

A *contrario* detection of focal brain perfusion abnormalities based on an Arterial Spin Labeling template

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Purpose

Objective

Detection of hypoperfusions and hyperperfusions at the individual level based on Arterial Spin Labeling images.

Context

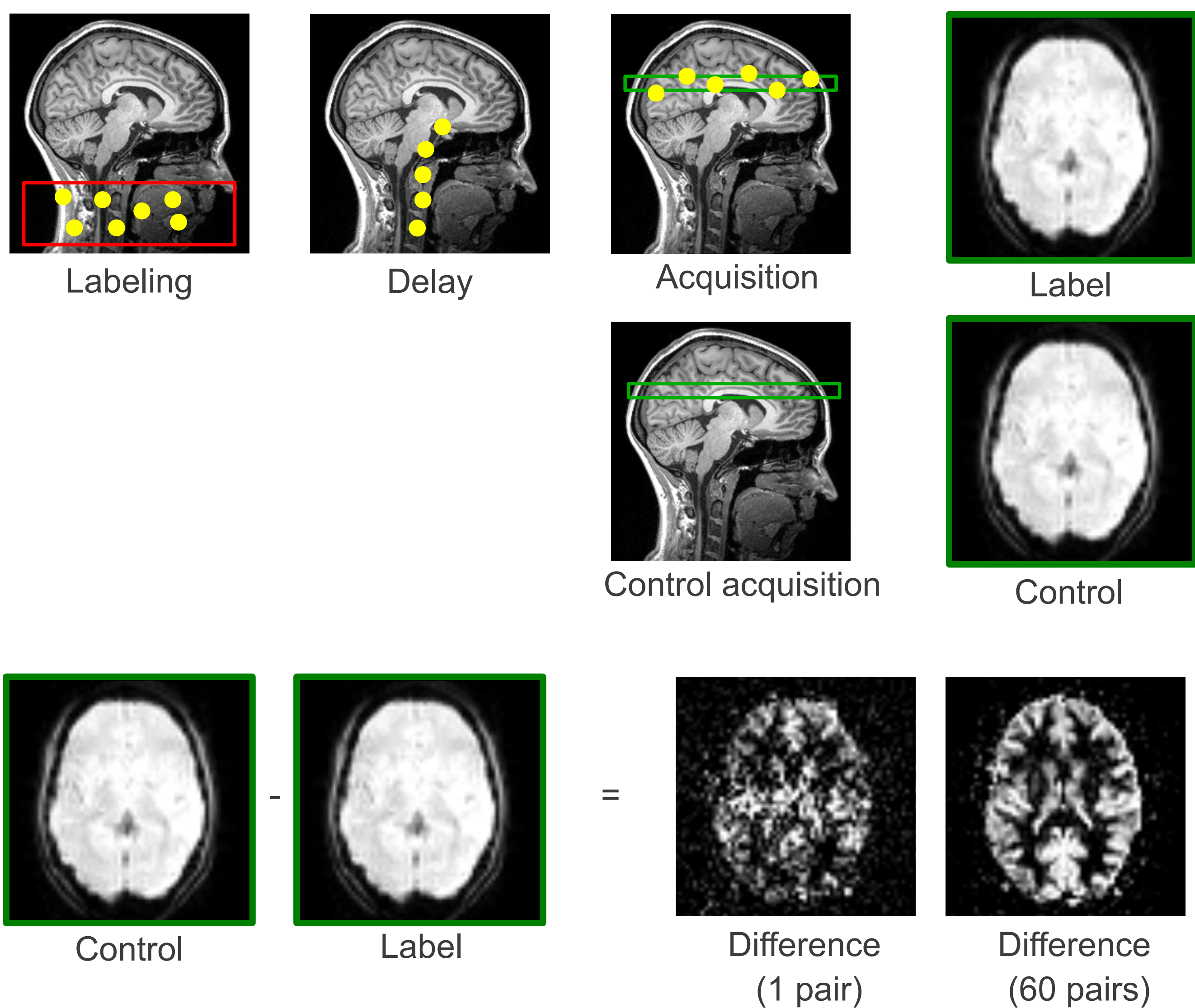
Arterial Spin Labeling enables non invasive Cerebral Blood Flow estimation by MRI imaging. The presence of regions with atypical CBF can characterize a pathology. In brain tumors for instance, perfusion increase can be directly related to the grading of the malignant tissues. It is therefore of great interest to identify these regions in order to provide the patients with the appropriate therapy.

