

Funktionelle Bildgebung in Neurologie und Neurochirurgie

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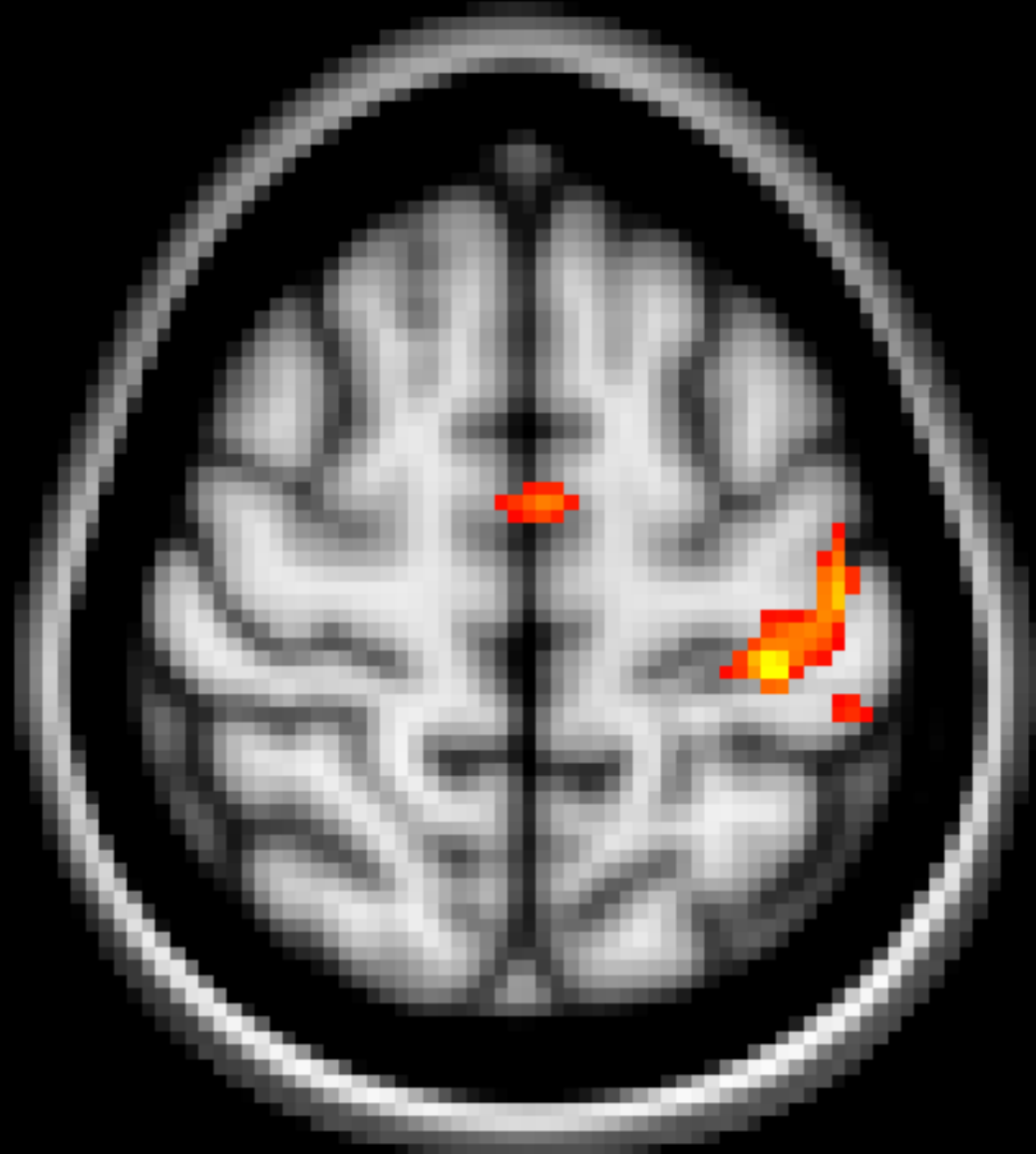
**Functional MRI
for
