

Inbred organisms are more likely to develop tumours

March 22 2018, by Nicholas Payne

Inbreeding could lead to increased rates of cancer, putting both humans and endangered animals at risk according to a review led by researchers at Deakin University's Centre for Integrative Ecology.

Deakin genetics expert Dr. Beata Ujvari said the impact of inbreeding on the emergence and progression of diseases such as cancer had previously been overlooked.

"Genetic [diversity](#) is essential for allowing organisms to adapt and respond to challenges, and there is a clear link between [genetic diversity](#) and resistance to parasites and pathogens," Dr. Ujvari said.

"Low genetic diversity has already been determined to result in decreased growth rate and fertility, but our review found low genetic diversity and inbreeding can also be associated with an increased risk of cancer in humans and animals.

"By reducing immune function, and thereby increasing the vulnerability to cancer-causing parasite and pathogen infections, inbreeding may constitute a significant underpinning of cancer development in humans as well as in other organisms."

Dr. Ujvari said the findings could have serious implications for conservation efforts, as biologists are forced to breed endangered animals from ever-dwindling genetic pools.

"Our review demonstrates the need to consider the effects of cancer on conservation biology," she said.

"Low genetic diversity and inbreeding may elevate [cancer development](#) in wildlife, even further reducing the long-term survival of the more than 16,000 animal species currently classified as endangered due to issues such as habitat destruction and climate change.

"For example, it's estimated there could be as few as 2500 Australian western barred bandicoots left in existence, and up to 61 per cent of those in captive breeding facilities were diagnosed with tumours and carcinoma in 2008.

"That problem has since has been resolved, but it was nevertheless a major warning sign for the importance of maintaining genetic diversity in endangered species."

Dr. Ujvari said previous studies had shown association between close-kin unions in humans and elevated risk of developing certain cancers.

"In some societies the reduction of population size, cultural traditions promoting close-kin marriages, and natural selection have contributed to an increased likelihood of a reduction in genetic diversity," she said.

"Studies have shown reduced genetic diversity and inbreeding among humans is associated with an increased risk of developing leukaemia, lymphoma, colorectal and prostate cancer, but a reduced risk of breast, skin, thyroid and female genital cancers.

"The results from [human](#) studies indicate the effects of genetic diversity and inbreeding on the development of a complex disease such as cancer may be tumour specific.

"Our publication clearly shows that further studies are crucial in order to fully understand the relationship between genetic diversity, inbreeding and cancer."

The full findings – the first paper of its kind to provide a comprehensive review of published data on the subject – were today published as "Genetic diversity, [inbreeding](#) and [cancer](#)" in the journal *Proceedings of the Royal Society B*.

More information: Beata Ujvari et al. Genetic diversity, inbreeding and cancer, *Proceedings of the Royal Society B: Biological Sciences* (2018). [DOI: 10.1098/rspb.2017.2589](https://doi.org/10.1098/rspb.2017.2589)

Provided by Deakin University

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