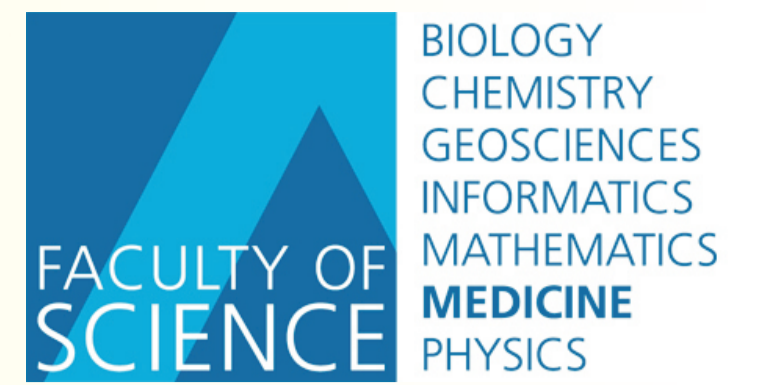


Characterizing the extent of spinal cord lesion in monkeys: comparison of magnetic resonance imaging (MRI) data with histological reconstructions



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Introduction:

Comparison of MR images with histological data is crucial to understand the significance of MRI scans as a tool to characterize the extent and pathological consequences of a spinal cord injury. The present investigation establishes and compares the extent of a cervical lesion in monkeys obtained using 4.7 and 9.4-T scanners and histological methods.

Conclusion:

At the present stage, our investigations indicate that high resolution MRI and the histological data provide comparable information about the lesion extent in experimental spinal cord injury.

Methods:

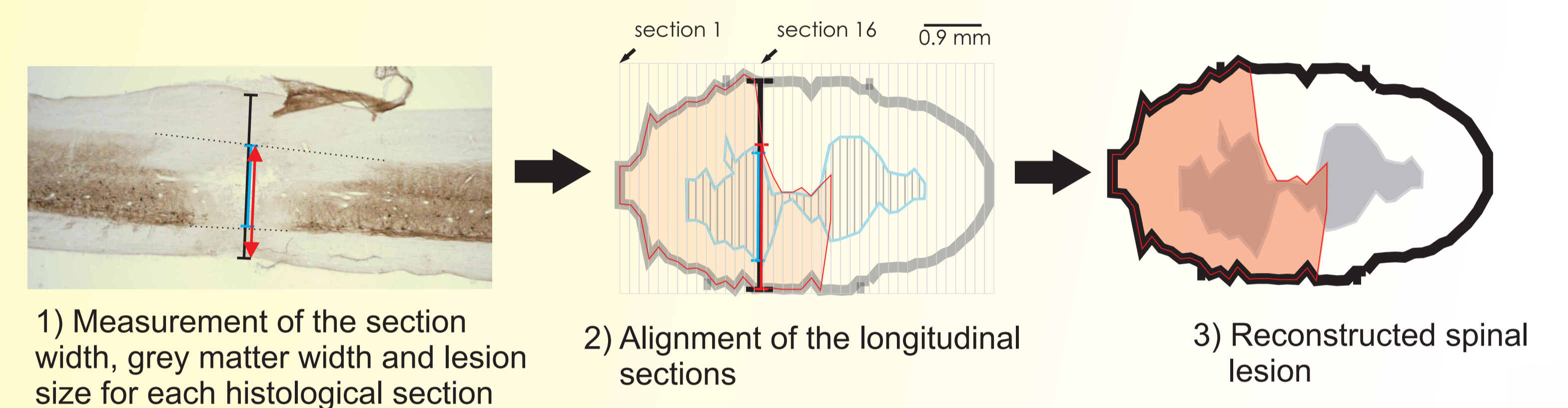
Four adult macaque monkeys were subjected to a unilateral section of the cervical cord. Three months following the lesion, the animals were sacrificed, the tissue fixed with paraformaldehyde and isolated. All four animals are derived from protocols dealing with the treatment of spinal cord lesions.

MRI analysis:

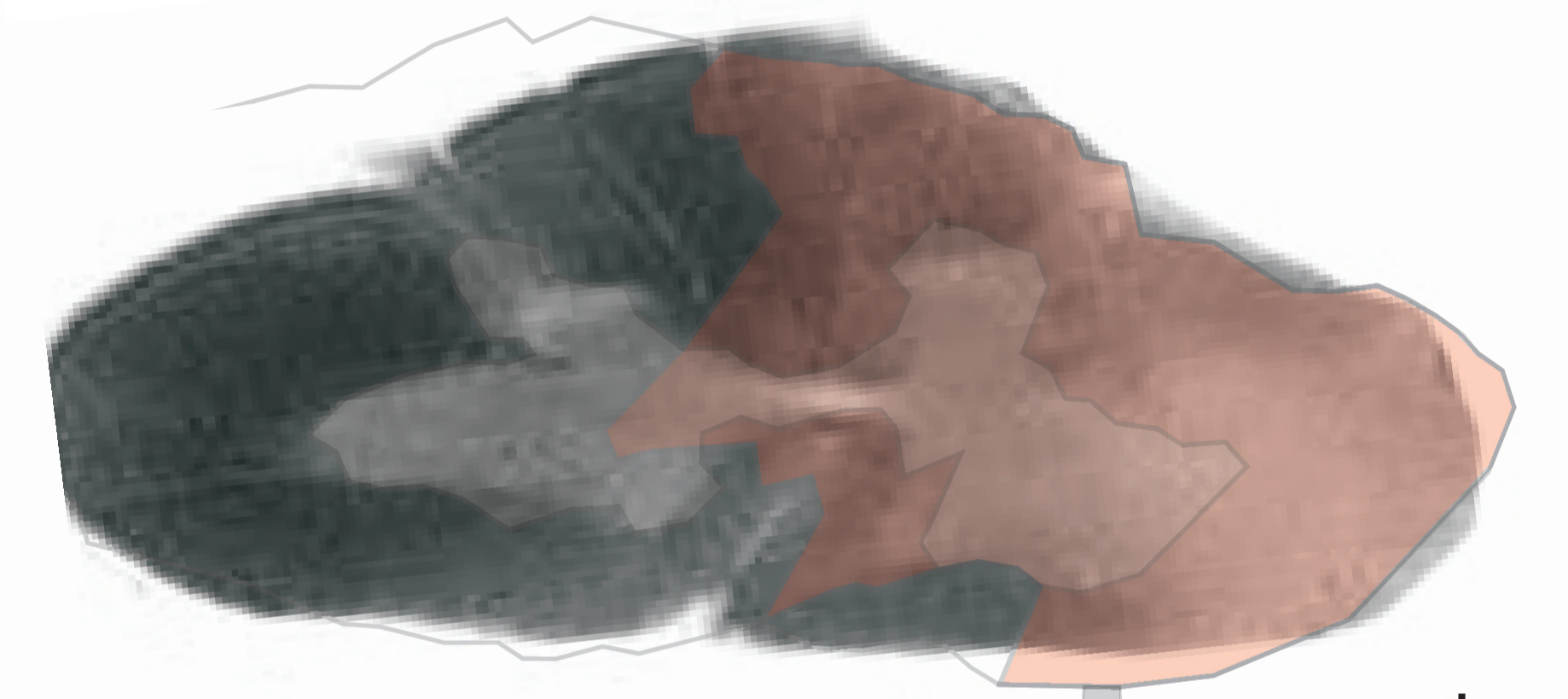
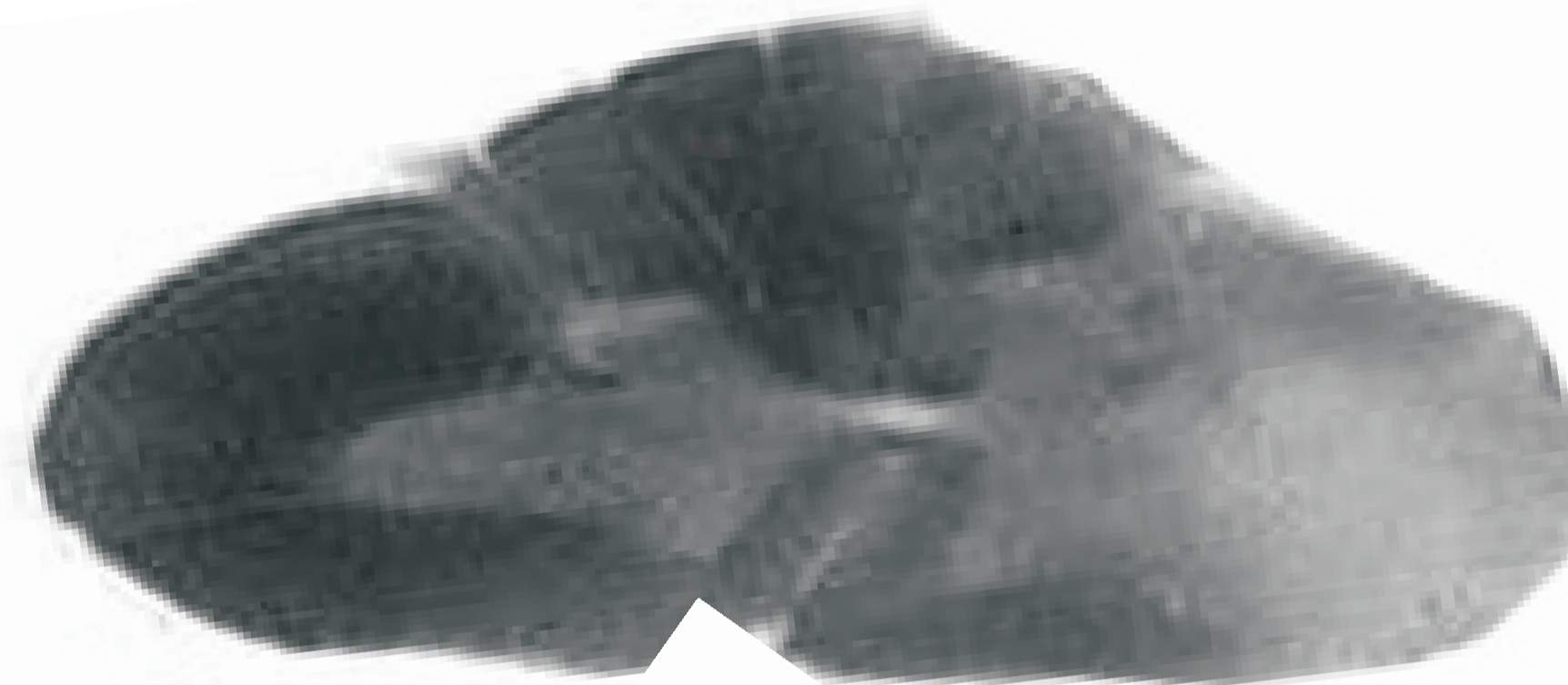
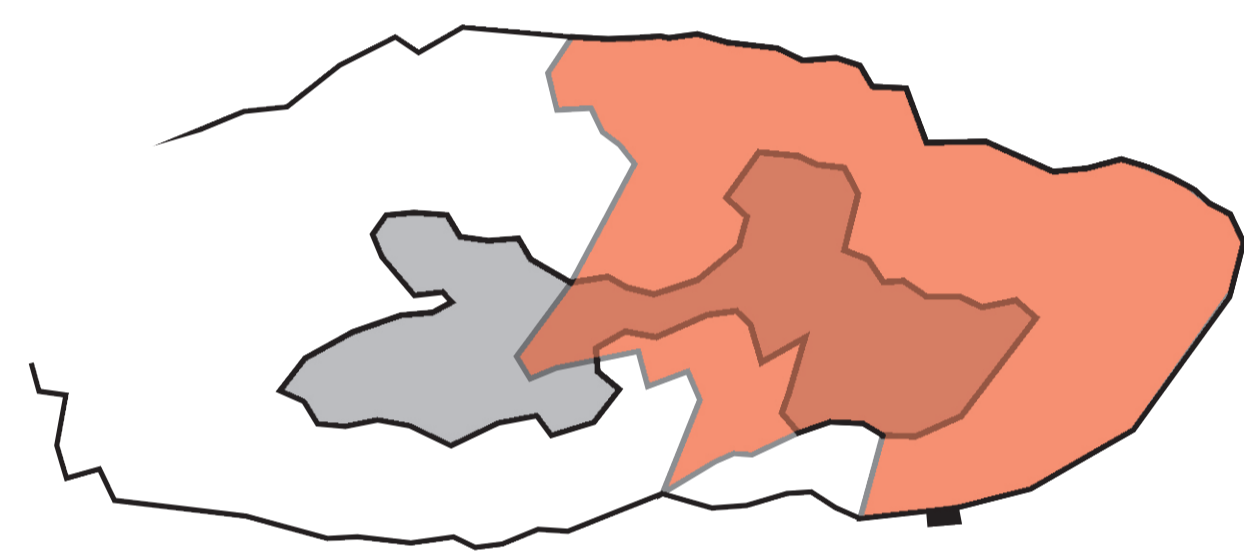
The spinal cords were imaged post-mortem using a proton-density weighted MR sequence either in axial slices with a 50 microns in-plane resolution on a 4.7-T animal MRI scanner (Mk-3 & Mk-4) or in axial, coronal and sagittal slices with 50 microns in-plane resolution on a 9.4-T animal MRI scanner (Mk-1 & Mk-2). The duration of image acquisition ranged from 13-18 hours.

