

SPM Maps of Relative Hypometabolism and Relatively Preserved Brain Regions

Clinical cases

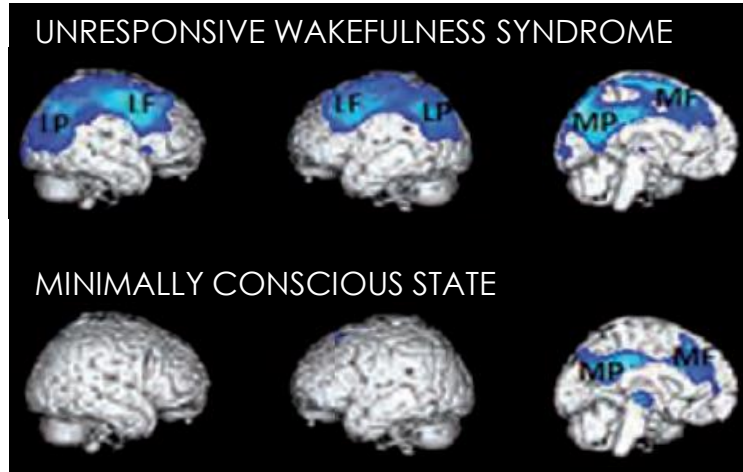
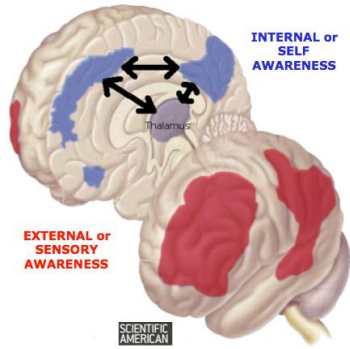
CSG PET workshop

Jitka ANNEN, PhD
Coma Science Group
GIGA-Consciousness
University Hospital & University of Liège
Contact: Jitka.annen@uliege.be

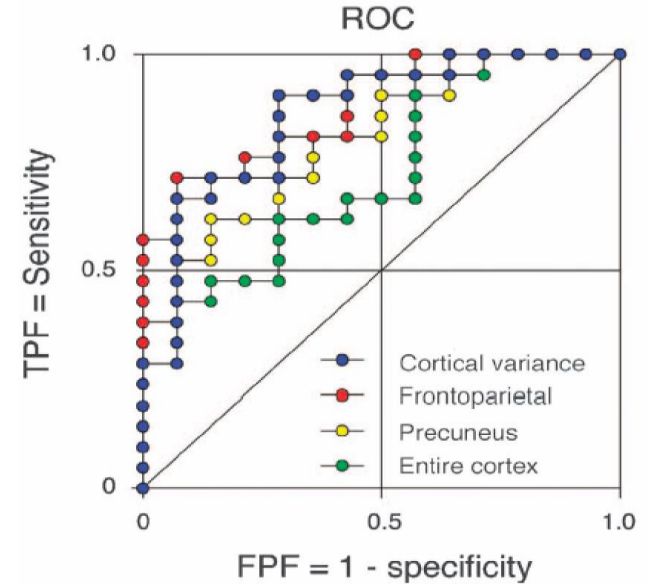


1) Regional brain metabolism = most informative

Hypometabolic areas



Cerebral metabolic rate of glucose



Thibaut et al, *J Rehabil Med*, 2012

Stender et al, *J Cereb Blood Flow & Metab*, 2015



2) SPM maps are the most sensitive paradiagnostic tool

- ▶ Voxel-wise interpretation of relative preservation and/or hypometabolism as compared to healthy volunteers

Coma Recovery Scale-Revised results			
	UWS	MCS	Total
Clinical consensus diagnosis			
VS/UWS	33 (37%)	18 (20%)	51 (57%)
MCS	2 (2%)	36 (40%)	38 (43%)
Total	35 (39%)	54 (61%)	89 (100%)
¹⁸F-FDG PET			
VS/UWS	24 (21%)	5 (4%)	29 (26%)
MCS	12 (14%)	71 (63%)	83 (74%)
Total	36 (32%)	76 (68%)	112 (100%)
Mental imagery fMRI			
VS/UWS	25 (36%)	23 (33%)	48 (69%)
MCS	3 (4%)	19 (27%)	22 (31%)
Total	28 (40%)	42 (60%)	70 (100%)

UWS=unresponsive wakefulness syndrome. MCS=minimally conscious state.

