

SATELLITE SYMPOSIUM

**THE IMPORTANCE
OF LIPIDS IN EARLY
LIFE – NEW INSIGHTS
ON GROWTH
AND METABOLIC
PROGRAMMING**



Friday 17th May 2024; 08:00 – 09:00
Gold Room, Allianz MiCo (Milano Convention Centre)

SPEAKERS



Prof. Meng Mao



Prof. Berthold V. Koletzko



Prof. Jonathan R. Swann

CONTENT OVERVIEW

Symposium agenda

Speaker biographies and abstracts

Abstracts ESPGHAN 2024

SPEAKERS



Prof. Meng Mao



Prof. Berthold V. Koletzko



Prof. Jonathan R. Swann

SYMPOSIUM AGENDA

TIME	TOPIC	SPEAKER
08:00	Welcome & Introduction speakers	<i>Prof. Meng Mao, China</i>
08:05	The critical role of lipids in infant nutrition as modulators of development and health	<i>Prof. Bert Koletzko, Germany</i>
08:30	Unveiling the Power of Metabolomics: Influence of large lipid droplets on the infant metabolome & lipidome	<i>Prof. Jonathan Swann, UK</i>
08:55	Q&A	<i>Prof. Meng Mao, China</i>
09:00	Close	

This symposium is not included in the main event CME/CPD credit.

For Healthcare Professionals only.

PROF. MENG MAO

Professor and Chief Physician in Pediatrics

*Supervisor of Ph.D. students in West China Second University
Hospital of Sichuan University, China*



Committed to clinical practice and research on growth and development, nutrition and nutritional diseases in childhood.

Honorary Head of Child Health Care Group, Chinese Medical Association

Deputy Editor-in-Chief, Chinese Journal of Pediatrics

Deputy Director of Women and Children Health Care Branch of China Association for the Promotion of International Medical and Health Exchange

Member of the Experts Committee on Breastfeeding of the United Nations Institute for Training and Research (UNITAR)

Member of International Society for Research of Human Milk and Lactation (ISRHML)

Chief Scientist of Infant Supplementary Food Committee of China Nutrition and Health Food Association

The head of the expert group of the whole process of technical guidance service for families with members injured and killed after the Wenchuan earthquake.

Editor-in-chief of National Planning Textbook of Child Health Care, Textbook of Pediatrics, etc.

PROF. BERTHOLD V. KOLETZKO

Else Kröner-Seniorprofessor of Paediatrics, Professor h.c.

Dr. med, Dr. med. habil. (MD PhD), Dr. h.c. mult.



Berthold Koletzko is Else Kröner-Seniorprofessor of Paediatrics at LMU – Ludwig Maximilians Universität Munich, Dept. Paediatrics, Dr. von Hauner Children's Hospital, LMU University Hospitals, Munich, Germany. He was trained in paediatrics at Baragwanath Hospital, Johannesburg-Soweto, South Africa; Kilimanjaro Christian Medical Center, Moshi, Tanzania; and the Children's Hospitals of the Universities of Düsseldorf, Germany and Toronto, Canada. His work focusses on metabolic and nutritional modulators of child health and on disease prevention. Bert is author of 1181 scientific journal articles, 252 book chapters, and 46 books/monographies. His research funding amounted to 20 Mio.€ during the last decade and was provided by the European Union (EU) Framework Research Programmes, EU Research Council, EU Erasmus+ Programmes, EU Joint Programming Initiative, German Research Council, German Federal Ministry Education & Research, German Ministry of Health, Alexander von Humboldt Foundation, US National Institutes of Health, German Academic Exchange Service, Else Kröner Fresenius Foundation, Family Larsson Rosenquist Foundation, and other funding bodies. Research.com rated him as the highest ranked German researcher in paediatrics in the year 2023, with 60,230 citations and a D-Index of 129. Expertscape 2023 rated Bert as "World Expert" in research on "Breastfeeding", "Human Milk", "Milk" and "Infant Nutritional Physiological Phenomena" (among the top 0.01 % researchers worldwide based on publications in the last decade,) and as the world's top rated expert in the areas "Child Nutritional Physiological Phenomena" and "Child Nutrition Science".

Bert is Editor in Chief of Ann Nutrition & Metabolism and of World Rev Nutrition & Dietetics, and Associate Editor of Curr Opin Clin Nutr Metabol Care and Monatsschrift Kinderheilkunde. xBert has been a member of the grant review board medicine, German Research Council (Deutsche Forschungsgemeinschaft DFG) for many years, as well as chair and deputy chair of the DFG Clinical Trial grant review board.

