and he presented a limited number of cases of misapplication of medical principle, and a perfect example of the dangers of pushing the body to extremes.

Nowadays, there's something wrong with the point of view we have about exercising. The "no pain, no gain" attitude is no longer welcome. One barrier to exercising is the mistaken belief that one needs to exercise strenuously to achieve health benefits. Not so. It's very different from what we preached in the early 90s. Positive effects can come from shorter periods of moderate activity. More and more research of the last decade has shown that moderate activities such as brisk walking, household work and yard work offer health benefits equal to those of a strenuous workout. More and more research shows that the thoughts and practices of ancient Greeks were closer to the truth.

Saturday 07/10/2017 15:45

Chair**:** Patikas D

Exercise and diabetes during the developmental years

Konstantina Dipla, Ass. Professor

Exercise Physiology and Biochemistry Laboratory, Department of Physical Education and Sports Science at Serres, Aristotle University of Thessaloniki, Greece

Diabetes mellitus is a complex, chronic disease that affects millions of people worldwide. Individuals with diabetes have an increased risk for long-term complications, target organ damage, and cardiovascular disease. Significant evidence supports that a range of interventions, such as lifestyle modifications, improve diabetes outcomes. Exercise and increased levels of physical activity have been shown to improve blood glucose control, cardiovascular health, and the well-being of individuals with diabetes. In children and adolescents with type 1 diabetes, exercise has numerous health benefits, and thus, youth with T1DMshould be encouraged to engage in at least 60 min of physical activity each day.In addition to moderate-vigorous aerobic activity exercise, all youth should engage to muscle strengthening activities at least 3 days per week. However, the risk of hypoglycemia during exercise and recovery, is an important barrier to exercise in children with type 1 diabetes and accounts, at least partially, for the low fitness levels of these individuals. The purpose of the talk will be to present the mechanisms by which exercise can improve glycemic control and induce health benefits during the developmental years. In addition, recent data reporting the appropriate frequency, intensity, type, and duration of exercise will be presented. The glucose requirements to maintain euglycemia during exercise and recent advances in insulin delivery systems for safe participation in exercise sessions will be discussed. Finally, the benefits of exercise in children with prediabetes or type 2 diabetes will be presented.

Saturday 07/10/2017 16:45-18:15, Oral session: Physical activity

Chair**:** Tremblay M, Biltz G

Saturday 07/10/2017 16:45

The crux of the cut-point choice for the objective assessment of pre-schoolers' physical activity

Claudia S. Leeger-Aschmann[1], Einat A. Schmutz[1], Annina E. Zysset[2], Tanja H. Kakebeeke[2,3], Nadine Messerli-Bürgy[4,5], Kerstin Stülb[4], Amar Arhab[5], Andrea H. Meyer[6], Simone Munsch[4], Oskar G. Jenni[2,3], Jardena J. Puder[5,7] Susi Kriemler[1]

[1]Epidemiology, Biostatistics and Prevention Institute, University of Zurich, Zurich, CH; [2]Child Development Center, University Children's Hospital Zurich, Zurich, CH; [3]Children's Research Center, University Children's Hospital Zurich, Zurich, CH; [4]Department of Clinical Psychology and Psychotherapy, University of Fribourg, Fribourg, CH; [5]Endocrinology, Diabetes and Metabolism Service, Centre Hospitalier Universitaire Vaudois, Lausanne, CH; [6]Department of Psychology, University of Basel, Basel, CH; [7]Division of Pediatric Endocrinology, Diabetology and Obesity, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, CH

Background: Accurate, valid and reliable assessment of physical activity (PA) by objective methods is essential to determine current and changing PA levels and effects of PA interventions especially in pre-schoolers who cannot report about their PA behaviour.

Methods: PA was measured for 8 consecutive days using ActiGraph accelerometers (wGT3x-BT) as part of the Swiss Preschooler's Health Study (SPLASHY) assessment. At least 3 days (1 weekend- and 2 weekdays) with 10 hours recording time were needed to be included in the statistical analysis. The impact of epoch length (15s vs. 60s) and axis selection (vertical axis vs. vector magnitude) on time spent in the different PA levels were analysed.

Results: 445 pre-schoolers (mean age 3.9 ± 0.5 years; 46% females) had valid accelerometer measurements. Longer epochs (60sec vs. 15sec) resulted in 2% less sedentary time (ST), 18% more light PA (LPA) and 50% less moderate-to-vigorous PA (MVPA); the vector magnitude compared to the vertical axis resulted in 33% less ST, 28% more LPA and 67% more MVPA (all $p \leq 0.001$). In other words ST ranged from 4.0h to 6.2h, LPA from 5.1h to 7.6hand MVPA from 0.7h to 1.6h.

Discussion: The choice of accelerometer cut-points has a substantial impact on PA levels in pre-schoolers. The epoch length as well as the choice of analysed axis have to be considered when comparing different studies and may explain part of the striking differences in PA behaviour among pre-schoolers. Yet, the optimal assessment approach may vary for different health-related outcomes.

Saturday 07/10/2017 17:00

Relationship Between Meeting 24-hour Movement Guidelines and Cardiometabolic Risk Factors in Children