Table 2: Diagnostic results by modality

35% clinical misdiagnosis

33% CRS-R misdiagnosis

75% recovered consciousness

- ▶ MCS patients: relative preservation of glucose uptake in the frontoparietal network
- ▶ UWS patients: widespread reduction of glucose uptake throughout the cortex
- ▶ Diagnosis is based on **visual evaluation by expert** of metabolic patterns

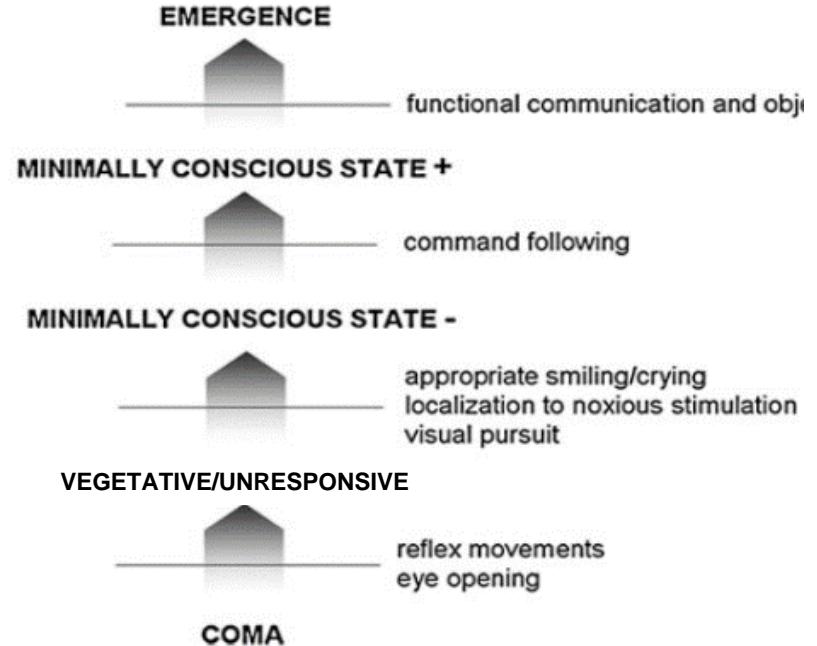
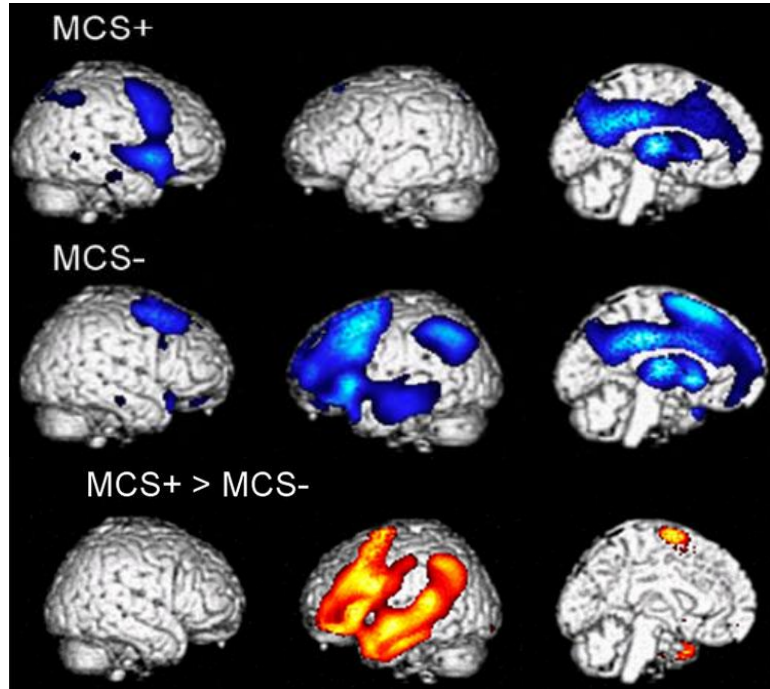
THE
LANCET