presurgical planning**



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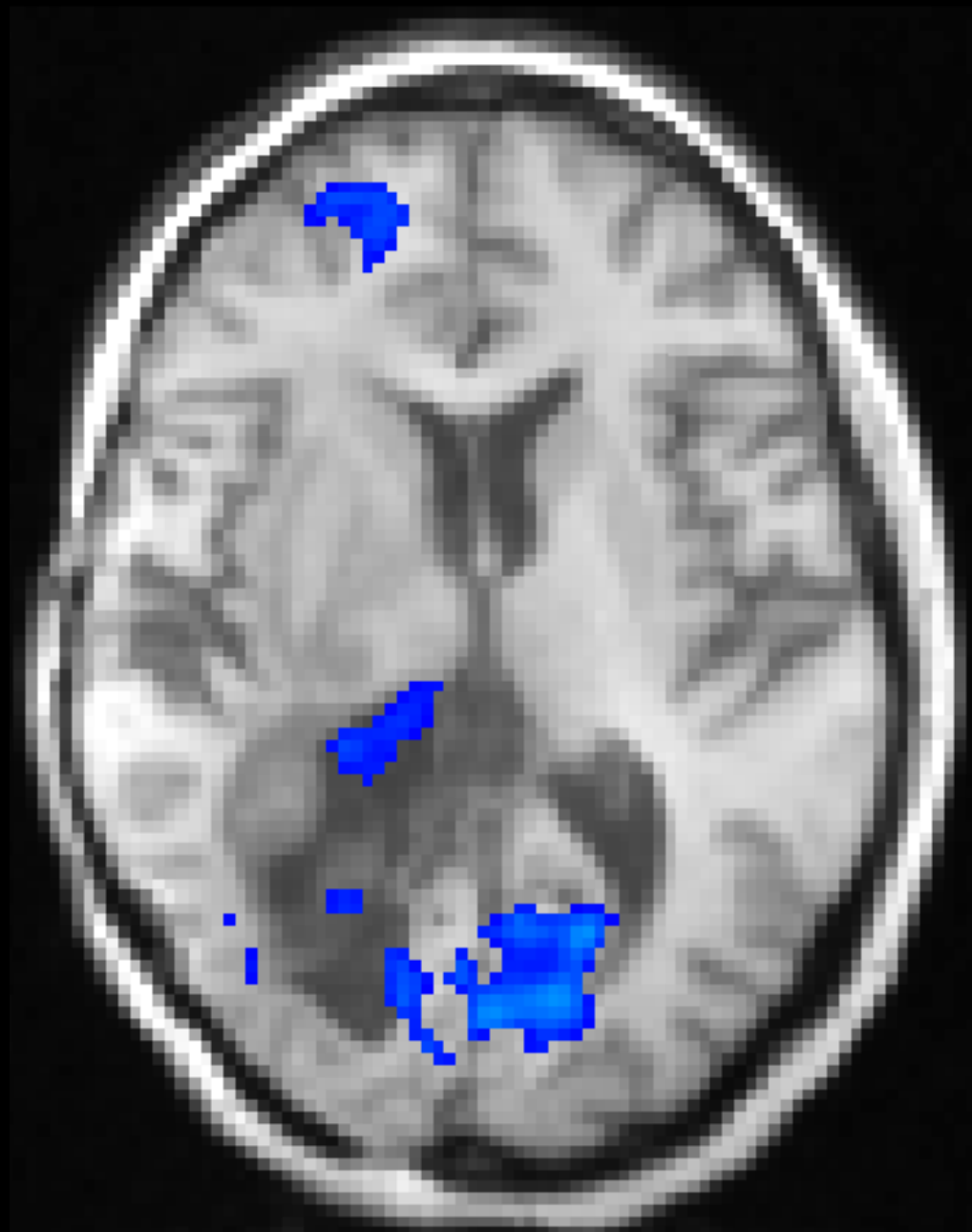


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