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## P350 -DETERMINING OPTIMAL TECHNIQUE FOR TISSUE FIXATION FOR EX-VIVO MRI IMAGING OF PORCINE KIDNEYS

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**Introduction:** Renal biopsy and histological staining is currently the gold standard for assessment of most renal pathologies, but is invasive and risks complications. Multi-parametric renal MRI protocols can non-invasively characterise renal pathology on a whole kidney basis. However, further study is required to validate MRI against renal histology, and ex-vivo MRI studies on post mortem tissue is a valuable approach to do this (as has been shown in post-mortem studies of brain tissue). We therefore sought to perform initial studies to determine the effects of different fixation techniques and timing on MRI measures, so that protocols for ex-vivo renal MRI studies can be developed.

**Methods:** 2 Whole porcine kidneys were fixed by placing them into ten-times their volume of 10% Neutral Buffered Formalin for 24-hours. They were then transferred to six times their volume of Phosphate-buffered Saline (PBS) to wash out excess formalin and rehydrate the kidneys. To study the changes in T1 following removal from formalin, the kidneys were (i) scanned regularly over the first 24-hours in PBS, and (ii) scanned over a ten-week period in PBS. In addition, one unfixed kidney was scanned immediately post-mortem. Kidneys were scanned at both 3T and 7T field strengths and T1 and T2\* maps were generated. To further study renal inflammation and fibrosis, aged pigs (0.5-2.5years) were euthanized and kidneys scanned after 24-hours in PBS, with histology was performed on the renal cortex using Haematoxylin and Eosin (H&E) and Masson's trichrome stains.

**Results:** There was a little change in T1 over first 24-hours of immersion in PBS and T1 was close to that of an unfixed kidney. However, there was a large reduction in T1 observed between 24-hours and one week, more so in the medulla than the cortex. This resulted in a fall in cortico-medullary T1 difference. Between one week and 10 weeks, there was a continued fall in T1 of the medulla while T1 cortex remained constant. The T2\* of the medulla remained constant over the entire study period, while the cortical T2\* increased. Comparing kidneys from 0.5 and 2.5yr old pigs, there was no significant difference in T1 or T2\* of the cortex or histology of the renal cortex, but both T1 and T2\* of the medulla were lower in 2.5-year old kidney.

**Conclusion:** We show that by scanning ex-vivo kidneys for ten-weeks post fixation, T1 is similar to an unfixed kidney in the first 24-hours, but after this T1 and T2\* have a dependence on time after fixation. This suggests that ex-vivo samples should be scanned within 24-hours of washing and rehydration; rehydration and scanning in PBS is essential as formalin affects the MRI relaxation times significantly.