Bert currently serves as President, European Academy of Paediatrics; Strategic Advisory group on Nutrition Member, International Pediatric Association; Treasurer, United European Gastroenterology; Chair, Committee Nutrition, German Society Pediatrics; and Board of Directors Member, Biomedical Alliance in Europe. He is Past President of the Federation Int Soc of Paediatr Gastroenterol, Hepatol & Nutrition (FISPGHAN), the European Soc of Paediatr Gastroenterol, Hepatol & Nutrition (ESPGHAN), the Int Soc Res Human Milk & Lactation (ISRHML), and the German Society of Nutritional Medicine (DGEM). He has been acting as Scientific Advisor to the German Federal Government, Innovation Initiative of the Chancellor of the Federal Republic of Germany, European Commission Scientific Committee on Food, European Parliament Committee Committee on the Environment, Public Health and Food Safety, World Health Organisation (WHO), Food and Agriculture Organisation of the United Nations (FAO), Codex Alimentarius of WHO and FAO, and other national and international governmental bodies and organisations.

Bert is the founder and Board Chair of the charitable Stiftung Kindergesundheit (Child Health Foundation, www.kindergesundheit.de) based at the Children's Hospital, LMU University of Munich. The foundation successfully engages in science and evidence based promotion of child health and disease prevention since 1997. With a total income exceeding 1.9 Mio. € in 2023, Stiftung Kindergesundheit i.a. implements a primary school health promotion programme reaching more than one third of all primary schools in Germany and a Kindergarten health promotion programme reaching more than 2500 day care centers and more than 200 000 children and their families in Germany and Austria, and it publishes an annual Child Health Report for Germany summarizing data on the state of child health and formulating policy recommendations.

ABSTRACT

The critical role of lipids in infant nutrition as modulators of development and health

Breastfeeding is considered the ideal way of feeding infants. Exclusively breastfed infants have the best start in life in terms of growth quality and metabolic development. Lipids are the second most abundant macronutrient in breast milk, contributing 45-55 % of a breastfed infants' energy supply. The composition of human milk lipids is complex and shows large inter- and intra-individual variation among lactating mothers as well as changes within feedings, during the day and over the course of lactation. Human milk lipids differs from conventional infant formula with respect to its' fatty acid composition and the content of complex lipids delivered in human milk fat globules enveloped by a unique triple-layered membrane. Human milk fat globules have an average diameter of ~4 μm , with a very large variation. The lipid droplets present in standard infant formulas are generated through traditional processing and are different in the overall lipid composition, the structure of triglycerides, the lipid membrane coating as well as the droplet size (mode diameter ~0.5 μm). Recent studies have explored differences in postprandial metabolism and potential biological and health effects of fat globule size infant milks.

PROF. JONATHAN R. SWANN

Professor of Biomolecular Medicine

Faculty of Medicine, University of Southampton



Jonathan Swann is a Professor of Biomolecular Medicine in the School of Human Development and Health, Faculty of Medicine at the University of Southampton and Visiting Professor in the Department of Metabolism, Digestion, and Reproduction at Imperial College London. He leads a metabolomic-based research programme to understand the influence of gene-environment interactions on the mammalian metabolic system and their implications for development, health, and disease. His primary interests involve developing analytical techniques and models to study the metabolic interactions between the gut microbiota and the human host and he has a specific interest in their role in human development. He has led several projects in this area funded by international research councils (e.g., ERC, BBSRC, MRC, NIH), charities (e.g., Wellcome Trust, Bill and Melinda Gates Foundation), and industry partners (e.g., Danone). His work has been published in high-impact journals such as *Cell*, *Nature Medicine*, *PNAS*, and *JEM* (>120 articles; >11,000 citations; H-index 45) and he is an Associate Editor for the journals, *Microbiome* and *Frontiers in Endocrinology*. Prof. Swann is the Director of the Clinical Metabolomics Unit at the University of Southampton and co-lead for the Nutrition, Lifestyle, and Metabolism theme of the NIHR-supported Southampton Biomedical Research Centre. He sits on the organising and programme committee for the leading international conference on the microbiota-gut-brain axis, *Mind, Mood, and Microbes*, leads the “Metabonomics” theme of the “Gut Microbiota for Health” panel for the British Society of Gastroenterology and has previously chaired an expert group on human microbiome studies for the International Life Sciences Institute.

