Devil disease is immortal, new study finds

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Dr Kathy Belov: "Amazingly Devil Facial Tumour Disease is replicating itself just as fast as ever."

(Phys.org)—The outlook for Tasmanian devils appears even worse following breakthrough research by the University of Sydney published in *PLoS One*, today.

This new research reveals that Devil Facial Tumour Disease (DFTD), which has already decimated 85 percent of the devil population, is not

weakening with time, making captive breeding and a vaccine urgent priorities to preserve the species.

"The scientific community trying to address the disease hoped it was slowing down or would show signs of slowing down but this research proves it is not doing that and is more likely to get stronger," said Dr Kathy Belov from the Faculty of Veterinary Science at the University and lead author of the paper.

"We have discovered that DFTD is able to survive indefinitely because the 'caps' at the ends of their chromosomes are being replenished, essentially preventing ageing in this cell line."

DFTD is a naturally occurring contagious cancer which is transmitted between devils when they bite each other. It is transmitted through the cloning of its cells.

Since its appearance in 1996 DFTD has killed in excess of 100,000 animals and gone through billions of cell divisions, so some deterioration of the cell line might have been expected.

"Amazingly DFTD is replicating itself just as fast as ever. Our results confirm that DFTD represents one of the oldest naturally living, and continuously transferred cell lines in nature," said Beata Ujvari, a postdoctoral research fellow in the Faculty of Veterinary Science and co-author of the paper.

The research looked at telomere changes over time in DFTD cells. Telomeres are repeated sequences on the ends of chromosomes that have been compared to the protective plastic on the end of a shoelace.

In the same way, the primary role of the telomeres is to protect the end of the chromosomes from fraying. During normal cell division telomere

length shortens until a critical length is reached, at which point the cell can no longer divide.

In human cancer cells telomeres do not get shorter but are maintained by an enzyme called telomerase.

"Similarly we have now confirmed that in DFTD cancer cells the telomeres were also maintained by the telomerase enzyme so the cells can divide without limit," Ujvari said.

"The confirmation of the mechanism did not surprise us, given its existence in humans, but the longevity and stability of the disease is surprising and at this point, the revelation that DFTD cells are immortal is demoralising."

In fact the researchers discovered that both the length of the telomere and the activity of the telomerase have been increasing over time in the devils.

Nobody has previously found that the activity of telomerase can increase over time in a species and future studies will need to test if this leads to an increased rate of cell division in the devils.

"In the meantime we need to redouble our efforts to protect this species from extinction. We have found that the tumour is not going to die out, meaning that our major hope at the moment lies in removing the devils from the path of DFTD. The captive breeding program is essential to save this iconic species from disappearing completely," Ujvari said.

More information: Ujvari B, Pearse A-M, Taylor R, Pyecroft S, Flanagan C, et al. (2012) Telomere Dynamics and Homeostasis in a Transmissible Cancer. *PLoS ONE* 7(8): e44085. doi:10.1371/journal.pone.0044085

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