P.T. Katzmarzyk and A.E. Staiano

Pennington Biomedical Research Center, Baton Rouge, LA, USA

Introduction: The recently developed Canadian 24-h Movement Guidelines provide recommendations for moderate-to-vigorous physical activity (MVPA), sedentary behaviour and sleep for children and youth. The purpose of this study was to evaluate the relationship between adherence to these guidelines and cardiometabolic risk factors in a biracial sample.
Methods: The sample was composed of 357 white and African American children aged 5-18 years. Physical activity, television viewing and sleep duration were measured using questionnaires, and meeting the 24-h guidelines was defined as: ≥60 min/day of MVPA on at least 5 days per week, ≤2 h/day of TV time, and sleeping 9-11 h/night (ages 5-13 y) or 8-10 h/night (ages 14-18 y). Waist circumference, resting blood pressures and fasting triglycerides, high density lipoprotein cholesterol (HDL-C) and glucose were measured in a clinical setting. General linear models were used to evaluate the associations among meeting the 24-hour guidelines and cardiometabolic risk factors. Age and race were included as covariates in all models.
Results: A total of 27% of the sample met none of the 3 guidelines, whereas 36%, 28% and 8% of the sample met 1, 2 or all 3 of the guidelines, respectively. Meeting a greater number of guideline components (0, 1, 2, or 3) was associated with lower levels of waist circumference (p for linear trend = 0.002), triglycerides (p = 0.002), and glucose (p = 0.04), but was not associated with HDL-C (p = 0.58), systolic blood pressure (p = 0.30) or diastolic blood pressure (p = 0.53).
Discussion: Only a small percentage of children in this sample met all 3 components of the 24-h guidelines. Meeting more components of the guidelines was associated with lower levels of waist circumference, fasting triglycerides and glucose. Future efforts should consider novel strategies to simultaneously improve physical activity, sedentary time and sleep in children.

Saturday 07/10/2017 17:15

Peak oxygen uptake cut points for identification of increased cardiometabolic risk in children aged 9–11-years – the PANIC Study

EA. Haapala[1,2], N. Lintu[1], T. Tompuri[1,3], A. Veijalainen[1], T. Takken[4], V. Lindi[1], and TA. Lakka[1,3,5] - [1]Physiology, Institute of Biomedicine, Univ. of Eastern Finland, Finland; [2]Sport and Exercise Medicine, Faculty of Sport and Health Sciences, Univ. of Jyväskylä, Finland; [3]Clinical Physiology and Nuclear Medicine, Kuopio University Hospital, Finland; [4]Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht, the Netherlands; [5]Kuopio Research Institute of Exercise Medicine, Finland

Introduction: We investigated the associations of peak oxygen uptake ($\dot{V}O_{2peak}$) with cardiometabolic risk in a population-based sample of children.

Methods: Altogether 352 (186 boys, 166 girls) children aged 9–11yrs participated in the study. $\dot{V}O_{2peak}$ was measured using breath-by-breath method in a maximal exercise test on a cycle ergometer. Lean mass (LM) was measured using bioimpedance analysis. We computed a continuous sex- and age-specific cardiometabolic risk score (CMR) using the formula waist circumference+insulin+glucose-HDL-C+triglycerides+the mean of systolic and diastolic blood pressure. We defined increased cardiometabolic risk as >1 standard deviation of cardiometabolic risk score. We used Receiver Operating Characteristic (ROC) curves analyses to investigate the $\dot{V}O_{2peak}$ cut points for identification of increased cardiometabolic risk. We also compared the CMR among children in the sex-specific quintiles of $\dot{V}O_{2peak}$ using ANCOVA.

Results: In the ROC curve analyses, boys with $\dot{V}O_{2peak}$ <45.8 mL/kg/min (95% CI=45.1 to 54.6, AUC=0.86, p<0.001) and girls with $\dot{V}O_{2peak}$ <44.1 mL/kg/min (95% CI=44.0 to 58.6, AUC=0.67, p=0.013) had an increased cardiometabolic risk. Boys with $\dot{V}O_{2peak}$ <63.2 mL/kg of LM/min (95% CI=52.4 to 67.5, AUC=0.65, p=0.006) had an increased cardiometabolic risk. In girls with $\dot{V}O_{2peak}$ mL/kg of LM/min was not able to differentiate those with increased cardiometabolic risk from other girls. Children in the lowest sex-specific quintile of $\dot{V}O_{2peak}$/kg (<44.8 mL/kg/min for boys, <40.4 mL/kg/min for girls) had a higher CMR than all other children (p<0.001 all). Children in the second quintile also had a higher CMR than children in 4–5 quintiles (p<0.04) and children in the 3–4 quintiles had a higher CMR than those in the highest quintile (p<0.0.04). Children in the lowest sex-specific quintile of $\dot{V}O_{2peak}$/kg of LM (<61.4 mL/kg of LM/min for boys, <56.9 mL/kg of LM/min for girls) had a higher CMR than children in 3–5 quintiles (p<0.02 all). Children in the second quintile (<65.6 mL/kg of LM/min for boys and <60.0 mL/LM/min for girls) also had a higher CMR than those in the highest quintile (p=0.017).
Conclusions: Our results suggest that $\dot{V}O_{2peak}$ <40–44 mL/kg/min and <57–61 mL/kg of LM/min are indicative for increased cardiometabolic risk in 9–11 year old children.

Saturday 07/10/2017 17:30

Associations between patterns across the activity spectrum and children's and adolescents' cardio-metabolic health: A Systematic Review

S.J.J.M. Verswijveren1, K.E. Lamb1, L.A. Bell1, A. Timperio1, J. Salmon1, and N.D. Ridgers11 – Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences Deakin University, Geelong, Australia.

Background: Little is currently known about how patterns of activity engagement across the activity spectrum (i.e. sedentary time, light, moderate and vigorous physical activity) impact on health of youth. This systematic review examined associations between patterns of activity accumulation and cardio-metabolic health risk factors in children and adolescents.

Methods: A systematic search was performed using seven databases in June 2016. Reference lists of included studies were also screened. Articles published in English/Dutch were included if they objectively assessed activity patterns in youth (aged 5-18 years) and reported associations with cardio-metabolic risk factors (e.g. adiposity, blood pressure, lipid profile). Information on risk of bias for individual articles was extracted by two reviewers. A narrative synthesis was performed. The review is registered with PROSPERO (CRD42016046764) and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA).

Results: From the 13594 articles identified, 27 articles were included (25 cross-sectional; 2 experimental). The majority of studies were conducted in children (5-12 years old; 52%). There was considerable variation in the definition of activity patterns in terms of bout lengths (n=36) (e.g. ≥4 seconds to ≥20 minutes for physical activity; ≥1 to ≥120 minutes for sedentary time), breaks, and time periods examined (e.g. weekday, weekend). In total, 35 different cardio-metabolic health outcomes were considered across the 27 articles, with adiposity the most commonly reported. Limited consistent associations were observed between activity patterns and cardio-metabolic health outcomes for patterns of physical activity and sedentary time.

