

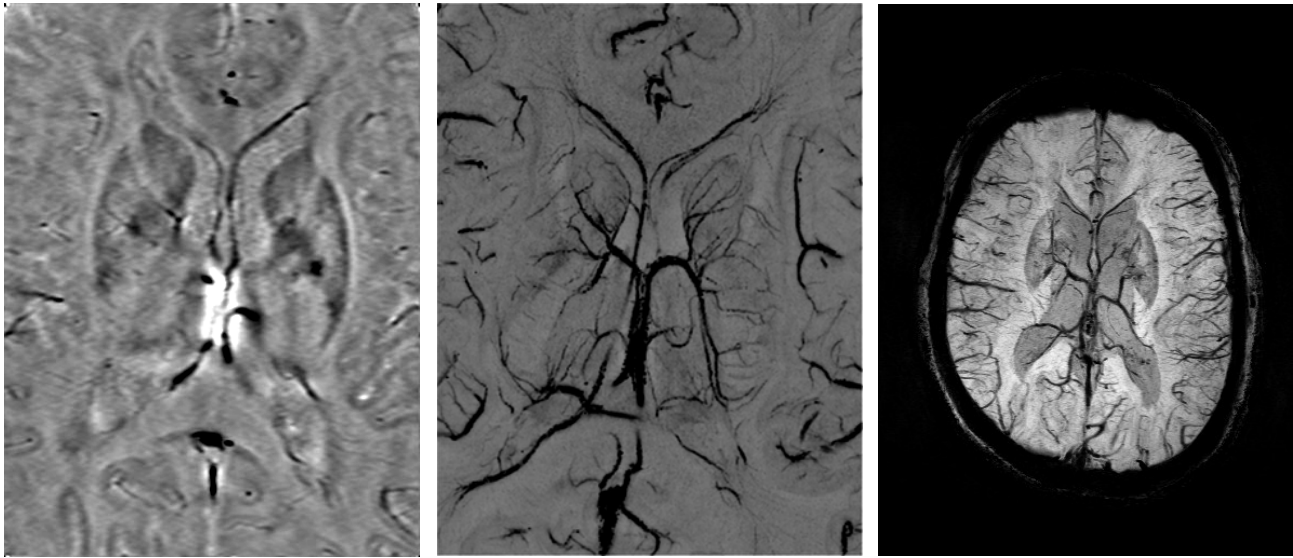
*Multiple sclerosis with the CCSVI protocol: SWI, MRA and FQ*

**Case 1 of the NICE protocol as proposed by the MRI Institute for Biomedical Research**

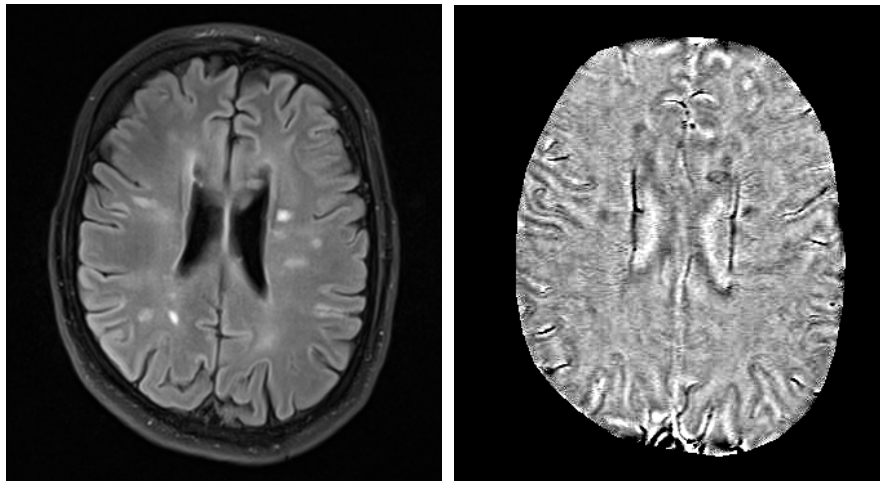
The first complete case we studied came from a collaboration with Juergen Reichenbach in Jena, Germany.

This patient was 45 years old and had a full brain susceptibility weighted imaging scan, an MR venogram of the major veins in the head and neck, and flow quantification in the jugular and dural sinuses.

Here are some example images showing the iron in the lesions from SWI, the iron in the basal ganglia, a conventional FLAIR image, and an image showing the stenosis of one jugular vein.



**Figure 1:** a) SWI filtered phase image of the basal ganglia in this patient showing abnormal iron content in the globus pallidus on both sides of the brain. b) SWI filtered phase of a normal volunteer showing only vessels no iron build up. c) SWI through the same region showing the main thalamostriate venous drainage system.



**Figure 2:** a) Conventional FLAIR image showing a variety of lesions around the ventricles. b) A single slice SWI filtered phase image showing iron in some lesions and a ring of iron around one lesion not clearly seen at all with the FLAIR image.



MS patient

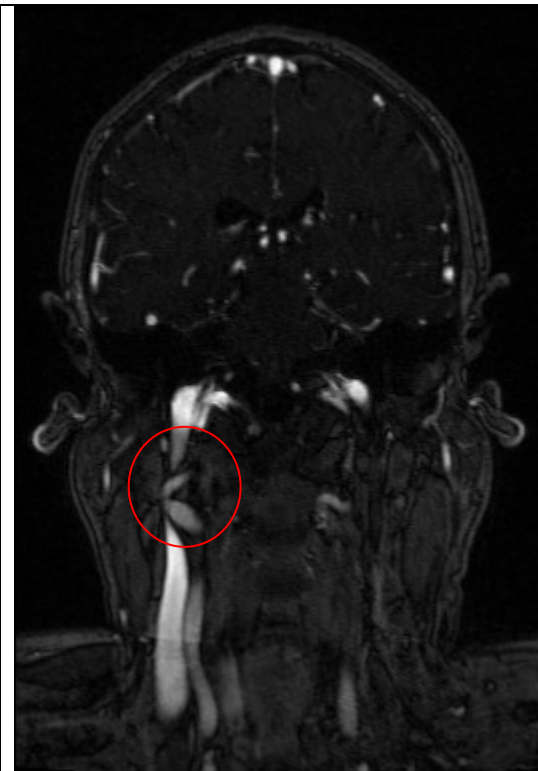


Normal control

**Figure 3:** a) Pinched jugular. b) Jugular for normal control.



MS Patient: MIP of the post-phase shows the right internal jugular vein being compressed by carotid artery.



MS Patient: Slice 86 of post-phase showing a second part of the carotid artery further compressing the internal jugular.



MS Patient: MIP of the pre-phase showing the sharp angle of the right internal carotid artery.



MS Patient: MIP of subtracted pre-phase from post-phase data.



The above is a 3D view of the pre-phase 3D volume rendered data. The sharp angle of the right internal carotid artery is shown by the blue arrow, while the straight left internal carotid artery is shown by the purple arrow.