Histological analysis:

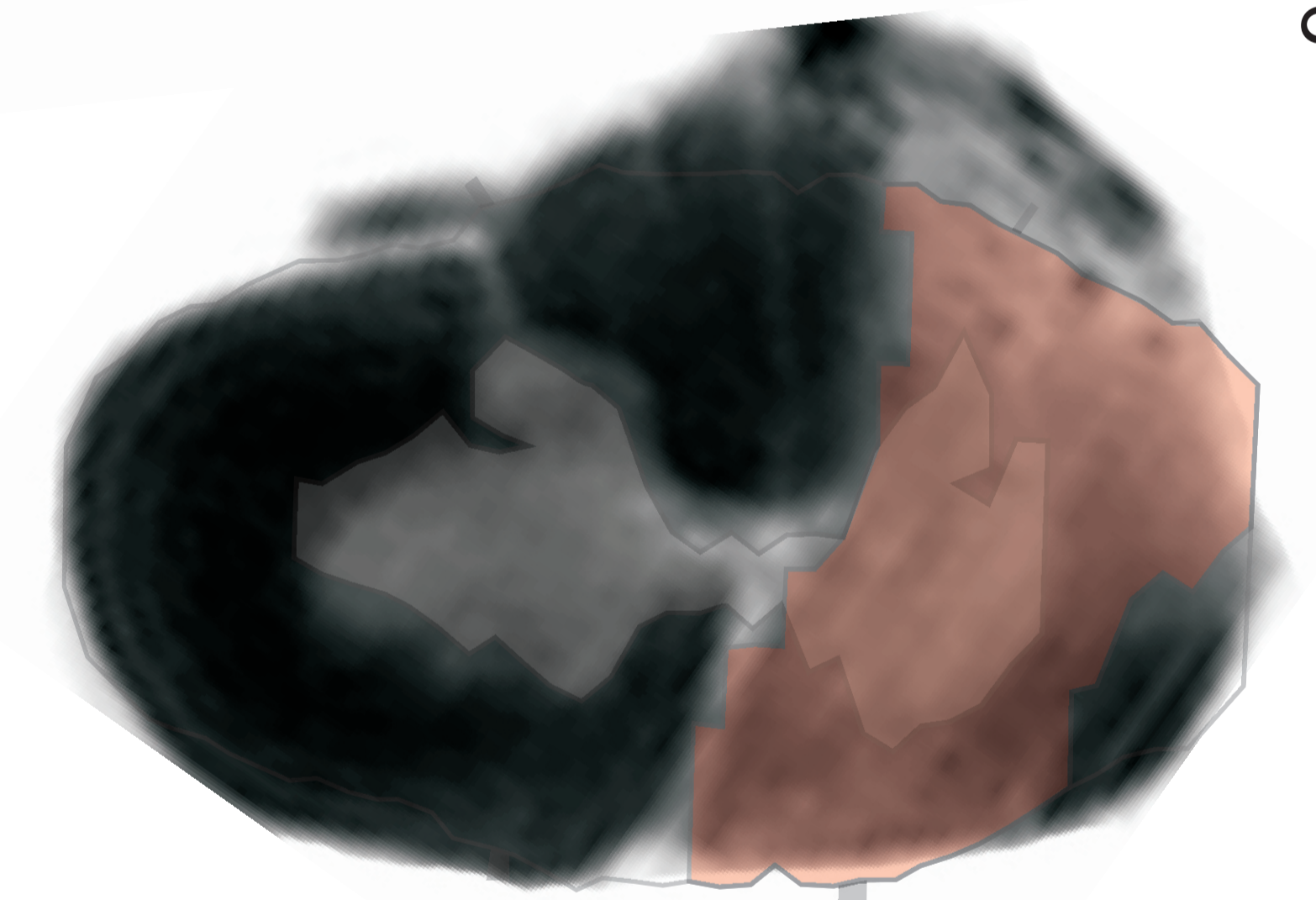
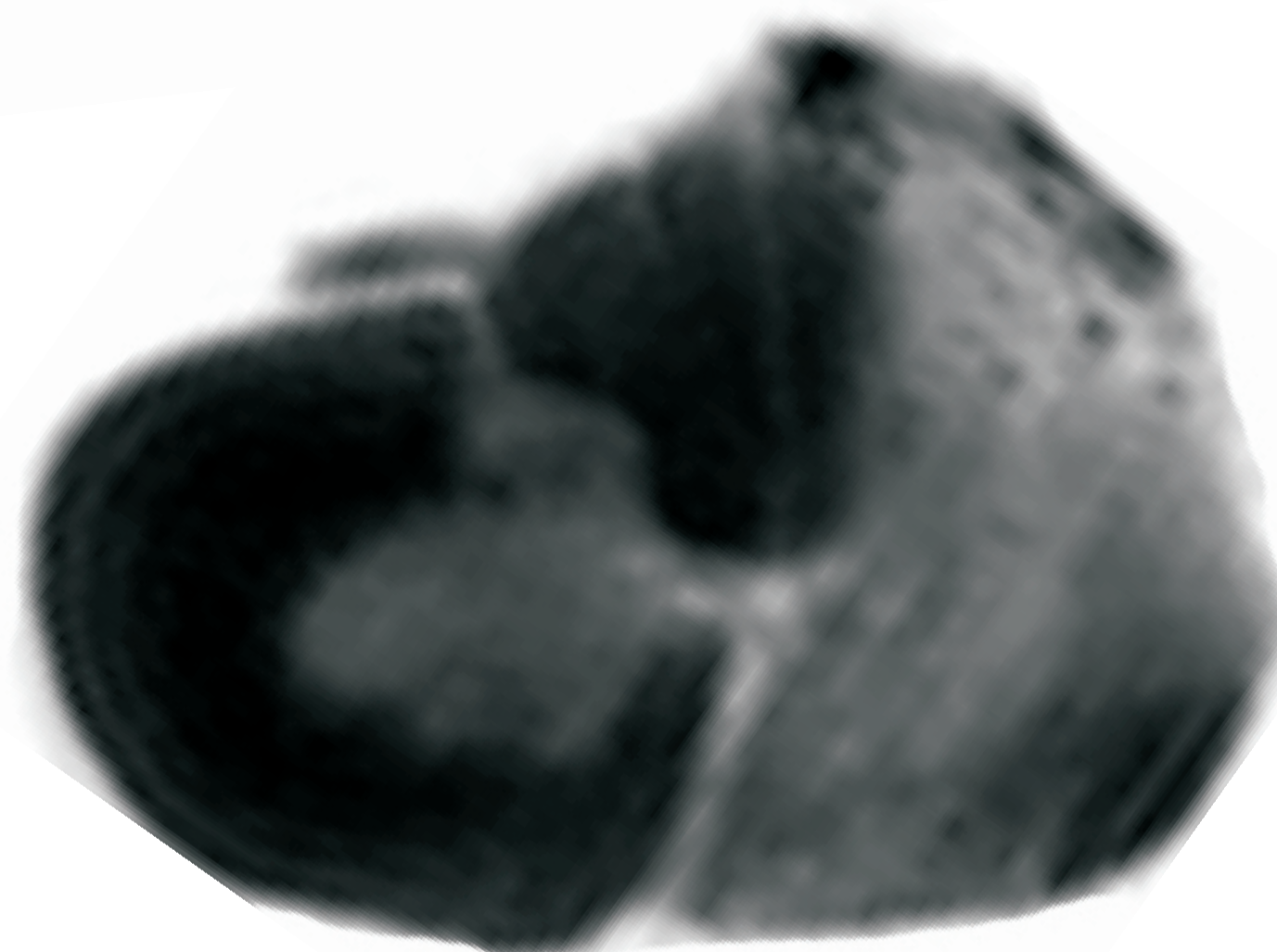
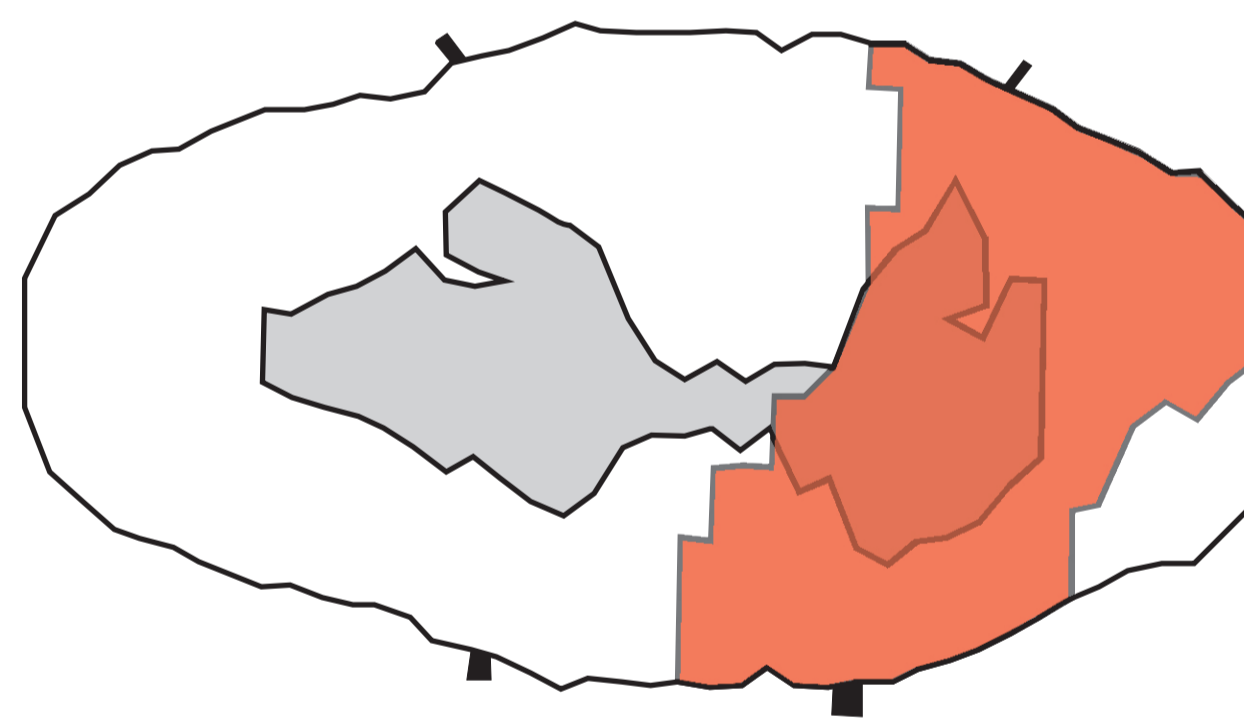
The spinal cords were cut in the longitudinal plane in five series of 30 μm (Mk-1 & Mk-2) or three series of 50 μm (Mk-3 & Mk-4) and one series was stained with the SMI-32 antibody. The lesion borders were then delimited under the microscope and the lesion reconstructed in the coronal plane.



