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### Microbiome-based therapeutic and predictive strategies for Eczema in children

#### Abstract:

Microbes at different mucosal sites is a potent driver of immunological maturation. There is rich evidence on early-life evolution of gut microbiome following child birth and in particular in response to different exposome. A healthy microbiome competes with pathogens, improves nutrient metabolism, enhances gut barrier integrity and regulates immune system maturation. Dynamic interactions also exist between microbes, the immune system and food allergens that may lead to innate and adaptive tolerance, and any disruption of such 'balanced' microbiota in early-life will adversely affect health later in life. Decreased Bifidobacterium and Enterococci in dysbiotic stool microbiome from children with eczema prompts my team to design a novel probiotic formulation called SIM03 that replenished the relevant Bifidobacterium. My team has just completed a clinical trial that showed this probiotic to be useful in ameliorating eczema severity and improving quality of life of Chinese preschool children. Evidence for the importance of microbiome at other body sites is limited. Our birth cohort revealed substantial temporal variations in skin microbiota during the first 12 months. Infants with persistent eczema had lower microbial biodiversity than those with transient eczema. Our metagenomics data revealed inverse relationship between eczema severity and microbial biodiversity. Early-phase clinical trials reported that the transfer of lantibiotic-producing coagulase-negative staphylococci suppressed *Staphylococcus aureus* growth and ameliorated eczema severity. In conclusion, microbiota in stool and skin are important driver for childhood eczema. Knowledge about microbial uniqueness and compositions is employed to design novel biomarkers and targeted biotherapy for treating this highly prevalent skin disease.

#### Biography

Professor **Leung** graduated from The Chinese University of Hong Kong in 1992, and he received subspecialty training on Immunology and Allergy in the Hospital for Sick Children in Toronto, Ontario, Canada in 1997-1998. Professor Leung is currently a professor in Department of Paediatrics at The Chinese University of Hong Kong, and a visiting professor in the Central South University in mainland. He is Immediate Past President of Hong Kong Society for Paediatric Immunology, Allergy and Infectious Diseases. His main research interests include natural history, novel diagnostics and host-microbe interactions for allergic diseases. He published more than 410 peer-reviewed journal articles.