Appendix

Developing a regimen in combating multidrug-resistant bacterial pathogens

Professor CHEN Sheng, Professor of the University's Department of Applied Biology and Chemical Technology, is leading a research project titled "Development of a colistin/adjuvant antimicrobial regimen that exhibits low toxicity and high efficacy in combating multidrug-resistant bacterial pathogens" which was granted a funding of nearly HK$ 6 million.

Among the major multidrug-resistant organisms that emerged within the past two decades, carbapenem-resistant Enterobacteriaceae (CRE) pose a particularly serious threat to hospital patients, especially those who are immunocompromised. Polymyxins (colistin) are currently considered the last resort antibiotics in treatment of CRE infections due to its high efficacy against clinical CRE strains and low resistance rate. However, couple major issues about colistin as last resort antibiotic were raised including its neuro- and nephrotoxic side effects, which remains intolerable to a high proportion of gravely ill patients, who are most affected by drug-resistant hospital infections.

PolyU recently identified three compounds, namely CET, DOM and Econ, which exhibited strong synergistic antimicrobial effect with colistin against both colistin-resistant and susceptible Enterobacteriaceae strains, facilitating the use of a much lower dosage of colistin in treatment and minimizing the toxic side effects on severely ill patients. Animal experiments confirmed that they provide remarkable protective effect against multidrug resistant infections that would otherwise be fatal. The proposed funded project will (1) perform pre-clinical studies to optimize the antimicrobial efficacy and to facilitate design of the dosing and formulation of such novel drug regimens, (2) investigate the mechanism of action by which CET/DOM/Econ enhances the antimicrobial activity of colistin. The project is expected to produce a series of new colistin and adjuvant-based antimicrobial drug regimens that are ready for clinical trial.

Early detection of scoliosis through novel 3D ultrasound imaging

Professor ZHENG Yongping, Head of the Department of Biomedical Engineering and Henry G. Leong Professor in Biomedical Engineering, PolyU, leads a project titled "Early Detection of progressive adolescent idiopathic scoliosis and optimization for non-surgical treatments using novel 3D ultrasound imaging", which was awarded HK$8.4 million funding.

The team has earlier developed an ultrasound imaging system for two-dimensional (2D) scoliosis assessment, which allows frequent monitoring of scoliosis among children without the impact of radiation. The technology has been adopted for clinical uses in a number of countries.

The team now studies to explore a novel clinical tool to assess the three-dimensional (3D) nature of scoliosis by applying radiation-free 3D ultrasound. The results of this study can be integrated into the current 2D ultrasound imaging system for prediction of curve progression, optimisation of spinal orthosis design and exercise treatment, and monitoring of scoliosis treatment outcomes.

Enhancing food safety with big data and IoT

Professor CAO Jiannong, Chair Professor of Distributed and Mobile Computing, Department of Computing, is leading a project titled "Tackling grand challenges in food safety: a big data and IoT enabled approach". A system enabled by Big Data and Internet of Things (IoT) will be developed to contribute to food safety by enhancing traceability and status detection of food items, thus allowing risk prediction of foul food. The project was granted HK$5.4 million through RIF.

The research team proposes to attach an RFID tag to each food item as its identity to enable tracking food items through all stages of production, processing, and distribution. In addition, a large number of wireless sensors will be deployed in the environment where food items reside to monitor temperature and humidity, allowing timely detection of the food status during food production, warehousing and shipping.

The research team will also integrate heterogeneous food safety data and propose big data techniques to uncover the hidden correlations, thereby pinpointing the sources of food risks and predicting the food status in future.

Bright light therapy and combined treatment for myopia control among children

Awarded a HK$8 million RIF funding, the project "Effectiveness of bright light therapy, myopic defocus, atropine and the combinations for controlling myopic eye growth in schoolchildren: a randomized control trial" is led by Professor TO Chi-ho, Head, School of Optometry and Henry G. Leong Professor in Elderly Vision Health, PolyU.

The research team will conduct a multi-arm randomised clinical trial to determine the effectiveness of Bright Light Therapy (BLT) on inhibiting myopia progression in schoolchildren, and whether a combination of various therapy treatments, including the use of bright light, myopic defocus and low-dose atropine, is more effective than monotherapy. In addition, potential factors that associate with the effectiveness of myopia control will be analysed in the study.

The team will recruit in Hong Kong over 700 Chinese children aged between eight and 13 with low (-1D) to moderate myopia (-6D) for the 24-month clinical trial.

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