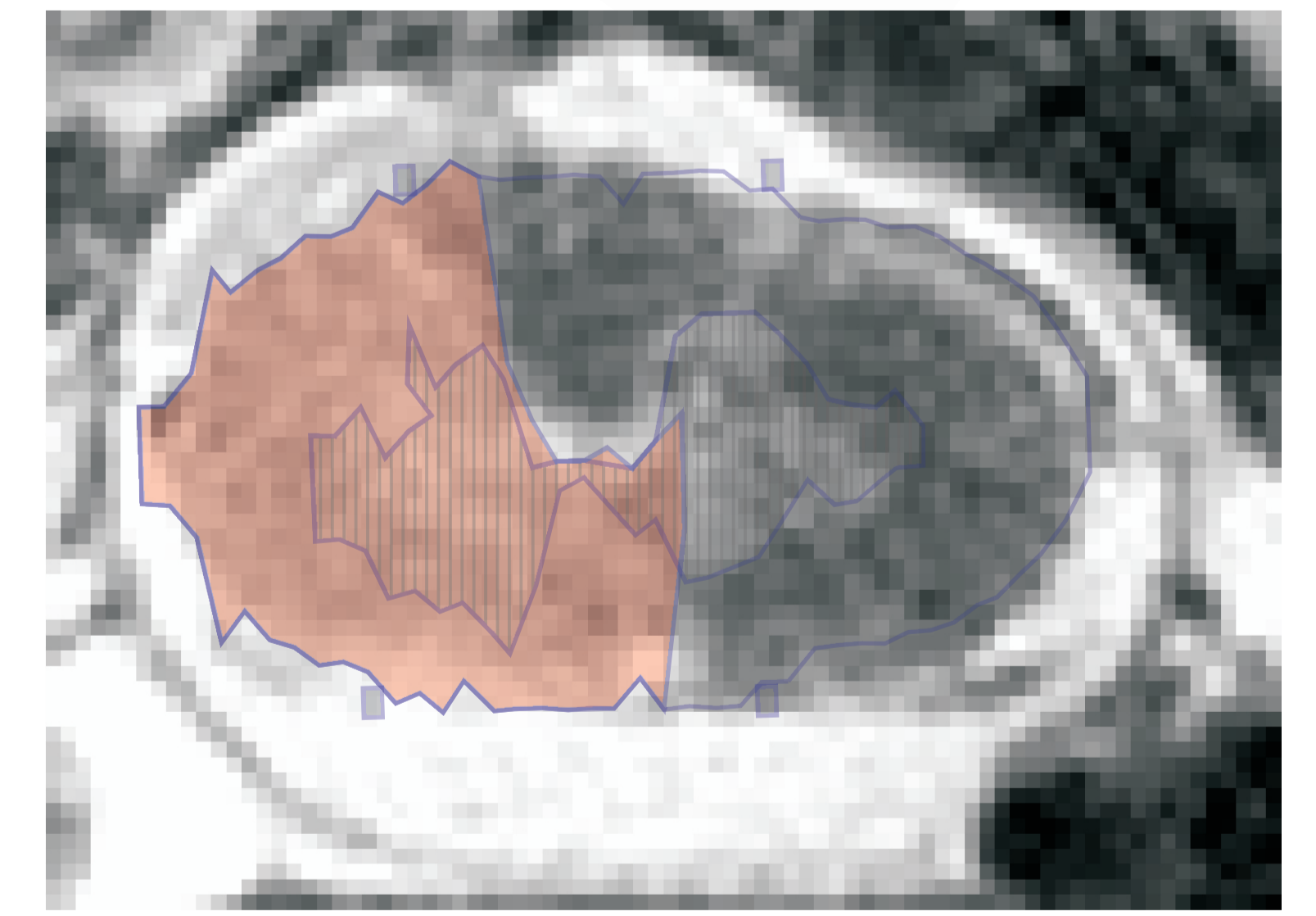
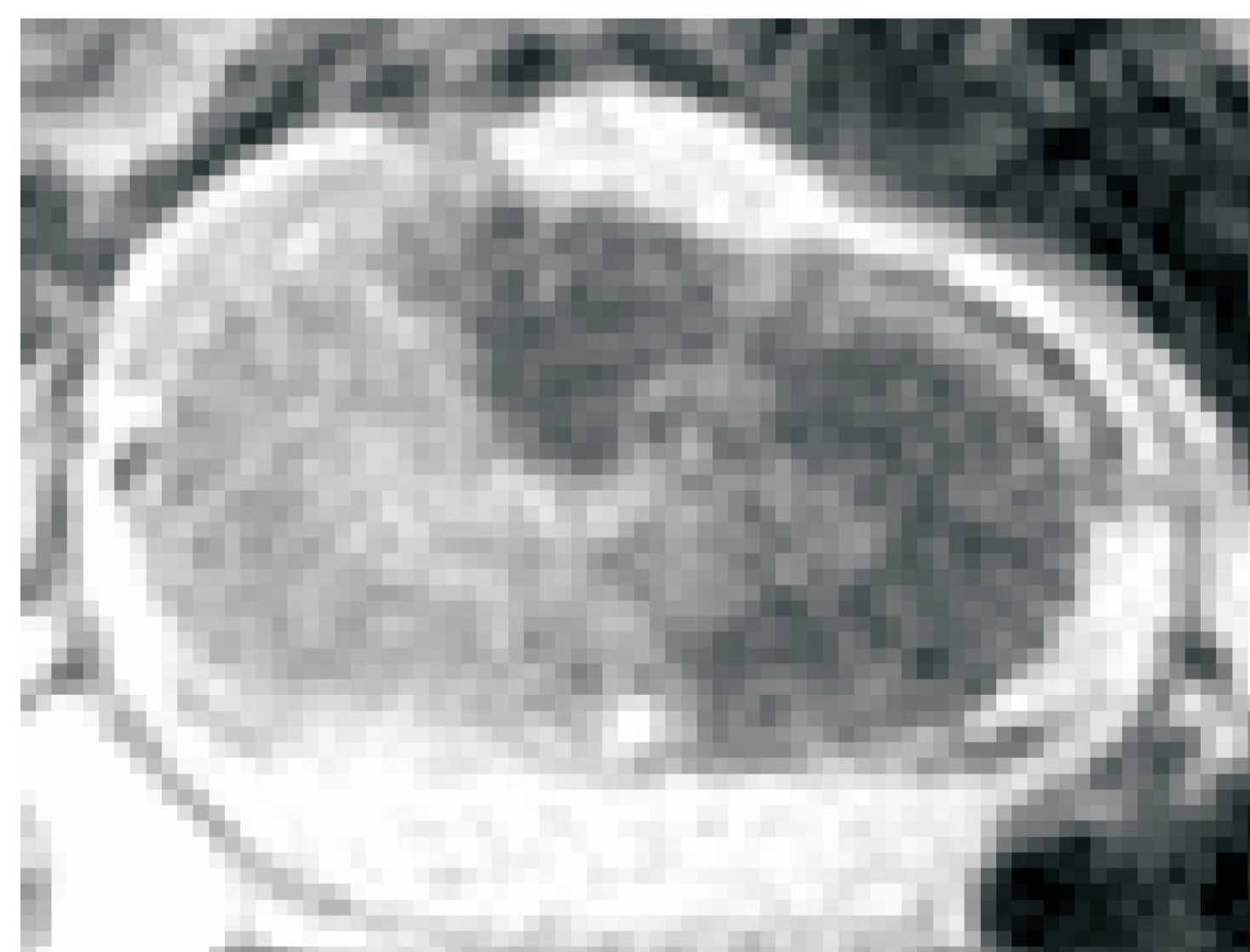
