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何鴻燊博士醫療拓展基金會
Dr. Stanley Ho Medical Development Foundation

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“揚帆追夢、創啟未來”2023年度獲資助研究項目
“SET SAIL FOR NEW HORIZONS, CREATE THE FUTURE” FUNDED PROJECT FOR 2023

王瑞兵 教授
Prof. Ruibing WANG

王瑞兵，澳門大學中華醫藥研究院、健康科學學院藥物科學系教授；主持國家自然科學基金項目、深圳市科創委深港澳科技計劃、澳門科學技術發展基金項目等多個科研項目；當選英國皇家化學會會士；擔任澳大全球事務部總監。

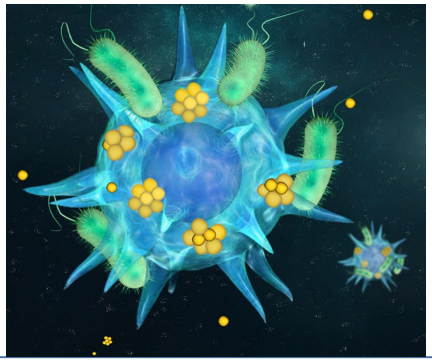
Ruibing WANG is a Professor at the Institute of Chinese Medical Sciences and Department of Pharmaceutical Sciences, Faculty of Health Sciences, University of Macau and a grantee of NSFC Fund, SZSTIC Fund, and FDCT Fund. He is an elected Fellow of the Royal Society of Chemistry (FRSC), UK, and currently serves as Director of Global Affairs Office at UM.

細菌工程化巨噬細胞海綿作為中和誘餌用於治療細菌感染

A bacteria-engineered macrophage sponge as a neutralization decoy to treat bacterial infection

我們開發了一種用於吸附細菌和內毒素的胞內凝膠化的巨噬細胞（GM）作為免疫細胞海綿。GM擁有完整的細胞形態和與源巨噬細胞相同的膜結構。通過受體-配體相互作用， GM對細菌和內毒素與宿主巨噬細胞表現出類似的中和能力，並分擔細菌負擔以改善體內感染。此外，來自細菌感染的巨噬細胞（這裡稱為細菌工程化巨噬細胞）具有上調的膜病原體相關受體，可增強細菌和內毒素的識別。細菌工程化的GM因此實現了敗血症和傷口感染的有效治療，並顯著緩解了細菌性肺炎。細菌工程化的宿主免疫細胞可作為精準治療細菌感染的全新藥物。

We developed an immune cell sponge for bacteria and endotoxin adsorption. Hydrogel is initiated in macrophage cytoplasm to construct intracellularly gelated macrophage (GM), which ensures intact cell morphology and membrane structure identical to the source macrophage. GM exhibits similar neutralizing capability towards bacteria and endotoxin to host macrophage via receptor-ligand interaction, and shares bacterial burden to ameliorate in vivo infection. Furthermore, GM derived from bacteria-infected macrophage (here referred to as bacteria-engineered macrophage) is found to have upregulated membrane pathogen-related receptors for strengthened bacterial and endotoxin recognition. Bacteria-engineered GM achieves an efficient management of sepsis and wound infection, and targeted alleviation of bacterial pneumonia. Instead of receptor modulation via gene engineering, bacteria-engineered host immune cell, upon intracellular gelation, demonstrates a natural cell engineering venue to obtain comprehensive neutralization decoys.



胞內凝膠化處理的細菌感染的免疫細胞可作為細胞海綿有效吸附細菌、內毒素和炎症因子以高效治療細菌感染。

Bacteria-engineered host immune cells, upon intracellular gelation, can efficiently sequester bacteria, endotoxins and inflammatory cytokines to effectively fight against bacterial infection.