MRA/DWI Mismatch
A Novel Concept or Something One Could Get Easier and Cheaper?

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See related article, pages 2491–2496.

“Too much is never good; too little is never enough.”
—French proverb

L ansberg et al present a further subanalysis (QUOTE) of the DEFUSE study.\(^1\) They assessed whether a more stringent “mismatch” concept than the usual perfusion imaging (PI)/diffusion-weighted imaging (DWI) mismatch would be a good tool to identify a target group, which might profit from early reperfusion enhanced by recombinant tissue plasminogen activator. In fact, they looked for patients with proximal middle cerebral artery occlusion or proximal stenosis with distal occlusion and a small DWI lesion (<25 mL respectively <15 mL). This of course is a smart thing to do, because the target group for treatment is further refined, albeit diminished in numbers. One could also increase the widely accepted mismatch ratio of 1.2 to 1.5, or 2.0, which would also optimize the target group at the cost of numbers of patients to be treated.

If the French proverb mentioned at the beginning of this Editorial were accurate, the MR angiography (MRA)/DWI mismatch idea would have some merit. Who exactly are these patients? In essence, they are patients with a therapeutic target (relevant vessel occlusion) and a very small tissue lesion at screening. One could also phrase it differently. These are patients with a very large perfusion deficit and a small diffusion lesion. Of course, these patients are the optimum target group for recanalization/reperfusion approaches in a later time window and of course these patients have a benefit on reperfusion.

At what cost does this come if the MRA/DWI mismatch were applied to select patients? First of all, an MRI has to be performed anyway with all extra cost (money as well as time and personnel). Second, the ratio of patients treated-to-screened further diminishes, because all those patients with a smaller treatment target (eg, M3 branch occlusion and cortical mismatch) and therefore smaller but still likely present treatment effect are not going to be treated. In the rather small (but very “clean”) study of 74 patients, only 62 remained for analysis, 41 with a measurable occlusion on MRA, 27 of whom had an MRA-DWI mismatch (primary definition: MRA score 3 corresponding to occlusion and DWI <25 mL). In this set, 34 of 62 patients would have been assigned as having a PI/DWI mismatch, a point in case of further subselection (see previously). Reperfusion could only be assessed in 57 patients. Reperfusion was associated with an increased rate of a favorable clinical response in patients with an MRA/DWI mismatch and a lower rate in patients without mismatch (QUOTE). In essence, the findings of DEFUSE (PI/DWI mismatch) were accentuated in this post hoc analysis using the MRA/DWI mismatch.

As the authors discuss in the further course of their article, CT may be a good tool for a similar “mismatch” definition. We personally are MRI advocates and believe that stroke MRI, including all the comprehensive information with MRA, DWI, PI, fluid-attenuated inversion recovery, and gradient recalled echo, has the real advantage over CT and should be used beyond 3 hours for all patients. PI/DWI mismatch corresponding to MRA vessel status,\(^2\) small DWI lesion,\(^3\) no major leukoaraiosis,\(^4\) and no more than 5 microbleeds\(^5\) may further improve the general trend toward a comparably favorable performance of stroke MRI beyond 3 hours regarding safety as well as outcome.\(^6\) Why would we want to discard all this information and still bear the additional cost and stress of an MRI?

If one wants to simplify diagnostic imaging in acute stroke (do we really want that?), why not downsize it more consequently? As an alternative to stroke MRI, the use of a CT angiography/CT mismatch (occlusion and either normal CT or ASPECTS >7) with or without taking a look at CT angiography source images\(^7,8\) would be cheaper, probably as reliable, far more generally applicable by many stroke centers, faster, and likely as effective as the MRA/ DWI mismatch in time windows beyond 3 hours. Even less expensive and toxic than CT angiography is transcranial Doppler, which very well can be applied to select patients for extended time windows or interventions.\(^9,10\) Finally, CT angiography and transcranial Doppler suffice for screening for intra-arterial thrombolysis as well as the IMS-3 trial or any thrombectomy device study, which recruits with a randomized, controlled, clinical end point design.

“Good (stroke MRI) is never too much; CT (>3 hours) is never enough.”
—German Stroke Physicians’ proverb

Disclosures
None.

References


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