

Ongoing retroviral invasion of the koala germline and its contribution to cancer

Retrovirus-like elements occupy a considerable part of the genome of placental mammals (about 8% in humans). They are also present in marsupials such as the koala. Now, [Gayle McEwen et al.](#) from the Leibniz Institute for Zoo and Wildlife Research in Berlin have discovered that insertions of elements of the KoRV retroviruses family contribute to the high rate of leukemia, lymphoma and other cancers in koala populations in New South Wales and Queensland in Australia. In contrast to humans, where retroviruses in the germline have been mutated into inactive genome elements during million years of evolution, the koala germline is currently being invaded by exogenous retroviruses, a process starting about 50,000 years ago. There are on average 100 retroviruses in the koala genome and about two-thirds of these are full-length, intact elements that are capable of re-integration at novel positions in somatic cells. By comparing the DNA from cancer cells to that of the germline, McEwen et al. demonstrate that tumors contain newly integrated KoRV copies at positions not present in the germline. These affect gene expression, leading to increased cell division rates, and, ultimately, to cancer. Hotspots for insertion are in regions with known cancer-related genes. Such knowledge of KoRV biology is not only essential for guiding koala species conservation efforts, but may also give us insight in how (repeated) invasions of the germline by retrovirus-like elements have contributed to the structure of our genomes.