Our method

We propose an automatic framework to detect abnormal patterns of perfusion using an *a contrario* approach and an Arterial Spin Labeling template as model of normal perfusion.

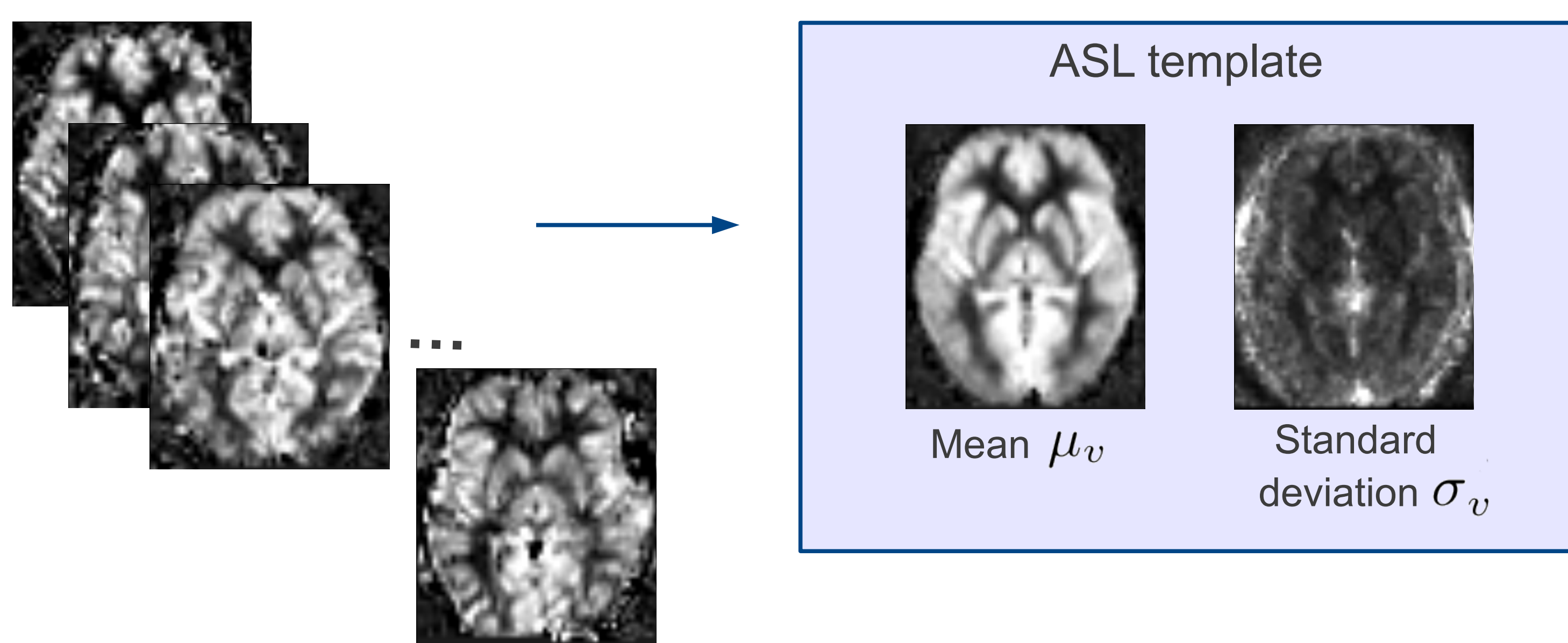
Arterial Spin Labeling

Arterial Spin Labeling (ASL) is a recent MRI perfusion technique which enables quantification of cerebral blood flow (CBF).