Stender*, Gosseries* et al., 2009

128 patients (81 MCS, 41 UWS, 4 LIS)



3) ≠ brain metabolisms underlie ≠ behaviors



Bruno et al, *J Neurology*, 2011
Aubinet et al, *NeuroRehab Neural Repair*, 2020

You are the expert! Or will become one

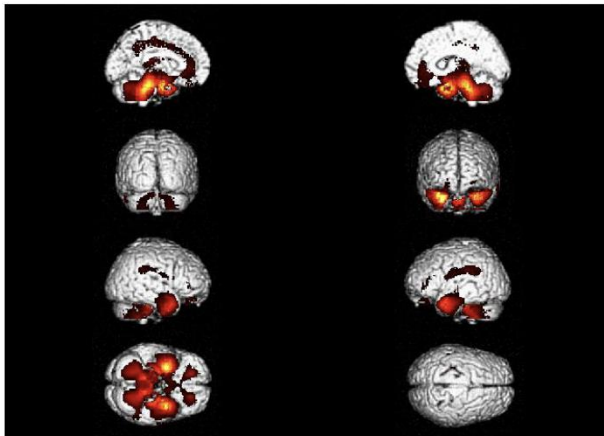
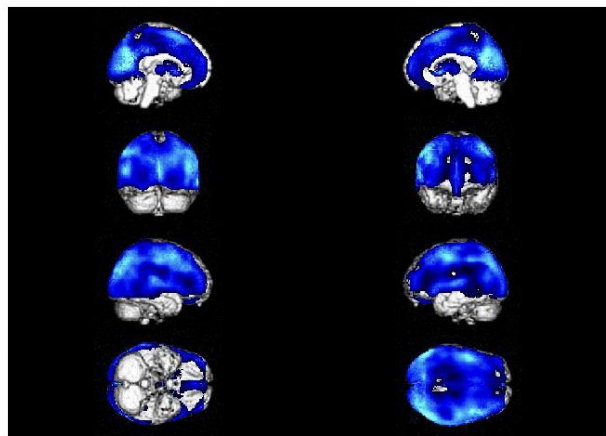
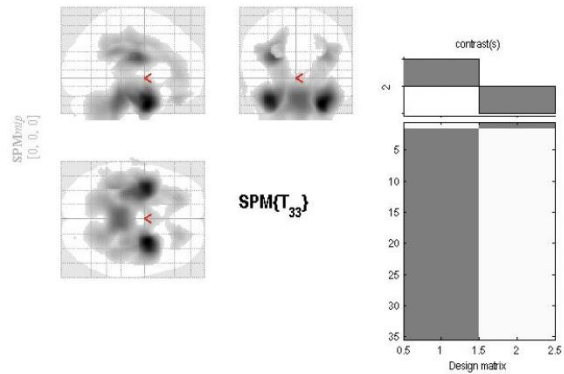
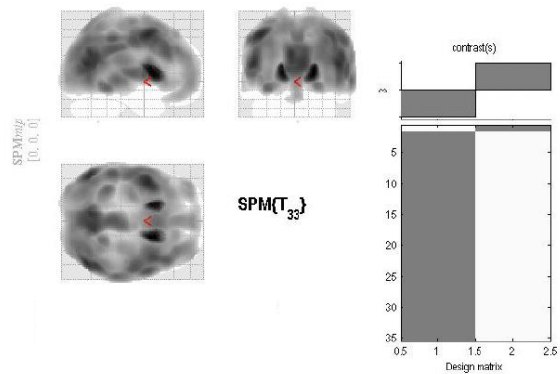


