Hope for threatened Tasmanian devils: Research paves way for vaccine development

March 11 2013

Credit: Save the Tasmanian Devil Program

New research paves the way for the development of a vaccine for the Tasmanian devil, currently on the brink of extinction because of a contagious cancer.

It has been less than two decades since scientists discovered the contagious cancer devil facial tumour disease (DFTD) which causes 100 per cent mortality in the endangered marsupials. The facial cancer,

which spreads when the devils bite each other's faces during fighting, kills its victims in a matter of months. As it has already wiped out the majority of the population with sightings of devils reduced by 85 per cent, scientists are desperate to find out more about the mysterious cancer which somehow manages to evade the devils' immune system.

Until now, scientists have believed that the tumours were able to avoid detection by the immune system because the Tasmanian devils have very little genetic diversity (preventing the immune system from recognising the tumour as foreign). However, a University of Cambridge led collaboration with the Universities of Tasmania, Sydney and South Denmark has discovered that the explanation is more complex.

On the surface of nearly every mammalian cell are major histocompatibility complex (MHC) molecules. These molecules enable the immune system to determine if a cell is friend or foe, triggering an immune response if the cell is foreign and a potential threat. The new research, published today, 11 March, in the journal *PNAS*, reveals that DFTD cancer cells lack these critical molecules, thereby avoiding detection by the devils' immune system.

Credit: Save the Tasmanian Devil Program

Professor Jim Kaufman, from the University of Cambridge's Department of Pathology, said: "Once it was found that the cancer was escaping from the devils' immune system, scientists needed to figure out how."

The researchers found that the DFTD cells have lost the expression of MHC molecules, but that the genes that code for these molecules are still intact. This means that these genes could potentially be turned back on. Indeed, the scientists showed that by introducing signalling molecules such as interferon-gamma, a protein which triggers the immune response, the DFTD cells can be forced to express MHC molecules.

Dr Hannah Siddle, lead author of the paper from the University of

Cambridge, said: "Developing a vaccine based on our research could tip the balance in the favour of the devil and give them a fighting chance."

"However, we still face some hurdles. The tumour is evolving over time and any vaccine programme would have to take this into consideration. Also, because of the difficulties of vaccinating a wild population, it may be more efficient to use a vaccine in the context of returning captive devils to the wild."

Although the only other contagious cancer has been found in dogs (canine transmissible venereal cancer), the rapid development of DFTD highlights how quickly they can emerge.

Professor Kaufman added: "Our study has implications beyond the Tasmanian devil. Sooner or later a human strain of contagious cancer will develop, and this work gives us insight into how these diseases emerge and evolve."

More information: The paper 'Reversible epigenetic down-regulation of MHC molecules by devil facial tumour disease' will be published in the 11 March edition of *PNAS*.

Provided by University of Cambridge