Discussion: Substantial variety in pattern definitions and confounder adjustments made comparison between studies challenging and therefore a standardised assessment of activity patterns is needed. In addition, the low scores on the ROB assessments may have impacted the strength of the conclusions. Further evidence is needed to better understand children and adolescents' activity patterns across the entire spectrum, and the implications for cardiometabolic health. This in turn will inform activity guidelines and interventions to change these behaviours.

Saturday 07/10/2017 17:45

Associations between physical fitness and health among school-aged youth: an analysis using the Canadian Health Measures Survey

Mark S. Tremblay[1], Justin J. Lang[1], Richard Larouche[1] – Healthy Active Living and Obesity (HALO) Research Group, Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON, Canada[1]

Background: This study explored the relationship between physical fitness indicators and measures of psychosocial and physical health in 9 to 17 year-old Canadian youth.

Methods: Data obtained from the nationally-representative Canadian Health Measures Survey (Cycles 1 and 2) were used to examine the associations between fitness variables, psychosocial and physical health markers in youth. The fitness variables were measured according to standardized protocols and included cardiorespiratory fitness (modified Canadian Aerobic Fitness Test), strength (grip strength), flexibility (sit and reach), and muscular endurance (partial curl-ups). The physical health markers included blood pressure, resting heart rate, cholesterol, c-reactive protein, glucose, glycohemoglobin, body mass index, waist circumference and skinfold thickness. Psychosocial health was assessed using the Strengths and Difficulties Questionnaire. Multiple linear regressions and odds ratios were calculated to assess the relationships between physical fitness, psychosocial and physical health markers. All models were adjusted for sex, maturity, parent education and family income.

Results: A sample size of 2,826 (48.2% female) children and youth were included in the study. In comparison with all fitness variables, cardiorespiratory fitness was the most strongly and consistently associated variable with physical health among children and youth, being favourably associated with all variables except for glycohemoglobin (B=-0.0; 95%CI: -0.0, 0.0; p=0.271). All physical fitness variables were favourably associated of body composition. Strength was favourably associated with resting heart rate (β=-1.3; 95%CI: -2.0, -0.6; p<0.001) and HDL cholesterol (β=-0.0; 95%CI: -0.0,-0.0; p=0.008), but it was associated with higher systolic blood pressure (β=0.8; 95%CI: 0.2, 1.5; p=0.01). Flexibility was favourably associated with resting heart rate (β=-1.8; 95%CI: -2.5, -1.1; p<0.001), HDL cholesterol (β=0.0; 95%CI: 0.0, 0.0; p=0.011) and glucose (β=0.0; 95%CI: 0.0, 0.0; p=0.016). Lastly, muscular endurance was favourably associated with HDL cholesterol (β=0.0; 95%CI: 0.0, 0.0; p<0.001) and c-reactive protein (β=-0.3; 95%CI: -0.5, -0.1; p<0.001). No physical fitness variables were significantly associated with the total difficulties score (psychosocial health).

Discussion: These findings suggest that overall physical fitness is favourably associated with some health indicators among Canadian youth aged 9 to 17 years. Further, the most important component of physical fitness for health was cardiorespiratory fitness which displayed the strongest and most consistent favourable associations across most physical health variables in this population.

Saturday 07/10/2017 18:00

Correlates of cardiorespiratory fitness and their interrelationships in children and adolescents

Laura Joensuu[1, 2], Heidi Syväoja[2], Jouni Kallio[2], Janne Kulmala[2], Urho Kujala[1], Tuija Tammelin[2] – [1]Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland – [2]LIKES Research Centre for Physical Activity and Health, Jyväskylä, Finland.

Background: Cardiorespiratory fitness (CRF) is positively associated with health during childhood and adolescence and is also considered as a surrogate measure of health risks. Thus, it is important to fully understand the correlates of CRF in children and adolescents. Age, body composition (BC), and physical activity (PA) are known correlates of CRF, but the nature and scope of their interrelationships and roles in CRF is yet to be determined. The aim of this study was to examine the associations between age, BC, PA and CRF in children and adolescents.

Methods: 594 Finnish children (56% girls) aged 9-15 (12.4 ± 1.3 years) were selected for a cross-sectional study performed in 2013. CRF was measured by a 20-m shuttle run test. Moderate-to-vigorous PA (MVPA) and sedentary time (ST) were objectively measured with an accelerometer (ActiGraph GT3X+). BC was measured using bioelectrical impedance analysis (InBody 720). Fat mass index (FMI) and fat free mass index (FFMI) were counted and selected as representatives of adiposity and muscle mass. A linear regression model was used to explore the associations.

Results: The regression model explained 45.3% and 30.8% of the variation in CRF in boys and girls, respectively. FMI had the strongest association with CRF in boys and girls (standardized regression coefficient (β): -0.465, $p < 0.001$ and β: -0.467, $p < 0.001$, respectively). In boys and girls, respectively, MVPA (β: 0.308, $p < 0.001$, β: 0.246, $p < 0.001$), FFMI (β: 0.164, $p = 0.005$, β: 0.262, $p < 0.001$) and age (β: 0.243, $p < 0.001$, β: 0.271, $p < 0.001$) were also correlates of CRF. No statistically significant associations between ST and CRF were found.

Discussion: Adiposity had a strong negative association with CRF, while muscle mass, MVPA, and age had positive associations. Adiposity was the strongest correlate with CRF, although other variables were fairly equally associated. This study quantifies the various background factors associated with CRF in children and adolescents. When designing interventions for CRF in the future, it is important to recognize the positive factors (MVPA, muscle mass and age) and negative factors (adiposity) associated with CRF.

Poster presentation October 7, 2017

Change of growth and maturing rates of boys in puberty period, some determinants

P. Prusov, Moscow scientific practical center of medical rehabilitation and sports medicine, branch No.11, Russia.

Background: Data about change of rates of biological maturing (CRBM) for the puberty are insufficiently studied or discrepant. For example information on the raised fatness (Roche A.F., 1998) and greater peak height velocity (PHV) (Tanner J.M., 1976) at early matured boys, is not coordinated with data about lower PHV at obese teenagers (Prusov P.K.,1993). The objective is to study growth velocity and CRBM of boys in the puberty subject to physical development and activity.

