

Koala Retrovirus Status and Putative Koala Retrovirus-Associated Diseases in Koalas (*Phascolarctos cinereus*) in North American Zoos

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ABSTRACT. The living koala population in North America is predominantly descended from koalas imported from a single Australian facility in 1976 and 1981, with several smaller imports from other facilities between 1985 and 2013. Koala retrovirus subtype B (KoRV-B) entered the North American population via imports in 2005, 2008, and 2013. The 2005 and 2008 KoRV-B positive lineages are deceased, but the 2013 KoRV-B positive lineage has seven surviving koalas, including one female of breeding age. Three koalas born to KoRV-B negative dams were documented as being KoRV-B positive at 15 months of age after nursing from a KoRV-B positive female. The prevalence of koala retrovirus subtype A (KoRV-A) detection in North America is 100% but the prevalence of KoRV-B detection is 17%. Lymphoid neoplasia is a common cause of mortality, dating back to founder koalas. Most cases of lymphoid neoplasia have occurred in presumptive KoRV-B negative koalas, and many cases have occurred between the ages of four and nine years. Familial clusters of lymphoid neoplasia are apparent. Additionally, myelodysplasia and fatal peripheral cytopenias are important putative KoRV-associated diseases that cause mortality in koalas in North America, with higher prevalence in koalas younger than two years of age. Since 2013, breeding of known KoRV-B positive koalas has been managed, to maintain separation from the remainder of the KoRV-B negative population.

Koalas in North America

The San Diego Zoo opened in 1916, after a small zoo exhibit was left behind at the end of the 1915–1916 Panama–California Exposition. Nine years later, in 1925, the zoo received international attention when Australia donated animals, including the first two koalas to arrive in the United States. In the 1950s, four koalas (two males and two females; 2.2) were imported but did not produce offspring. In the 1960s, two more importations occurred (three males and three females; 3.3). These koalas produced 11 offspring, three of which lived into the 1970s when this lineage ended. In 1976, six mature koalas (two males, four females, and one unknown sex pouch young; 2.4.1) were imported to San Diego Zoo. These koalas, plus an additional seven koalas

(one male and six females; 1.6) imported in 1981 from the same facility in Australia, are the founders of the current North American koala population. Later, several other zoos imported smaller numbers of koalas from a variety of facilities in Australia. The last importation occurred in 2013.

The current North American koala population consists of 52 koalas living at 10 different zoos. San Diego Zoo Wildlife Alliance (SDZWA) cares for the largest colony of koalas outside of Australia (32 resident koalas) and manages the North American koala population through leadership of the Association of Zoos and Aquariums (AZA) Koala Species Survival Plan (SSP) program. All 10 zoos holding koalas participate in the Koala SSP program. In 1983, SDZWA established the Koala Education and Conservation Program (KECP) to support koala care, education, research, and

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