



## Pathology/Biology Section - 2016

### **H131 Detection and Differentiation of Early Acute and Following Age Stages of Myocardial Ischemia With Quantitative Postmortem Cardiac Magnetic Resonance (PMCMR)**

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After attending this presentation, attendees will better understand MR quantification, which is used as a new and promising tool in postmortem cardiac imaging.

This presentation will impact the forensic science community by presenting the conclusion that PMCMR quantification is feasible for characterization and differentiation of early acute and following age stages of myocardial infarction based on quantitative values. Quantitative PMCMR enables assessment of early acute myocardial ischemia, which is not visible in conventional PMCMR or heart dissection.

In the last decade, PMCMR has been introduced and established in the field of postmortem forensic imaging. PMCMR can be used as a valuable adjunct to forensic autopsy in assessing cardiac pathologies and cardiac-related deaths.<sup>1-5</sup> Recently, quantitative MR sequences have started to be used in PMCMR. Quantitative MR data allow for an objective characterization and differentiation of healthy tissues and pathologic tissues based on quantitative values such as T1 and T2 relaxation times.<sup>6-8</sup> Thus far, no quantitative values for the different histopathological age stages of myocardial infarction have been established in postmortem 1.5T MR imaging.

The goal of the present study was to assess quantitative T1 (in ms), T2 (in ms), and Proton Density (PD) (as %) values of early acute and following age stages of myocardial ischemia and to correlate these values to their corresponding histologic findings.

In 80 deceased individuals (25 female, 55 male) from forensic cases, a cardiac MR quantification sequence was performed prior to cardiac dissection. Ischemic myocardial lesions and unremarkable myocardium were MR quantified and correlated with histology.

Seventy-three myocardial lesions were detected by PMCMR. These lesions were characterized histologically as early acute (n=39), acute (n=14), subacute (n=10), and chronic (n=10) ischemic lesions. Further early acute ischemic lesions (n=22) not visible at heart dissection were detected at routine histological heart examinations and showed no visible signal alterations in conventional PMCMR. All detected lesions (n=95) were MR quantified. Statistical analysis revealed that based on their quantitative T1, T2, and PD values, a significant difference between all tested age groups of myocardial ischemia (early acute, acute, subacute, and chronic ischemic lesions) can be determined among one another and between normal myocardium.

The results of this study provide a basis for computer-aided diagnoses of myocardial ischemia in postmortem cardiac magnetic resonance.



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### Quantitative Postmortem MRI, Myocardial Ischemia, Forensic Imaging