Image A – Healthy control

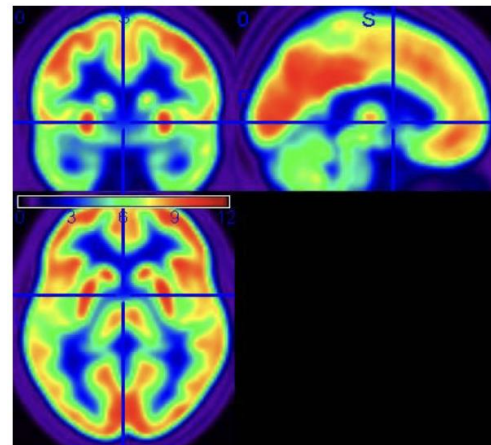
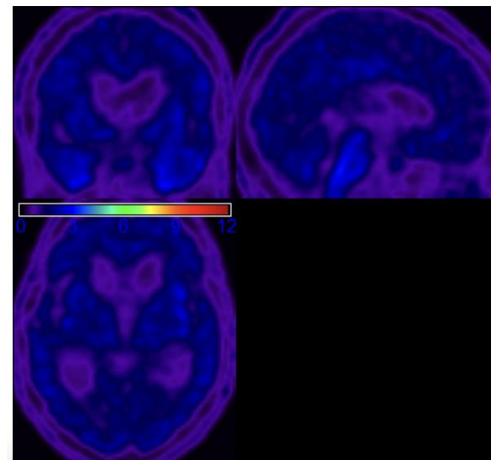
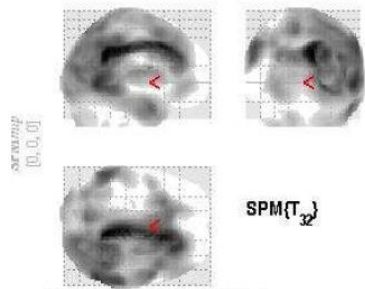


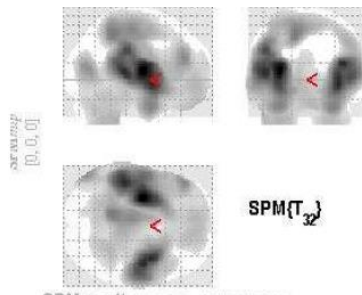
Image B - Patient



You are the expert! Or will become one



t1 + 1 year



t1 + 1 year

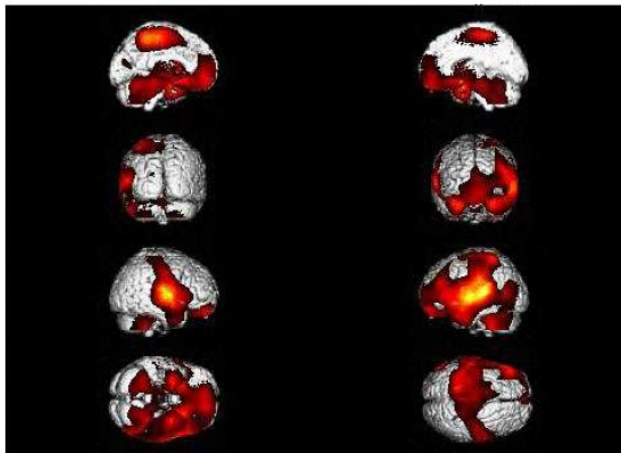
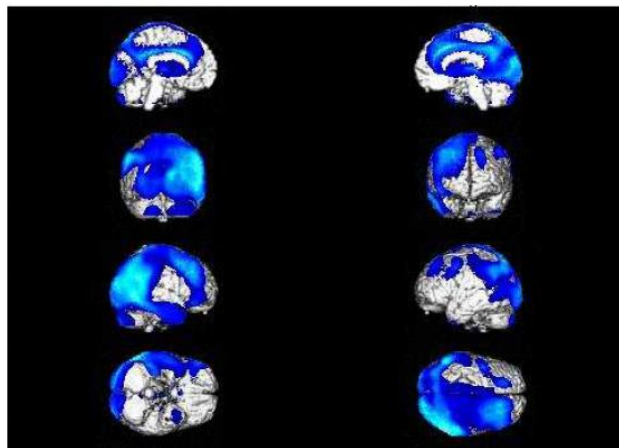