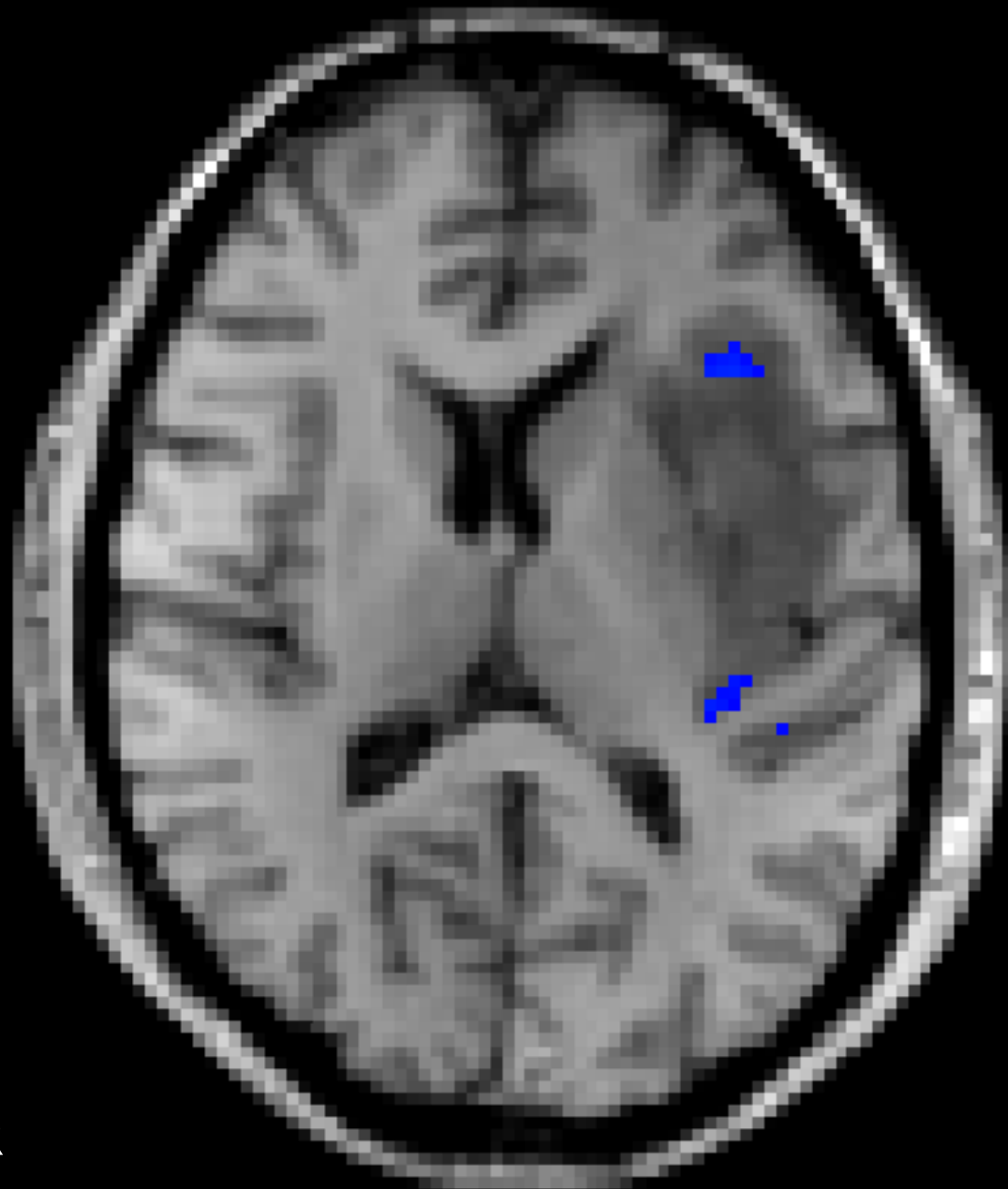


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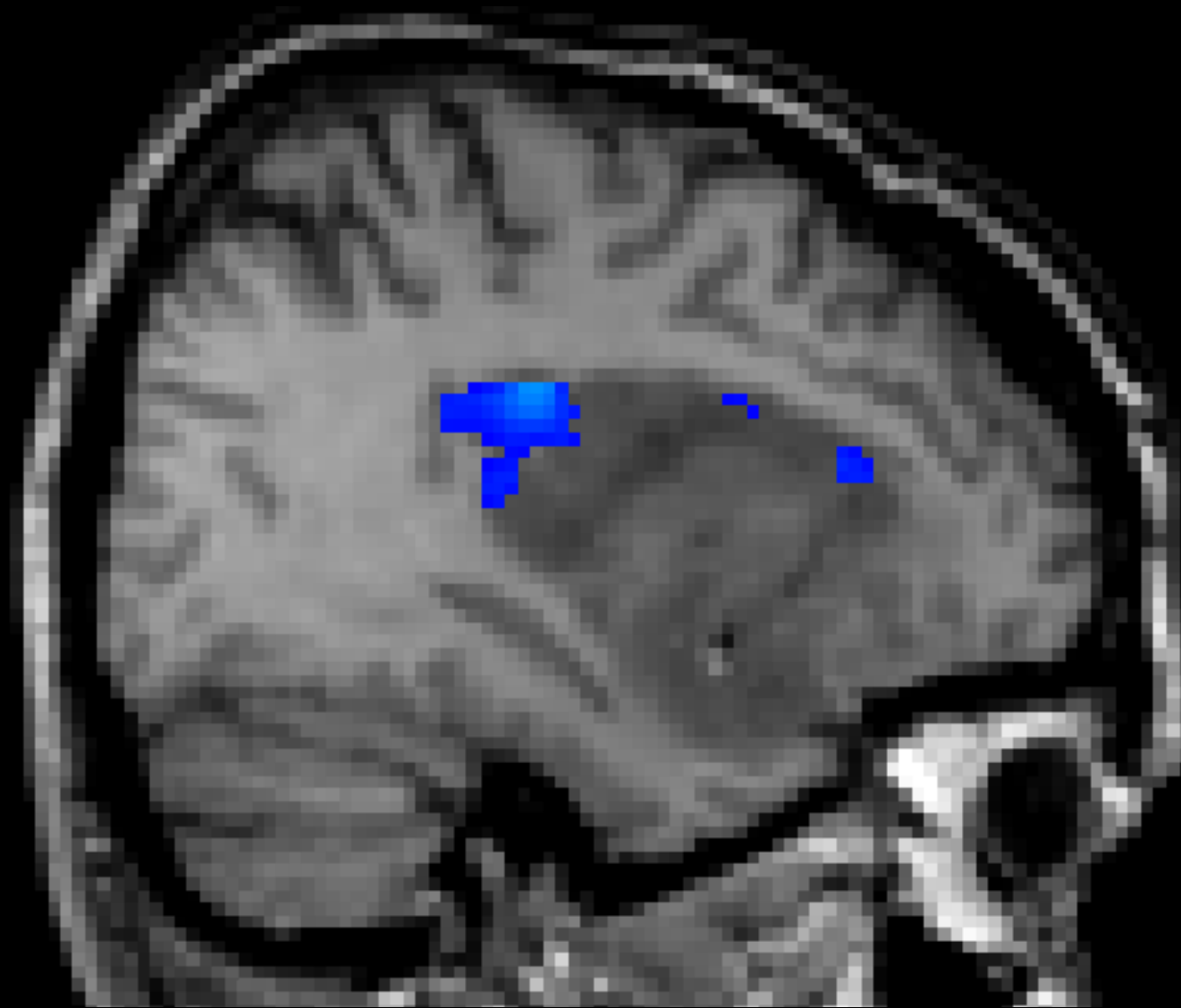
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