Predicting Infarct Core with Perfusion CT
Does Red Mean Dead?

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Introduction

CT perfusion (CTP) may be used to identify viable and non viable tissue in acute stroke. Thresholds which define ischaemic core and penumbra have been proposed, and are incorporated into perfusion software for clinical application.

Aim

To assess the accuracy of CTP for identifying ischemic core using commercially available processing software

Results

Baseline CTP was co-registered to follow-up imaging in 16 cases.

False positive "core" voxels occurred in all perfusion scans (Median 879 voxels, IQR 588-4580).

False positive "core" volume on CTP accounted for a median of 45 % (IQR 8-93%) of baseline CBV lesion volume (Median absolute volume 1.1ml, IQR 0.7-5.7ml).
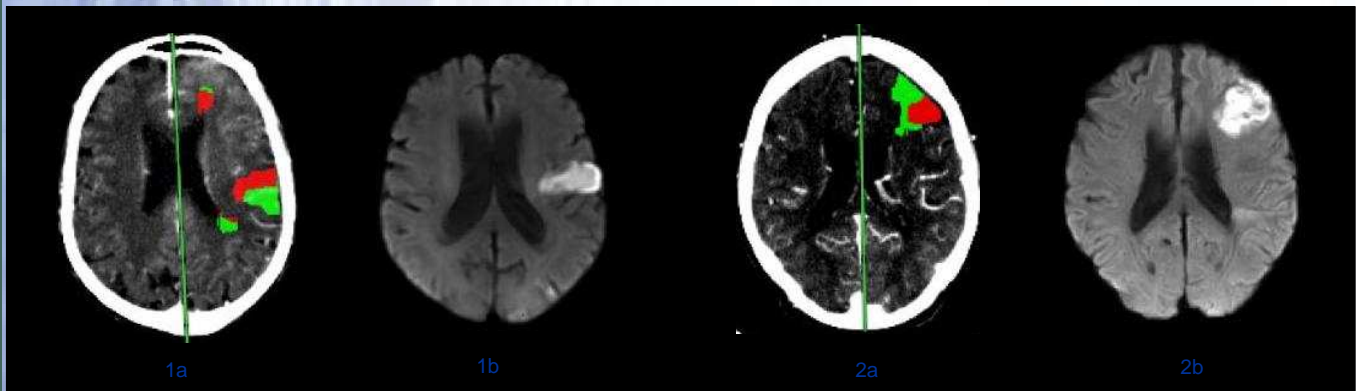
Example 1: Overestimation of true infarct core(proposed core appears as red) when compared to follow up MRI

Example 2: More accurate assessment of true infarct core

Methods

CTP within six hours of symptom onset was processed.

Infarct core definition=Absolute cerebral blood volume (CBV) lesion <2.0ml/100g within brain parenchyma .

Voxels representing putative core were extracted and compared to follow up infarct location on co-registered images (Analyze 9.0, FSL FLIRT).

True and false positive voxels were calculated.

Conclusion

Thresholded CBV lesions proposed to represent infarct core, are not always destined to be within the final infarct volume.

Early recanalisation and correction for delay in CTP processing may influence CBV lesion outcome.

Clinicians should be aware of potential false positives when interpreting CTP in acute stroke.

Summary

CT perfusion can be used to view irreversibly damaged brain tissue in stroke, appearing as red on the processed scan. By comparing this to the final stroke volume, we demonstrated that this area will contain a proportion which is not actually part of the final stroke. An awareness of the potential inaccuracies when using CT perfusion for clinical purposes is advised