ABSTRACT

Unveiling the Power of Metabolomics: Influence of large lipid droplets on the infant metabolome and lipidome

Breast milk is rich in lipids which are incorporated into large droplets (milk fat globules (MFG)) with an average volume-based mode diameter of 4 μm , enveloped by a complex triple-layer membrane (MFGM) mainly consisting of phospholipids, sphingomyelin, glycolipids, membrane-specific proteins, and cholesterol. MFGs play an important role in development, promoting gut maturation by inducing epithelial cell proliferation and differentiation, increasing tight junction protein expression. However, little is known about how MFGs influence the development of the intestinal microbiota and their metabolic interactions with the human host, and their implications for the phenotypic maturation of the holobiont.

We studied whether an infant formula containing large, milk phospholipid coated lipid droplets (Nuturis) influences host biology, alters the maturation of the intestinal microbiota and impacts infant weight gain and body composition in the first year of life compared to standard infant formula. An integrated metabolomic and microbial profiling approach was applied to longitudinally collected plasma and stool samples. During this symposium results will be presented that show that the physical properties of lipid droplets in the early life diet can positively contribute to growth and modulate (later in life) metabolic health outcomes.

The presence of large phospholipid-coated lipid droplets in formula milk positively influences the host metabolism and development of the infant gut microbiota, and body composition. This suggests a role of lipid droplets on metabolic programming and maturation of microbiota, which may contribute to long-term health benefits, such as reducing the risk of obesity and metabolic disease development.

ABSTRACTS ESPGHAN 2024

Abstract oral presentation

Date: 15/05/2024

Time: 13:30 - 14:30

The use of a weight artificial intelligence (wai) algorithm for weight estimation of children in a real-world setting

Mei Chien Chua, Matthew Hadimaja, Sankha Mukherjee, Jill Wong, Umesh Nandal, Agathe Foussat, Fabian Yap

First digital tool predicting the weight of recumbent children from images, opening possibilities for parents and caregivers to easily perform regular weight measurements in the comfort of their homes, facilitating growth tracking of the child. Ongoing efforts are dedicated to enhancing the precision and trueness of this novel weight prediction tool to allow for clinical use in the future.

ABSTRACTS ESPGHAN 2024

Abstract poster presentation

Large Milk phospholipid Coated Lipid Droplets In Infant Formula Milk Modulate The Metabolic Functionality Of The Developing Holobiont	Simone Zuffa, Christophe Lay, Arabella Hornung Rodriguez, Yi Wu, Franklin Nobrega, Nana Bartke, Guus Roeselers, Jan Knol, Jonathan Swann	IF with large milk phospholipid coated lipid droplets (compared to Control (standard IF), increased several plasma lipids to more closely resemble breastfed infants at 3 months of age. Significant differences between Nuturis and Control were also observed in markers for diverse metabolic pathways, many of which were significantly associated with future body composition. This suggests a broad impact of Nuturis on infant metabolic programming and its potential to shape physiological development.
Qilin: Gut microbiome and metabolome maturation in Chinese infants receiving breastmilk and formula supplemented with prebiotics GOS/FOS	Zhe Zeng, Wanying Zhong, Qin Lv, Xiaoli Xie, Jie Wu, Baoxi Wang, Xiaoqin Li, Yi Jin, Mengjin Liu, Guus Roeselers, Sitang Gong	This study unveils gut microbiome and metabolome development in Chinese infants aged 0-24 months. Compared with breast-fed infants, prebiotics-supplemented formula-fed infants shows a similar microbiome composition. In agreement with previous studies on the prebiotics 9:1 scGOS/lcFOS with more than 100 structures mimicking human milk oligosaccharides, this study shows that the prebiotics 9:1 scGOS/lcFOS supports microbiome and metabolome maturation on Chinese healthy infants.
ACBS study/ Energy and nutrient dense feed containing 2'-fucosyllactose (2'-FL) supports body weight increase with good compliance, acceptability, and tolerance in infants with faltering growth	Marta Delsoglio, Rebecca Capener, Sarah Trace, Ellie Evans, Luise Marino, Karla Palframan, Leanne Rees, Graeme O'Connor, Jo Rayner, Mica Tizzard, Victoria Shaw, Carolyn Patchell, Julie Barker, Nicola Payne, Luise Marino, Vandna Patel, Sophie Aubrey, Rebecca J. Stratton, Gary P. Hubbard	Infants with faltering growth receiving a 2'FL-containing ENDF, showed good GI tolerance with some improvements, accompanied by increase in body weight and improvement in weight-for-age z-score, excellent compliance and acceptability, suggesting a future role of HMOs in infant medical nutrition feeds. Further research is required.
Improved gastro-intestinal symptoms in paediatric patients receiving a high energy enteral tube feeding formula containing real food ingredients	Marta Delsoglio, Rebecca Capener, Ben Green, Graeme O'Connor, Odette Dicke, Ellie-May Evans, Sarah Trace, Katharine Hampshire-Jones, Sarah Durnan, Hannah Baker, Sarah Kordecki, Sophie Rawlings, Marie Watson, Carrie Wills, Helen Stanton, Sarah Pidgeon, Joanna Berry, Lindsay Rosie, Rebecca Coles, Claire Baber, Sarah Donohoe, Rebecca J. Stratton, Gary P. Hubbard	Patients fed a paediatric tube feed containing real fruit and vegetable-derived ingredients showed a high degree of compliance, good GI tolerance, and GI-QOL. The feed supported patients' weight gain and helped them meet their dietetic goals while being well accepted by parents.

