Cleft palate discovery in dogs to aid in understanding human birth defect

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This puppy is a Nova Scotia Duck Tolling Retriever, the breed with the newly discovered genetic mutation for cleft palate. Credit: Danika Bannasch/UC Davis

UC Davis School of Veterinary Medicine researchers have identified the genetic mutation responsible for a form of cleft palate in the dog breed Nova Scotia Duck Tolling Retrievers.

They hope that the discovery, which provides the first dog model for the craniofacial defect, will lead to a better understanding of cleft palate in humans. Although cleft palate is one of the most common birth defects in children, affecting approximately one in 1,500 live human births in the United States, it is not completely understood.

The findings appear this week online in the journal *PLOS Genetics*.

"This discovery provides novel insight into the genetic cause of a form of cleft palate through the use of a less conventional animal model," said Professor Danika Bannasch, a veterinary geneticist who led the study. "It also demonstrates that dogs have multiple genetic causes of cleft palate that we anticipate will aid in the identification of additional candidate genes relevant to human cleft palate."

Bannasch, who holds the Maxine Adler endowed chair in genetics, explains that common breeding practices have made the dog a unique animal model to help understand the genetic basis of naturally occurring birth defects.

By conducting a genome-wide study of these particular retrievers with a naturally occurring cleft palate, researchers identified a mutation responsible for the development of cleft palate in the breed. Dogs with this mutation also have a shortened lower jaw, similar to humans who have Pierre Robin Sequence. The disorder, a subset of cleft palate, affects one in 8,500 live human births and is characterized by a cleft palate, shortened lower jaw and displacement of the tongue base.

Cleft palate condition occurs when there is a failure in the formation of the secondary palate, which makes up all of the soft palate and the majority of the hard palate. A disruption in the sequential steps of palate development causes a cleft palate and leads to the spectrum of cases that are observed. Children born with cleft palate may develop hearing loss and difficulties with speech and eating. They also may be at increased risk for neurological deficits.

More information: The study is available online: www.plosgenetics.org/article/info%3Adoi%2F10.1371%2Fjournal.pgen.1004257

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