PRESS RELEASE

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Singapore’s IMCB researchers shed light on how Candida albicans transform into a life-threatening form

Researchers at the Agency for Science, Technology and Research’s (A*STAR) Institute of Molecular and Cell Biology (IMCB) have discovered new molecular mechanisms that provide a more detailed understanding of how the normally benign Dr. Jekyll-like fungus known as Candida albicans transforms into a serious and often life-threatening Mr. Hyde-like form.

C. albicans can cause serious and potentially life-threatening infections in the mouth, blood and other tissues of people who are undergoing cancer chemotherapy or radiation treatments, or who have developed AIDS or other diseases that damage the immunity of the individual.

In two separate papers published this month in Developmental Cell and last month in the EMBO journal, the team of scientists led by Associate Professor (A/P) Wang Yue, Principal Investigator at IMCB, have managed to reveal previously unknown mechanisms which are responsible for causing the infectious phase of C. albicans.

The fungus starts its ‘attack’ on a patient by changing its oval shape into a filamentous form, which has thin, threadlike appendages emerging from the cell body. A/P Wang’s team, who has been studying C. albicans for more than seven years, was responsible for identifying the master “controller” protein called Hgc1 in 2004. This “controller” functions like a regulator and tells the fungus when to start the transformation from the harmless oval shape to the infectious filamentous form. “One question remained, however – how does it activate the cellular machineries that determine the fungal cell shape?” said A/P Wang.

A/P Wang’s team found the answer to this question in two proteins called Rga2 and Cdc11. They discovered that they each function like a switch on two different cellular machineries that normally determines cell shape. “The master regulator Hgc1 acts like the ‘finger’ that flips the switches to start the infection process” said A/P Wang.

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“Our findings have uncovered detailed molecular mechanisms which define how these two proteins interact with the master ‘controller’ to cause infections. This has opened new opportunities for us to investigate further into a new range of therapeutic targets for fungal infections,” explained A/P Wang.

In the same issue of Developmental Cell, the team’s work was given an expert mention² by a leading *C. albicans* researcher, Dr. Peter Sudbery, stating its importance in bringing awareness of the cellular processes that is necessary for *C. albicans* to transform to its infectious state.

In addition, the new knowledge of the detailed interaction of these proteins with other cellular machineries has also revealed critical information on how cells in general determine their shape, a fundamental question in biology as Rga2 and Cdc11 are also found in nearly all eukaryotic organisms.

Largely due to the AIDS pandemic in the last 25 years, the once nearly harmless and commensal fungus Candida albicans has become one of the most prevalent microbial pathogens in AIDS patients, causing life-threatening infections with high death rate, especially in infected children.

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For more information, please contact:

Joshua WOO
Corporate Communications
Institute of Molecular and Cell Biology (IMCB)
Tel: (65) 6586 9771
Email: woohk@imcb.a-star.edu.sg

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Notes to the editor

Figure 1

Killing of a macrophage by *Candida albicans* through hyphal (thread-like appendages) growth

Research publications


About the Institute of Molecular and Cell Biology (IMCB)
http://www.imcb.a-star.edu.sg

The Institute of Molecular and Cell Biology (IMCB) is a member of Singapore’s Agency for Science, Technology and Research (A*STAR) and is funded through A*STAR’s Biomedical Research Council (BMRC). It is a world-class research institute in biomedical sciences with core strengths in cell cycle, cell signalling, cell death, cell motility, protein trafficking, developmental biology, structural biology, genomics and infectious diseases. Its recent achievements include leading an international consortium that successfully sequenced the entire pufferfish (Fugu) genome. The IMCB was awarded the Nikkei Prize 2000 for Technological Innovation in recognition of its growth into a leading international research centre and its collaboration with industry and research institutes worldwide. Established in 1987, the Institute currently has 40 independent research groups with more than 500 staff members.