

New AI could help diagnose dogs suffering from chronic pain

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CKCS are predisposed to CM—a disease which causes deformity of the skull, the neck (cranial cervical vertebrae) and, in some extreme cases, lead to spinal cord damage called syringomyelia (SM). While SM is straightforward to diagnose, pain associated with CM is challenging to confirm and why this research is innovative.

In a paper published by the Journal of Veterinary Internal Medicine, researchers from Surrey's Centre for Vision, Speech and Signal Processing (CVSSP) and School of Veterinary Medicine (SVM) detail how they used a completely automated, image mapping method to discover patterns in MRI data that could help vets identify dogs that suffer from CM associated pain. The research helped identify features that characterise the differences in the MRI images of dogs with clinical signs of pain associated with CM and those with syringomyelia from healthy dogs. The AI identified the floor of the third ventricle and its close neural tissue, and the region in the sphenoid bone as biomarkers for pain associated with CM and the presphenoid bone and the region between the soft palate and the tongue for SM.

Dr. Michaela Spiteri, lead author of the study from CVSSP, said: "The success of our technique suggests [machine learning](#) can be developed as a [diagnostic tool](#) to help treat Cavalier King Charles Spaniel's that are suffering from this enigmatic and terrible disease. We believe that AI can be a useful tool for veterinarians caring for our four-legged family members."

Identification of these biomarkers inspired a further study, also published in the *Journal of Veterinary Internal Medicine*, which found that dogs with [pain](#) associated with CM had more brachycephalic features (having a relatively broad, short skull) with reduction of nasal tissue and a well-defined stop.

SVM student, Eleonore Dumas, whose 3rd year project formed part of the study data, said: "Being able to contribute to the development of diagnostic tools that allow for earlier diagnosis of patients suffering from this painful condition has been both challenging and incredibly rewarding."

Dr. Penny Knowler, lead author of the study from SVM, said: "This study suggests that the whole skull, rather than just the hindbrain, should be analysed in diagnostic tests. It also impacts on how we should interpret MRI from affected dogs and the choices we make when we breed predisposed [dogs](#) and develop breeding recommendations."

Adrian Hilton, Distinguished Professor from the University of Surrey and Director of CVSSP, said: "This project demonstrates the potential for AI using machine learning to provide new diagnostic tools for [animal health](#). Collaboration between experts in CVSSP and Surrey's School of Veterinary Medicine is pioneering new approaches to improve animal health and welfare."

The findings of the studies are available to read on the *Journal of Veterinary Internal Medicine* website.

More information: Susan P. Knowler et al. Facial changes related to brachycephaly in Cavalier King Charles Spaniels with Chiari-like malformation associated pain and secondary syringomyelia, *Journal of Veterinary Internal Medicine* (2019). [DOI: 10.1111/jvim.15632](https://doi.org/10.1111/jvim.15632)

Michaela Spiteri et al. Using machine learning to understand neuromorphological change and image-based biomarker identification in Cavalier King Charles Spaniels with Chiari-like malformation-associated pain and syringomyelia, *Journal of Veterinary Internal Medicine* (2019).
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