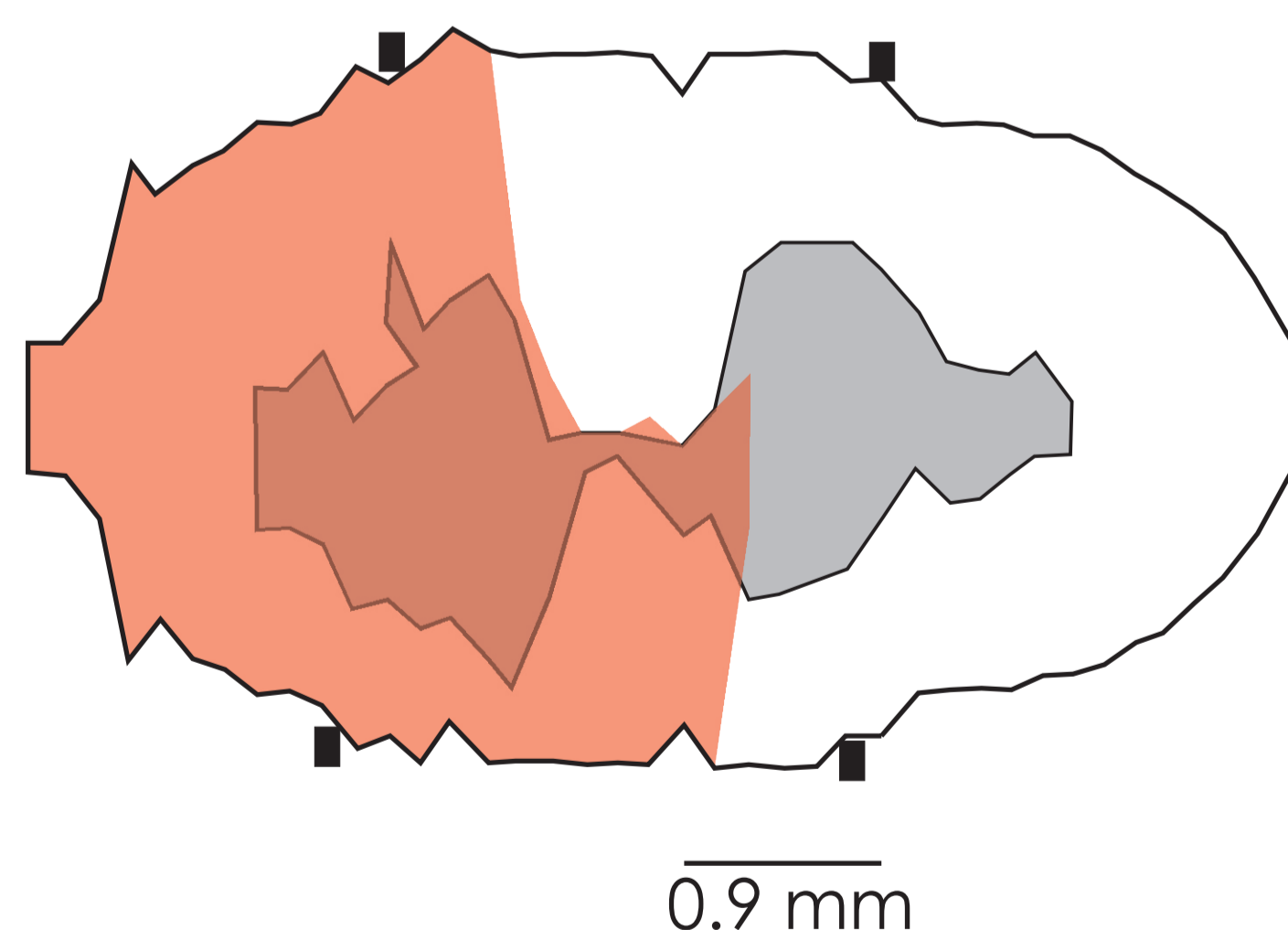
Mk-1