Image A – Healthy control

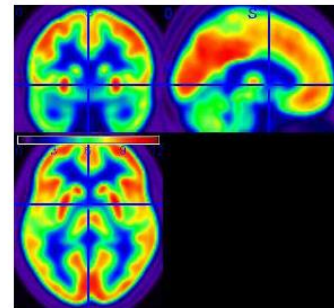


Image B: Patient at t1

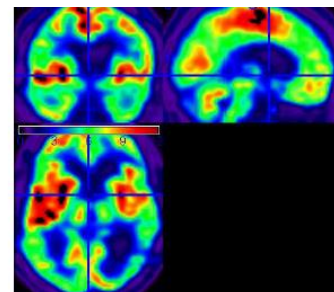
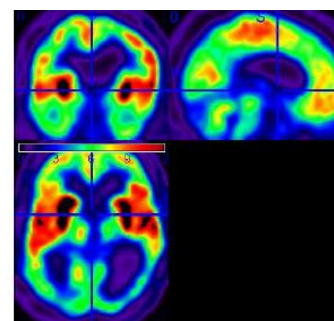
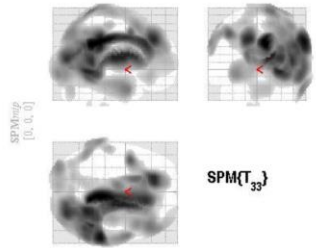


Image C: Patient at t1 + 1 year

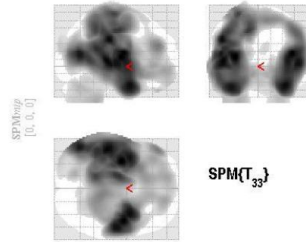




You are the expert! Or will become one

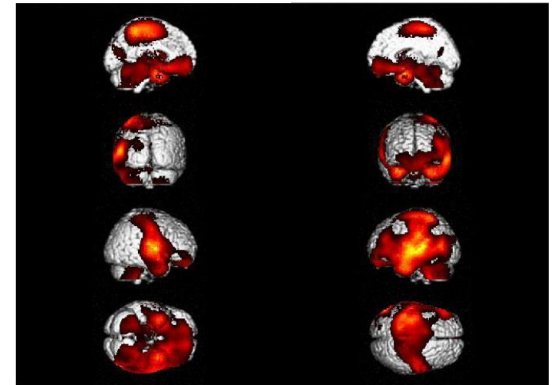
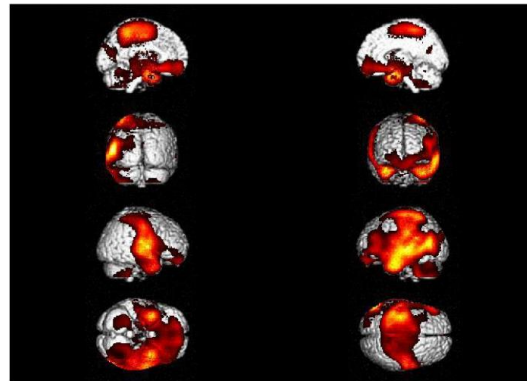
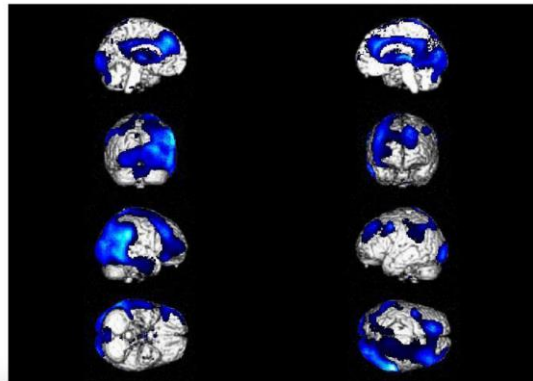
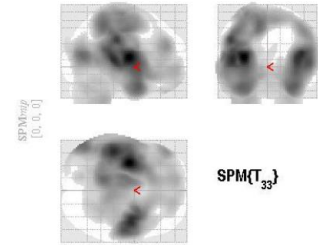