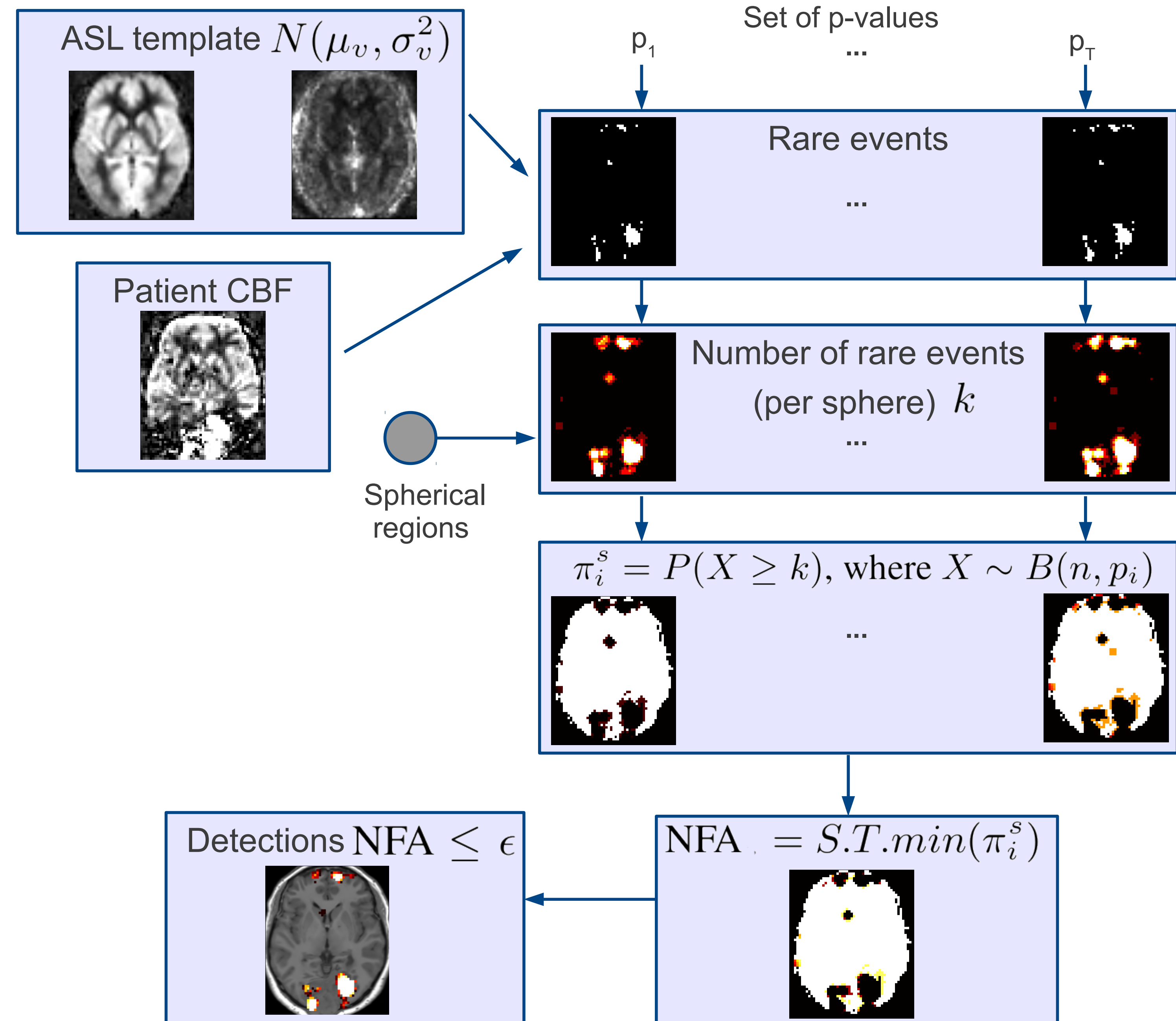


Cerebral Blood Flow Template construction

Perfusion in healthy subjects was modeled by a gaussian law in each voxel: $N(\mu_v, \sigma_v^2)$

