

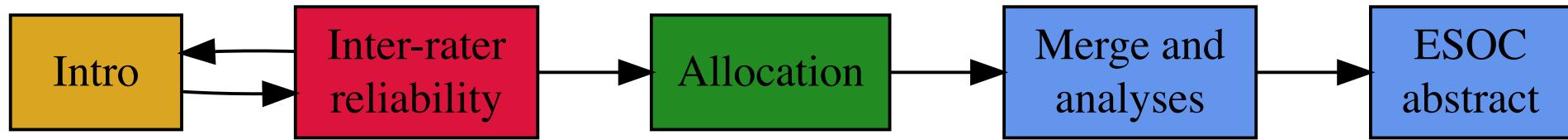
SVD annotation intro

Andreas 

andrlr@rm.dk

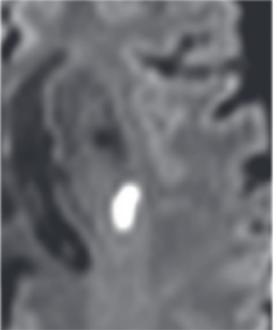
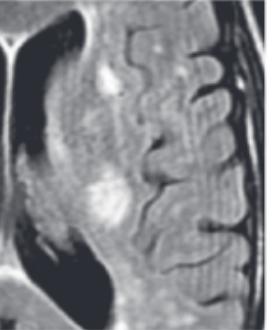
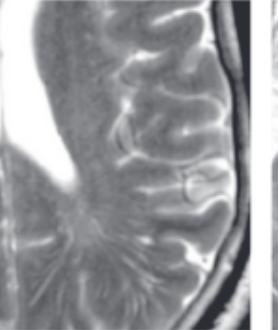
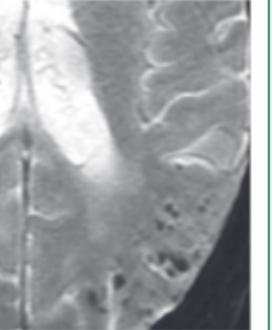
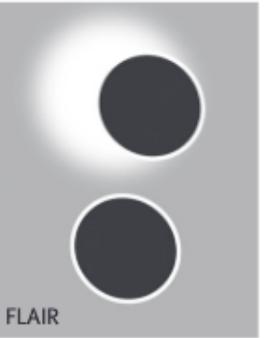
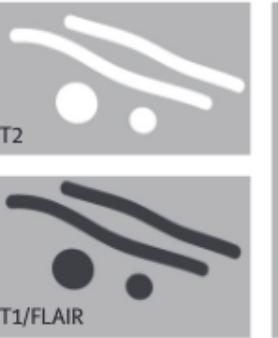
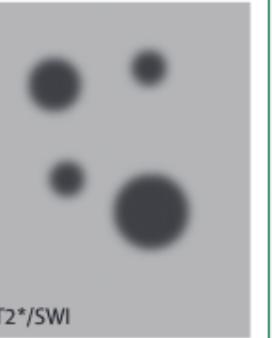
Danish Stroke Centre, AUH

Project flow



Baggrund

Physical activity (PA) may reduce the development of small vessel disease (SVD). The effect of physical activity and more classical vascular risk factors such as hypertension and diabetes in the development of SVD is debated, however. We aim to investigate the effect modification of physical activity on traditional vascular risk factors and the burden of small vessel disease among acute ischemic stroke patients. [ESOC 2024, submitted abstract]

	Recent small subcortical infarct	White matter hyperintensity	Lacune	Perivascular space	Cerebral microbleed
Example image					
Schematic				 	
Usual diameter	≤20 mm	Variable	3–15 mm	≤2 mm	≤10 mm
Comment	Best identified on DWI	Located in white matter	Usually have hyperintense rim	Most linear without hyperintense rim	Detected on GRE seq., round or ovoid, blooming
DWI	↑	↔	↔/(↓)	↔	↔
FLAIR	↑	↑	↓	↓	↔
T2	↑	↑	↑	↑	↔
T1	↓	↔/(↓)	↓	↓	↔
T2*-weighted GRE	↔	↑	↔ (↓ if haemorrhage)	↔	↓↓
↑ Increased signal ↓ Decreased signal ↔ Iso-intense signal					

Neuroimaging standards for research into small vessel disease and its contribution to ageing and neurodegeneration

Joanna M Wardlaw, Eric E Smith, Geert J Biessels, Charlotte Cordonnier, Franz Fazekas, Richard Frayne, Richard I Lindley, John T O'Brien, Frederik Barkhof, Oscar R Benavente, Sandra E Black, Carol Brayne, Monique Breteler, Hugues Chabriat, Charles DeCarli, Frank-Erik de Leeuw, Fergus Doubal, Marco Duering, Nick C Fox, Steven Greenberg, Vladimir Hachinski, Ingo Kilimann, Vincent Mok, Robert van Oostenbrugge, Leonardo Pantoni, Oliver Speck, Blossom C M Stephan, Stefan Teipel, Anand Viswanathan, David Werring, Christopher Chen, Colin Smith, Mark van Buchem, Bo Norrving, Philip B Gorelick, Martin Dichgans; STAndards for ReportIng Vascular changes on nEuroimaging (STRIVE v1)

Cerebral small vessel disease (SVD) is a common accompaniment of ageing. Features seen on neuroimaging include recent small subcortical infarcts, lacunes, white matter hyperintensities, perivascular spaces, microbleeds, and brain atrophy. SVD can present as a stroke or cognitive decline, or can have few or no symptoms. SVD frequently coexists with neurodegenerative disease, and can exacerbate cognitive deficits, physical disabilities, and other symptoms of neurodegeneration. Terminology and definitions for imaging the features of SVD vary widely, which is also true for protocols for image acquisition and image analysis. This lack of consistency hampers progress in identifying the contribution of SVD to the pathophysiology and clinical features of common neurodegenerative diseases. We are an international working group from the Centres of Excellence in Neurodegeneration. We completed a structured process to develop definitions and imaging standards for markers and consequences of SVD. We aimed to achieve the following: first, to provide a common advisory about terms and definitions for features visible on MRI; second, to suggest minimum standards for image acquisition and analysis; third, to agree on standards for scientific reporting of changes related to SVD on neuroimaging; and fourth, to review emerging imaging methods for detection and quantification of preclinical manifestations of SVD. Our findings and recommendations apply to research studies, and can be used in the clinical setting to standardise image interpretation, acquisition, and reporting. This Position Paper summarises the main outcomes of this international effort to provide the STAndards for ReportIng Vascular changes on nEuroimaging (STRIVE).

Neuroimaging standards for research into small vessel disease—advances since 2013

Marco Duering*, Geert Jan Biessels, Amy Brodtmann, Christopher Chen, Charlotte Cordonnier, Frank-Erik de Leeuw, Stéphanie Debette, Richard Frayne, Eric Jouvent, Natalia S Rost, Annemieke ter Telgte, Rustam Al-Shahi Salman, Walter H Backes, Hee-Joon Bae, Rosalind Brown, Hugues Chabriat, Alberto De Luca, Charles deCarli, Anna Dewenter, Fergus N Doubal, Michael Ewers, Thalia S Field, Aravind Ganesh, Steven Greenberg, Karl G Helmer, Saima Hilal, Angela C C Jochems, Hanna Jokinen, Hugo Kuijf, Bonnie Y K Lam, Jessica Leiberman, Bradley J MacIntosh, Pauline Maillard, Vincent C T Mok, Leonardo Pantoni, Salvatore Rudilosso, Claudia L Satizabal, Markus D Schirmer, Reinhold Schmidt, Colin Smith, Julie Staals, Michael J Thriplleton, Susanne J van Veluw, Prashanthi Vemuri, Yilong Wang, David Werring, Marialuisa Zedde, Rufus O Akinyemi, Oscar H Del Brutto, Hugh S Markus, Yi-Cheng Zhu, Eric E Smith*, Martin Dichgans*, Joanna M Wardlaw*

Cerebral small vessel disease (SVD) is common during ageing and can present as stroke, cognitive decline, neurobehavioural symptoms, or functional impairment. SVD frequently coexists with neurodegenerative disease, and can exacerbate cognitive and other symptoms and affect activities of daily living. Standards for Reporting Vascular Changes on Neuroimaging 1 (STRIVE-1) categorised and standardised the diverse features of SVD that are visible on structural MRI. Since then, new information on these established SVD markers and novel MRI sequences and imaging features have emerged. As the effect of combined SVD imaging features becomes clearer, a key role for quantitative imaging biomarkers to determine sub-visible tissue damage, subtle abnormalities visible at high-field strength MRI, and lesion-symptom patterns, is also apparent. Together with rapidly emerging machine learning methods, these metrics can more comprehensively capture the effect of SVD on the brain than the structural MRI features alone and serve as intermediary outcomes in clinical trials and future routine practice. Using a similar approach to that adopted in STRIVE-1, we updated the guidance on neuroimaging of vascular changes in studies of ageing and neurodegeneration to create STRIVE-2.