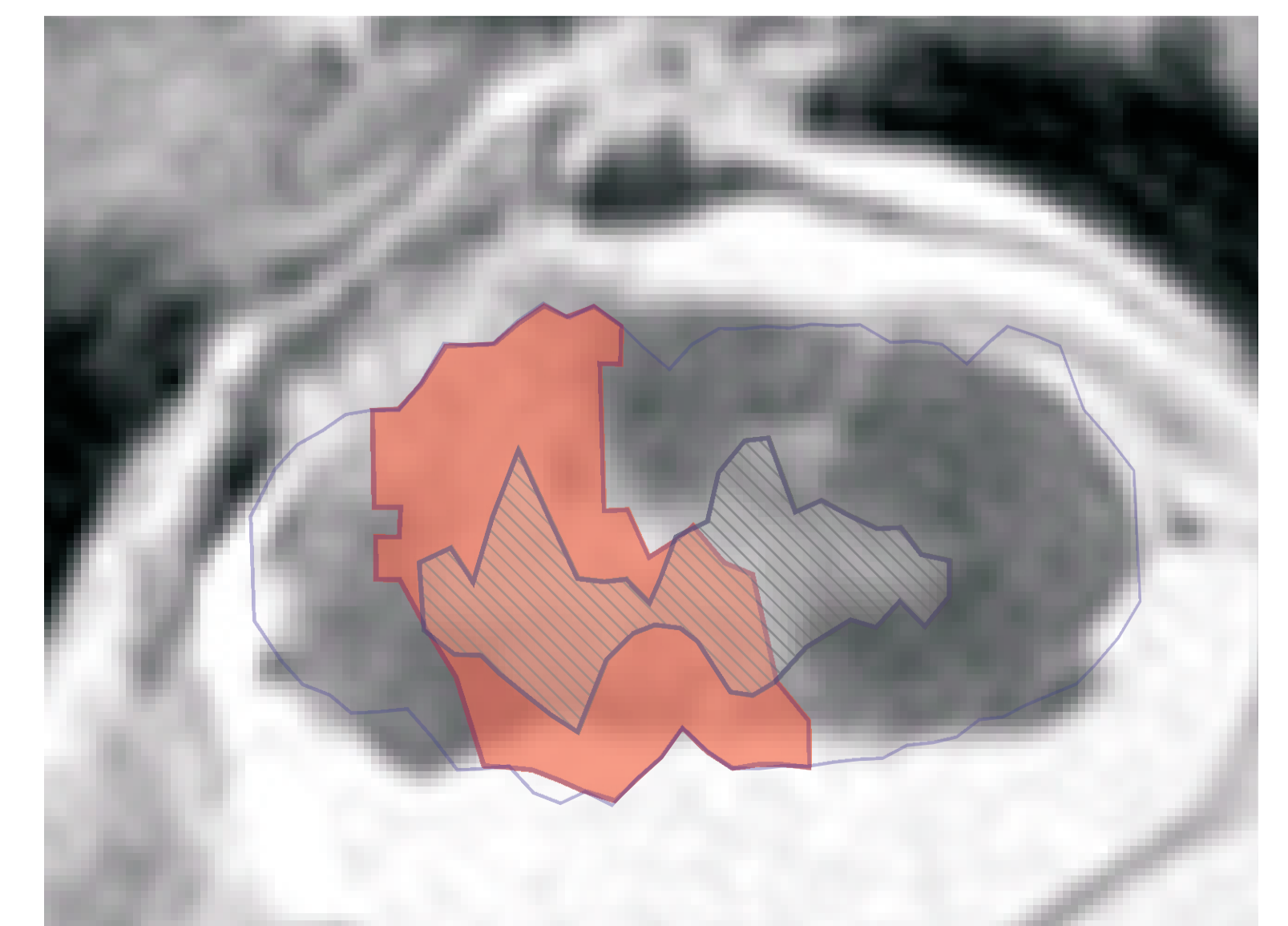
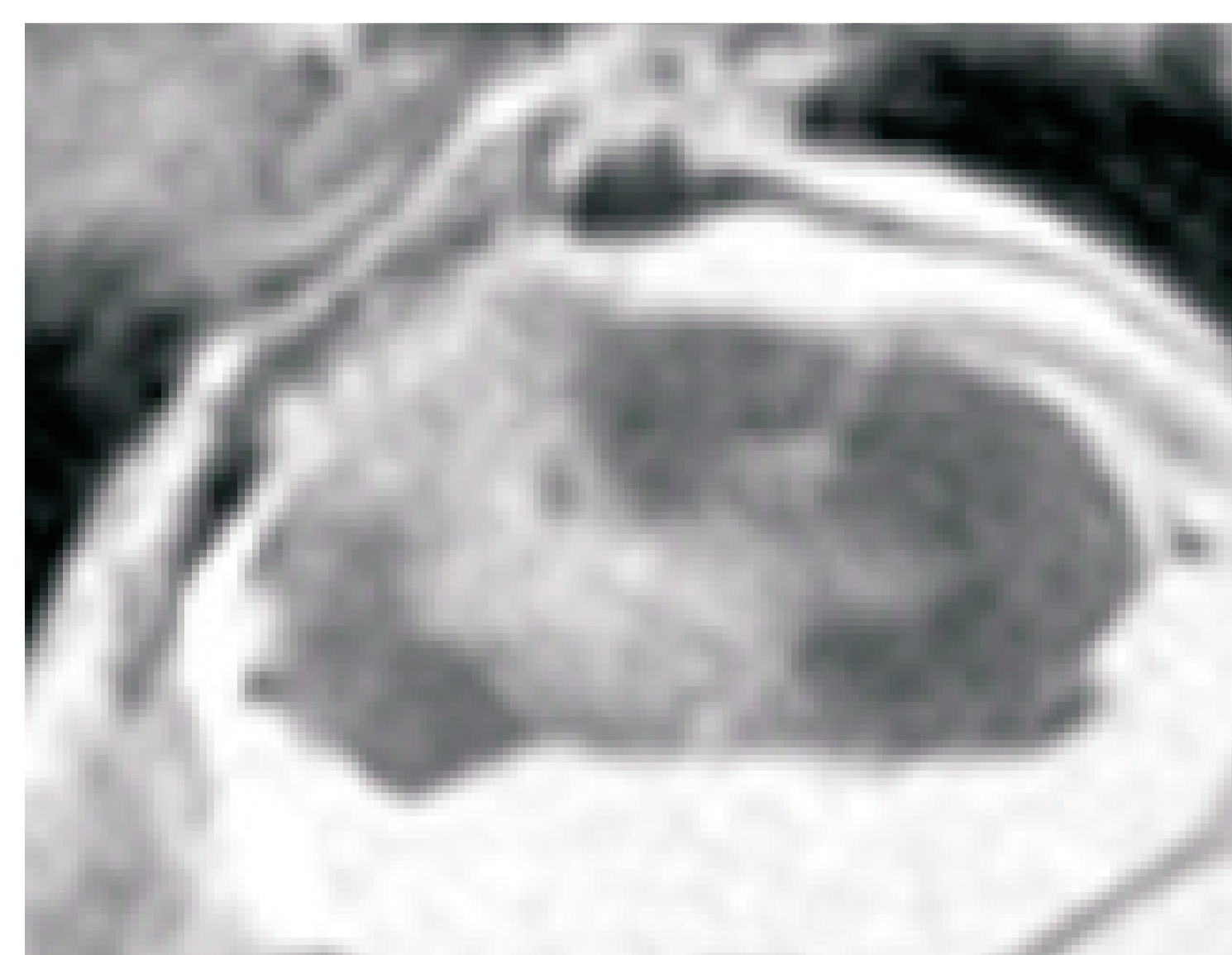
