JOINT EVENT



26th World Nutrition Congress \$&\$ 15th Euro Obesity and Endocrinology Congress

June 17-18, 2019 London, UK

Keynote Forum Day 1

Nutrition World 2019 & Euro Obesity 2019

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Food ingredients modulating the expression of virulence factors in bacteria

Statement of the Problem: Disease-causing properties (virulence) of microbial pathogens are greatly influenced by environmental factors such as temperature, pH, and food ingredients like carbohydrates. As human bodies are inhabited by a number of opportunistic pathogens, factors modulating the virulence of these potential disease-causing bacteria may have important health consequences. We have developed reporter systems in bacteria for evaluating the virulence modulating properties of various agents including common food ingredients.

Methodology & Theoretical Orientation: We have constructed *gfp-luxABCDE* dual-reporter plasmids with selected promoters from bacterial virulence-associated genes. The plasmids were introduced into bacteria to establish a *gfp-lux* based multiplex promoter reporter platform for monitoring bacterial virulence gene expressions in real time to identify factors that may modulate virulence factors expression. We have selected a number of common food ingredients and tested these ingredients in our multiplex promoter reporter platform to evaluate their virulence modulating properties. Virulence gene expression in bacteria was monitored by luminescence signals detected with an IVIS Spectrum *In Vivo* Imaging System (PerkinElmer).

Findings: We have profiled the virulence modulating activities of common food ingredients on 9 bacterial virulence gene promoters, namely promoters from genes involved in the production of α -toxin, Panton-Valentine leukotoxin, phenol-soluble modulins, Protein A, Extracellular Adhesion Protein, fibronectin binding protein A, fibronectin binding protein B, clumping factors A, and capsular polysaccharide. The tested virulence factors are important for the establishment of bacterial infections in humans.

Conclusion & Significance: Microbial virulence is an overlooked factor while considering food ingredients and nutritional supplements for healthy individuals or patients with special needs. Our study has provided an evidence-based scientific platform for the effective evaluation of various food substances that may modulate the virulence of opportunistic pathogens residing in humans.

Recent Publications

- Woo P C Y, Lau S K P, Lau C C Y, Tung E T K, Au-Yeung R K H, Cai J P, Chong K T K, Sze K H, Kao RY, Hao Q and Yuen K Y (2018) Mp1p homologues as virulence factors in *Aspergillus fumigatus*. Med Mycol. 56(3):350-360.
- 2. Gao P, Ho P L, Yan B, Sze K H, Davies J and Kao R Y T (2018) Suppression of *Staphylococcus aureus* virulence by a small-molecule compound. Proc Natl Acad Sci U S A. 115(31):8003-8008.

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- Tse H, Yang D, Sze K H, Chu I K, Kao R Y T, Lee K C, Lam C W, Gu Q, Tai S S, Ke Y, Chan E, Chan W M, Dai J, Leung S P, Leung S Y and Yuen K Y (2017) A tricyclic pyrrolobenzodiazepine produced by *Klebsiella oxytoca* is associated with cytotoxicity in antibiotic-associated hemorrhagic colitis. J Biol Chem. 292(47):19503-19520.
- 4. Gao P, Davies J and Kao R Y (2017) Dehydrosqualene Desaturase as a novel target for anti-virulence therapy against *Staphylococcus aureus*. mBio 8(5):e01224-17.
- 5. Gao P, Wang Y, Villanueva I, Ho P L, Davies J and Kao R Y (2016) Construction of a multiplex promoter reporter platform to monitor *staphylococcus aureus* virulence gene expression and the identification of usnic acid as a potent suppressor of psm gene expression. Front Microbiol. 7:1344.

Biography

Richard Y Kao has obtained his PhD in Microbiology at UBC in 1999 and subsequent Postdoctoral training at Harvard Medical School. He has joined the University of Hong Kong as a Research Assistant Professor in 2001 and now a tenured Associate Professor in the Department of Microbiology, Li Ka Shing Faculty of Medicine. His research focuses on the application of chemical genetics in infectious diseases. Most recently, he has extended his chemical genetic studies to virulence and antibiotics resistance in bacteria and has illustrated the potential use of anti-virulence compounds to treat MRSA infections. The research results have been published in top microbiology journals Frontiers in Microbiology, mBio, and PNAS in 2016, 2017, 2018 respectively. He has received the Innovation Academy Award from International Consortium of Prevention and Control of Infection (ICPIC) in Geneva, Switzerland in 2017.

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Body weight control in patients followed up in a multidisciplinary team for obesity in China

Introduction: The treatment of obesity is based on diet and lifestyle intervention and medication, bariatric surgery or acupuncture in China is recommended in some cases. Therefore, a multidisciplinary team is needed for the management of obesity. Herein we described the body weight and other metabolic profile changes in the multidisciplinary team for obesity at Peking University First Hospital in 2-year follow-up.

Methodology & Theoretical Orientation: 445 patients participated in the multidisciplinary team for obesity, which consisted of a physician, a dietician, an exercise therapist, a bariatric surgeon, an acupuncturist and several health educators. Patients were followed up at 3 months, 6 months, 1 year, 18 months and 2 years after their first visit. We investigated body weight changes across up to 5 times of follow-ups and factors that affected the successful rate in weight reduction using logistic regression.

Findings: Body weight declined significantly at every visit compared with the basal value (p<0.0001), and it decreased significantly in follow-up at 6 months and 1 year compared with the former visit (p<0.0001, 6m vs. 3m; p<0.0001, 1y vs. 6m). Defining body weight reduction over 5% as success, the rate of success was as high as 40.9%-50.9% during visits. Defining the reduction of body weight over 10% as success, the successful rate gradually increased from 13.2% to 26.9% during visits. Sex category, baseline body weight, body mass index and hip circumference were associated with the success of weight-loss.

Conclusion & Significance: A multidisciplinary team for obesity management could significantly achieve the goal of body weight reduction. For most of the patients, weight reduction occurs during the first year of treatment. Sex category, baseline body weight, body mass index and hip circumference are associated with successful weight control.

Recent Publications

- 1. Lu D and Guo X (2016) Parameters of obesity in polycystic ovary syndrome. J Rare Dis Res Treat (2)1:19-22.
- 2. Lu D, Huang J, Ma X, Gu N, Zhang J, Zhang H and Guo X (2017) Rs46522 in the ubiquitin conjugating enzyme E2Z gene is associated with the risk of coronary artery disease in individuals of Chinese Han population with type 2 diabetes. Journal of Diabetes Research Article ID 4501794.
- Lu D, Guo X, Li Y, Zheng B and Zhang J (2018) Insoles treated with bacteria killing nanotechnology Bio-Kil reduce bacterial burden in diabetic patients and healthy controls. Journal of Diabetes Research Article ID 7678310.

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Biography

Difei Lu has her expertise in evaluation and passion in improving the health and wellbeing of patients with diabetes or obesity in China. Graduated as MD in Peking University Health Science Center, she works as a Specialist in Endocrinology Department at Peking University First Hospital. After the multidisciplinary team for obesity of Peking University First Hospital was launched since 2016, she participated in the clinical practice and collected data. Since then, nearly one thousand obesity patients were regularly followed up in the MDT for obesity. This approach provided a real world-based data for weight control efficacy of MDT for obesity in China.

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