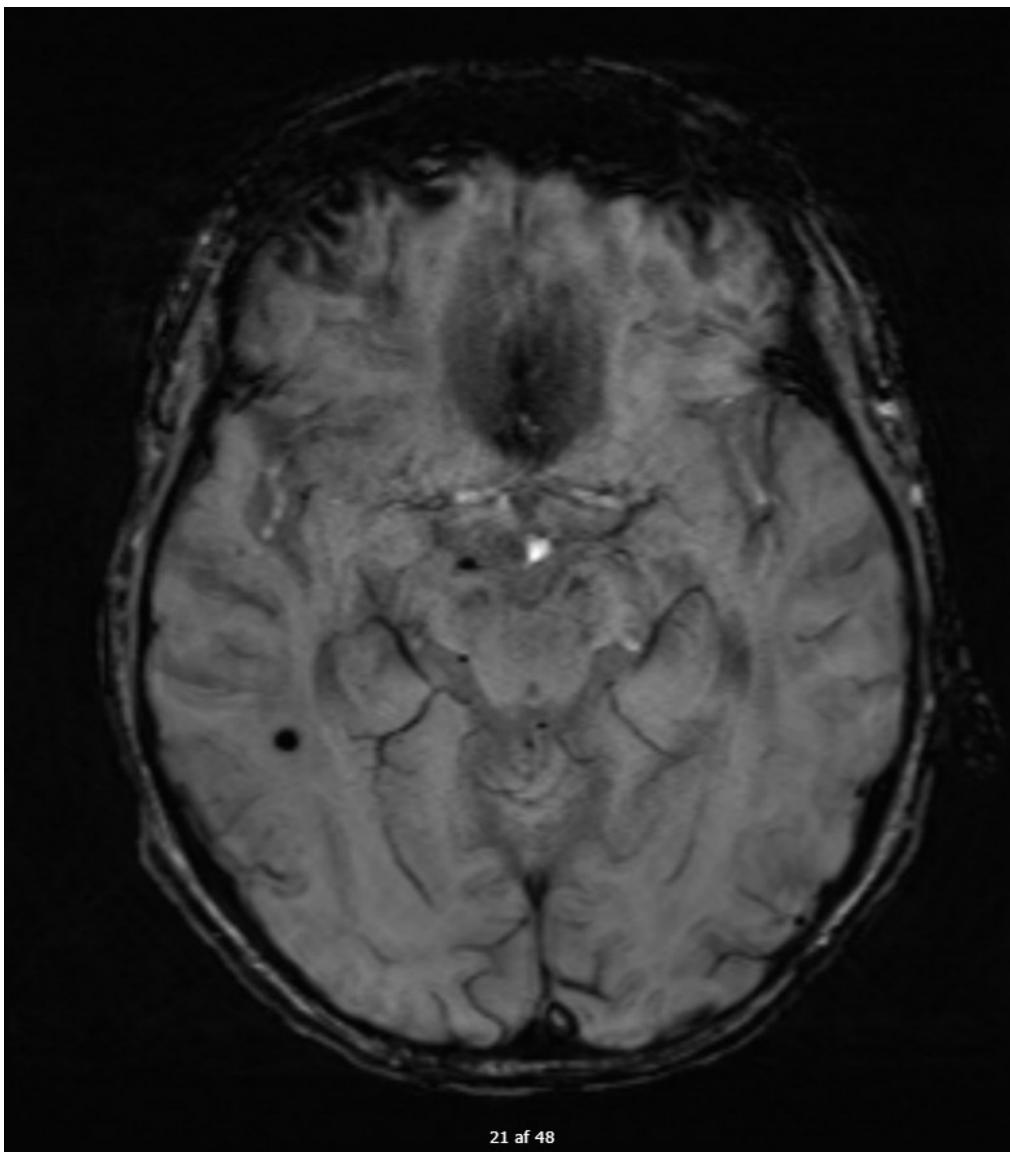
Scoring

- Første 10 (pt 1-11) til IRR-beregning
- Det kan være svært. Lad være at bruge lang tid på hver pt. Vi kan snakke om det.
- Først registrering, så kommer der eksempler.

