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[Medicine] National Yang Ming University Researchers Identify Compound That Inhibits Cancer Development without Damaging Normal Cells

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NYMU Spotlight (2012/07/20) & tophealth.com (2012/07/19) A research team at National Yang Ming University led by Professor Zee-Fen CHANG at the Institute of Biochemistry and Molecular Biology has made a significant breakthrough in fundamental medicine. The team has identified a compound that can efficiently control the development of cancer cells without damaging normal cells.

Chemotherapy is the most widely adopted cancer treatment. Doxorubicin is an widely used antineoplastic drug that targets multiple types of cancer. It can cause severe damage to DNA and kill cells, but the effect comes commonly to both cancer cells and normal cells, and in order to efficiently kill the cancer cells, high-dose and intensive medication is required, so the drug's strong side effects, such as vomiting, nausea, inflammation, hair loss, and even cumulative damage to heart, bring limit to the medication.

According to CHANG, during DNA repair, there is a requirement for dideoxy nucleotide; by analyzing the metabolism difference of the dideoxy nucleotide between DNA-damaged cancer cells and normal cells, the research team finds increasing expression of ribonucleotide reductase (RNR) in the cancer cells' repair along with the effect of thymidylate kinase (TMPK) that is found to be bound with the supply of enough and balanced volume of four types of RNR that help with repair, for the team finds that the reduction of TMPK's activity causes imbalance among the four types of RNR and leads to incomplete DNA repair and cell apoptosis. On the other hand, the team finds decreasing RNR expression in damaged normal cells, i.e., even under the circumstance of decreasing TMPK, the four types of RNR keeps balanced until the DNA repair is complete, while the cells stay sleep, not apoptosis.

CHANG stressed, upon the basis of the findings, the team targets TMPK and develops one inhibitor that suppresses TMPK with a luminescent rapid screening system. The inhibitor can selectively reduce the growth of adenosine triphosphate (dTTP) and, together with low-dose doxorubicin, efficiently kills cancer cells while do no harm to the normal cells.

The findings have been published in Cancer Cell, July 10.

Related Website:
http://www.ncbi.nlm.nih.gov/pubmed/22789537

Further Information:
NYMU Spotlight 2012/07/20 (Chinese)
Tophealth.com 2012/07/19 (Chinese)

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