Starchy Diet Evolution

Dog domestication occurred early in human civilization (>10,000 years ago). Wolves may have been attracted to human settlements to scavenge food, possibly setting the stage for the evolution of ancient wolves into domestic dogs. The purpose of this study was to identify genetic variants between wolves and dogs that may have been targets of natural selection over the course of domestication. DNA was pooled from 12 wolves of worldwide distribution and 60 dogs represented 14 breeds. Through extensive genetic analysis, 36 unique regions in the dog genome were identified that appear to have been significantly transformed over evolution. Gene ontology analysis revealed one cluster of regions associated with nervous system development and another relating to starch metabolism, digestion, and fatty-acid metabolism. Domestic dogs had key mutations in 3 genes involved in starch metabolism. The *AMY2B* gene, which encodes α-2B-amylase, had a 7.4-fold increase in copy number. *MGAM*, which encodes maltase-glucoamylase, had several base pair mutations that may increase the rate of hydrolysis of maltose to glucose. *SGLT1*, which encodes the sodium–glucose transporter 1 enzyme, had a structural mutation that may improve cellular glucose uptake. Selection at these 3 genes in particular allowed early ancestral dogs to adapt to a diet rich in starch.

Commentary

Many researchers have looked into why and how dogs were domesticated from wolves; in this study, genomic variations between wolves and dogs representing different breeds were compared. Predictably, many variants involved the CNS, suggesting that selection for altered behavior occurred during domestication. Dogs, not wolves, have genes associated with starch digestion and glucose transport. This is consistent with a dietary shift from carnivorous wolves to omnivorous dogs that scavenged around early human settlements. The timing of canine domestication is most likely consistent with the agricultural revolution and parallel evolution to a diet containing starches in both humans and dogs.—*Craig Datz, DVM, MS, DABVP, DACVN*

Source

The genomic signature of dog domestication reveals adaptation to a starch-rich diet. Axelsson E, Ratnakumar A, Arendt ML, et al. *NATURE* 495:360-364, 2013.

Risk for Blindness after Anesthesia

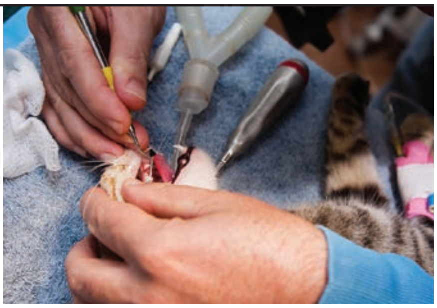
Medical records of 20 cats with postanesthetic cortical blindness (± other neurologic signs) were reviewed to document vision and neurological abnormalities and identify risk factors for blindness following anesthesia.

Cats were anesthetized for dentistry (*n* = 13), endoscopy (*n* = 4), neutering (*n* = 2), and urethral obstruction (*n* = 1). A mouth gag was used in 16 cats. Three cats suffered cardiac arrest; the remaining had no identified potential anesthetic cause of blindness. Although 3 cats had blindness with no other neurologic abnormalities, the rest showed neurologic abnormalities (eg, circling, ataxia, head tilt, weakness, opisthotonos, decreased proprioception, abnormal mentation). Fourteen cats had documented recovery of vision, 4 remained blind, and 2 were lost to follow-up while still blind. Ten cats with neurologic deficits had full recovery, 2 had mild persistent deficits, 4 were lost to follow-up with no resolution of signs, and 1 was euthanized after failure to recover. Mouth gags were identified as a potential risk factor for cerebral ischemia and subsequent blindness. Investigators determined that wide jaw opening caused tension of the temporalis and masseter muscles, potentially compromising the maxillary artery, leading to ischemic necrosis causing blindness and other signs.

Decreased perfusion to the cerebral cortex via the maxillary artery is possible with mouth gags; maximal opening of the jaw should be short or avoided. Based on this study, prognosis for recovery from cortical blindness following anesthesia is good.

Commentary

Many potential causes for the postanesthetic cortical blindness in these cats were examined (eg, anesthetics, hypotension, cardiac arrest), but findings were largely attributed to spring-loaded mouth gags. Cadaveric dissections, although inconclusive, supported the theory that this type of



mouth gag may compromise maxillary artery blood flow which, in turn, could result in cerebral hypoxia. Unfortunately, the study did not provide the prevalence of this occurrence during the evaluation but did report that 70% of cats regained vision and 59% of cats regained complete neurologic function. Until further data are available, one should be cautious not to overexpand the oral cavity when using a spring-loaded mouth gag.—*Khursheed Mama, DVM, DACVAA*

Source

Post-anesthetic cortical blindness in cats: Twenty cases. Stiles J, Weil AB, Packer RA, Lantz GC. *VET J* 193:367-373, 2012.

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