Abstract Book – Invited Speakers

PL001 / #359

Plenary Session
PLENARY SESSION 01: COVID-19. 2021 UPDATE
08-26-2021 13:35 - 15:05

THE EPIDEMIOLOGY OF COVID 19 IN YOUNG CHILDREN

G. Milani
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The novel Coronavirus disease (COVID-19) pandemic is causing millions of victims worldwide among adults, particularly elderly. The new vaccinations are leading to a drastically decrease in deaths in many Western Countries, but the emergence of new variants, mainly from transition Countries, may put at risk of new pandemic waves. Although the morbidity and mortality of this disease is children is quite limited as compared with adults, a long debate is still ongoing on the role of children as possible spreaders of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the general population. Consequently, the closure of the schools has been one of the most debated issues for limiting the diffusion of the virus. Many countries have strictly adopted such measure while others have not considered it as potentially effective. The following points will be discussed: 1) the possible role of children as virus spreaders in the early phase of the pandemic, 2) the evidence either supporting, or not, children as virus diffusors during school closure and school re-opening, 3) clinical manifestations of the virus in children and adolescents and 4) the role of variants and vaccination in the pediatric population. Most of these topics have been investigated in several well conducted studies, while others deserve more research and evidence-based data. These issues are also of particular importance considering that most children in both high- and middle/low-income countries will not be in the condition of receiving any vaccination in the near future with the risk of becoming infected by the SARS-CoV-2.

PL002 / #354

Plenary Session
PLENARY SESSION 02: ENERGY, GROWTH AND BRAIN DEVELOPMENT
08-26-2021 15:30 - 17:00

ENERGY CONSTRAINTS AND TRADE-OFFS IN CHILD DEVELOPMENT

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Background and Aims Metabolic energy is required to support life's essential tasks, including growth, brain development, physical activity, and immune function. As such, understanding how children spend calories is central to understanding developmental variation and the early life origins of related health disparities. Accumulating evidence indicates that childhood energy expenditure is characterized by constraints and trade-offs that are predicted by evolutionary theory. I review and build on this work. Methods I capitalize on energetics data recently collected from children living in Amazonian Ecuador – including gold-standard stable isotope-tracking (doubly labeled water) and respirometry data – to investigate variation in children's energy expenditure across diverse lifestyles and environments. Results Results demonstrate that the total energy expenditures (kcal/day) of children living very different lives in rural Amazonia, urban Amazonia, and the U.S./U.K. are indistinguishable. This constraint in childhood total energy expenditure is facilitated by underlying energy allocation trade-offs between competing physiological tasks. In challenging contexts, increased investment in immune and physical activity appears to drive the down-regulation of investment in linear growth, contributing to growth faltering and short stature. Conclusions Mechanisms of energy constraint and trade-offs are apparent in many species and likely evolved to prevent long-term negative energy balance in resource-limited environments. For humans, resource-abundant environments are increasingly common. A greater propensity for body fat deposition (a hedge against future energetic stress) among growth stunted children highlights the importance of understanding pathways of childhood energy constraint and trade-offs in the present context of a global obesity crisis. Support: NSF #SMA1606852; NSF #BCS1650674; Wenner-Gren #9231; CIFAR Global Scholars

PL003 / #355

Plenary Session
PLENARY SESSION 02: ENERGY, GROWTH AND BRAIN DEVELOPMENT
08-26-2021 15:30 - 17:00