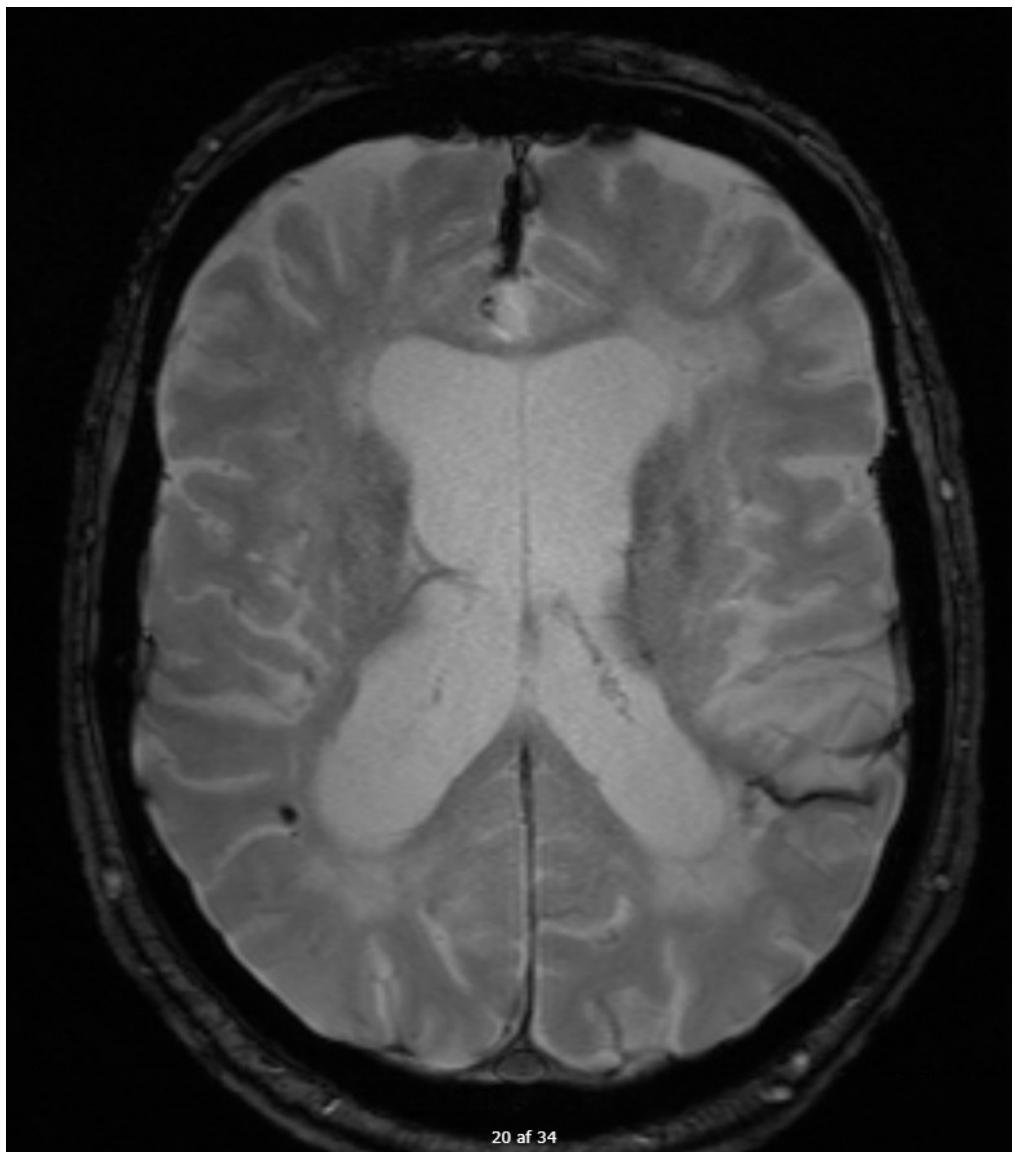
REDCap

REDCap: SVD score instrument

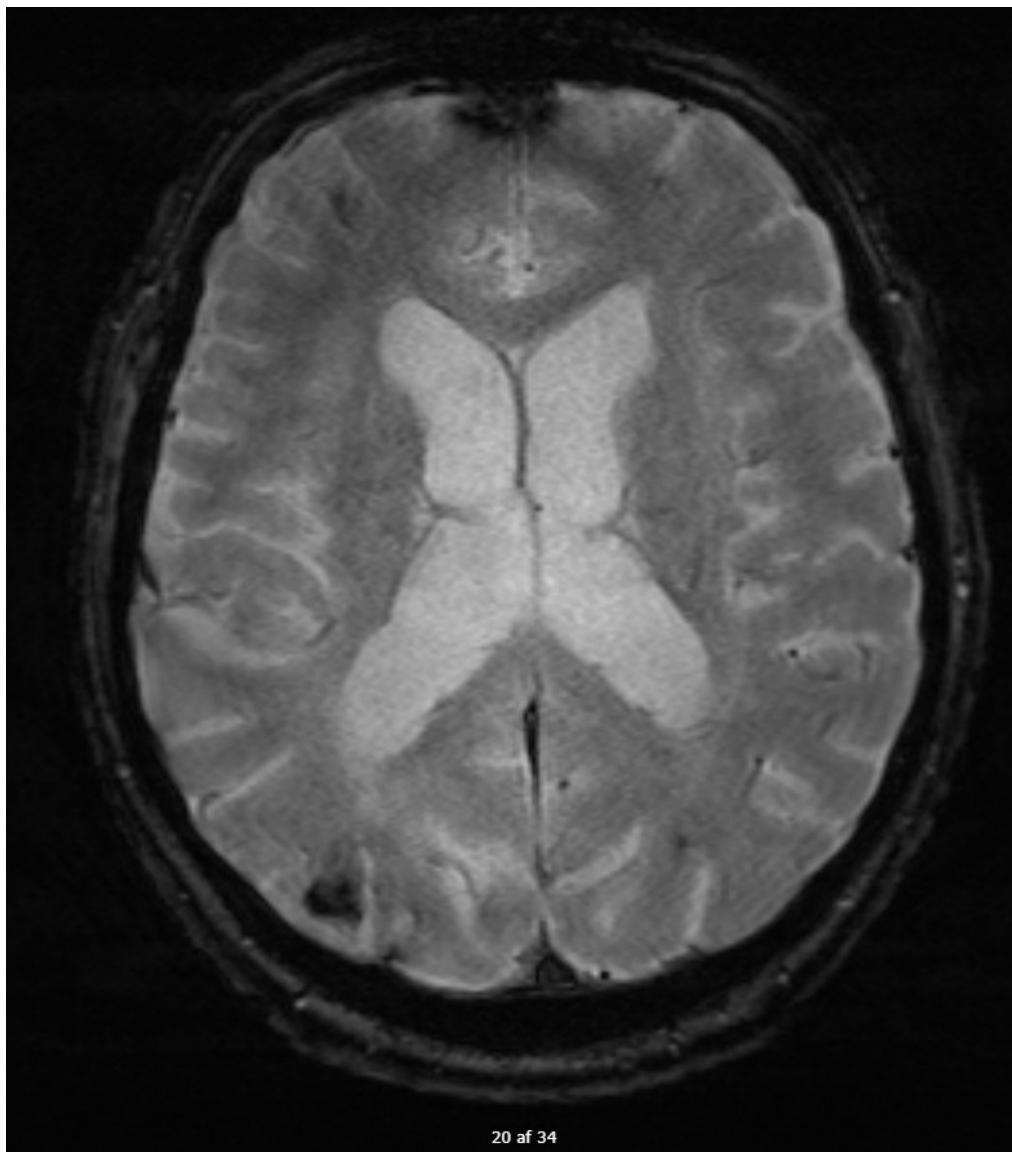
Microbleeds #1-1



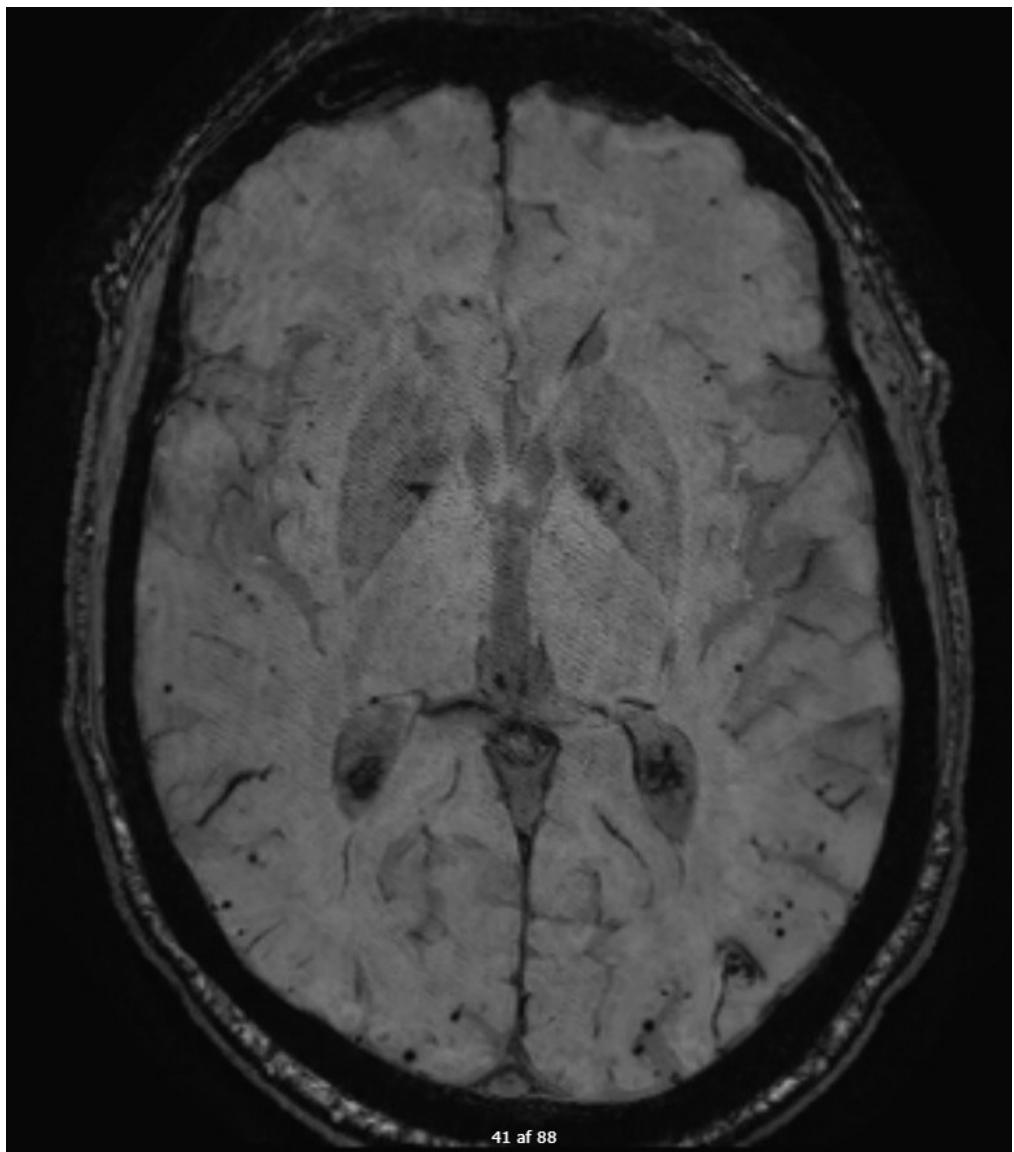
Superficiel siderose #1-1



Superficiel siderose #1-2

