NON-CONTRAST CT IS SUFFICIENT FOR THE PRIMARY ASSESSMENT OF ACUTE STROKE: NO

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Non-contrast brain CT (NCCT) has been the workhorse for acute stroke management since the mid 1970's. Although NCCT is highly accurate in the distinction between infarct and hemorrhage, it is very insensitive to acute ischemia despite the recognition of early ischemic changes (EIC) and application of scales such as the MCA score and the ASPECTS score. While CT scanning still has an important role in acute stroke management, many centres are now using CTA as routine, also measuring CT perfusion (CTP), in acute stroke patients. CTA can provide information about underlying arterial occlusion or stenosis, location and severity. In addition, in intracerebral hemorrhage (ICH), CTA can demonstrate the spot sign indicating contrast leakage and ongoing bleeding. In (ICH), CTA may also reveal underlying structural pathology such as arterial venous malformations (AVM). Using CTP, mismatch between perfusion and the ischemic core (either cerebral blood volume, CBV, or cerebral blood flow, CBF) is an index of the ischemic penumbra although less validated than MRI.

Undoubtedly MRI is far more sensitive in the diagnosis of acute ischemia with diffusion weighted imaging (DWI) lesions immediately apparent within minutes of the onset of ischemia. Multimodal MRI can generate images of perfusion (PWI), the ischemic core (DWI), mismatch and underlying arterial pathology. Mismatch on MRI can now be measured using automated online programs such as RAPID. Similar programs are being developed for CTP and increasing evidence indicates that the presence of mismatch highlights a treatment target.

To summarize, we have moved beyond the concept of blunt diagnosis to far more useful delineation of tissue that is either dead or at risk, together with the underlying arterial anatomy. In 2011 the days of NCCT are numbered. MRI is the most sensitive and specific technique for brain ischemia. If not immediately available, CT followed by contrast, and ideally generation of CTA and CTP, can provide far more information than NCCT.