t1+ 5years



t1+ 5years

t1+5years > T1



You are the expert! Or will become one

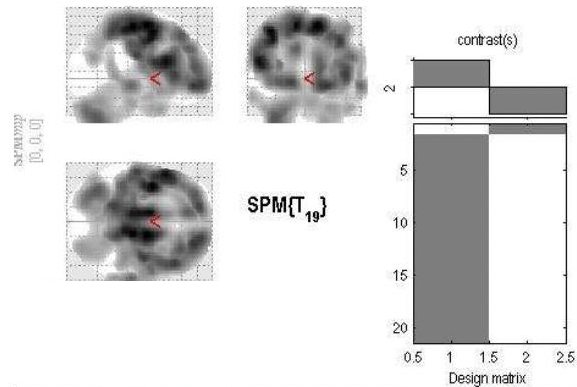
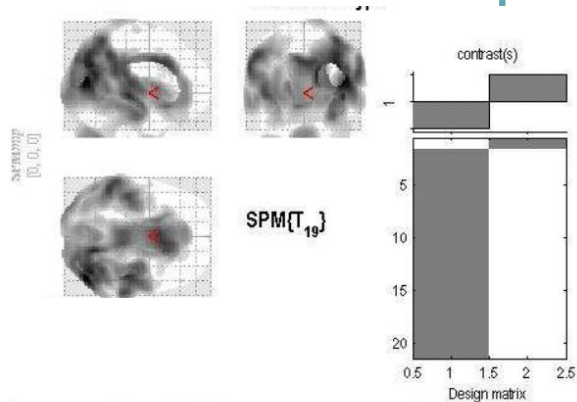