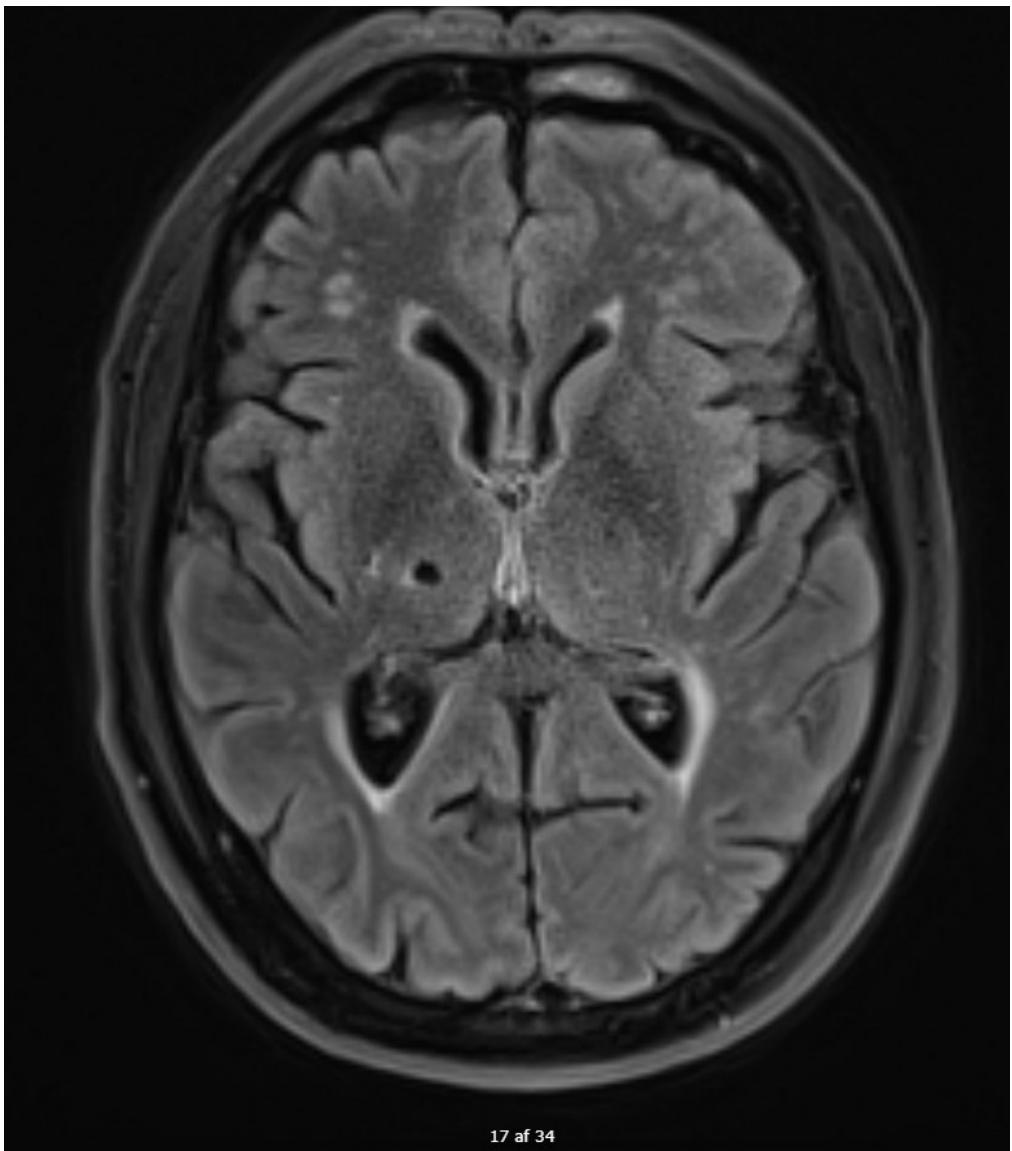


Superficiel siderose #1-3



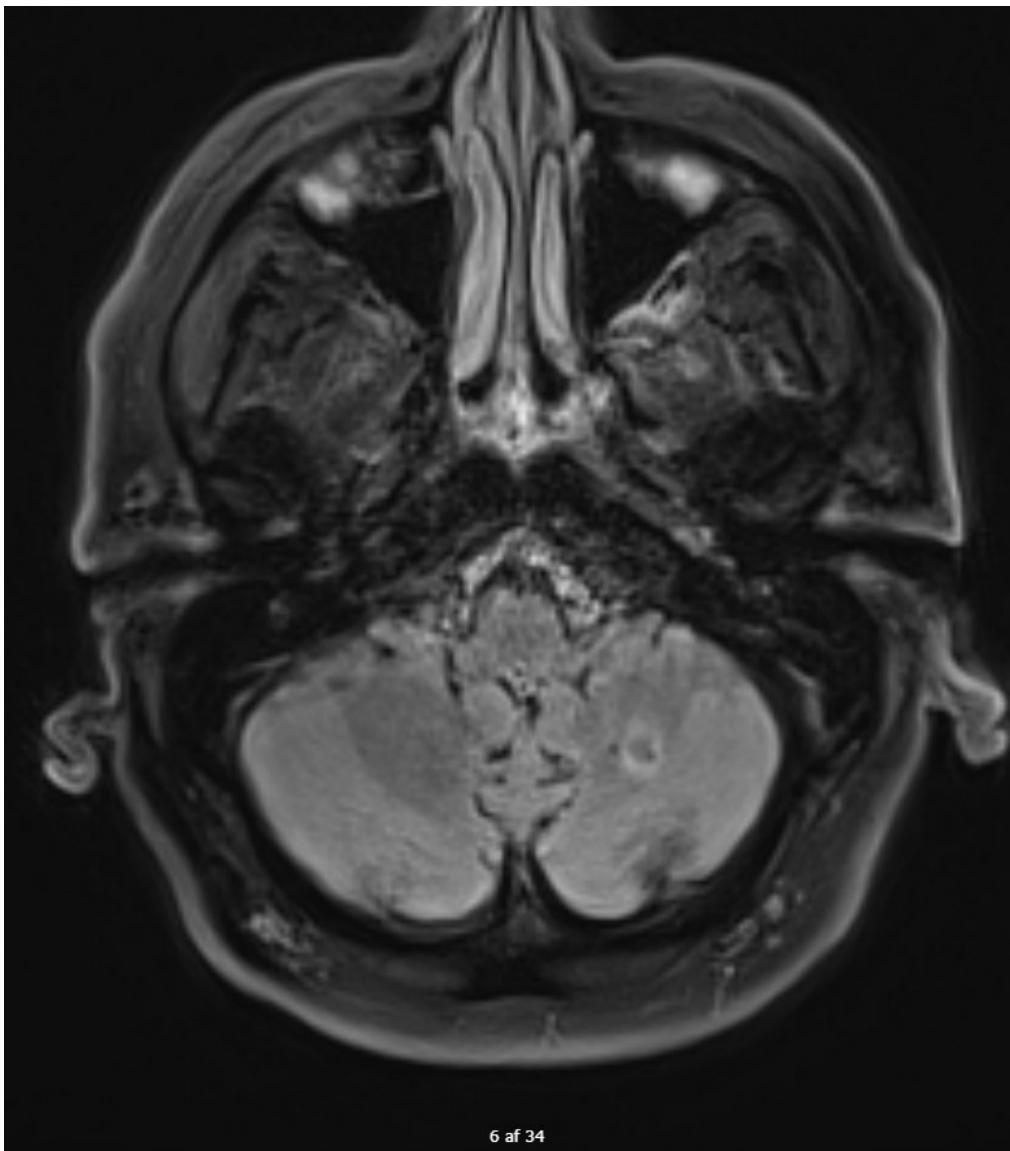
41 af 88

Lacunar infarcts #1-1



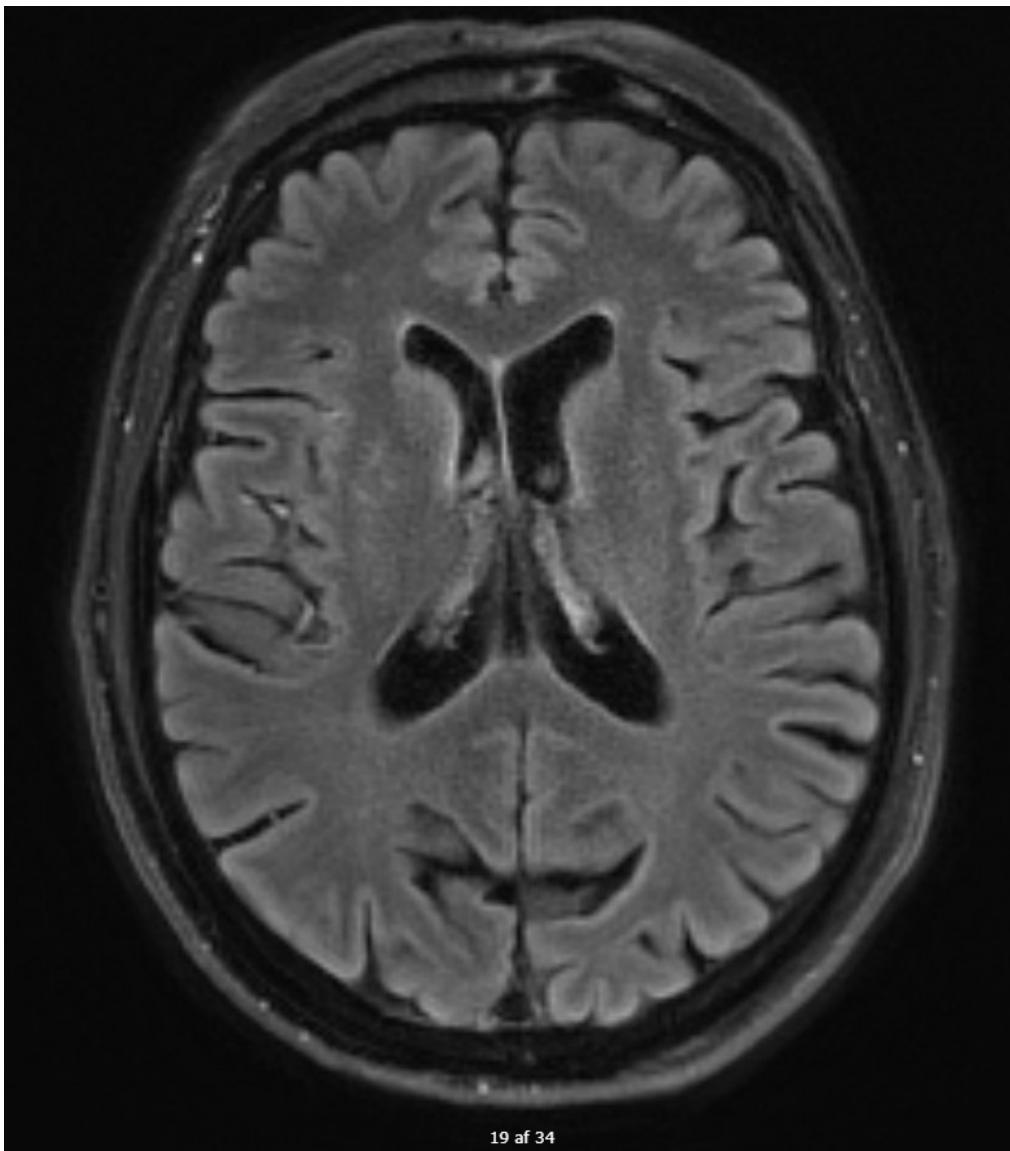
17 af 34

Lacunar infarcts #1-2



