

More genes associated with canine hip dysplasia and osteoarthritis discovered

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Credit: Lea Mikkola

A study encompassing over 700 German shepherd dogs indicates that increased joint surface attrition is not the sole cause underlying the development of osteoarthritis associated with hip dysplasia.

Hip dysplasia, common in both dogs and humans, and associated osteoarthritis are complex disorders influenced by a multitude of [genes](#). Hip dysplasia causes changes to the structure and functioning of the joint, resulting in painful and progressive osteoarthritis that leads to the destruction of the articular surfaces of the hip joint. Additionally,

inflammatory factors play a role in the development of osteoarthritis.

A canine study carried out at the University of Helsinki uncovered novel loci associated with hip dysplasia and osteoarthritis, as well as those previously identified by the research group, on chromosomes 1, 9 and 28. For [gene mapping](#), [blood samples](#) were collected from more than 700 German shepherds that had relevant hip dysplasia phenotypes (normal hips to severe hip dysplasia) in the breeding database of the Finnish Kennel Club.

"The candidate genes in the associated loci revealed in this study are very interesting in terms of the disease mechanisms in hip dysplasia and osteoarthritis. However, the more specific causality of these genes remains to be shown in future studies," says Lea Mikkola, who will this spring defend her [doctoral thesis](#) on the topic at the Faculty of Veterinary Medicine, University of Helsinki.

Valuable help from dog owners

The study highlights the hereditary nature and polygenic background of hip [dysplasia](#). Due to the complexity of the disorder, gene tests for it cannot be developed in the same way as for disorders caused by a [single gene](#).

"Nevertheless, understanding the genetic factors of complex diseases and their biological roles is important for the big picture. We may be able to develop better treatment options in the future when we come to understand which genes and related networks drive disease development, and how," Mikkola notes.

The study of complex diseases requires extensive and high-quality datasets. In fact, the researchers wish to thank all of their partners for supporting their work, especially the owners of the dogs that took part in

the study.

"The collection and categorization of samples for the genetic analyses took a large effort, requiring versatile cooperation between researchers and dog owners. A particularly meaningful part of this study was that we also determined more specific [hip dysplasia](#) and [osteoarthritis](#) phenotypes. The canine DNA biobank founded and maintained by Professor Lohi was very important for the successful outcome. We have stored all of the samples collected in this project in the biobank," says Professor Antti Iivanainen, the principal investigator of the study.

More information: Lea Mikkola et al. Genetic dissection of canine hip dysplasia phenotypes and osteoarthritis reveals three novel loci, *BMC Genomics* (2019). [DOI: 10.1186/s12864-019-6422-6](https://doi.org/10.1186/s12864-019-6422-6)

Provided by University of Helsinki

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