Methods: Analyzed data of longitudinal researches anthropometry and caliperometry of 170 boys from 11 years to stop of body height growth (Vitebsk, 1983-1992). CRBM for the puberty was defined on growth duration from achievement of 85% of adult height (85%AH) till the moment of 99%AH. Upon our and (Vismanos R.,2001) data on the average about 85%AH corresponds to puberty beginning. Individual parameters of height process were calculated on a logistic model (Preece M.A., Baines M.J.,1978). Groups of physically active and hypokinesia (30 and 39 persons) were chosen.

Results: Average duration of growth from moment 85%AH up to 95%AH was 3.55±0.56 years, a range of fluctuation is 2.15-5.7 years. In physically active group this period was shorter than in gypokinesia one at 1.1 standard deviation (SD). Delay in RBM for a puberty is connected with relative values of fat, total mass of body, length of leg, AH. Acceleration is connected with PHV and muscular tissue value. Age of 85%AH had no value for CRBM whereas ages of PHV and 99%AH are positively connected with RBM delay, coefficients of correlation accordingly are 0.33 and 0.54. Boys with the fat high % P>90 in the beginning of puberty had acceleration of RBM at + 0.56 SD and by the moment of puberty end delayed at - 0.32 SD.

Discussion: Features of physical development and character of physical activity influence upon CRBM of boys in puberty.

Reference data for ultrasound bone characteristics in Hungarian children aged between 7-19 years

[1]Szmodis, M., [2]Zsákai, A., [1]Bosnyák, E., [1]Protzner, A., [1]Trájer, E., [1]Farkas, A., [1]Szőts, G., [1]Tóth, M., [1]University of Physical Education, Department of Health Sciences and Sport Medicine, Budapest, Hungary. [2]Eötvös Loránd University, Department of Biological Anthropology, Budapest, Hungary

Backround: Osteoporosis is common disease. Physical activity has favourable influence on the bone status. The aim was to establish normative data for calcaneal quantitative ultrasound (QUS) bone characteristics in children and to analyze the relationships among habitual physical activity, anthropometric and bone structural parameters.

Methods: Hungarian children aged 7-19 years (N=2674; 1325 girls, 1349 boys) provided physical activity, anthropometric and bone data. Anthropometry was measured according to the guidelines of International Biological Program (Weiner and Lourie 1969). Body fat percentage and body composition was assessed by Parizková (1961) and Drinkwater and Ross method (1980). The level of physical activity was measured by questionnaire. Quantitative Ultrasound parameters were registered with Sonost 3000 densitometer. In the analysis speed of sound (SOS, m/s), broadband ultrasound attenuation (BUA, dB/MHz), bone quantity index (BQI=αSOS+βBUA) were included. Differences between subgroups were tested by Student's t-test. Correlation patterns of the variables for total sample and subgroups were analyzed ($p<0.05$). Reference centiles of QUS parameters were constructed by LMS method.

Results: In both sexes, QUS bone structural parameters increased by age. There were no gender differences except in 11 and 19 years old children, boys showed higher SOS, BUA, BQI values. SOS (1497,15±15,72 vs. 1494.05±14,81 m/s**)** and BQI (65,31±16,71 vs. 62,26±15,78) were significantly higher in athletic children. QUS parameters correlated significantly with age (r=0,36-0,48), body height (r=0,46-0,63), body weight (r=0,41-0,62), body mass index (r=0,26-0,44), fat percentage (r=0,05-0,24), muscle% (r=0,10-0,18), bone% (r=- 0,29--0,45), and the sport training hours per week (r=0,12-0,15).

Discussion: Changes in the calcaneal ultrasound bone parameters among 7-19 year-old Hungarian children mainly depended on age, anthropometric variables related to growth and on the level of physical activity. Our normative data could be used for monitoring QUS bone parameters in children and present findings have the potential to follow up improvement in more effective interventions.

Children's Physical Activity Step Rates: Activity Tracker vs. Direct Observation

C.A. Howe – Faculty of Applied Health Sciences and Wellness, Ohio University, Athens, OH 45701.

Background: While activity trackers (ATs) are common in the commercial market, few have been validated for measuring children's free-play physical activity (PA). Therefore, this study assessed the step rate (steps/min) of children's play, locomotion, and stationary PA from five different ATs compared to video direct observation (ViDO) and assessed the relationship between AT and ViDO step rate and measured PA intensity.
Methods: Healthy weight (HW) and overweight (OW) children (N=31; 15 girls) participated in play, locomotion, and stationary PA. Prior to play, anthropometrics and resting metabolic rate (RMR) were measured using standard procedures. While playing, children wore a portable metabolic unit to measure PA energy expenditure [PAEE (METs) = energy expenditure ÷ RMR], plus 2 research and 3 commercial ATs to record step rate for each activity. All activities were self-paced and played in random order. ANOVA assessed differences in PAEE and step rate across sex and weight status, while RMANOVA assessed differences between AT and ViDO step rate. Regression analyses assessed relationships between ATs and ViDO step rate and PAEE.

Results: Overall, PAEE (6.5±0.2 METs) was similar across sex and weight status. Four of the five ATs recorded higher (adj. $p<0.01$) step rate for all activities combined (range: 71±5 to 173±15 steps/min) compared to ViDO (37±4 steps/min). When activities were classified by PA intensity (moderate vs. vigorous) or type (play vs. locomotion), one of the four ATs recorded consistently higher step rate than ViDO (adj. $p<0.05$). Each AT recorded higher step rate (range: 6.5±2 to 141.5±69 steps/min) during stationary PA compared to ViDO (1.8±0.7 steps/min). Weak relationships existed between the different ATs step rates and PAEE (range: $r=0.25$ to 0.36), with stronger relationships between ViDO and ATs step rates (range: $r=0.32$ to 0.68).

