

## **THE CONTRIBUTION OF NUCLEAR MEDICINE IN THE RESEARCH OF CANINE BEHAVIOUR DISORDERS**

K. Peremans\*

Department of Medical Imaging and Small Animal Orthopedics, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, B-9820 Merelbeke, Belgium

\*Corresponding author: *Kathelijne Peremans*; [mailto: kathelijne.peremans@ugent.be](mailto:kathelijne.peremans@ugent.be)

Brain Single Photon Emission Computed Tomography (SPECT) and Positron Emission Tomography (PET) are molecular imaging modalities based on the use of radioactive tracers. Both brain perfusion and metabolism (glucose consumption) are closely related to neuronal function and the use of perfusion (SPECT) and metabolic tracers (PET) can therefore be used to evaluate neuronal function. In addition to the function of neurons, neurotransmitter systems can be evaluated with dedicated markers that bind specifically with given neuroreceptors/transporters and allow estimation of the number of receptors/transporters present in different brain regions. The neurotransmitter systems currently mostly, but not exclusively, investigated are the serotonergic and the dopaminergic systems. This imaging modality is interesting to investigate the neurobiological base of brain (dys)function and is an important diagnostic tool when structural abnormalities are absent and anatomical imaging is of no use. Another important advantage is the possibility to evaluate the effects of therapeutic interventions, such as psychopharmaca. Their effect on neuronal activity and neurotransmitter systems can be evaluated and optimal dosing can be explored. This imaging modality is, besides its use in a clinical set-up, an important asset in research and development/clinical validation of new therapy modalities. Limitation is the use of radioactive compounds, requiring dedicated licensed infrastructure and the necessity of anaesthesia. Adherence to a strict anaesthetic protocol with foreknowledge of the effects on the brain is mandatory.

In conclusion, SPECT/PET imaging with dedicated tracers is an important tool in the investigation of behavioural problems and effect of therapy on neuronal function and on neurotransmitter systems.

Keywords: canine behaviour disorders, molecular imaging, neuronal function, neurotransmitter systems, psychopharmaca,