QUANTIFYING THE HIGH ENERGY COSTS OF CHILDHOOD BRAIN DEVELOPMENT: IMPLICATIONS FOR STUDIES OF NUTRITION AND GROWTH

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Humans reach a lifetime nadir in adiposity during childhood (the adiposity rebound, AR), and kids who experience an earlier AR tend to be heavier adults. Why children experience the AR, and the factors that influence its trajectory, are less certain. One underappreciated but likely important influence on body composition dynamics at this age is the brain. Our work shows that the brain consumes a lifetime peak of 66% of the body's resting metabolic rate (RMR) at 4-5 years. Further, developmental changes in weight velocity are tightly, inversely related to changes in brain energetics between infancy and puberty, showing that the body's finite energy is diverted away from bodily functions to help meet the high energy requirements of brain development. The age of peak brain energetics, and slowest weight gain, coincides with the AR, suggesting that body composition dynamics at this age are similarly constrained by these trade-offs. These observations inspire a novel hypothesis that individual variation in the timing and magnitude of brain energy use could help explain variation in the dynamics of the AR, and thereby, long-term risk for excess weight gain and obesity. We estimate that plausible levels of variability in brain energetics could represent an energy savings sufficient to move a 3-4 year old from the 50^{th} to 70^{th} centiles of BMI for age. We conclude that work on childhood obesity should quantify variation in the brain's energy costs as a complement to the traditional focus on factors like intake and physical activity.

PL004 / #356

Plenary Session
PLENARY SESSION 02: ENERGY, GROWTH AND BRAIN DEVELOPMENT
08-26-2021 15:30 - 17:00

THE ENERGY DEMAND OF THE BRAIN IN CHILDHOOD: LINKS TO COGNITIVE DEVELOPMENT AND OBESITY

C. Blair
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A well-established literature demonstrates executive function (EF) deficits in obese children and adults relative to healthy weight comparisons. EF deficits in obesity are associated with overeating and impulsive consumption of high calorie foods leading to excess weight gain and to problems with metabolic regulation and low-grade inflammation that detrimentally affect the structure and function of prefrontal cortex (PFC). Here, we propose a complementary explanation for the relation between EF and body mass index (BMI) grounded in the energy demand of the developing brain. The development of PFC is a prominent aspect of brain development in early childhood, exhibiting both grey matter increase and synaptic proliferation and as such is a primary contributor to the high developmental peak in brain energy demands during childhood. The development of PFC in early childhood manifests behaviorally in the emergence of EF abilities. Accordingly, given the prominent role of PFC development in the childhood brain energetics peak, the development of EF in early childhood could provide a useful proxy for evaluating the hypothesis of a brain-body energetic trade-off. Further support for the brain energetics explanation for the inverse correlation between EF and BMI is found in polygenic data indicating that genes associated with BMI are expressed in the brain and pleiotropically associated with smaller volume in PFC. Given that the brain is highly plastic and responsive to experience, however, particularly in early childhood, suggests that high quality early childhood education could be an obesity prevention as well as school readiness promoting strategy.

