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Singapore discovers protein that promotes chemotherapy resistance

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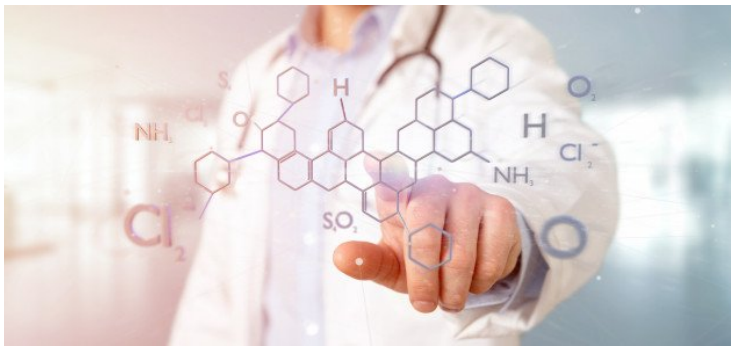
NUS researchers identify a novel molecule DUSP16 that plays an important role in a cancer patient's response to chemotherapeutic drugs



Chemotherapy is a drug treatment that uses powerful chemicals to kill fast-growing cancer cells in the body. The resistance of cancer cells to chemotherapy is marked by changes and increased output of certain proteins. These altered proteins can help doctors to identify patients who will not respond well to chemotherapy and paves the way for the development of therapeutic intervention to “re-sensitise” their cancer cells to treatment.

In a *Nature Communications* article published mid-April, Associate Professor Zhang Yongliang from NUS Yong Loo Lin School of Medicine’s Immunology Translational Research Programme reported the finding of one such altered protein in a study that identified how a molecule called DUSP16 plays an important role in a cancer patient’s response to chemotherapeutic drugs.

Assoc Prof Zhang and his study team, in collaboration with clinical scientists including the team led by Professor Goh Boon Cher, Deputy Director of both the Cancer Science Institute of Singapore at NUS and NUS Center for Cancer Research (N2CR), found that an increased expression of DUSP16 led to resistance from cancer cells to chemotherapy in colorectal, nasopharyngeal, gastric and breast cancer. Prof Goh’s team studies mainly cancers of the upper aerodigestive tracts (of the head and neck and lung), which are among the most frequent cancers, and seeks to understand these diseases.

Analysis of head and neck cancer patients, and breast cancer patients showed that those with higher DUSP16 expression in their cancer cells lived for significantly shorter periods compared to patients with lower levels of DUSP16. DUSP16 expression can thus be used as a biomarker for sensitivity of cancer patients to chemotherapy, which will be important for clinicians seeking to design suitable treatment, said Assoc Prof Zhang. This molecule could also be targeted for the development of new therapies to improve the success of chemotherapy treatment. While this discovery is not only relevant to these four types of cancer, more research would be needed to examine other cancer types.

The study also found that chemotherapy drugs are a factor in the increased expression of DUSP16. This means that once chemotherapy begins, the expression of DUSP16 will increase in patients, Assoc Prof Zhang added. In addition, other factors such as stress or infections have also caused increased expression of DUSP16.

While there are no alternative treatments that might be effective in cancer patients who test positive for the increased expression of DUSP16, Assoc Prof Zhang and his team are planning to conduct further research to identify molecules and drugs that can reduce DUSP16 levels in patients.