Discussion: None of the ATs consistently recorded an accurate step rate of children's play, locomotion, and stationary PA. With the tendency to inflate step rates, caution should be exercised when using activity trackers to determine if children are meeting the recommended dose of daily physical activity.

Sedentary behaviour and its association with waist-to-height racio in a sample of female portuguese children

Aristides M. Machado-Rodrigues,[1,2], Rômulo Fernandes[3], Luís P. Mascarenhas[4], Augusta Gama[1], Isabel Mourão[5], Helena Nogueira[1], Victor Rosado[6], Cristina Padez[1]

[1]Research Centre for Anthropology and Health, University of Coimbra, Portugal; [2]High Education School of Viseu, Polytechnic Institute of Viseu, Viseu, Portugal; [3]São Paulo State University, Brazil; [4]Paraná University, Curitiba, Brazil; [5]University of Tras-os-Montes and Alto Douro, Portugal, [6]Faculdade de Motricidade Humana, Universidade de Lisboa, Portugal

Background: Behavioural changes during the past decades, such as increased TV viewing and reduced physical activity (PA) levels, may have contributed to the increased prevalence of paediatric obesity. The literature has often reported the excessive TV viewing as linked to obesity, although the effect size appears to be variable depending on the assessed methods. Therefore, the waist-to-height ratio (WHtR) had been recently used, since it does not depend on sex- or age-specific reference criteria (Taylor et al., 2011). Thus, the present study aimed to analyse the association between sedentary behaviours and central adiposity risk in female Portuguese children.

Methods: The sample comprised 1997 female children aged 7-9 years. Height, weight and waist circumference (WC) were measured. Sedentary behaviours (i.e. TV viewing) and PA were assessed by questionnaire. WHtR was calculated as the ratio of waist/height with a cutoff of 0.5 used to define risk of abdominal obesity. Logistic regressions were used, with adjustments for age, habitual PA, and parental education.

Results: The crude statistical model revealed that TV viewing was positive associated with increased risk of central adiposity in girls (β=0.29; 95% CI, 1.07 to 1.67). However, after adjustments for the parental education, no associations between TV viewing and the waist/height ratio were found. In addition, the final model shown an important inverse association between habitual PA and the risk of abdominal obesity (β=-0.01; 95% CI, 0.98 to 0.99).

Conclusion: Finding revealed that associations between sedentary behaviours and obesity risk could be highly influenced by socio-economic factors of the families. Future research should extend similar design to male children, and probably incorporating other nutritional variables in the statistical models, to confirm or not some of the afore-mentioned findings.

Is Somatic Maturity Delayed in Adolescents Living with Perinatally Acquired HIV?

Sarah A Moore[1,2], Heather A Macdonald[1,3], Daljeet Mahal[4], Evelyn J Mann[4], Heather A McKay[1,2,3], Hélène C.F. Côté [5,7,8], Ariane Alimenti[4,7], and the CIHR Team in HIV Therapy and Aging (CARMA)

[1]Centre for Hip Health & Mobility, Vancouver Coastal Health Research Institute, Vancouver, Canada; [2]Department of Orthopaedics, Faculty of Medicine, University of British Columbia, Vancouver, Canada; [3]Department of Family Medicine, Faculty of Medicine, University of British Columbia, Vancouver, Canada; [4]Oak Tree Clinic, British Columbia Women's and Children's Hospital, Vancouver, Canada; [5]Department of Pathology & Laboratory Medicine, University of British Columbia, Vancouver, Canada; [6]Centre for Blood Research, University of British Columbia; Vancouver, Canada; [7]Department of Pediatrics, University of British Columbia, Vancouver, Canada; [8]Women's Health Research Institute, Vancouver, Canada

Background: Children who acquired human immunodeficiency virus perinatally (HIV+) may experience delayed pubertal onset and shorter final adult height (FAH) despite use of combined antiretroviral therapy (cART). However, timing and magnitude of somatic maturity, as measured by age at peak height velocity (APHV), is not well described in HIV+ youth. Therefore, we aimed to determine whether APHV differs between HIV+ and HIV unexposed uninfected (HUU) youth.

Methods: We conducted a retrospective chart review of 39 HIV+ participants (16 girls, 23 boys; median age first clinic visit=2.1y; median length of care = 15.4y) in the **C**hildren and women, **A**nti**R**etroviral and **M**arkers of **A**ging (CARMA) cohort. For participants with at least 5 years of serial height measures during adolescence (n=25) we fit a cubic spline to whole year height velocity values to determine APHV (y) and PHV (cm/y). In remaining participants (n=14), we estimated APHV using a valid prediction equation. We generated z-scores for APHV, magnitude of PHV, and final adult height (FAH, n=8; 5 girls, 3 boys) using data from 230 HUU youth (120 girls, 110 boys) and compared values between HIV+ and HUU groups using non-parametric analyses.

Results: Most HIV+ youth (n=35) were receiving combination antiretroviral therapy (cART) prior to APHV; in most HIV+ youth (82%), peak HIV viral load (pVL) and cART initiation occurred prior to age 9y. APHV z-scores were not significantly different between HIV+ youth (median (IQR): 0.38 (-0.38, 1.00)) and HUU controls (-0.15 (-0.71, 0.63)). However, APHV z-scores were positively associated with HIV pVL (rs=0.40, p=0.012) and negatively associated with cART use (rs=-0.35; p=0.029) such that those not on cART (n=4) had later APHV z-scores. PHV and FAH z-scores were not significantly different between HIV+ and HUU groups.

Discussion: Our findings suggest that timing and magnitude of PHV are within normal ranges in youth living with perinatally acquired HIV, the majority of whom received cART during the period of peak growth. Associations between APHV z-score and peak HIV pVL may indicate 'catch-up' growth occurring in those with peak HIV pVL during early childhood. Longer follow-up is needed to determine if FAH is compromised in this cohort.

Academic achievement and moderate-to-vigorous physical activity

Aristides M. Machado-Rodrigues[1,2,3], Fernando Enes[1], Fernando Sá-Correia[1], Raul A. Martins[4]

[1]High School of Emídio Navarro, Viseu; [2]High Education School of Viseu, Polytechnic Institute of Viseu; [3]Research Centre for Anthropology and Health, University of Coimbra. [4]Research Centre of Sport and Physical Activity, University of Coimbra.

