IPH was confirmed by histology. Further prospective quantitative validation study is now underway.

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IN-VIVO QUANTITATIVE T2 MAPPING OF CAROTID PLAQUES IN PATIENTS WITH RECENT CEREBROVASCULAR EVENTS: AHA PLAQUE TYPE CLASSIFICATION AND CORRELATION WITH PLAQUE HISTOLOGY

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Introduction Although in-vivo multicontrast MRI is capable of characterizing atherosclerotic plaques in carotid arteries, its non-quantitative nature and the need for extensive post-acquisition interpretation limit its widespread clinical application. Quantitative T2 mapping is a promising alternative since it can provide an absolute physical measure of plaque components that can be standardised among different MRI systems and widely adopted in multi-centre studies. The purpose of this pilot study is to seek the potential of in-vivo T2 mapping and its correlation with different plaque components *ex-vivo* on histology.

Methods *3T-MRI*: 15 asymptomatic patients (11 males, 71±10 years) and 13 patients scheduled for endarterectomy (9 males, 70 ±17 years) were imaged at 3T using the conventional multicontrast protocol and Multiple-Spin-Echo (Multi-SE). T2 maps were generated by mono-exponential fitting to the series of images acquired by Multi-SE using non-linear least-squares regression. Two reviewers independently classified plaque types according to the MRI-modified AHA scheme, one using T2 maps+TOF images, the other using multicontrast MRI.

Histology Carotid plaques were freshly obtained at time of endarterectomy. Plaques were divided at the level of maximal stenosis and 4mm-segments on either side of the cut were processed for formalin-fixed, paraffin-embedded (FFPE) sections and cryosections, respectively. FFPE sections were stained for H&E and Masson's trichrome, while cryosections were used for Oil-Red-O/adipophilin (foam cells marker) staining to visualize lipid. MRI-histology matching was performed for each segment using the carotid bifurcation as the common anatomical landmark. AHA plaque type was determined by an independent reviewer.

Results In the 15 asymptomatic patients, AHA plaque type classified on multicontrast MRI and on T2 maps (+TOF) showed good agreement (76% of matching classifications and Cohen's $\kappa=0.68$). 4 of the 13 patients scheduled for endarterectomy were excluded due to severe MRI motion artefacts. AHA type classification of the remaining 9 plaques using T2 maps (+TOF) vs. histology is presented in Table 1. Figure 1 shows a type VI and Figure 2 a type IV-V plaque. T2 maps were able to differentiate lipid-rich necrotic core (LRNC), fibrous tissue, calcification, and recent intraplaque-haemorrhage (IPH).

Conslusions These preliminary results show the potential of in-vivo T2 mapping for atherosclerotic plaque characterization. Agreement between AHA plaque types classified by T2 maps (+TOF) and by conventional multicontrast MRI was good. The ability of T2 maps to discriminate LRNC, fibrous tissue and recent