

Title: A retrospective study of cardiovascular disease in captive orangutans (*Pongo* sp.).

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Overview: As in other great ape species, it is known that cardiovascular disease accounts for a significant number of deaths in our captive orangutan population. Little is known about cardiovascular disease in orangutans when compared to other ape species. Significant literature is available on heart disease in gorillas and chimpanzees, but there are only about six case reports in orangutans (two of which discuss congenital disease). Since orangutans are so different from these species, as shown by their early split from the ape evolutionary tree, information on cardiovascular disease in other great apes cannot be extrapolated to orangutans. This confirms that our understanding of heart disease in orangutans is lagging behind.

Methodology: Retrospective cohort study. To obtain and review all diagnosed cases of acquired cardiovascular disease in orangutans over the past 20 years. Cases can be diagnosed on routine echocardiograms or based on the onset of clinical signs. Cases of both living orangutans receiving treatment and deceased orangutans that have or haven't received treatment will be reviewed for the study. All institutions providing cases will be recognized as contributors to the study.

Timeline:

- Three months to obtain complete records (electronic and/or paper records) of all known cases of cardiovascular disease in orangutans from the past 20 years
- Three to six months to review, compile, and analyze all the information from the medical records
- Three to six months to complete the paper for publication

Goals:

- To give an overview of the unique attributes of orangutan physiology and how it may affect cardiac function
- To learn about how cardiovascular disease in orangutans differs from other great apes
- To provide a systematic review of the current cases of cardiovascular disease in orangutans and to describe:
 - Presenting clinical signs
 - Risk factors of disease (age, sex, obesity, etc.)
 - Current therapies being utilized and their success
 - Average survival time and prognosis
 - Benefits of diagnosis on routine echocardiograms
 - Specific cardiac changes noted on the echocardiograms of orangutans that lead to the diagnosis of heart disease

- Significance: This study will provide an overview of all compiled information on heart disease in orangutans. This paper will act as a source of information to zoo veterinarians and keepers on how cardiovascular disease in orangutans differs from other great apes, clinical signs of disease, and the current thoughts on how to manage cardiovascular disease. The hope is that this paper will advance our knowledge of cardiovascular disease in orangutans and enable zoo veterinarians to better treat captive orangutans with cardiovascular disease.

Shipping instructions: Complete medical records can be sent to Dr. Marino electronically by email at drmarino@gcvs.com or by mail to: Amanda Mario, 6425 Westheimer Rd, Apt. # 914, Houston, TX 77057.

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