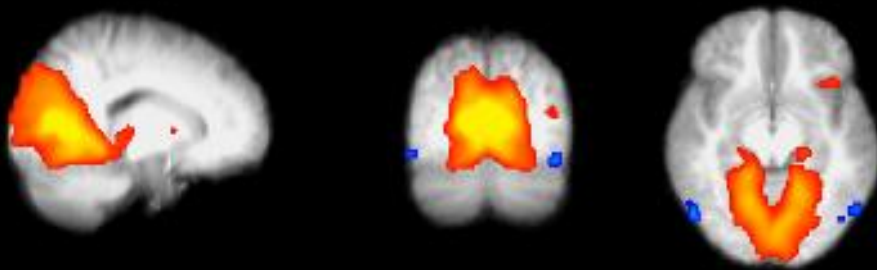
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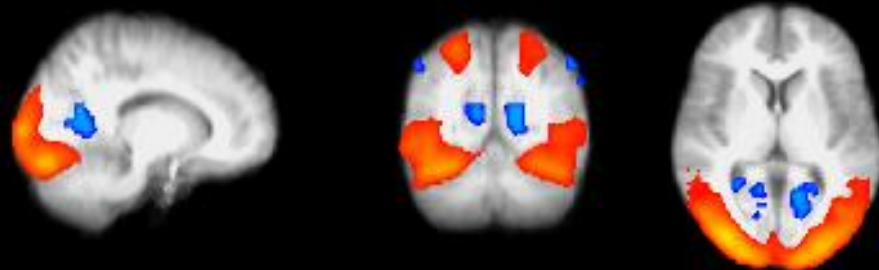