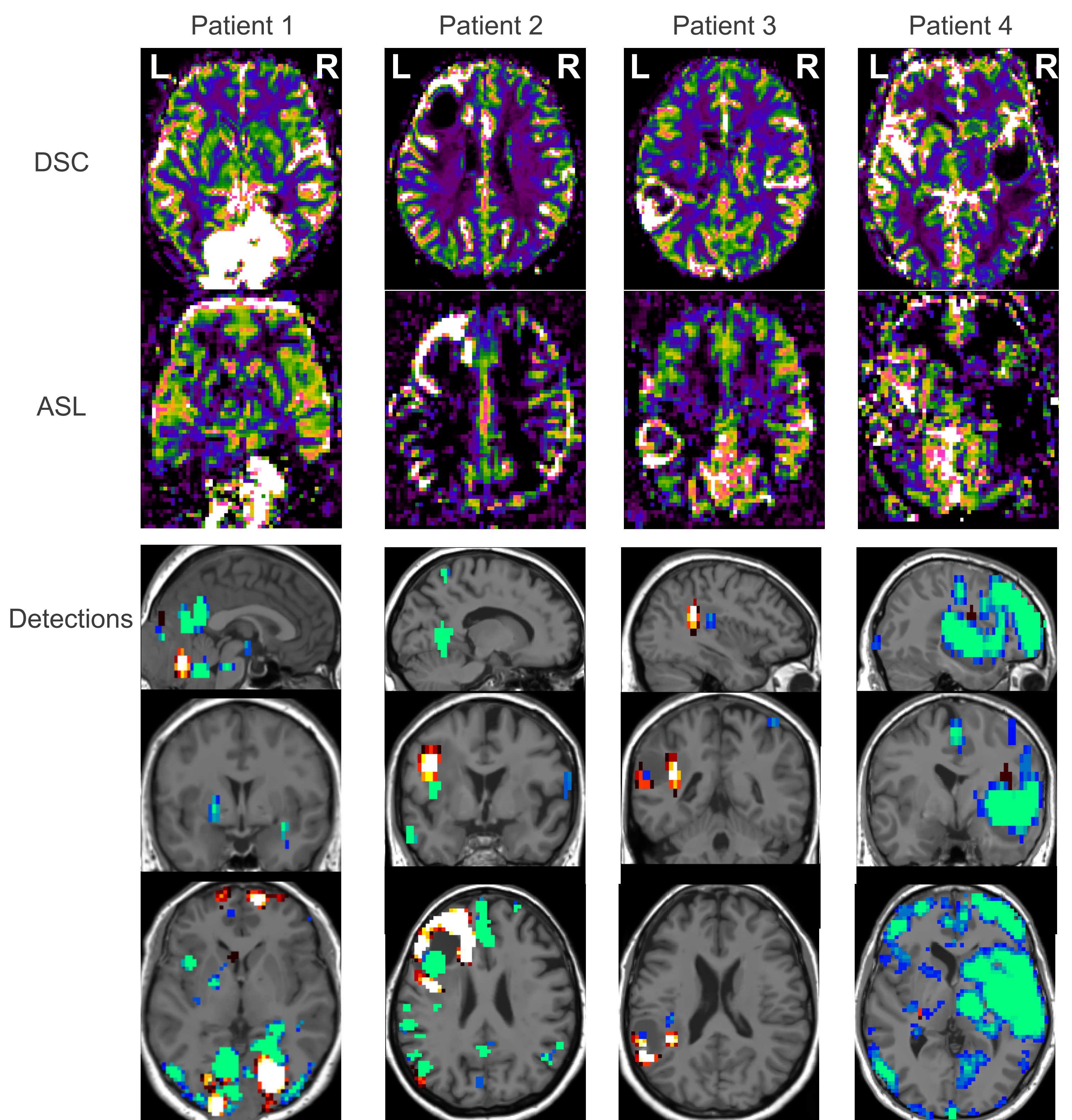


A *contrario* detections



Results

Validation was undertaken on 4 patients presenting brain tumors by qualitative comparison with CBF extracted from dynamic susceptibility weighted contrast enhanced (DSC) imaging.



Conclusion

We presented an automatic *a contrario* approach to detect hyperperfusions and hypoperfusions based on ASL images. Detections in four patients were qualitatively assessed by comparison to DSC CBF maps. This study included four patients and a broader validation on a larger database is ongoing. Current work focuses on a comparison of the *a contrario* detection framework with the general linear model, and a validation based on quantitative criteria.

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