

## **NON-CONTRAST CT IS SUFFICIENT FOR THE PRIMARY ASSESSMENT OF ACUTE STROKE – COMMENTARY**

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What neuroimaging techniques do we have available for our primary assessment of stroke? Firstly, non-contrast CT is the workhorse. But now we have 'multimodal CT' available routinely, that incorporates vascular imaging (CTA) and tissue imaging (CTP). We also have MRI that can also look at vessels (MRA) and tissue (DWI and PWI). Multimodal CT is faster and much more accessible than MRI. However, MRI has some diagnostic advantages - in some cases the delays in obtaining MRI compared to multimodal CT may be worth accepting (see below). So, are we happy with NCCT for our primary assessment of stroke? When we see a patient with what appears clinically to be an acute stroke, what questions do we really want our neuroimaging to answer? This particularly applies to the hyperacute work-up of stroke patients for potential acute reperfusion therapy.

1. What is the diagnosis? NCCT is excellent at excluding hemorrhage. Occasionally, we can see positive signs of acute ischemia on NCCT and sometimes a hyperdense vessel. But in many hyperacute (<6 hour) patients we do not have a positive diagnosis with NCCT. Multimodal CT will make a positive diagnosis of acute ischemia in virtually all large vessel occlusions, but MRI is superior for the posterior circulation and for stroke mimics.
2. What is the topography and mechanism of the stroke? Often no information provided by NCCT. Multimodal CT will diagnose large artery disease. MRI is best for brainstem and lacunar stroke (and there is a very nice paper that Dr Shuaib is an author on in September Stroke that proves this).
3. How much brain is dead? DWI is now the 'gold standard' although perfusion CT is catching up. NCCT is limited in hyperacute stroke. There is considerable evidence that infarct core volume on baseline imaging is one of the most powerful predictors of response to acute reperfusion therapy.
4. How much brain is there to salvage? Perfusion imaging is required here - CT and MR perfusion are roughly equivalent.
5. What method should we use to salvage brain and how long do we have to do so? The probability of recanalizing a terminal-ICA or proximal M1 MCA occlusion is so low with IV tPA that many consider endovascular therapy the first line approach. Thus one needs vascular imaging. Furthermore, the status of collateral flow distal to the occlusion gives an idea of penumbral 'life expectancy' - this may be best assessed with perfusion imaging.
6. If we can salvage brain, will it make any difference to the patient's outcome? This is the most difficult question to answer, and one that cannot be answered by NCCT alone. The answer varies dramatically with the modern brain imaging data.

Unless we use the now widely available modern imaging techniques in the routine assessment of acute stroke patients we will never gain a sophisticated understanding of acute stroke pathophysiology. The alternative is to persist in performing only NCCT - this approach is seductive as it is simple and requires little brain power, but beware! This path leads to stagnation and is an impediment to scientific advance.