Image A – Healthy control

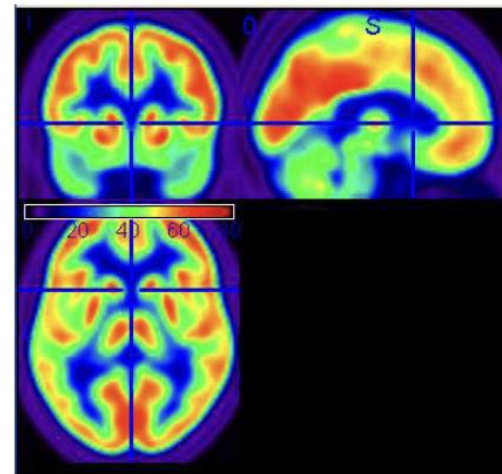
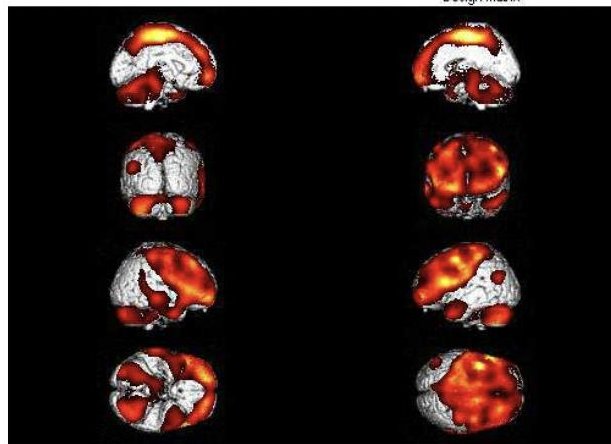
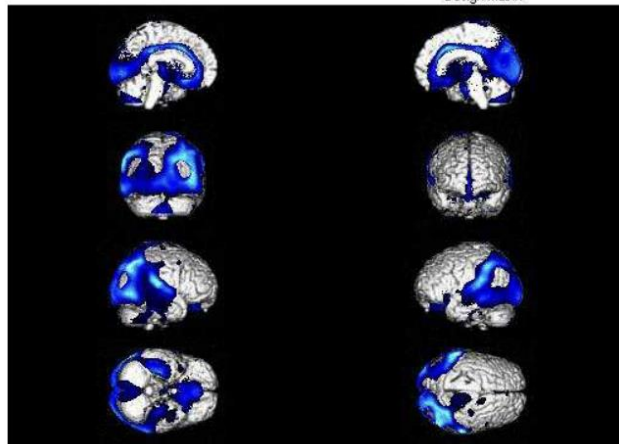
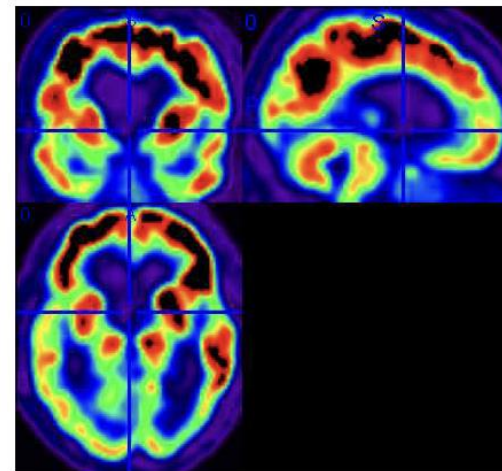
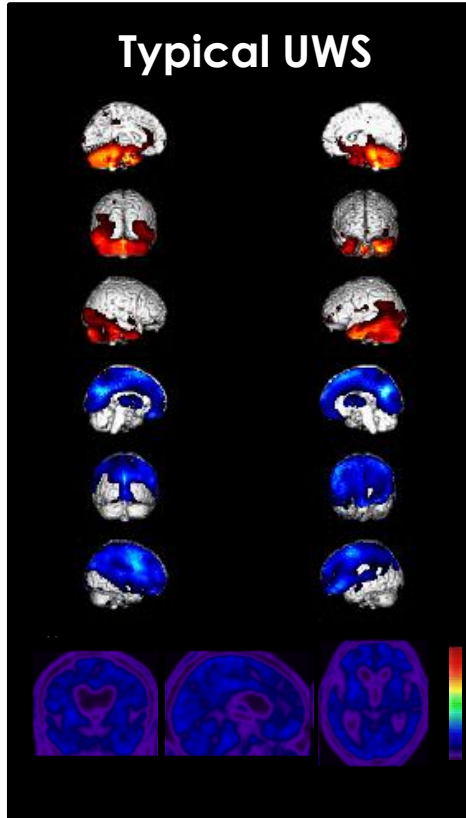


Image B - Patient





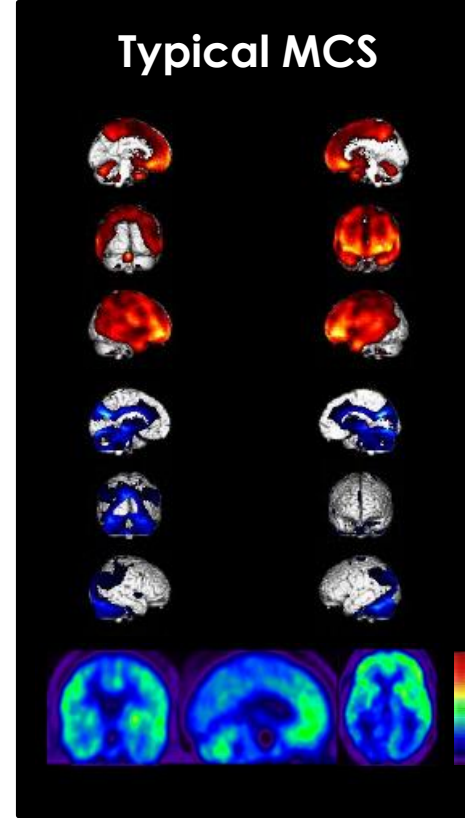
PET to compliment clinical diagnosis



Preserved
brain areas

Hypometabolic
brain regions

SUV



Thank you for your attention.

Questions?

Contact: Jitka.annen@uliege.be