Background: There is a growing evidence that the regular physical activity (PA) has an import impact on cognitive and memory functions of the brain among youth. However, there are no specific studies of this phenomenon in understudied adolescent population of the interior of Portugal, with low density populations. The purpose of this study was to analyse the effects of moderate-to-vigorous physical activity (MVPA) on the academic achievement of Portuguese adolescent students.

Methods: A sample of 143 adolescent students of both genders (82 females) from the 10th to the 12th grades took part of this project, conducted in 2014. Height, weight, and body mass index (BMI) were measured. MVPA and sedentary behaviour were estimated from a 3-day PA diary. Logistic regression with adjustments for age, sex, BMI, and parental education was used.

Results: Contrary to the recent studies, findings of the present research revealed there was not any significant association between MVPA and academic performance. However, after controlling for potential confounders, the final model revealed that having a normal weight status was related with high academic achievement (OR = 8.21, 95% CI: 2.91 to 23.21, $p < 0.001$).

Conclusions: MVPA was not independently associated with the academic achievement in adolescent students of the district of Viseu. Future research should extend similar design to other students from relatively low population densities to confirm some of these findings, with clear advantage for intervention strategies on potential factors contributing to academic performance.

The association of meeting physical activity, screen time and sleep guidelines with cognitive development among toddlers

Z. Zhang[1,2], E. Sousa-Sá[1,2], J. Pereira[1,2,3], A.D. Okely[1,2], X. Feng[1,2,4], R. Santos[1,2,5]

[1] - Early Start Research Institute, University of Wollongong, NSW 2522, Australia [2] - Illawarra Health and Medical Research Institute, University of Wollongong, NSW 2522, Australia [3] - Research Unit for Sport and Physical Activity (CIDAF), University of Coimbra, Portugal [4] - Population Wellbeing and Environment Research Lab (PowerLab), School of Health and Society, University of Wollongong, NSW 2522, Australia [5] - Research Centre in Physical Activity, Health and Leisure; University of Porto, Portugal

Background: This study aimed to examine the association of meeting Australian physical activity (PA) guidelines, Australian screen time guidelines or sleep guidelines from National Sleep Foundation and the combinations of each guideline with cognitive development, in toddlers.

Methods: Baseline data from the "GET-UP" study were analysed. Participants' average daily time spent in total PA, moderate-to-vigorous physical activity (MVPA) and sleep were assessed using Actigraph GT3X+, while daily screen time was reported by parents. Cognitive development was evaluated using Bayley Scale. Meeting the recommendation for PA, screen time and sleep were defined respectively as: (1) total PA ≥ 180minutes/day (2) no (<24 months) or ≤ 60 minutes/day (24-35 months) of screen time (3) 11-14 hours of sleep. Compliance with an additional PA criteria (total PA ≥ 180minutes/day including at least 60 minutes of MVPA) and its combination with recommendations for screen and/or sleep were also examined. Odds ratios (OR) of having higher cognitive development according to compliances with guidelines were calculated using multilevel models, with age, sex, and family socioeconomic status included as covariates.

Result: 202 toddlers (mean age 19.74 ± 4.07 months) were included in the analyses. Children not meeting the combination of PA + sleep guidelines (20.79%) had significantly higher odds (adjusted OR=2.826, 95%CI: 1.278, 6.250) of achieving higher cognitive development, compared with those meeting these two guidelines.

Discussion: The better cognitive outcome of not meeting the combination of PA + sleep guidelines might be explained by the very unequal sample size of children meeting (79.2%) and not meeting (20.79%) this guideline combination, which is likely to affect the homoscedasticity assumption of multilevel analysis. Additionally, while increased time engaged in PA has been suggested to benefit cognitive development in early childhood, recent evidence has shown that daytime napping and night time sleep may have opposite associations with pre-schoolers' cognitive function. Future research is required to provide guidance for parents and early childhood educators by studying the influence of daily sleep ratios (daytime sleep: night time sleep) and their combinations with other movement behaviours on cognitive development.

Lower limb vascular response to an acute bout of prolonged sitting in children

VA Armstrong[1], NCS Lewis[1], K Castiloux[1], AM McManus[1] – 1Centre for Heart, Lung and Vascular Health, School of Health & Exercise Sciences, University of British Columbia, Kelowna, BC, Canada

Background. Prolonged sitting has been shown to impair endothelial function in children, yet the mechanisms underlying this remain unclear. Recently in adults it was confirmed that the decline in FMD with sitting is shear stress mediated, and sitting-induced reductions in FMD can be prevented if shear stress is maintained with limb heating. The relationship between FMD and shear stress is weaker in children and whether limb heating increases in shear affect FMD in children is unknown. We therefore examined whether increasing shear stress during sitting would prevent reductions in FMD.

Methods. Ten healthy children completed bilateral measurements of superficial femoral artery (SFA) flow-mediated dilation (FMD) taken before and after a 3-hour sitting period. In one leg the calf was heated with an electronic heat pad at 42°C (i.e. heated), while the contralateral leg served as an internal control (i.e., non-heated).

Results. Heart rate and blood pressure were unchanged throughout the 3-hours confirming the heating was localized. Following sitting SFA mean shear rate was unchanged in the non-heated leg (pre sit: 135.52 ±52.04 s^{-1}, 3 hr sit: 100.46 ±30.44 s^{-1}; $p>0.05$), but increased in the heated leg (pre sit:147.23 ±60.53 s^{-1}, 3 hr sit: 214.65 ±100.90 s^{-1}; $p<0.05$). SFA FMD was unchanged after 3 hours of sitting in the non-heated leg (pre sit: 5.98±2.8% vs. post sit: 5.7±2.23%; $p<0.05$) and in the heated leg (pre sit: 6.54±2.31% vs. post sit: 6.34±2.14%; $p>0.05$).

