

Koala Retrovirus Related Diseases in European Zoo-based Koalas (*Phascolarctos cinereus*)

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ABSTRACT. European zoos have housed koalas (*Phascolarctos cinereus*) for almost 25 years. From the time the first individual arrived on the old continent to the present population of 30 (15.15) animals, medical knowledge has improved significantly. During this time, 57 koala deaths have been recorded. With the discovery of the koala endogenous retrovirus (KoRV), the question remains whether it is involved in the various diseases found in captive population and specifically whether it was involved in the 57 deaths. This question is unfortunately difficult to answer as no real time tests were performed before and during the course of the diseases. A study of the detailed information of these records shows that almost half of them concern very young animals probably mainly because of joeys falling from the pouch and maternal neglect. A few deaths have no recorded information or are clearly not related to any infectious cause. 44% are due to neoplastic and opportunistic or non-opportunistic bacterial infectious process. While KoRV is thought to cause immunosuppression and tumour induction (mainly lymphomas), the link between disease and the virus has not been clearly established.

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The San Diego Zoo loaned the first koalas to European zoos in 1989 (Hamlin Andrus, 2011) to the London zoo. The first breeding pair arrived in 1991 at the Jardim Zoológico de Lisbon, Portugal. Twenty-five years later, seven institutions house 30 animals (15.15) (Hamlin Andrus, 2011).

Over the past 25 years, our knowledge in husbandry and care of this unique species has greatly improved. One of the major recent discoveries was the presence of an active endogenous retrovirus in the genome of a large portion of wild koalas and most (if not all) captive koalas (Canfield *et al.*, 1988; Hanger *et al.*, 2000; Tarlinton *et al.*, 2005). This retrovirus is thought to be responsible for an innate immunosuppression and neoplastic induction, especially, but not only, lymphoma (Tarlinton *et al.*, 2005). This detailed retrospective study of koala deaths that have occurred in the European captive population aims to look for a possible association with the presence of the retrovirus.

In 25 years, 57 deaths have been recorded in the European population (a list of every death with details can be found in Table 1). While every adult death has been examined in detail, some joey deaths, mainly during the first days of life, are missing, depending on the keepers observations.

Among these 57 deaths, 4% (2) have no record. 5% (3) are clearly not related to the retrovirus: one case of bladder stone with death occurring post surgery, one case of head trauma with hydrocephalus internus associated, and one case of ileum and colon torsion.

Deaths of joeys accounted for 47% (27) of all deaths. Most of these cases have no details, but we can assume most of them are related to joey falling from the pouch or maternal neglect (absence of pouch cleaning, joey rejected, etc.). A few cases have bacterial culture recorded and the results are listed among the other bacterial results (Table 2).