Resting-State Functional MRI

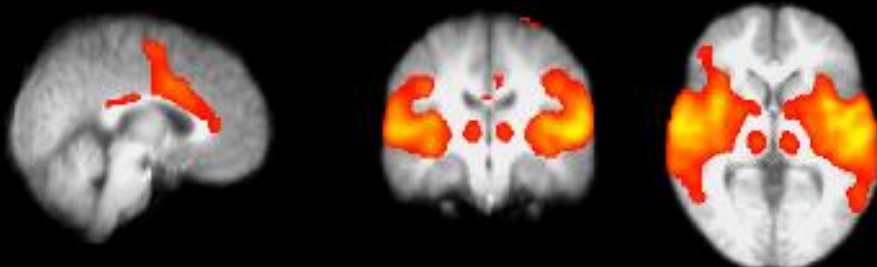
Medial visual cortex



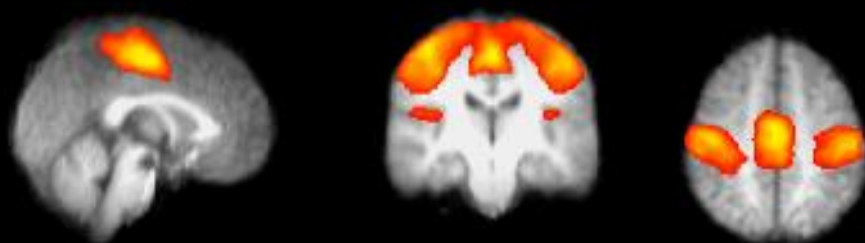
Lateral Visual Cortex



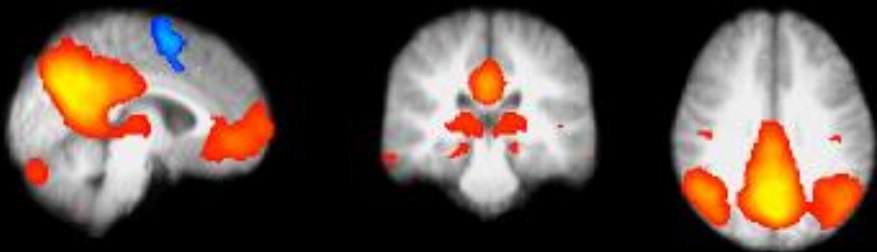