PL005 / #394

Plenary Session
PLENARY SESSION 04 -YEARBOOK
08-27-2021 13:30 - 14:50

EPIGENETIC NUTRITION AND GROWTH

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The fascinating research field on epigenetic, biochemical modifications of the human genome in relation to nutrition and growth continues to expand. A search in the US National Library of Medicine performed on January 1, 2021 with the search term “epigenetic* AND (nutrition OR growth)” revealed 2418 entries for 2017, 2521 for 2018, 2623 for 2019, and 2259 for the then still incomplete database for 2020. Therefore, it is not feasible to provide a comprehensive overview but the author subjectively selected some publications that appeared in 2019 and 2020 which he considered noteworthy. Most but not all studies measured DNA methylation at 15 cytosine-(phosphate)-guanine sites (CpGs), given that convenient albeit somewhat expensive commercial chip technology for genome-wide profiling of human DNA methylation is available. A major challenge is the complex bioinformatic analysis of the evolving large datasets arising mostly from observational cohort studies that report associations. Therefore, replication of findings in independent studies is most valuable. Studies published during the time period that was reviewed support the concept of an important impact of epigenetic programming through environmental exposures during early life for lasting health outcomes. This is underpinned by reported associations of differentially methylated CpG regions to immediate predictors of long-term health such as birthweight and duration of gestation, and to later health outcomes such as asthma, the most common chronic disease in children Reported predictors of differentially methylated CpG regions comprise infant sex, maternal BMI at conception, gestational weight gain, and maternal hypertension, all of which are well known to correlate with immediate and later health outcomes. Maternal environment, lifestyle and diet appear to matter, indicated by a lasting association of pre-pregnancy socio-economic status with epigenetic marks at birth and up to early school age, and by repeatedly reported associations with the quality of maternal dietary fatty acid intakes. It is tempting to speculate that epigenetic DNA methylation could be one of the missing mechanistic links by which maternal and fetal biological characteristics and environmental cues predict the child’s later health outcomes. Fathers appear to matter, too, given that the fathers’ BMI at conception was associated both with infant birth weight and epigenome-wide DNA methylation patterns in their children at birth and up to 7 years of age. At later ages, the time of pubertal onset was related to DNA methylation, suggesting that epigenetic imprinting in early life may influence the biological processes and health consequences of later puberty development. The results available at this time are truly exciting. Better understanding of the biological mechanisms by which lifestyle and environment during developmental plasticity during early life may modulate long-term health and development could offer new opportunities for even more effective strategies to promote the health of populations and of individuals at increased risk. Author: Berthold Koletzko, Dr. med. Dr. med. habil (MD PhD) Dr. h.c. mult., Professor of Paediatrics, Professor h.c. LMU - Ludwig-Maximilians-Universität München, Dept. Paediatrics, Dr. von Haunersches Kinderspital, Univ. of Munich Hospitals, Campus Innenstadt, Lindwurmstr. 4, 80337 München, office.koletzko@med.uni-muenchen.de Acknowledgements: BK is the Else Kröner Seniorprofessor of Paediatrics at LMU – University of Munich, financially supported by the Else Kröner-Fresenius-Foundation, the LMU Medical Faculty and the LMU University Hospitals. LMU and it’s employee BK received support for scientific and educational activities from European Commission, H2020 Programmes DYNAHEALTH - 633595 and Lifecycle-733206, European Research Council Advanced Grant META-GROWTH ERC-2012-AdG–no.322605, Erasmus+ Early Nutrition eAcademy Southeast Asia (573651-EPP-1-2016-1-DE-EPPKA2-CBHE-JP) and Capacity Building to Improve Early Nutrition and Health in South Africa (598488-EPP-1-2018-1-DE-EPPKA2-CBHE-JP), European Interreg Focus in CD-CE111, European Danube Programme CD-Skills, European Joint Programming Initiative Projects NutriPROGRAM and EndObesity, German Ministry of Education and Research, Berlin (01 GI 0825), German Ministry of Health, German Research Council (Ko912/12-1 and INST 409/224-1 FUGG), Alexander von Humboldt Foundation, US National Institutes of Health (1R03HD087606-01A1), Else Kröner Fresenius Foundation, Family Larsson Rosenquist Foundation, and different healthcare and nutrition companies, mostly as part of publically funded research projects. No conflict of interest is declared with no circumstances involving the risk that the professional judgment or acts of primary interest may be unduly influenced by a secondary interest.

PL006 / #407

Plenary Session
PLENARY SESSION 06 - FEAR, VIOLENCE, INEQUALITY AND STUNTING IN GUATEMALA
08-28-2021 8:30 - 9:00

FEAR, VIOLENCE, INEQUALITY AND STUNTING IN GUATEMALA

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Background: Stunting is defined by the public health community as a length or height-for-age <2 SD of a growth standard or reference and is claimed to be caused by poor nutrition, repeated infection, and inadequate psychosocial stimulation. Material and Methods: Stunting is common at all income levels in middle and low-income countries. At the higher income levels, stunting is unlikely to be caused by nutrient deficiency or infectious disease. Results: In Guatemala, 17% of <5-year-olds in the highest family income quintile are stunted. Guatemala has a history of violence from armed conflict, current-day social and economic inequalities, government corruption, and threat of kidnapping for the wealthiest families. Discussion and Conclusion: The high level of persistent violence creates an ecology of fear, an extreme range of inequalities in Social-Economic-Political- Emotional resources, and biosocial stress that inhibits skeletal growth and causes stunting for people of all income levels.

