MEDIA RELEASE

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INFANT GUT MICROBIOTA LINKED WITH GESTATION DURATION, DELIVERY METHOD AND HEALTHY WEIGHT GAIN

Singapore - Researchers in Singapore and UK as part of the EpiGen consortium worked together with scientists at the Nestlé Research Center, Switzerland, on a new study on the bacterial makeup of the gut (gut microbiota) of infants in Singapore. Their study reveals that the rate of bacterial colonisation of the gut is influenced by external factors such as the method of delivery and duration of gestation. The study also found that infants with a mature gut bacteria profile at an early age had normal levels of body fat at the age of 18 months, while infants with less mature gut bacteria profiles tended to have lower levels of body fat at the age of 18 months, indicating that gut bacteria could be related to normal development and healthy weight gain.

Bacteria in the human gut may influence many aspects of our health; however, it is not fully known what determines the composition of the gut microbiota. Rapid bacterial colonisation of the infant gut could be influenced by the environment of the baby before birth, and microbiota content has been associated with the development of obesity and insulin resistance.

Led by scientists at A*STAR’s Singapore Institute for Clinical Sciences (SICS), in collaboration with researchers from KK Women’s and Children’s Hospital, the National University Health System (NUHS), the University of Southampton and Nestlé Research Center, the study on the Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort revealed that infants who had a vaginal delivery and who were born at term but after a longer duration of gestation acquired a more mature gut microbiota at a faster rate. In contrast, infants who were delivered by Caesarean section and after a shorter duration of gestation had a delay in the development of their gut microbiota.

While the infants had varying rates of gut microbiota acquisition depending on their mode of delivery and duration of gestation, most of them had “caught up” within six months of life, with no differences in gut microbiota detected at this time point. In this study, infants with a delay in microbial acquisition tended to have a lower adiposity (or fat) at age 18 months, while those with a more rapid microbial acquisition achieved a more normal adiposity by that age.
Dr Joanna Holbrook, Senior Principal Investigator at A*STAR’s SICS said, “Epidemiological data has linked what happens to us very early in life with our health later in life. The mechanisms for this are not yet known; how do our bodies remember our earliest experiences in a way that impacts health issues like our weight? This work suggests that one of the mechanisms for the transmission of early life experience to later life health is the seeding of our gut microbiota.”

Professor Keith Godfrey, a co-investigator on the study at the MRC Lifecourse Epidemiology Unit at the University of Southampton, UK, comments, “This study is an important example of how influences before and after birth have a lasting effect on the growth and development of the child. The findings will help our EpiGen global research consortium to design future interventions aimed at optimising early development, with benefits for lifelong health.”

Associate Professor Chong Yap Seng, Lead Principal Investigator, GUSTO, Associate Professor and Senior Consultant with the National University Health System (NUHS) and Executive Director of SICS, commented that, “The incredible efforts put in by the many academic partners involved in GUSTO, as well as the wonderful cooperation of the GUSTO families, have allowed us an unprecedented opportunity to study the secrets of the developing gut microbiome, which we know is vital, right from birth in Singapore.”

Notes to Editor:

The research findings described in this media release can be found in the mBio journal, under the title “Dynamics of infant gut microbiota are influenced by delivery mode and gestational duration and are associated with subsequent adiposity” by Shaillay Dogra1, Olga Sakwinska2, Shu-E Soh3, Catherine Ngom-Bru2, Wolfram M Brück2, Bernard Berger2, Harald Brüssow2, Yung Seng Lee1,3, Fabian Yap4, Yap-Seng Chong1,3, Keith M Godfrey6, Joanna D Holbrook1,7*, on behalf of the GUSTO study group.

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The Agency for Science, Technology and Research (A*STAR) is Singapore’s lead public sector agency that fosters world-class scientific research and talent to drive economic growth and transform Singapore into a vibrant knowledge-based and innovation driven economy.

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A*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities, located in Biopolis and Fusionopolis, as well as their vicinity. These two R&D hubs house a bustling and diverse community of local and international research scientists and engineers from A*STAR’s research entities as well as a growing number of corporate laboratories.

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**About the Singapore Institute for Clinical Sciences (SICS)**

Established in 2007, the Singapore Institute for Clinical Sciences (SICS) is a research institute within the Agency for Science, Technology and Research (A*STAR), and its mission is to develop disease-oriented clinical and translational research programmes in key disease areas.