Auditory system



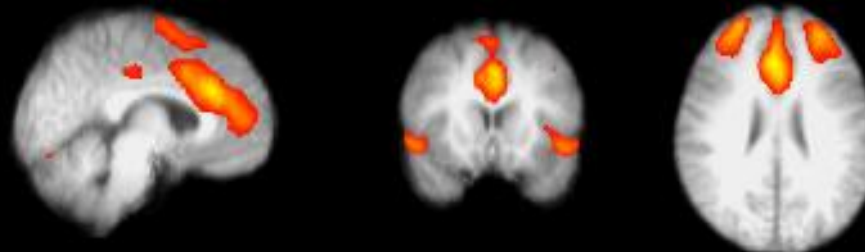
Sensori-motor system

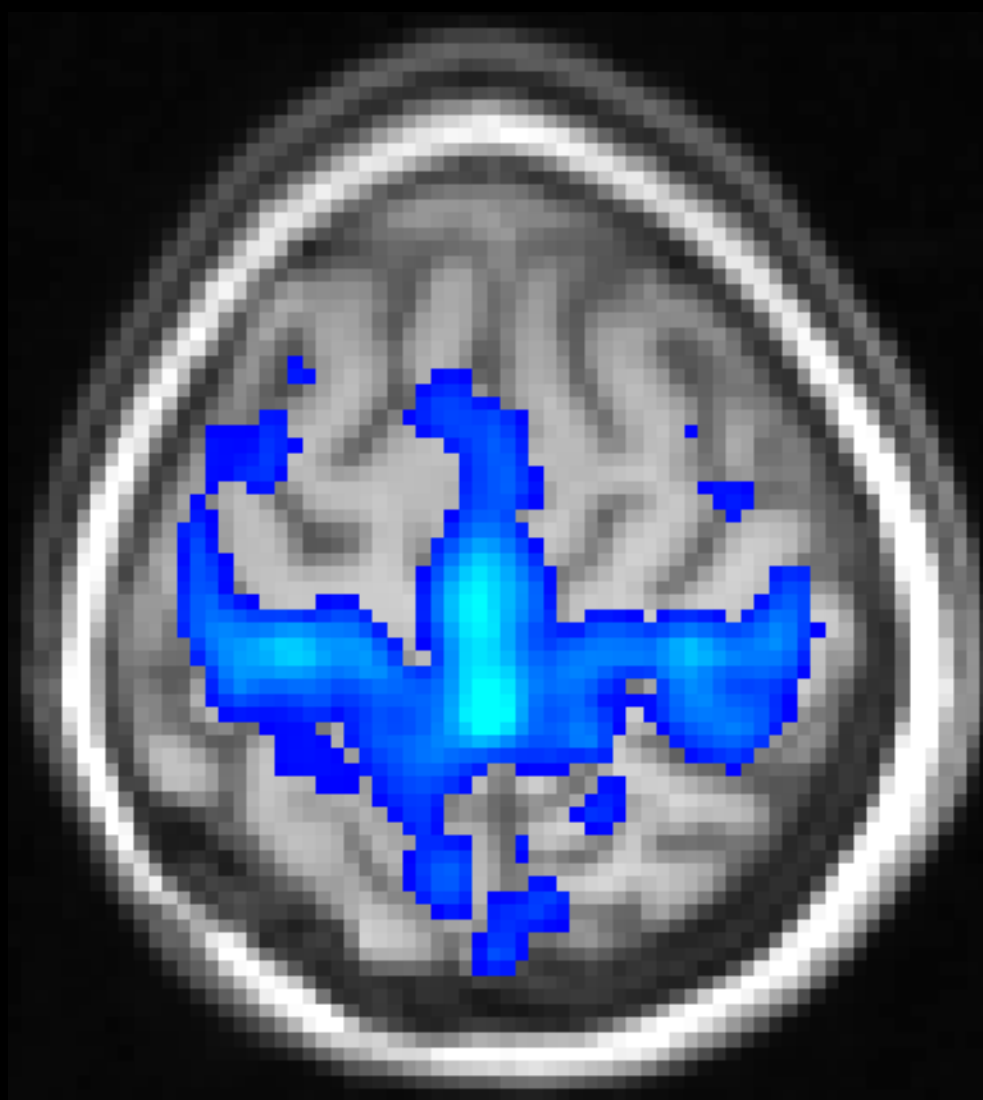


default mode network