PL007 / #409

Plenary Session
PLENARY SESSION 07 - ENTERAL NUTRITION AND GROWTH
08-28-2021 9:00 - 10:30

ENTERAL NUTRITION IN CHILDREN. OLD AND NEW CONCEPTS

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Children's Hospital Zagreb, Referral Center For Pediatric Gastroenterology, Hepatology And Nutrition, ZAGREB, Croatia

Enteral nutrition is defined as the delivery of food beyond the oesophagus via a feeding tube/stoma and as oral feeding using special formulae. It is generally indicated in patients who are unable to meet energy and nutrients requirements by a regular food intake via a normal oral route but who do have a sufficient level of gastrointestinal function preserved. It is also indicated whenever a liquid diet is used for the main treatment of the disease, and when the feeding time is excessively prolonged to more then 4-6 hours/day. Necrotising enterocolitis, ileus, intestinal obstruction and perforation, and major intra-abdominal sepsis are among the few absolute contraindications. In the presentation, the process of selection of the most appropriate type, route and mode of feeding will be presented. In addition, monitoring, complications and the transition to normal oral feeding will be addressed.

PL008 / #410

Plenary Session
PLENARY SESSION 07 - ENTERAL NUTRITION AND GROWTH
08-28-2021 9:00 - 10:30

ENTERAL NUTRITION CHALLENGES IN NEUROLOGICALLY IMPAIRED CHILDREN

F. Gottrand
University Hospital of Lille, Pediatric Gastroenterology Hepatology And Nutrition, Lille, France

F Gottrand. Department of Pediatric Gastroenterology, Hepatology and Nutrition, Jeanne de Flandre University Hospital, Lille France. Faculty of Medicine, Univ. Lille Advances in supportive care have extended the life expectancy of people with neurological impairment (NI). Due to feeding difficulties, NI children can be at risk of malnutrition. European nutritional guidelines (ESPGHAN) regarding children with NI have stressed the importance of identifying nutritional difficulties through factors beyond weight and height, such as assessment of fat mass, bone mineral density, and nutritional status. Feeding difficulties can be caused by a combination of oral- and gut-related problems, such as postural complications, swallowing difficulties, and gastro-oesophageal reflux disease (GORD). If oral feeding is inadequate, or is unsafe, a feeding tube may need to be inserted. Once the feeding method is established, other considerations include ensuring energy needs are being met. These must be individually assessed because of large differences in energy needs and body composition. Nutritional management of children with CP involves a multidisciplinary team of healthcare professionals, the child, and their family. One goal of adequate nutrition is to meet a person's energy needs. The ESPGHAN-WG recommend using dietary reference standards for typically developing children.Oral feeding can be considered as long as it is safe, nutritionally sufficient, stress-free, and takes no longer than 3 hours a day. For those unable to gain enough nutrition through oral feeding, EN via a PEG tube may be required to supplement or replace the oral method.[4] If problems such as GORD-related aspiration, refractory vomiting, retching, and bloating occur with PEG feeding, the ESPGHAN-WG suggested using jejunal feeding.[4] There is a great importance in taking parents/caregivers on board when discussing the process of gastrostomy feeding. The decision whether to use EN has to be made by assessing the needs of not only the child, but also their parents/caregivers and the family as a whole. The type of EN used depends on a number of factors, such as the child's age, their energy requirements, and the mode of enteral access. It may be given as a combination of daytime bolus feeds and nocturnal continuous feeds, especially in children with high-caloric needs or poor tolerance to high volumes of food in one sitting. EN will often be in the form of a commercially available formula, and the ESPGHAN-WG have suggested that a standard (1.0 kilocalorie [kcal]/mL) polymeric age-appropriate formula including fibre is adequate for most children past their first year. In those who cannot tolerate a high volume of food, a high-energy density formula (1.5 kcal/mL) may be required.[4] In children who are immobile, low energy needs suggest a low-fat, low-calorie, high-fibre, and micronutrient-replete formula may be needed.[4] During EN feeding, some assessments need to be regularly carried out, such as monitoring of body weight and fat mass every 6 months and micronutrients yearly. Additional nutrition may be needed for 'catch-up growth'; however, once this is achieved there is a risk of over-feeding, leading to obesity.