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## Preventing Heart Failure and Increasing Survival Rates in Cancer Patients

*A breakthrough by scientists at Queen's University Belfast could help reduce heart failure in cancer patients around the world, and ultimately increase survival rates.*

Scientists at Queen's Centre for Vision and Vascular Science have discovered the role of an enzyme which, when a patient receives chemotherapy, can cause life-threatening damage to the heart. This has, until now, restricted the amount of chemotherapy doses a patient can receive; but while protecting the heart, this dilutes the chemotherapy's effectiveness in destroying cancerous tumours.

By identifying the role of the enzyme -- NADPH oxidase -- work can now go ahead into making chemotherapy treatments more effective and reduce the toxic effects of cancer treatment on the heart.

Dr. David Grieve, jointly leading on the research at Queen's School of Medicine, Dentistry and Biomedical Sciences said: "While chemotherapy drugs are highly effective in treating a wide range of tumours, they can also cause irreversible damage to the heart. This means that doctors are restricted in the doses they can administer to patients. In recent years, scientists have been searching for new drugs to prevent these side-effects".

"Although we have known about the NADPH oxidase enzyme for many years, until now, we were not aware of its crucial role in causing heart damage associated with chemotherapy. Our research findings hold clear potential for the creation of new drugs to block the action of the enzyme, which could significantly reduce heart damage in cancer patients".

"Ultimately, this would allow for the safer use of higher doses of chemotherapy drugs and make the treatment more effective against tumours. Despite improved treatments, cancer is currently responsible for 25 per cent

of all mortality in the western world. By reducing the risk of heart failure associated with chemotherapy, patient survival rates could be significantly increased".

Scientists at Queen's are now concentrating their efforts on further studies to define the precise role of NADPH oxidase in the development of heart failure associated with cancer therapies. It is hoped that these may lead to the development of a drug which would have the potential to save lives among cancer patients.

The research by Dr. David Grieve and Professor Barbara McDermott was funded by the British Heart Foundation in Northern Ireland and published in journal, Cancer Research.

### **Background information**

Enzymes are proteins that catalyse (increase or decrease the rates of) chemical reactions.

Around 7 per cent of cancer patients treated with the upper limit dosage of chemotherapy agent Doxorubicin currently develop heart failure. Doxorubicin is commonly used in the treatment of a wide range of cancers. Its most serious adverse effect is life-threatening heart damage. The drug is administered intravenously, in the form of hydrochloride salt. The drug was originally isolated in the 1950s from bacteria found in soil samples taken from Castel del Monte, an Italian castle.

**Source:** Y. Zhao, D. McLaughlin, E. Robinson, A. P. Harvey, M. B. Hookham, A. M. Shah, B. J. McDermott, D. J. Grieve. Nox2 NADPH Oxidase Promotes Pathologic Cardiac Remodeling Associated with Doxorubicin Chemotherapy. Cancer Research, 2010; 70 (22): 9287 DOI: 10.1158/0008-5472.CAN-10-2664