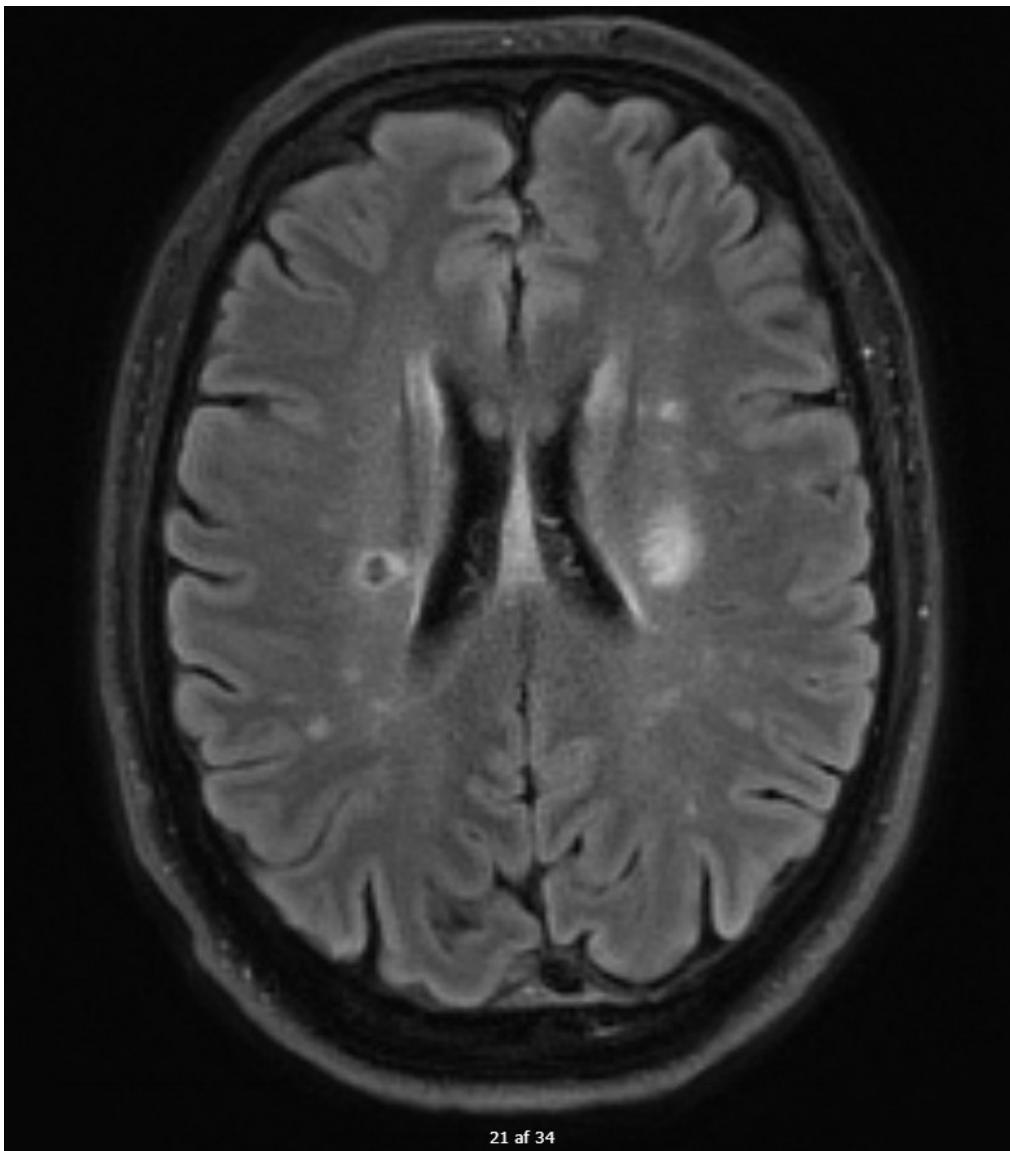
6 af 34

WMH (Deep white matter) #0



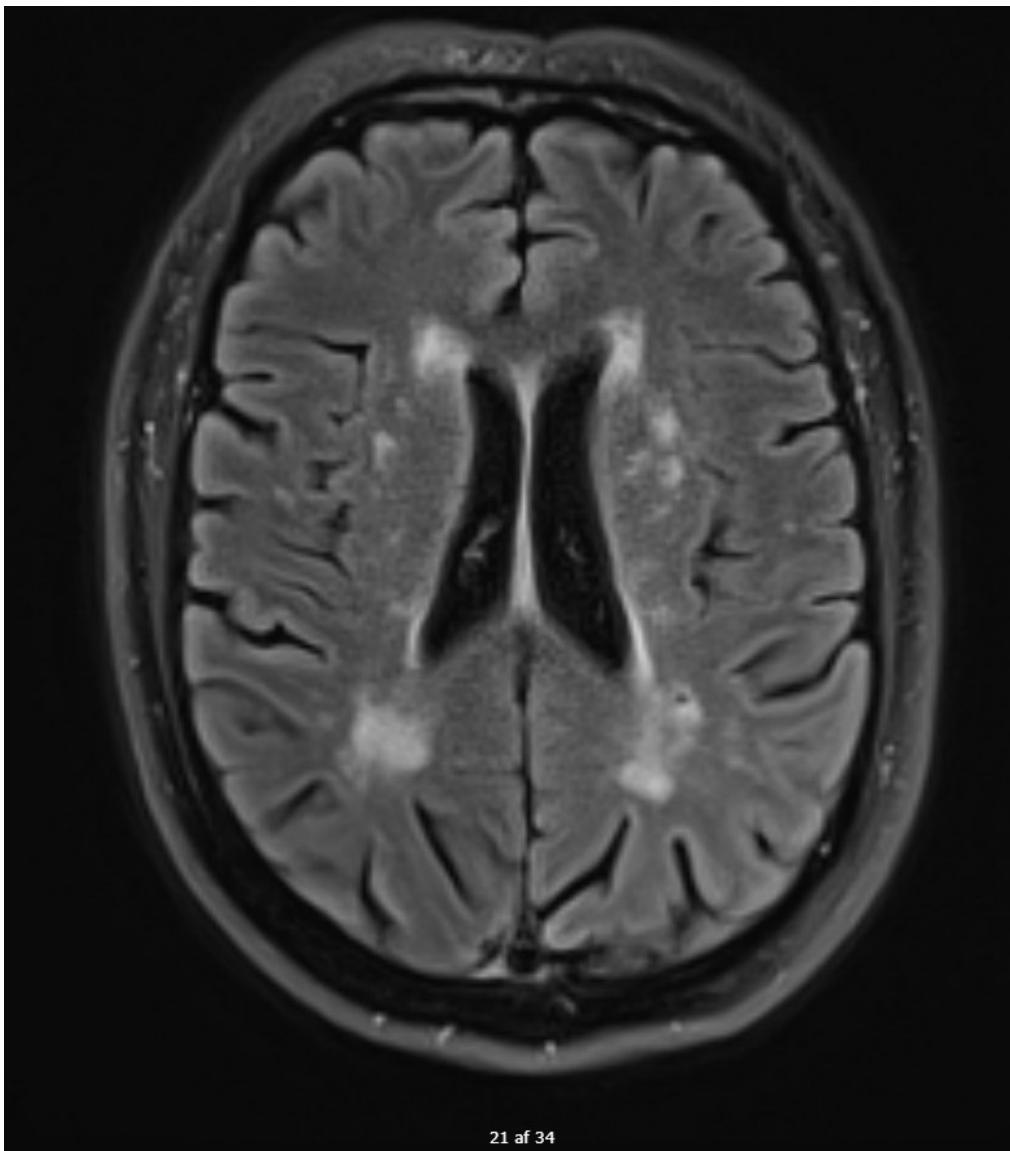
19 af 34

WMH (Deep white matter) #1



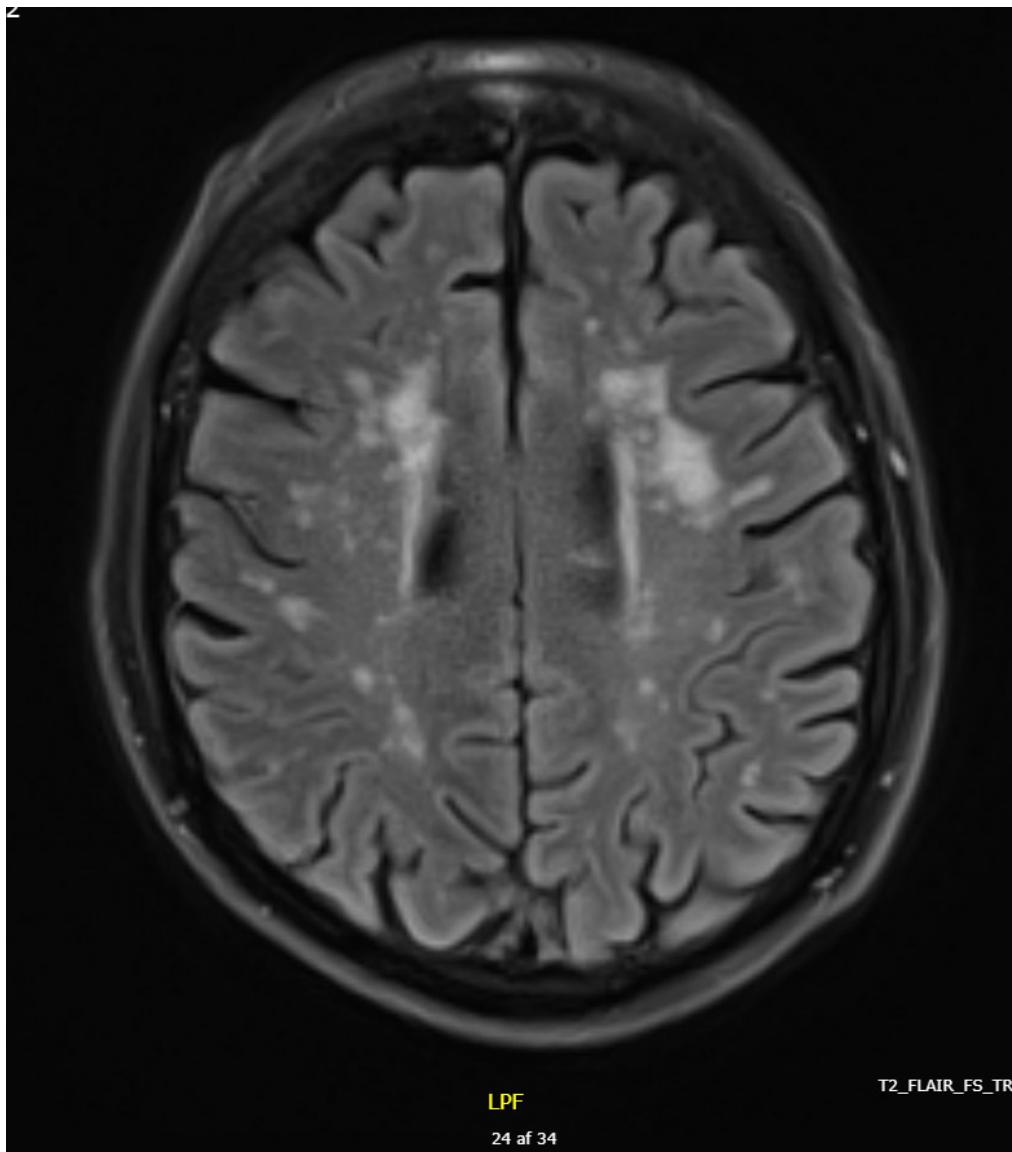
21 af 34

WMH (Deep white matter) #2



21 af 34