Discussion. In contrast to previous work, we did not find a reduction in FMD with 3-h of sitting. Importantly we report that while limb heating increased shear stress, there is no effect on FMD, suggesting that FMD is not mediated by shear stress in children.

A new reliable laboratory based performance test for adolescents.

P. Miliotis, S. Ntalapera, N. Geladas - Section of Sports Medicine and Biology of Exercise, School of Physical Education and Sport Science, National and Kapodistrian University of Athens, Greece.

Background: The evaluation and detection of subtle, though meaningful, change of human performance requires valid and reliable tests. In many cases, these changes cannot be detected from classic methods (e.g. VO_{2max} and Wingate tests). Aerobic performance is considered multifactorial. In developmental years, the biological maturation is considered as an additional factor significantly affecting physiological responses and aerobic performance. Thus, the objective of this study was to design a reliable aerobic performance test for adolescents.

Methods: Seven young males (age:13.8±0.5yrs), before the onset of puberty (PHV=-0.76±0.29yrs), were studied on 2 occasions separated by at least 1 week interval, within 1 month to avoid the influence of maturation at this particular age. In both experimental days, the participants exercised on the cycle ergometer at 70rpm; they started with unloaded cycling and then continued until exhaustion at a workload corresponding to 150% of peak power output obtained in a VO2max test and to 38% of Pmax obtained in a Wingate test. The workload was applied within 5s of the unloaded cycling initiation, at which point the recording of time to exhaustion began. Throughout the test, the participants were verbally encouraged strongly by 2 instructors until exhaustion which was defined as the inability to maintain the pedal rate above 50rpm. The test-retest reliability was examined using Intraclass Correlation Coefficient (ICC) and Coefficient of Variation (CV). Residual analysis on the data was also performed.

Results: The exercise time to exhaustion was 196±150s and 186±143s for test and retest, respectively. The statistical analysis revealed a perfect ICC=0.99 and a robust CV=4.95%. In addition, the residuals were normally distributed.

Conclusion: According to ICC and CV, it is concluded that the new laboratory based test for aerobic performance is reliable and can be used as a tool for evaluation of training programs in male adolescents. However, further research is needed with greater sample and across different ages and maturation status.

The author thanks Special Account for Research Grants and National and Kapodistrian University of Athens for funding to attend the meeting.

Can child motor performance tasks predict high school sport participation?

Siegel Shannon

SR Siegel[1], J Wilson[1], KA Pfeiffer[2], L True[3], EM Martin[4]

[1]University of San Francisco, San Francisco, CA, [2]Michigan State University, East Lansing, MI, [3]SUNY Cortland, Cortland, NY, [4]Boise State University, Boise ID.

Background: One area of focus in motor behavior involves addressing associations between child competence in motor skills and later physical activity and fitness levels of youth in sport and dance (Lai et al., 2014). Purpose: To determine the likelihood of high school sport participation based on the motor skill performance (MSP) of children less than 12 years of age.

Methods: Participants were part of a 30-year longitudinal study at Michigan State University. They were tested on a battery of motor performance tasks at six month intervals. Seven motor tasks were administered to the children, some addressing health-related fitness parameters (HRF). These HRF tasks included a flexed-arm hang (FAH) to measure upper body muscular strength and endurance, an endurance shuttle run (ESR) to assess cardiovascular endurance, and the sit-and-reach (SR) to measure hamstring and lower back flexibility. To assess performance-related fitness (PRF), a vertical jump and reach (JR) and standing long jump (SLJ) were used to estimate explosive leg power, a 30-yard dash (TYD) measured speed, and an agility shuttle run (ASR) assessed both speed and change of direction. Logistic regression (R software, R Foundation) was used to determine which of the MSP tasks in children 6, 9, and 12 years of age predicted high school sport participation with an odds ratio (OR) and 95% confidence interval (CI).

Results: The sample of adults who reported their high school sport participation status included 121 males (33.0 ± 3.3 years at follow-up) and 135 females (32.7 ± 3.9 years). Of adult males and females surveyed at follow-up, 81 and 87 played high school sport, 67% and 64%, respectively. The MSP tasks (assessed between 6-12 years of age) that predicted high school sport participation were JR (OR (CI) = 1.02 (1.00, 1.03), $p < 0.05$) and ESR (OR (CI) = 0.99 (0.99, 1.00), $p < 0.01$).

Discussion: Fewer of our adult sample said they participated in high school sport compared to current estimates of 75%. The associations between JR and ESR with high school sport participation warrant further investigation, as this finding has not previously been corroborated in the extant literature.

Musculoskeletal biomechanics changes in children during growth and development and implications for muscle strength assessment and performance

V. Baltzopoulos, Research Inst. for Sport & Exerc. Sci., Liverpool John Moores Univ., UK.

During growth and development in children or following training and as we age later in life, there are significant changes in the musculoskeletal system that alter the structural, mechanical and functional characteristics of muscles and tendons. This plasticity in the neuromuscular system can affect performance across a range of activities but can also be targeted for the prevention of injuries in young athletes. This presentation is an overview of our research on mechanical factors that influence movement in children and the quest to develop techniques and biomechanical tools for improving performance and reducing injuries. We have developed biomechanical models of the musculoskeletal system to study muscle forces and moments and the loading of different tissues during various movements, pathological conditions and sports activities. The muscle moment, which generates joint rotation, is the product of muscle force and moment arm, so this leverage represents the mechanical advantage of the muscle. Muscle moment arms also play an important role within the context of muscle function. For a given movement they dictate muscle length and shortening velocity, which in turn determine muscle force generation and transmission to the skeleton for the production of movement. Skeletal growth during childhood and adolescence affects these joint mechanics parameters, with likely changes both in the joint centre of rotation and the distance of the tendon attachment point, so the moment arm will also be affected with significant implications for muscle force, joint moment and thus joint strength. These effects and important functional interactions are poorly understood, so the focus of our work has been to explore some fundamental biomechanical and physiological mechanisms of muscle function and to test related important hypotheses about how muscle operation, their leverage in particular, is affected by the changing dimensions of the skeleton with growth and maturation in children. This has led to significant advancements in muscle-tendon mechanics knowledge and applications in the areas of human movement, and musculoskeletal development.