ABSTRACTS ESPGHAN 2024

Abstract poster walk presentation

Date: 18/05/2024

Time: 11:30 - 12:20

Qilin: Development of dominant gut microbiota from 0 to 2 years old in Chinese infants

Zhe Zeng, Wanying Zhong, Qin Lv, Xiaoli Xie, Jie Wu, Baoxi Wang, Xiaoqin Li, Yi Jin, Mengjin Liu, Guus Roeselers, Sitang Gong

This study highlights the significance of Bifidobacterium and Bacteroides for the early life gut microbiome development for healthy Chinese infants. The dynamic changes of Bifidobacterium species abundance strengthen our understanding of their role in the ecological succession of the early life gut microbiome.

Content of human milk oligosaccharides across lactation stages among Chinese lactating women

Junai Gan, Sainan Wang, Xianfeng Zhao, Bernd Stahl, Zhixu Wang, Jingyu Yan

This study quantified 24 human milk oligosaccharides (HMOs) across lactation stages in the Chinese population as part of a large multicenter cohort study. Although the concentration of total HMOs decreased as lactation progressed, the concentration of individual HMOs showed different dynamic changes, suggesting that infant feeding strategies need to be tailored at different stages.

ABSTRACTS ESPGHAN 2024

Abstract e-poster presentation

Evaluation of an infant formula with large, milk phospholipid-coated lipid droplets on long-term growth and adiposity: the saturn study design	Demi Dorrepaal, Inge van Beijsterveldt, Marieke Abrahamse-Berkeveld, Anita Hokken-Koelega	Description of the Saturn study design, an RCT that will improve understanding of the role of dietary lipid droplet characteristics in infant adiposity development and the potential impact of IF with large milk-phospholipid coated lipid droplets (Nuturis) on childhood health outcomes.
Large Milk-phospholipid Coated Lipid Droplets In Infant Formula Result In A Stool Bile Acid Profile Closer To That Of A Breastfed Infant	Louise Harvey, Elly Hassink, Simone Zuffa, Christophe Lay, Arabella Hornung Rodriguez, Nana Bartke, Guus Roeselers, Anita C.S. Hokken-Koelega, Jan Knol, Jonathan Swann	Exposure to IF with large milk-phospholipid coated lipid droplets (Nuturis) resulted in a stool bile acid profile at 3 months of age closer to that of breastfed infants. Bile acids regulate both fat absorption and metabolic homeostasis. Our results suggest that Nuturis IF may mediate short- and long-term health outcomes via these molecules.
Healthcare Professional and Parental Scores on Stool Characteristics and Acceptability of a New Infant Formula: Early Engagement Program	Anke Bongers, Loret Keulers, Sandy Tse, Nana Bartke, Eppie Yu-Han Leung, Amber Jia-Chi Chiou	A survey showed high satisfaction scores on stool characteristics and formula acceptance in infants after the consumption of a new infant formula with Nuturis, synbiotics and 5 HMOs.
Observational study in healthy term-born infants fed with a partly fermented formula with an improved lipid profile and oligosaccharides. Post study	Luis Carlos Blesa Baviera, Ana Albors Fernández, Pedro Samblas Tilve, Úrsula Maragat Idarraga, Cristóbal Coronel Rodríguez, Beatriz Abad Balaguer, Elena Viciano Delibano, Francisco Javier Pérez-Sádaba, Cecilia Martínez Costa	The growth, gastrointestinal tolerance, and infection incidence were similar in both groups. FF parents/caregivers were satisfied with this infant partly fermented formula with an improved lipid profile and oligosaccharides.

