LETTER TO THE EDITOR   OPEN ACCESS

Response to Letter Regarding "An Artificial Neural Network-Based Model to Predict Chronic Kidney Disease in Aged Cats"

Vincent Biourge[1] | Sebastien Delmotte[2] | Alexandre Feugier[1] | Richard Bradley[3] | Molly McAllister[4] | Jonathan Elliott[5]

[1]Royal Canin Research Center, Aimargues, France | [2]Mad-Environnement, Nailloux, France | [3]Waltham Pet Science Institute, Waltham on the Wolds, Leicestershire, UK | [4]Banfield Pet Hospitals, Vancouver, Washington, USA | [5]The Royal Veterinary College, London, UK

Correspondence: Vincent Biourge (vincent.biourge@royalcanin.com)

Dear Editor,

We read with interest the letter from Dr. Wun regarding our article "An artificial neural network-based model to predict chronic kidney disease in aged cats" published in Volume 34, Issue 5 of Journal of Veterinary Internal Medicine (JVIM). The issue he raises is a common misconception about the International Renal Interest Society (IRIS) staging system, which should not be used to diagnose chronic kidney disease (CKD). Rather, it is used to stage cats (and dogs) once a clinical diagnosis of CKD has been made. All cats used to derive and validate the algorithm in our study were healthy based on history and physical examination and had serum creatinine concentrations below the diagnostic threshold for CKD according to the reference interval of the laboratory used, and thus did not have a diagnosis of CKD at the time of screening.

The IRIS staging system accounts for the fact that serum creatinine concentration is insensitive in identifying cats with early CKD. For this reason, stage 1 and the first part of stage 2 CKD for the cat use serum creatinine concentration cut-offs that are below the laboratory reference intervals of many diagnostic laboratories. In such cases, other criteria are required to make a diagnosis of CKD, such as a combination of persistent proteinuria, persistent structural changes identified in the kidney, progressive increases in serum creatinine concentration over time, or persistently increased serum symmetric dimethylarginine (SDMA) concentration. The article on the IRIS website written by Dr. Syme summarizes these clearly: https://www.iris-kidney.com/ckd-early-diagnosis.

These diagnostic criteria are more subtle and often difficult for general practitioners to clearly define. One of the goals in deriving the algorithm in our paper was to use neural network analysis to identify patterns in the commonly applied screening tests used in general practice to identify the cats that have a high likelihood of developing azotemic CKD within 12 months of the screening event. We wanted to do this based on a single screening event in a population of healthy senior cats recognizing that many owners in Europe do not want their healthy cats to have screening events more frequently than annually. The cats identified by the algorithm have early-stage CKD (as shown by prospectively following and documenting their development of persistent azotaemia, diagnostic of CKD) but are at a stage where plasma creatinine concentration is still within the laboratory reference interval and would thus be considered as normal in a regular senior screening. Neural network analysis evaluated all possible combinations of screening test results to identify at a single visit the combination with the highest specificity while not compromising on sensitivity in predicting the future development of CKD. The use of plasma creatinine concentration alone performed less well than when combined with both urine specific gravity and plasma urea concentration.

We hope this letter explains our approach and the interpretation of single test results.

Yours sincerely,

Vincent Biourge
Sebastien Delmotte
Alexandre Feugier
Richard Bradley
Molly McAllister
Jonathan Elliott