Microbiome Nano Medicine

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Recent scientific evidence indicates that human is a holobiont or supraorganism, contributed by 1% of human genome and 99% of microbial genome (microbiome). Coelomate animals have coevolved with a diverse range of symbiotic microbes, collectively known as the environmental microbiota. Microbiota is involved in the regulation of multiple host immune and metabolic pathways, giving rise to interactive host-microbiota metabolic, signaling, and immune-inflammatory axes. Host and gut microbes coproduce a large array of materials during the metabolism of food, many of which play critical roles in shuttling information between host cells and the host's microbes. Extracellular vesicles (EVs) were found in 1960 through Electron Microscope (EM) when EVs in multivesicular bodies were observed in reticulocytes and released into the extracellular space. It was found that microbes also secrete EVs in 1960s using EM. Now, it is known that both prokaryotic and eukaryotic cells release EVs as means of intercellular communication, influencing neighboring and distant cells. Bacterial EVs are spherical bi-layered phospholipids ranging in size from 20-200 nm in diameter, called by nanovesicles, that are produced from both gram-negative and gram-positive bacteria during their proliferation and death. While commensal bacteria can not penetrate mucosal barrier, their secreting EVs can penetrate through the mucosal barriers, enter the systemic circulation, and then distribute to target organs and intracellular organelle. So, microbial EVs can be used as biomarkers and smart drugs. Certain pathogenic bacteria-derived EVs induce disease, whereas some beneficial bacteria-derived EVs protect the development of disease. In this prestation, I will talk about microbial EVs as a new horizon of precision medicine.