WMH (Deep white matter) #3

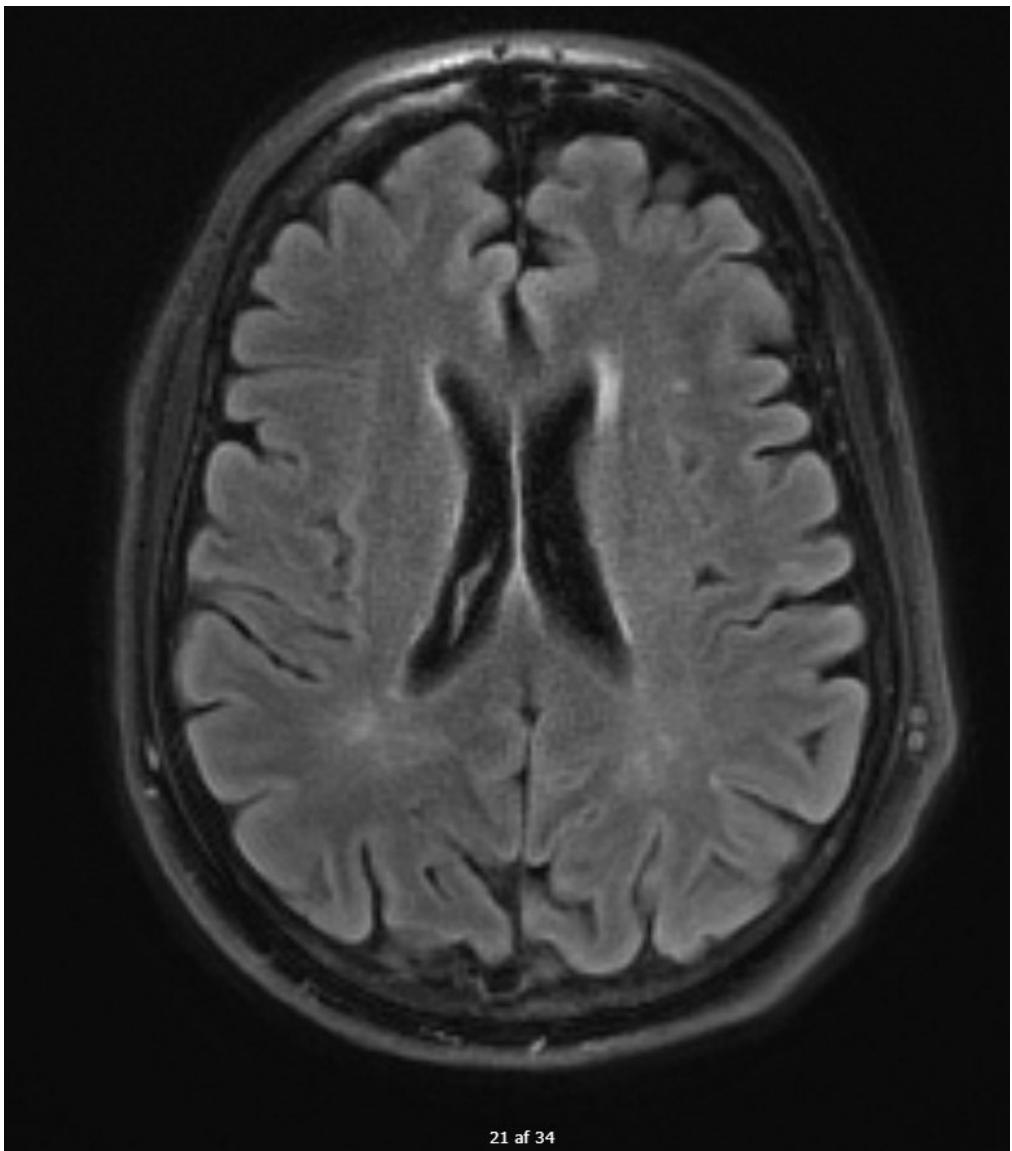


LPF

24 af 34

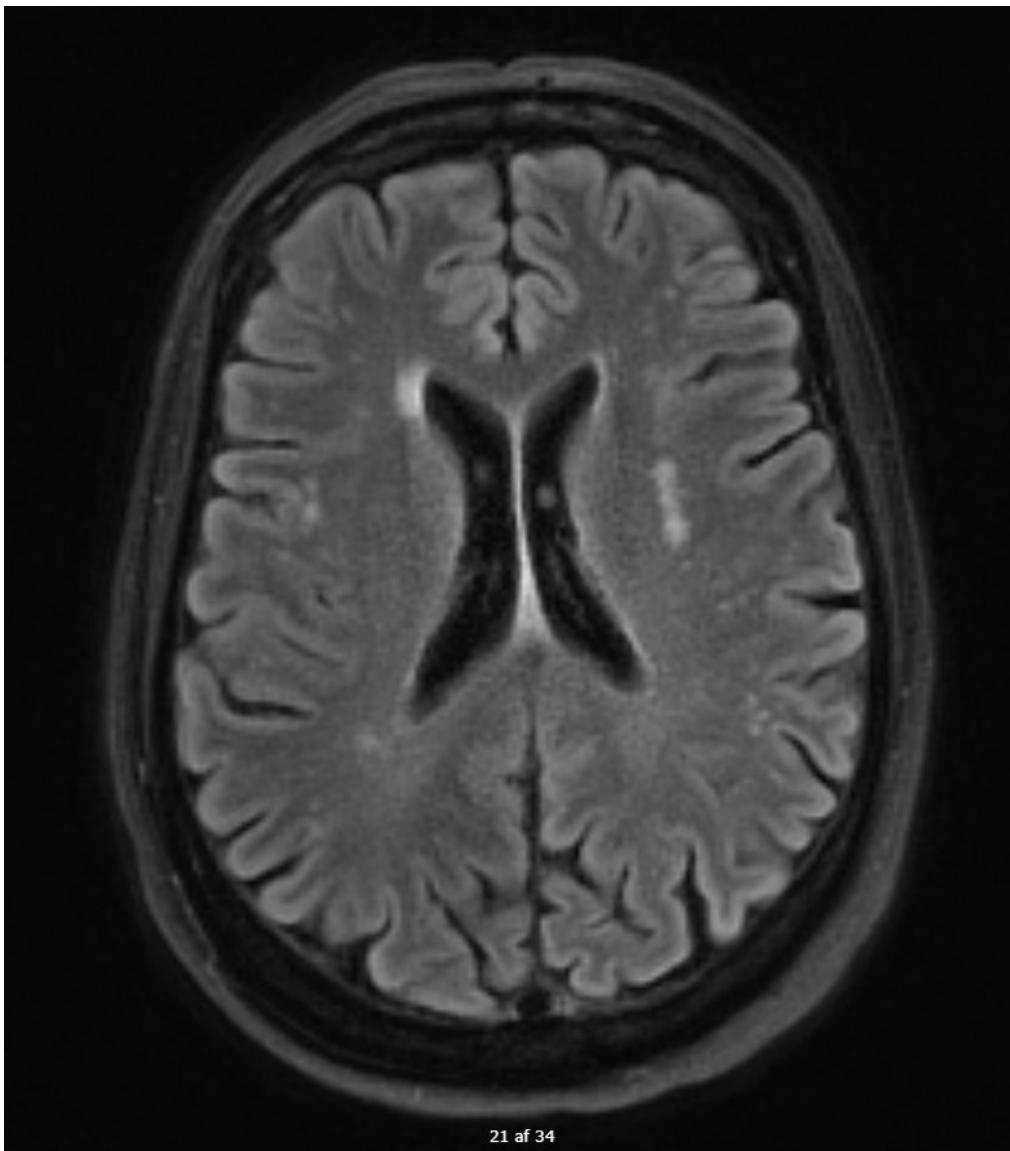
T2_FLAIR_FS_TR

Atrophy (GCA) #0-1



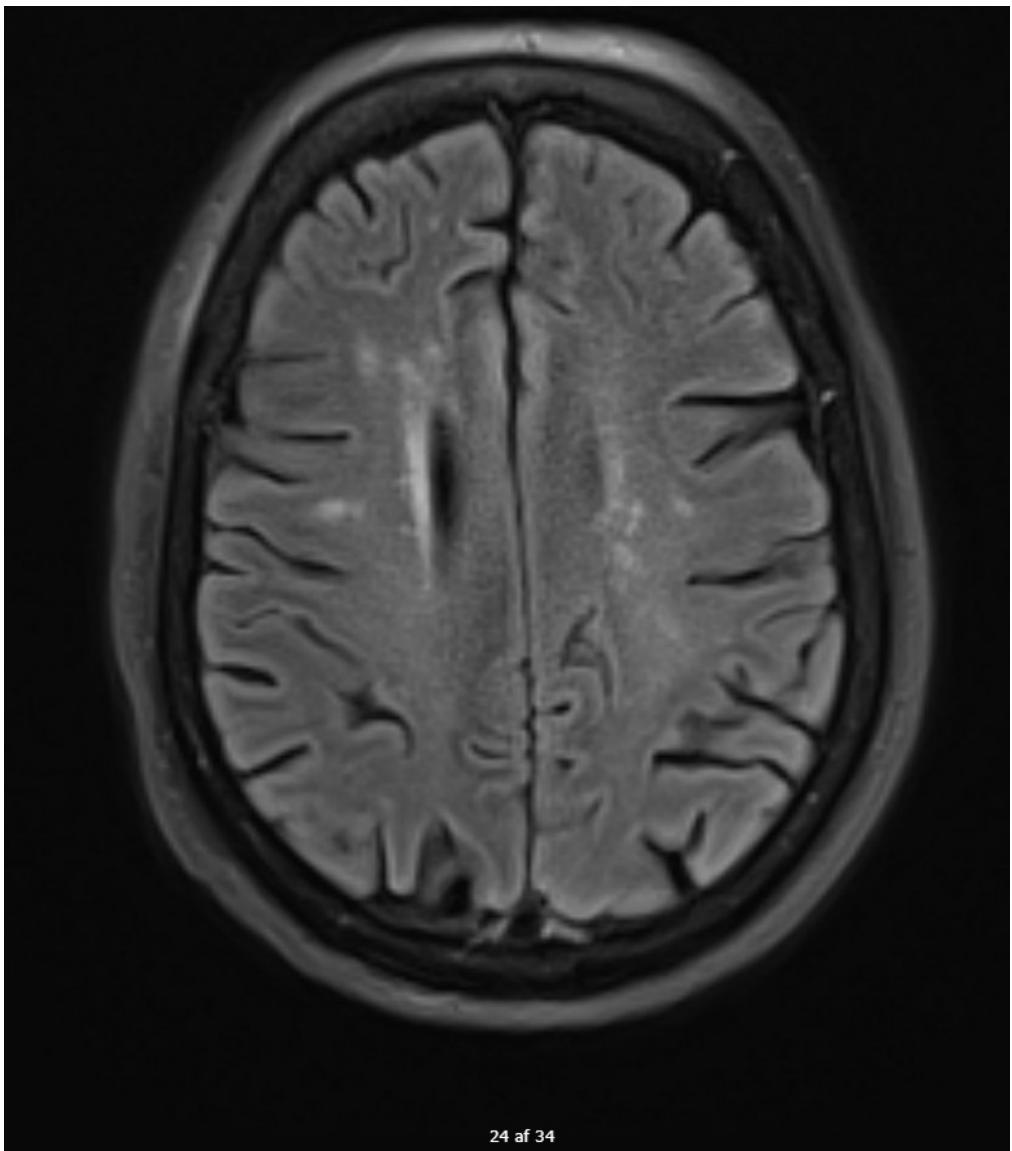
21 af 34

Atrophy (GCA) #0-2

