Suppressor genes linked to less cancer and longer lifespan found in whales

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A trio of researchers with ICAEV, Universidad Austral de Chile, and the University of Liverpool, respectively, have found suppressor genes linked to longevity and less cancer in two species of whales. In their

paper published in the journal *Proceedings of the Royal Society B*, Daniela Tejada-Martinez, João Pedro de Magalhães and Juan C. Opazo, describe their genetic study of longevity in cetaceans and what they learned.

Cetaceans are marine mammals including whales, porpoises and dolphins. Prior research has shown that many of them defy a trend in the animal kingdom in which bigger animals tend to have a greater chance of developing cancerous tumors that limit their lifespan. One species of whale, for example, has been found to live as long as 200 years. In this new effort, the researchers tested the theory that genetics must play a role in such longevity and protection against cancer. To that end, they studied the genes of two types of long-lived whales, toothed and baleen. They created genetic maps of the parts of their genetic codes that contain tumor suppressor genes and then compared them with other mammals, both marine and land dwelling—including the human genome.

The differences between the maps showed 71 tumor suppressor genes that were in both of the whales studied. In The scientists found that the turnover rate of these genes was 2.4 times faster than any other known mammal. They also found that several of the genes were related to senescence, which prior research has found relates to suppression of tumors. The researchers noted that bottlenose dolphins (which are known to have much higher rates of cancer than the whales they were studying) had far fewer tumor suppressor genes.

The researchers concluded by noting that they had also identified whale genes linked to human conditions such as leukemia, cancer and nervous system problems. They also suggest that the higher numbers of copies of aging genes in whales and other cetaceans likely prevents the development of some types of cancerous tumors. They acknowledge that more work is required to fully understand why cetaceans are less prone

to cancer and why they live so long.

More information: Daniela Tejada-Martinez et al. Positive selection and gene duplications in tumour suppressor genes reveal clues about how cetaceans resist cancer, *Proceedings of the Royal Society B: Biological Sciences* (2021). DOI: 10.1098/rspb.2020.2592