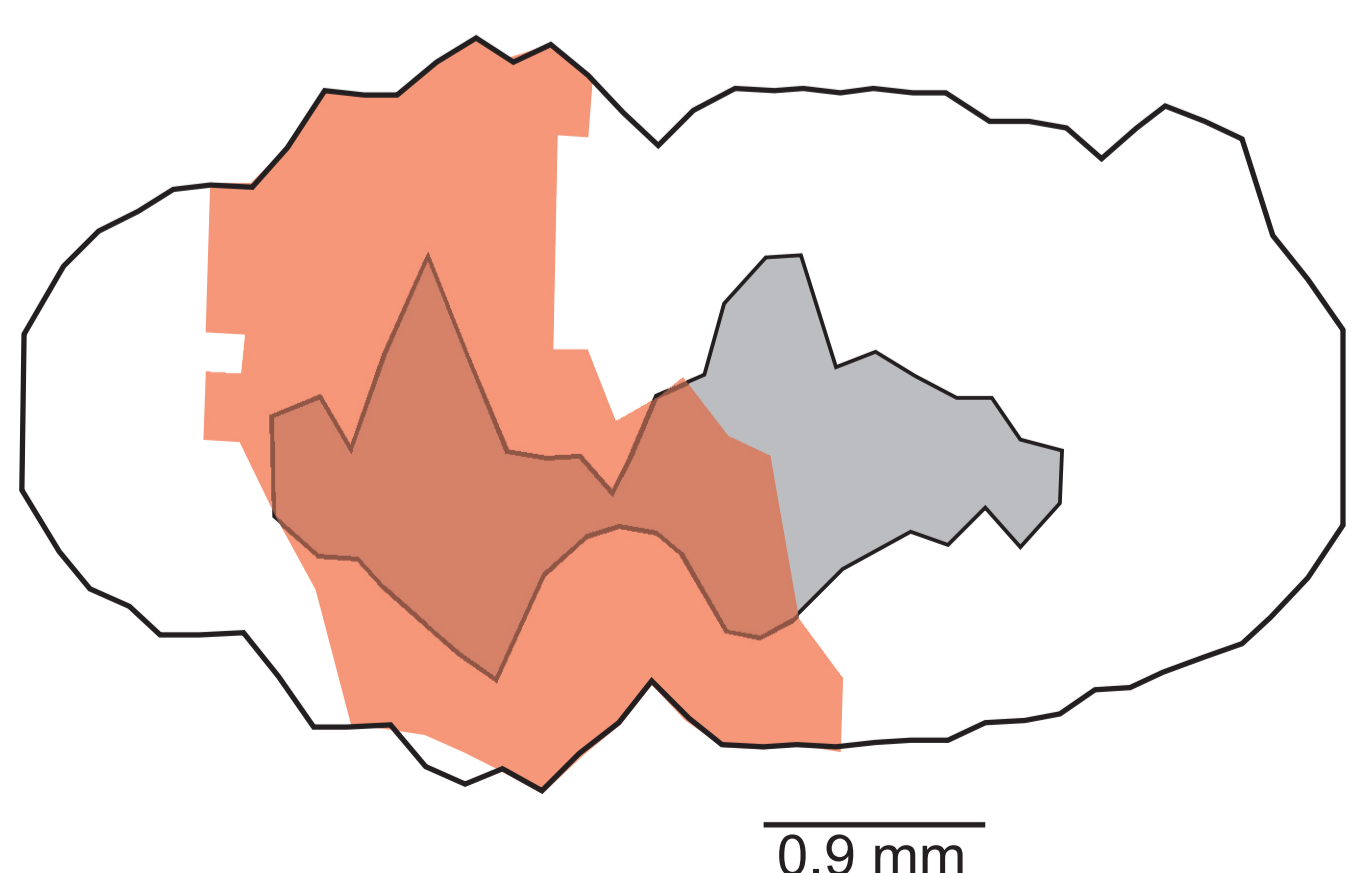
Mk-2



Mk-3



Mk-4



9.4 T

4.7 T