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From Image to Insight

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Application of Diffusion Tensor Imaging in the Canine Brain

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Diffusion tensor imaging (DTI) is an advanced diffusion MRI technique that provides quantitative information on the microstructural organization of brain tissue. By measuring the directionality and magnitude of water diffusion, DTI allows assessment of white matter integrity using parameters such as fractional anisotropy, mean diffusivity, axial diffusivity, and radial diffusivity. Although DTI has been widely applied in human neuroimaging, its clinical and research applications in veterinary medicine remain relatively limited.

Successful application of DTI in the canine brain requires an understanding of both technical and biological factors. Acquisition parameters, including b-value, number of diffusion-encoding directions, spatial resolution, signal-to-noise ratio, and motion control, can substantially influence image quality and quantitative measurements. In addition, post-processing approaches such as region-of-interest analysis, tractography, and voxel-based analysis should be carefully selected according to the purpose of the study and the anatomical characteristics of the canine brain.

This lecture will review the basic principles of DTI, practical considerations for protocol optimization in dogs, and current applications of DTI in human and veterinary neuroimaging.

Keywords: *Diffusion tensor imaging, Canine, Veterinary medicine*