Chronic exercise training does not influence inflammatory markers in pubertal girls: a comparison study between athletes and non-athletic controls

J. Jürimäe, K. Võsoberg, A.L. Tamm, L. Remmel, V. Tillmann – Faculty of Medicine, University of Tartu, Tartu, Estonia

Background: Various inflammation parameters are associated with childhood obesity, but few comparable data are found in lean growing athletes. This study aims to characterize differences in 12 simultaneously measured inflammatory parameters between pubertal rhythmic gymnasts and untrained controls, and to examine the relationship between body composition and inflammatory markers.

Methods: Sixty 10-12-year-old girls at pubertal stages 2-4 were divided into rhythmic gymnasts (n=30) and untrained controls (n=30). Fat mass and fat free mass were measured by dual-energy X-ray absorptiometry. Leptin and 12 inflammatory parameters (interleukin [IL]-2, IL-4, IL-6, IL-8, IL-10, vascular endothelial growth factor, interferon-gamma [IFN-γ], tumor necrosis factor-alpha, IL-1α, IL-1β, monocyte chemotactic protein-1 and epidermal growth factor) were measured from fasting blood samples.

Results: No differences were seen in 12 inflammatory markers between rhythmic gymnasts and untrained controls. As expected, leptin (rhythmic gymnasts: 2.4±1.1; untrained controls: 7.6±4.2 ng/ml) and fat mass (rhythmic gymnasts: 7.3±2.3; untrained controls: 11.8±5.1 kg) were lower ($p<0.05$) in rhythmic gymnasts compared to untrained controls. In the whole group, leptin explained 69.0% of the variability of fat mass and IFN-γ 11.2% of the variability of fat free mass.

Discussion: Measured 12 inflammatory markers were not different between rhythmic gymnasts and untrained controls, despite lower leptin and fat mass in rhythmic gymnasts. In pubertal girls, IFN-γ was independently associated with fat free mass, and leptin with fat mass.

Sunday 08/10/2017 08:30

CHAIR**:** Christoulas K

Bone turnover during exercise in children: what bone resorption/formation markers and exercise-induced osteokines can tell us?

Panagiota Klentrou, PhD

Centre for Bone and Muscle Health Research, Department of Kinesiology, Brock University, Ontario, Canada

Studies in prepubescent, pubescent and young adult populations have demonstrated the beneficial,long-term effect of exercise training on bone. However, the conventionalmeasures of bone mineral density and content are static and thus, not appropriate when examining dynamic responses of bone or the mechanisms through which exercise affects bone. In contrast, examination of the biochemical markers of bone metabolism is advantageous in that these markers provide a better understanding of the dynamic course of bone remodeling/turnover.

Bone remodeling is a complex process that involves multiple signaling pathways driving the osteoblast and osteoclast response to various stimuli, such as mechanical loading. This may lead to unexpected findings in the acute post-exercise response,especially in children. For example, while exercise training enhances bone accrual, recent studies in children have demonstrated post-exercise increases in bone markers typically related to bone resorption.

Exercise type, intensity and timing variably influence the expression of bone formation and resorption markers, which may differ between children and adults.In children, for example, markers of bone formation increase following plyometric exercise but not following cycling while in adults, both exercise modes lead to elevated levels of bone markers. The inconsistency of results may be due to the fact that the commonly measured biomarkers in human studiesare not directly related to the effects of mechanical strain on the skeletal system.

Recently, the effect of exercise on bone-derived cytokines has been studied in pediatric and adult populations to better understand how exercise-induced *osteokines* affect bone development and homeostasis. Sclerostin is an osteocyte-specific glycoprotein that negatively regulates bone formation through inhibition of the Wnt pathway.We have recently demonstrated age- and sex-specific responses of sclerostin during the 24 hours following plyometric exercise.

It is possible that by measuring the exercise-induced changes in bone biomarkers, such as sclerostin, we canunveil the mechanisms by which exercise affects bone development, and the role thatmaturity or dietary (energy) intake play in altering the response of bone to different intensities and modes of exercise in children and adolescents.

Sunday 08/10/2017 09:00

Chair: Kriemler S

A short history of PWP: 30 conferences in 50 years

Han CG Kemper, VU University Medical Center, Amsterdam The Netherlands

Background: Because this PWP2017 is my 26th attendance, I like to give you some insides in the history of the European group of Pediatric Work Physiology.

Methods: What is born in 1967 in Berlin by a small group of gifted and open minded pediatricians and exercise scientists is developed in 2017 in Thessaloniki to a modern conference with scientific interaction between more than 100 experienced scientists and young talented researchers in the field of pediatric exercise science and medicine. The 30 conferences have been organized in more than 25 European countries on a small base with one important goal: to promote scientific excellence and to stimulate interaction, dialogue and friendship. Respect, without regard to prestige is leading the discussions between participants. Oral presentations and poster presentation do never overlap and the participants are together in venues outside big cities and building of universities. Accomodation for conference rooms is combined with sleeping facilities. Discussion can continue during breakfast, lunch and dinner and also in the evening.

Results: During this 50 years period the founders and first participants have died: Seliger (CSSR), Rutenfranz (W Germany), Stoboy (W Germany), Oseid (Norway), Bar-Or (Canada) and Beunen (Belgium). As a young researcher I attended in 1972 the fourth conference in Israel. I met there Bar-Or, Rutenfranz, Shephard, Cumming, Eriksson, Koch, Klissouras, Godfrey, Davies and Mocellin. Famous scientists such as Saltin, Astrand, Hermansen, Klimt, Ekblom , Asmussen and Parizkova were lecturing. The PWPgroup lobbied during the sixties, seventies and eighties to have scientists from behind the iron curtain: Russia, East Germany, Poland, Hungary and Tsjechoslowakia. We helped them to attend and sponsored them.

Discussion: For me personal, PWP influenced my professional career in pediatric exercise physiology in a positive way: I learned from the experts, avoided methodological mistakes and most of all it kept me motivated and eager to bring pediatric science further.

PWP 2017 SPONSORS