

Anatomical Brain Mapping Using Ultra-High Field 7T MRI System and Serial Brain Section in Dogs

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Purpose: This study was performed to obtain high resolution magnetic resonance (MR) images and for mapping the anatomical structures of the MR images based on serial brain section in dogs.

Materials and Methods: The study was performed with 3 beagle dogs positioned in sternal recumbency under general anesthesia. 7 T MRI unit and bird-cage type coil were used to obtained T2*-weighted gradient echo images in sagittal, dorsal, and transverse planes. Whole brain from same dogs that had scanned with 7 T MRI was removed intact through perfusion fixation. Then we obtained serial section structures in vivo corresponding to 7 T MR images.

Results: The T2*-weighted GRE images at 7 T could depict fine details of the whole brain region. Particularly, T2*-MR images provided superior resolution for the various essential structures like as exact distinction on brain subdivision, the degree of enlargement and distribution of cerebral ventricles and limbic system which were difficult to identify clearly at conventional MR images. Serial section allowed the examination of the structures such as an elaborate feature of the hippocampal formation and the conspicuous contour of the brain voided by susceptibility artifacts.

Conclusion: The clinical usage of ultra-high field units for veterinary medicine is almost impossible for now. This study will be a great help to understand the brain anatomy and ultimately lead to in-depth study of canine brain mapping as well as diagnosis of the brain diseases.

Key words: 7T MRI, brain mapping, dog, serial brain section

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