ABSTRACTS ESPGHAN 2024

Abstract e-poster presentation

Infant formula ingredients lutein and beta-palmitate or lutein and casein-phosphopeptide in combination with scGos/lcFos increase in vitro calcium, iron and zinc bioaccessibility	Fadoua Daouad, Gabriel Thomassen, Xianfeng Zhao, Jan Knol, Ingrid Renes	In vitro calcium, iron and zinc bioaccessibility is improved by a mix of SCFAs (derived from scGOS/lcFOS fermentation) combined with beta-palmitate and lutein (mix-1), as well as SCFAs combined with CPP and lutein (mix-2). Both mixes alone and in combination with scGos/lcFos 9:1 might therefore increase mineral absorption, promoting healthy micronutrient status and preventing diseases related to mineral deficiencies.
Nutrijourney: Exploring parental immune perspective and knowledge of Chinese infants aged 0-3 years post COVID-19 pandemic	Jiongnan Wang, Jin Zhou, Yufan Chen, Nan Liu, Guiju Sun, Jialu You, Mengjin Liu	This study highlighted suboptimal parental knowledge in Chinese 0-3 years old infants, indicating the need for effective education on infant immunity and health. The knowledge association with attitudes towards immunity and gut microbiota importance suggests that future studies are needed to further explore the interrelationship between infant immune health and parental knowledge, attitude as well as parenting practices.
Risk factors for childhood obesity in the first 1000 days: systematic review and risk factor quality assessment	Sophia Blaauwendraad, Arwen Kamphuis, Francisco Ruiz-Ojeda, Marco Brandimonte-Hernandez, Eduard Flores-Ventura, Marieke Abrahamse-Berkeveld, Maria Collado, Janna van Diepen, Patricia Iozza, Karen Knipping, Carolien van Loo-Bouwman, Angel Gil, Romy Gaillard	Childhood obesity is a global epidemic that may already originate in early-life. Our findings are relevant for early-life risk prediction and insight into strongest potential modifiable factors. Further research should focus on preconception factors, lifestyle interventions, and studies among middle- and low- income countries.

ABSTRACTS ESPGHAN 2024

Abstract e-poster presentation

Exploring perceptions and experiences of aptamil advance 3 in the middle east: a prospective multicentre cross-sectional study	Khaldoun Adnan Baddour, Hassan Alsabea, Mohamed Ashraf, Antoine Farah, Raafat Hamzeh, Mohammad Mizyed, Ashraf Othman Saleh Sayed, Alain Sayad, Edward Sayyad, Talal Mahmoud	Overall caregivers' perception of YCF in the Middle East were positive. Caregivers expressed high levels of satisfaction with Aptamil Advance Junior 3.
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Abstract e-poster presentation

Date: 17-05-2024

Time: 15:30 - 16:20

Increased macronutrient and micronutrient intake in paediatric patients with a high energy enteral tube feed formula containing real food ingredients.	Isabel Evans, Marta Delsoglio, Rebecca Capener, Ben Green, Graeme O'Connor, Odette Dicke, Ellie-May Evans, Sarah Trace, Julie Barker, Nicola Payne, Luise V. Marino, Catarina Fandinga, Nicky Heather, Joanna Mankelov, Denise Kennedy, Katharine Hampshire-Jones, Sarah Durnan, Hannah Baker, Sarah Kordecki, Sophie Rawlings, Marie Watson, Carrie Wills, Helen Stanton, Sarah Pidgeon, Joanna Berry, Lindsay Rosie, Rebecca Coles, Claire Baber, Sarah Donohoe, Gary P. Hubbard, Rebecca J. Stratton	Macronutrient and micronutrient intakes increased at end of intervention with the enteral tube feed containing real food-derived ingredients, better meeting UK requirements and needs in this cohort of enterally fed paediatric patients. Further research and monitoring of micronutrient status with emerging EN products and practices are required.
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