SICS is distinguished by its focus on clinical sciences and the use of innovative approaches and technologies that enable the efficient and effective study of human health and diseases. The clinical scientists in SICS conduct the full spectrum of "bench to bedside" research activities in metabolic diseases (including diabetes, obesity and insulin resistance), pathways to normal growth and development (including cognitive and behavioural development), nutritional sciences as well as in certain viral infectious diseases such as chronic viral diseases.
The institute aims to attract, train and nurture clinician-scientists and to develop joint programs with universities, academic medical centres, government hospitals and research institutes.

For more information on SICS, please visit: www.sics.a-star.edu.sg

**About the KK Women's and Children's Hospital (KKH)**

KK Women’s and Children’s Hospital (KKH) is a leading healthcare centre for Obstetrics, Gynaecology, Paediatrics and Neonatology. Founded in 1858, the 830-bed JCI accredited hospital is a referral centre providing tertiary services to manage complex conditions in women and children. More than 400 specialists adopt a multi-disciplinary and holistic approach to treatment, and harness the latest innovations and technology for the best medical care possible.

As an academic and research institution, KKH is a major teaching hospital for Duke-NUS Graduate Medical School, Yong Loo Lin School of Medicine and Lee Kong Chian School of Medicine. The hospital also runs the largest residency programmes for Obstetrics and Gynaecology and Paediatrics in Singapore, accredited by the Accreditation Council for Graduate Medical Education International (ACGME-I).

For more information on KKH, please visit: www.kkh.com.sg

**About the National University Health System (NUHS)**

The National University Health System (NUHS) groups the National University Hospital (NUH), the NUS Yong Loo Lin School of Medicine, the NUS Faculty of Dentistry and the Saw Swee Hock School of Public Health under a common governance structure to create synergies to advance health by integrating clinical care, research and education. The enhanced capabilities and capacity will enable the NUHS to deliver better patient care, train future generations of doctors more effectively and bring innovative treatments to patients through groundbreaking research.

For more information about the NUHS, please visit: www.nuhs.edu.sg

**About the EpiGen Consortium**

EpiGen is a global consortium of leading researchers based at five centres in three countries (Auckland UniServices Limited, University of Southampton, Medical Research Council Lifecourse Epidemiology Unit - University of Southampton, Singapore Institute for Clinical Sciences of the Agency for Science, Technology and Research (A*STAR), and National University of Singapore). EpiGen strives to advance understanding of the developmental and environmental processes that influence health through the life course.

For more information on the EpiGen Consortium, please visit: www.epigengrc.com

**About the University of Southampton**

Through world-leading research and enterprise activities, the University of Southampton connects with businesses to create real-world solutions to global issues. Through its educational offering, it works with partners around the world to offer relevant, flexible
education, which trains students for jobs not even thought of. This connectivity is what sets Southampton apart from the rest; we make connections and change the world. [www.southampton.ac.uk

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About Nestlé Research Center (NRC)

With a staff of over 600 people, representing approximately 50 nationalities and a wide range of scientific disciplines, the NRC is at the heart of scientific research and innovation within Nestlé. The role of the NRC is to lead food and nutrition research for science-based and consumer-centric solutions to promote nutrition, health and wellness for consumers. Its research focuses on five key platforms: Healthy Ageing; Healthy Pleasure; First 1000 days and Healthy Kids; Sustainable Nutrition; and Food Safety and Integrity.

Through scientific excellence and technical knowledge, Nestlé Research translates science into products, which help fulfil Nestlé’s vision of Good Food, Good Life for all consumers.

For more information about NRC, please visit: [www.research.nestle.com

About GUSTO

Incepted in 2009 as a collaborative effort with the two major public maternity hospitals in Singapore, National University Health System (NUHS), KK Women’s & Children’s Hospital (KKH) and A*STAR’s Singapore Institute for Clinical Sciences (SICS), GUSTO is the region’s leading longitudinal birth cohort study that combines multi-ethnic Asian participants with detailed records of ante and post-natal data and biological specimens from both mother and child. These data include rare insights into new-born body composition and correlated future obesity via infant MRIs in the 1st week of birth, molecular analysis of birth tissues (placenta, umbilical cord, cord blood) and ongoing breast milk, stool, nasal and buccal swab specimens post-natal up to 2 years of age for the over 1200 mother-child pairs recruited. Clinical assessments include nutritional, biochemical, imaging, molecular and cognitive studies of the mothers and infants, with extensive implications for understanding future metabolic compromise, allergic and respiratory illnesses, cognitive spectrum childhood disorders and more. For more information on GUSTO, please visit: [www.devos.sg/about/GUSTO.html]