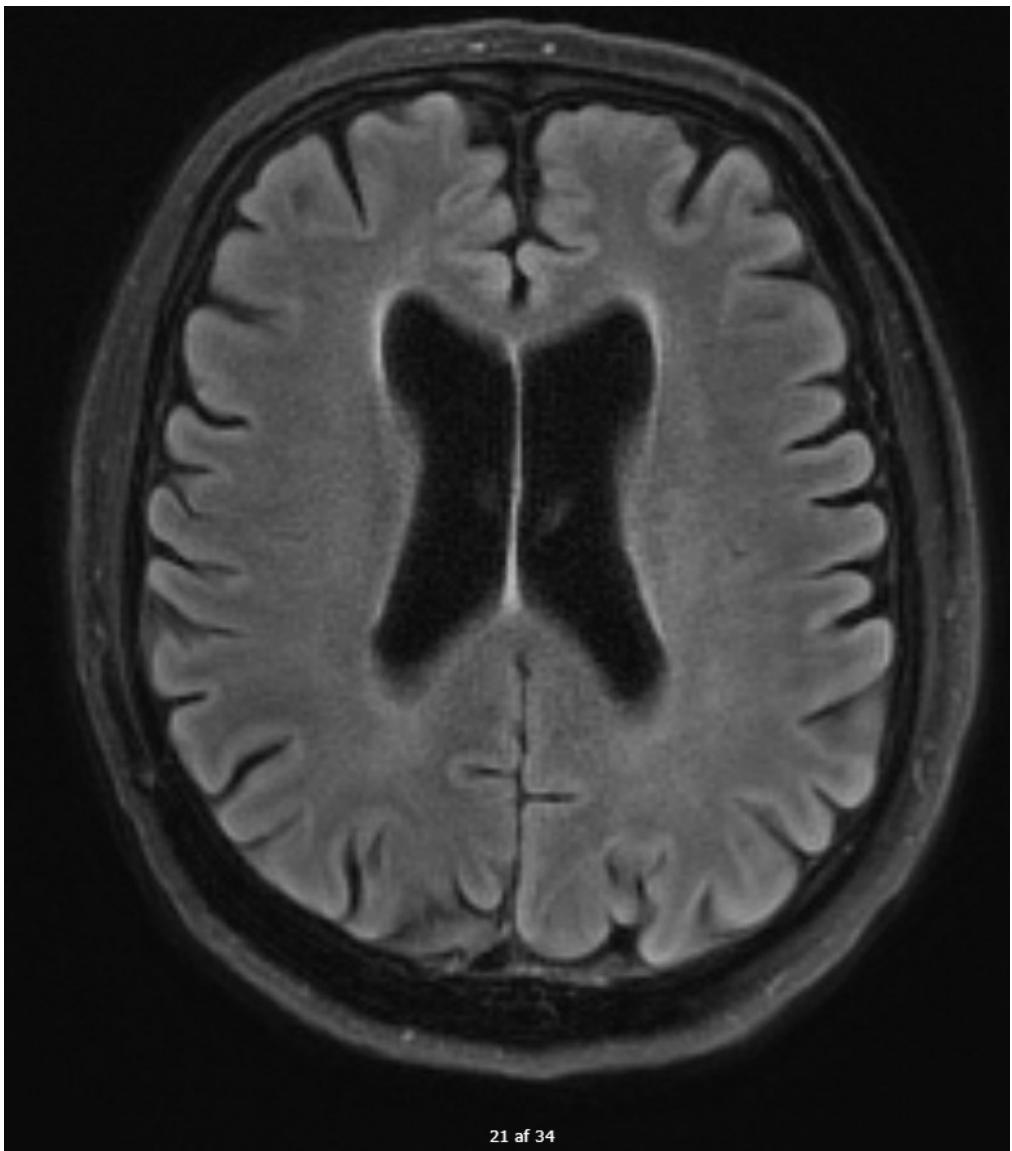


21 af 34

Atrophy (GCA) #1-1

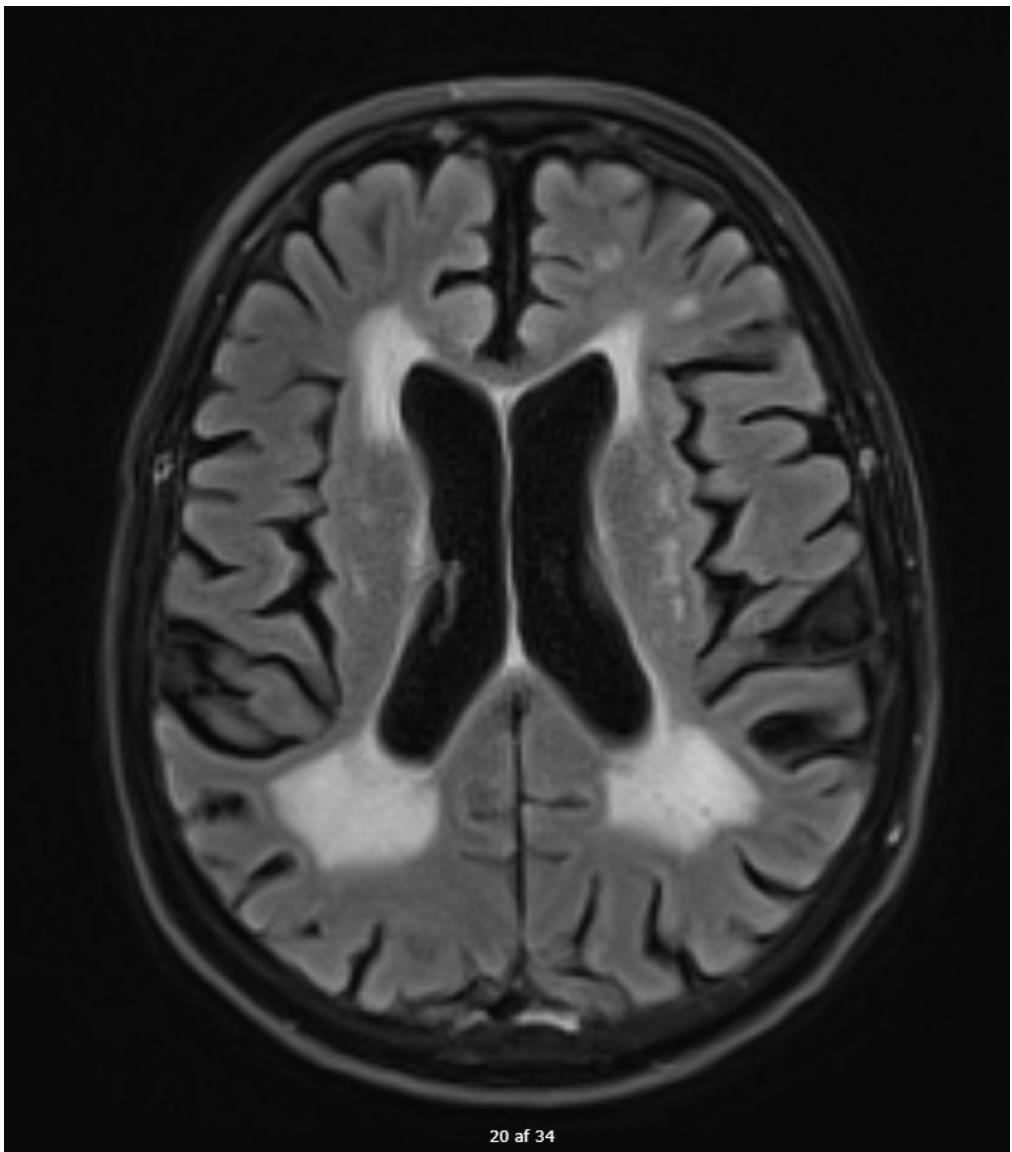


Atrophy (GCA) #1-2



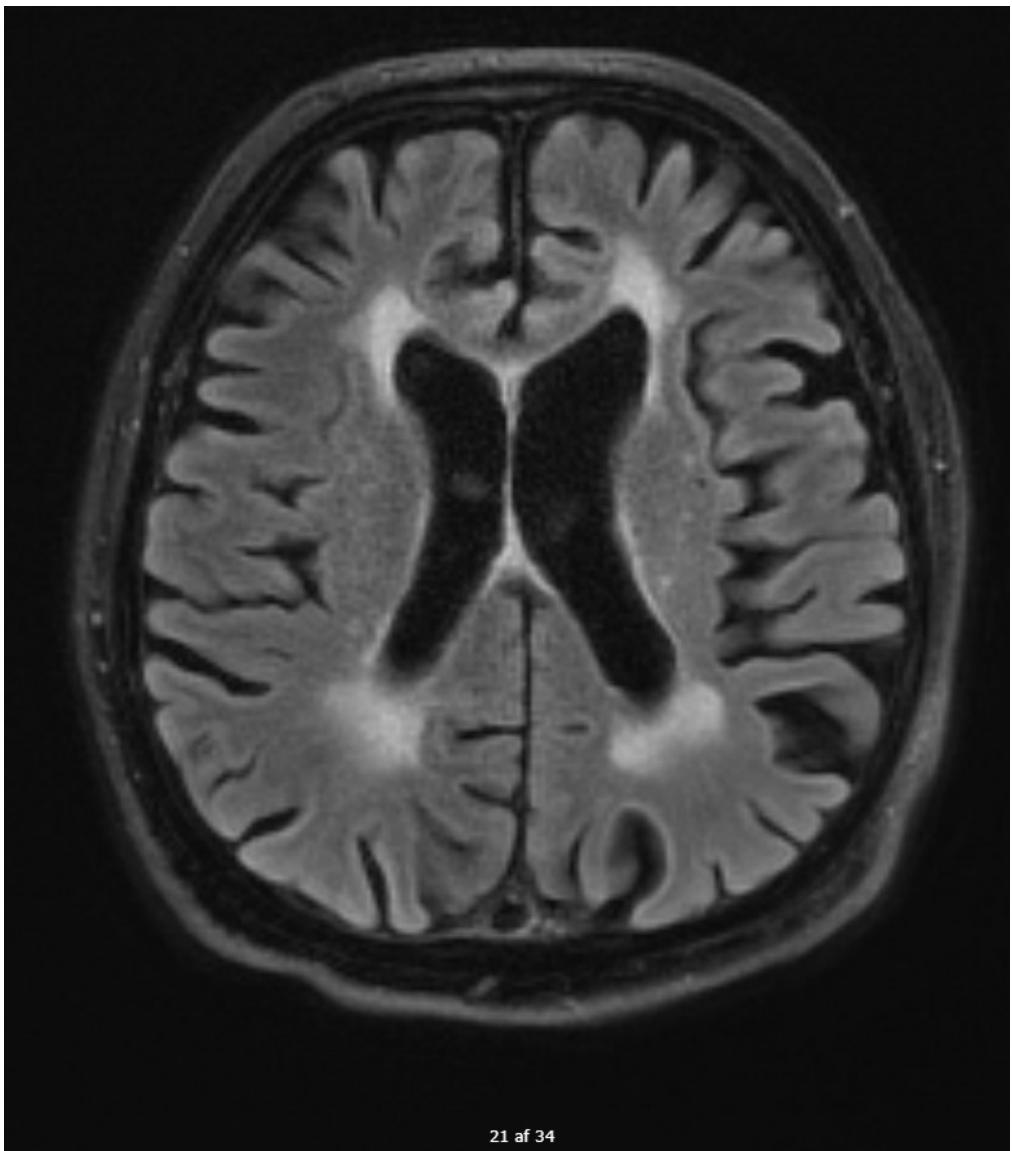
21 af 34

Atrophy (GCA) #2-1



20 af 34

Atrophy (GCA) #2-2

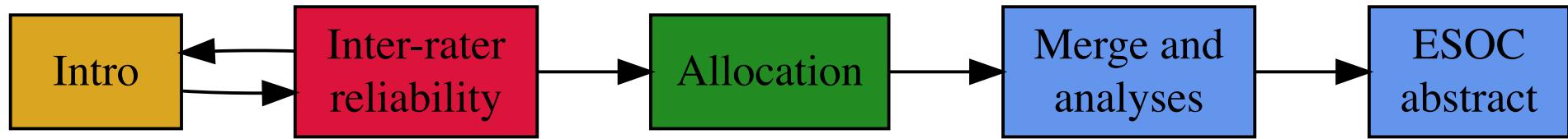


21 af 34

Website

Resource page

Plan



Noter

- Igen, tusind tak
- Noget er svært, andet er knap så svært
- Vi kan snakke sammen undervejs
- Al hjælp er hjælp
- Start med de første 10, så ser vi på det.