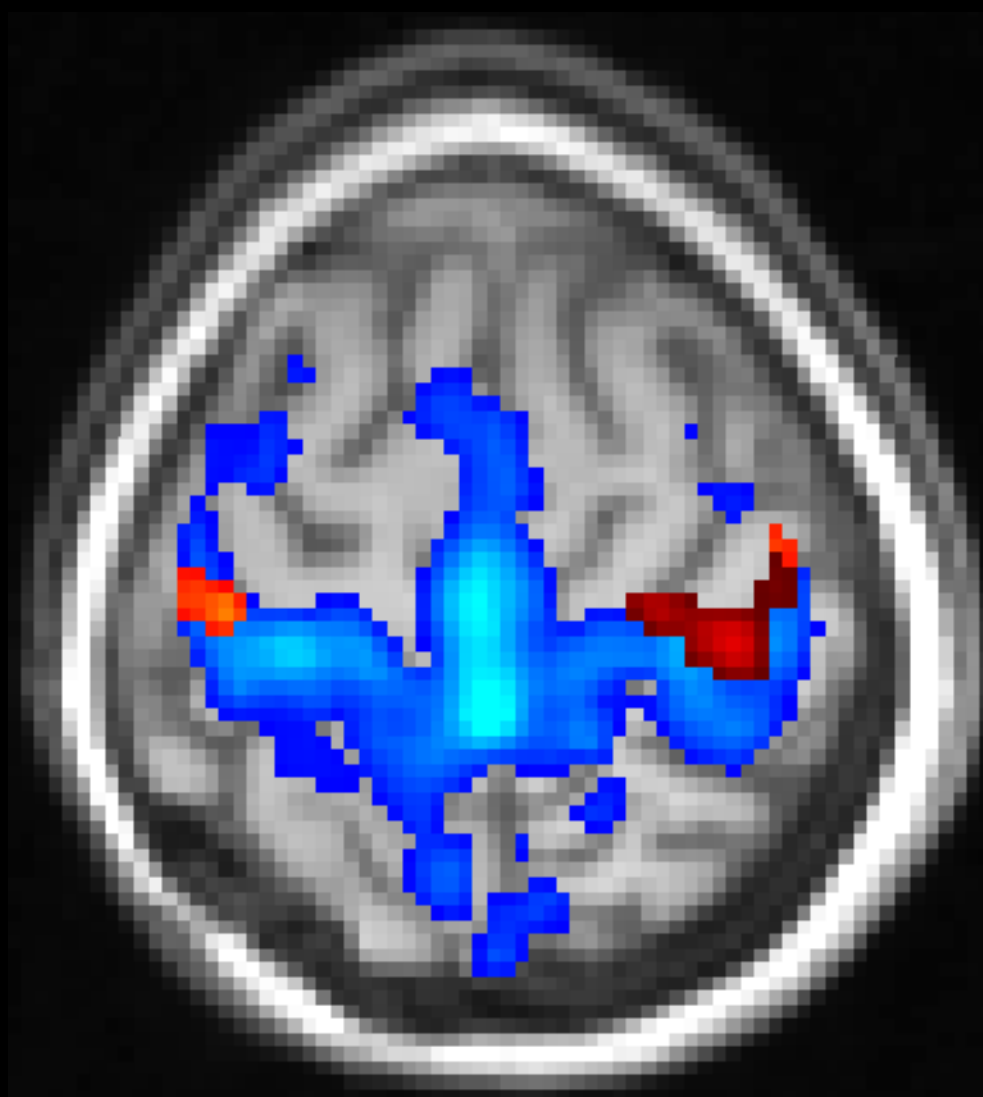
Executive control





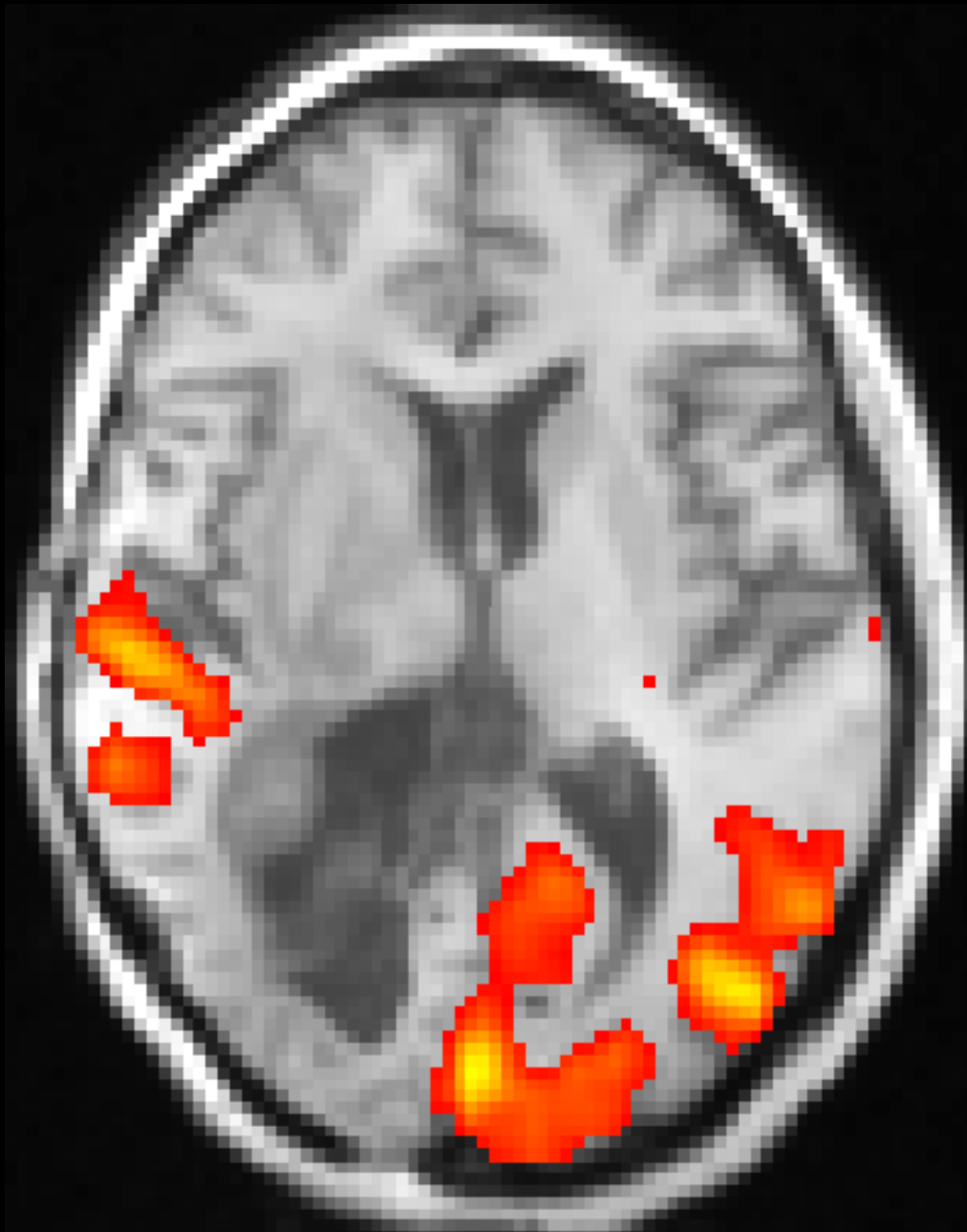
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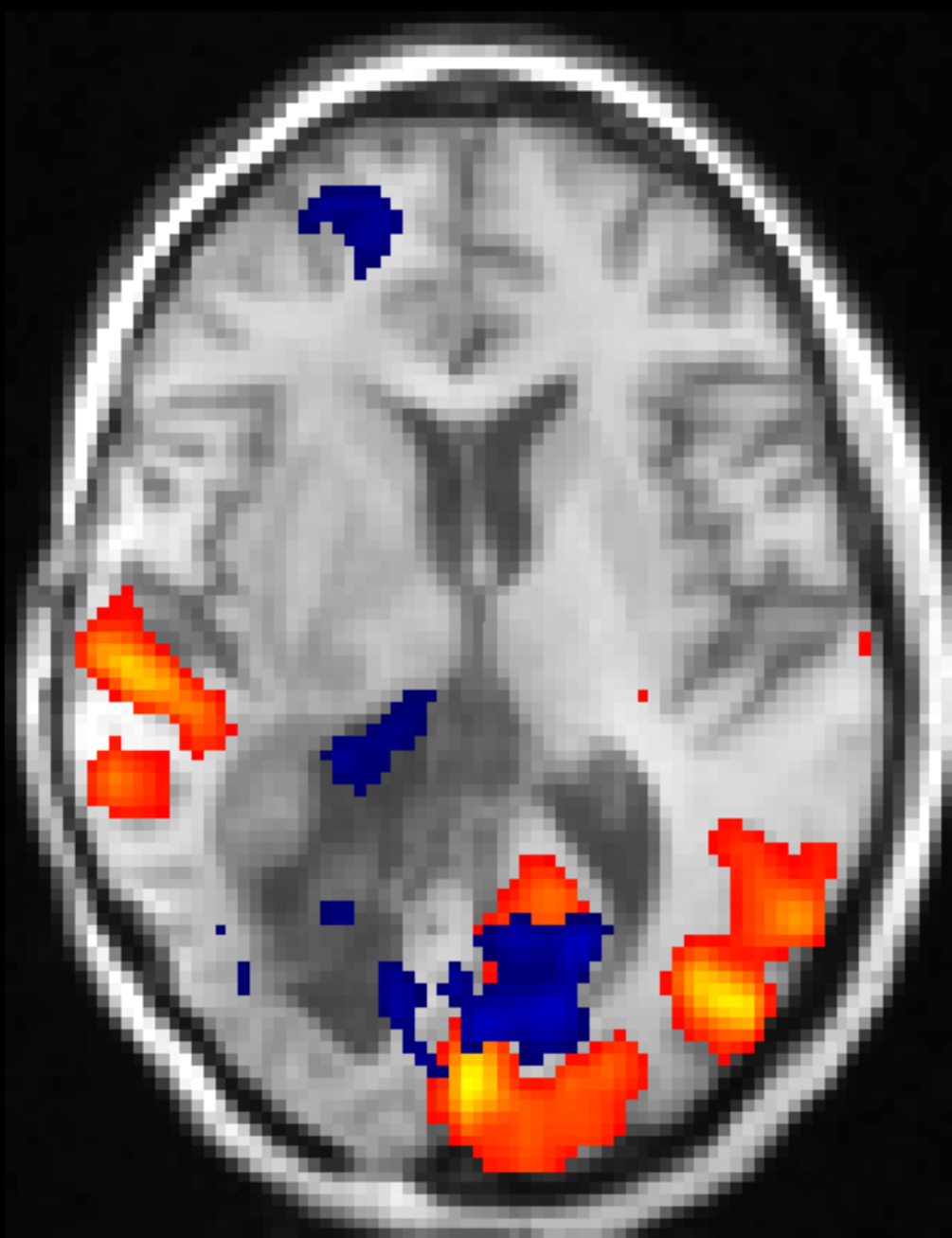
