

OPTIMIZATION OF SHORT T1 INVERSION RECOVERY (STIR) SEQUENCES FOR THE EQUINE DISTAL LIMB USING A LOW FIELD MRI SYSTEM

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Aims: Temperature affects the appearance of STIR images. An inversion time (TI) of 85ms is used clinically in a low field MRI system. We investigate effect of temperature on signal intensity (SI) on STIR images at TI of 85 ms, and optimise TI at 22^o Celsius for STIR sequences in the cadaver distal limb. **Methods:** Four cadaver distal limbs were used. The temperature of the limb was determined before and after scanning using a thermoprobe. Part 1: A limb was placed in a support stand and transverse STIR sequences run using TI of 85ms. Experiment 1: The limb was scanned at mean core temperature of 21.6 degrees C. Experiment 2: Before scanning, the limb was chilled for 1 hour (mean core temperature of 11 degrees C). Experiment 3: Before scanning, the limb was heated for 1 hour (mean core temperature of 34.6 degrees C). SI was determined from images by drawing an ellipse on the distal phalanx (P3), middle phalanx (P2) and proximal P2 in each sequence. A graph of SI versus temperature of the limb was plotted for the three regions. Part two: A limb was thawed at 22 degrees Celsius. Transverse STIR sequences were run, varying TI from 35-95ms. Signal intensity was measured as above. A graph was plotted to determine the optimal TI, corresponding to the point of lowest SI on the graph. **Results:** With TI of 85ms, at a temperature of 11^oC the mean SI was 422 for P3, 343 for mid P2 and 259 for proximal P2. At 22^oC, mean SI was 159, 250 and 215 respectively. At 35^oC, mean SI was 169, 158 and 94 respectively. TI of 55ms was optimal for cadaver limbs at a core temperature of 22 degrees Celsius. **Conclusions and practical significance:** MRI can highlight damage in all structures of the equine distal limb. Inversion recovery is a fat suppression technique that enables fluid representing pathology to be visualized in medullae of bones. At a temperature of 35^oC, fat suppression is adequate with TI of 85ms, however at cooler temperatures TI of 85ms does not produce optimal fat suppression. Images from STIR sequences for equine cadaver distal limbs at 22 degrees Celsius are optimal with a TI of 55ms. Alteration of TI may be beneficial clinically to obtain optimal STIR images. **Acknowledgements:** The Horse Trust, Hallmarq Ltd.