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Koala Retrovirus (KoRV): Are Humans at Risk of Infection?

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Abstract. This manuscript summarizes the break-out session held on koala retrovirus (KoRV): Any risks of human infection? at the *Koala Conservation Workshop: The koala and its retroviruses: implications for sustainability and survival* held at San Diego Zoo, April 17–18, 2013. The goals of this break-out session were to discuss the zoonotic risk of koala retroviruses, the necessity to test human populations for exposure, and precautions to be taken to protect humans who transport or handle koalas *(Phascolarctos cinereus)*. Currently there is no evidence to support the zoonotic potential of KoRV, and the necessity to test humans for KoRV infection needs to be further justified. We recommend strict compliance with standard precautions when handling animals.

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Zoonotic potential of retroviruses

Based on their genomic structure, retroviruses are generally classified as either simple or complex. A number of complex retroviruses from nonhuman primates such as simian immunodeficiency virus, simian leukemic virus, and foamy virus have the capacity to jump species and infect humans. Koala retrovirus (KoRV), by contrast, is a simple retrovirus of the gammaretrovirus genus, whose members do not contain the accessory proteins required to counteract human cell restriction factors. Replication of a gammaretrovirus in human cells is therefore largely inhibited by human restriction factors, such as APOBEC 3 enzymes and tripartite motif (TRIM) proteins.

Viruses made in non-primate cells will also be inactivated by the complement system following binding of naturally occurring antibodies to the alpha gal epitope.

In the extensive studies and discussions that followed the discovery of a putative human retrovirus, xenotropic murine leukemia virus-related virus (XMRV), which was first isolated from human prostate cancer tissues but later shown to be a laboratory contaminant, the likelihood of a gammaretrovirus jumping species and replicating efficiently in humans was proposed and dismissed. Some gammaretroviruses have been shown to have the ability to infect human cells efficiently in culture yet show no evidence of transmission to humans, for example, feline leukemia virus (specifically FeLV subgroup B) and porcine endogenous retrovirus (PERV), both of which are related to KoRV. While 2–3% of U.S. domestic cats are infected with FeLV, which causes cat leukemia and lymphoma, FeLV infection of humans has not been detected (Levy *et al*., 2008; Hartmann, 2012). Neither has PERV been demonstrated to be zoonotic, PERV has not been detected in patients who

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