Bacteria Shed Light on Cancer Treatment

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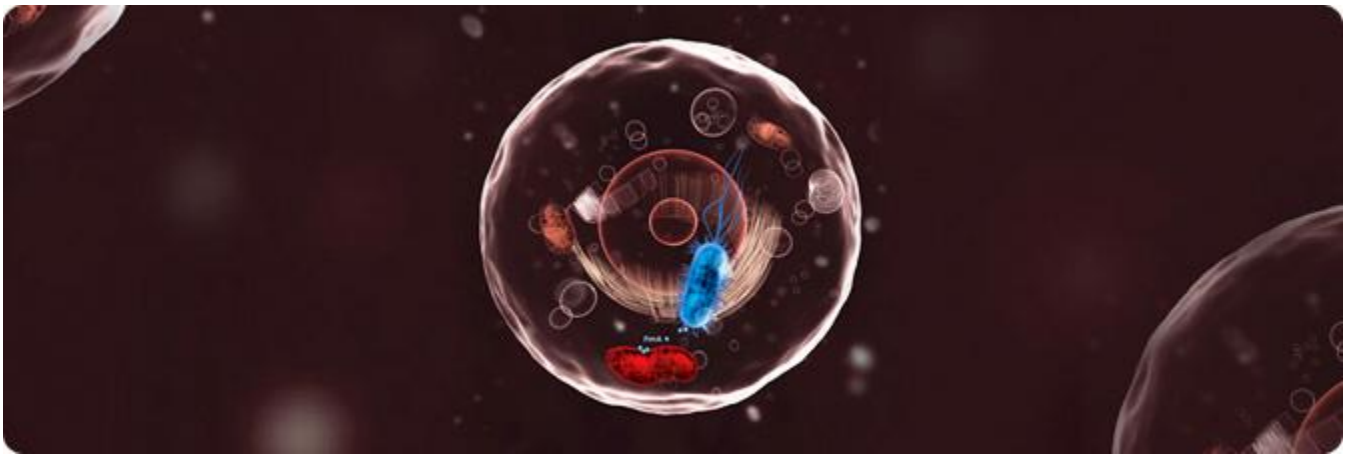

Scientists at the National University of Singapore (NUS) and A-STAR's Institute of Molecular and Cell Biology (IMCB) are the first to discover that the bacterial protein called FimA has a unique function in turning off the suicide program, known as apoptosis, of the host cells during infection. This finding is published on 26 March in the prestigious science journal, ***Molecular Cell***.

On daily basis, many cells in our body will be infected by bacterial or viral pathogens and others may undergo mutations that may cause the cells to become cancerous. To prevent the damage from spreading further and eventually causing diseases, these infected or mutated cells would need to activate a cell suicide program, known as apoptosis, to permit the cells to be "self-destructed. To mount a successful infection in the host, thereby causing disease, the bacterial pathogens need to have a way to prevent the host cells from committing suicide.

It is known that the command center for activating the cell suicide program is situated inside a type of cellular structure inside the cell known as "mitochondria". Said A/P Victor YU, who is the lead researcher in the study, "Until six years ago, our research focus got nothing to do with infection, but has always been on studying the details how the command center in mitochondria works in the hope that we can come up with a better way to treat cancers. "When a talented postdoctoral fellow, Dr. Sunil Sukumaran, with extensive experience in working with bacterial pathogens in human gut joined the laboratory six years ago, we could not resist the temptation to ask the question whether bacterial pathogens in our gut inhibit the suicide response of the infected cells by directly hijacking the command center at mitochondria".


SCIENCE

Bacteria provide a clue for better cancer treatment

'Missing link found' in cancer fight

By Victoria Vaughan

A DISCOVERY made by the National University of Singapore (NUS) and A*Star's Institute of Molecular and Cell Biology

IN THE NEWS: ***The Straits Times***, Science, pD10, Missing Link Found In Cancer Fight, 10 April 2010

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These researchers now found that once the bacteria get inside the cell, FimA released by the bacteria is able to quickly target to host cell mitochondria and turn off its cell suicide program by binding to the VDAC-hexokinase protein complex to prevent them from separation which is a necessary step for activating the cell suicide program. Interestingly, works by many research groups in the cancer field over the last ten years had already generated several lines of evidence in implicating VDAC-Hexokinase

protein complex play an important role in stopping cancer cells from committing suicide. It is remarkable that the same protein complex is involved in shutting down the suicide program by the bacterial pathogen.
The discovery that there is a connection between bacterial infection and cancer would have far reaching implications which may lead to new treatment for these two seemingly unrelated diseases. In future, chemicals capable of binding to the protein complex could potentially be exploited as drug candidates for treating cancers as well as infectious diseases caused by the gut bacteria.

Publication:

S.K. Sukumaran, N.Y. Fu, B.T. Chua, K.F. Wan, S.S. Lee and V.C. YU. A soluble form of the pilus protein FimA targets the VDAC-hexokinase complex at mitochondria to inhibit host cell apoptosis, ***Molecular Cell***, 37: 768-783, 2010