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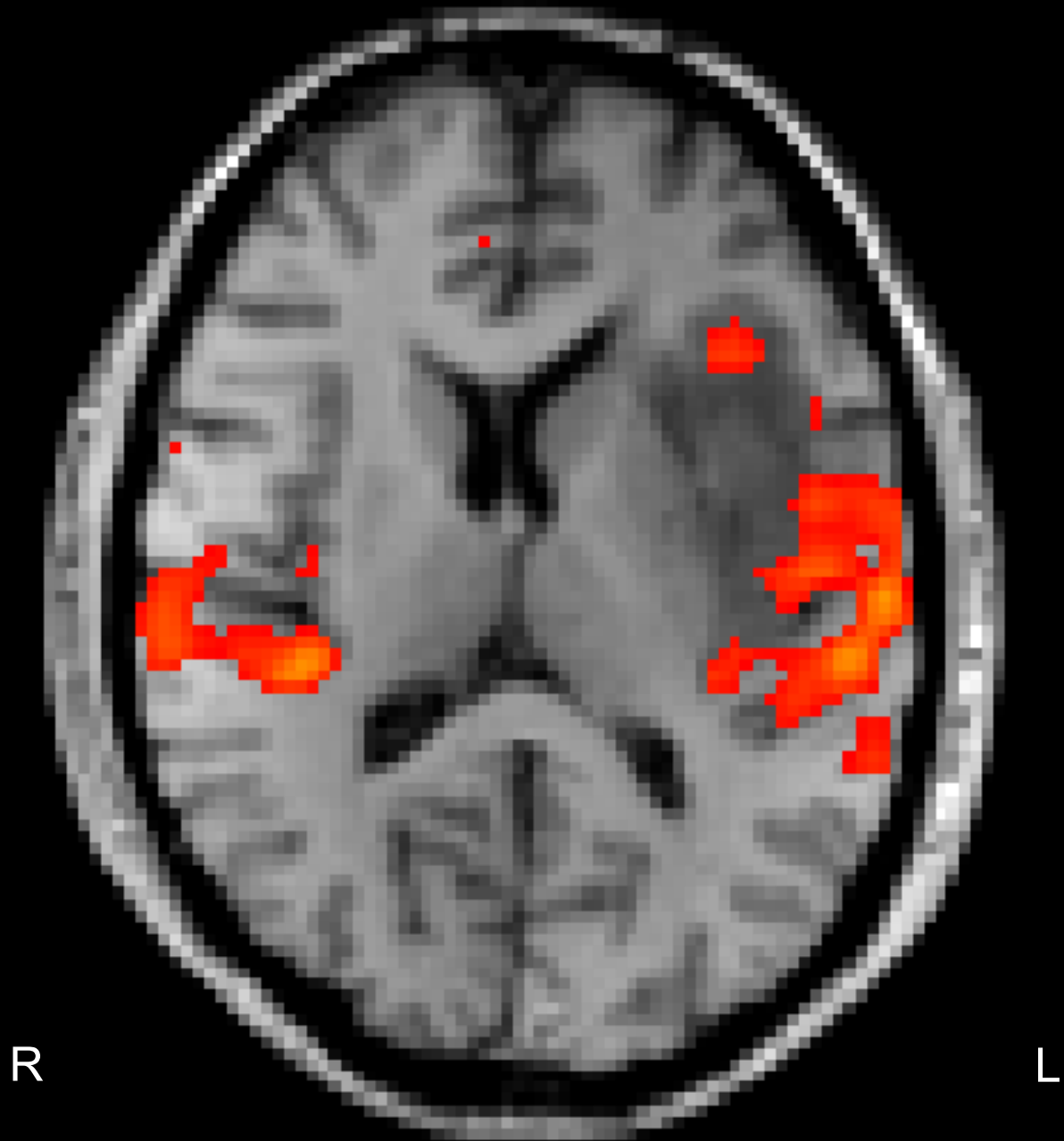
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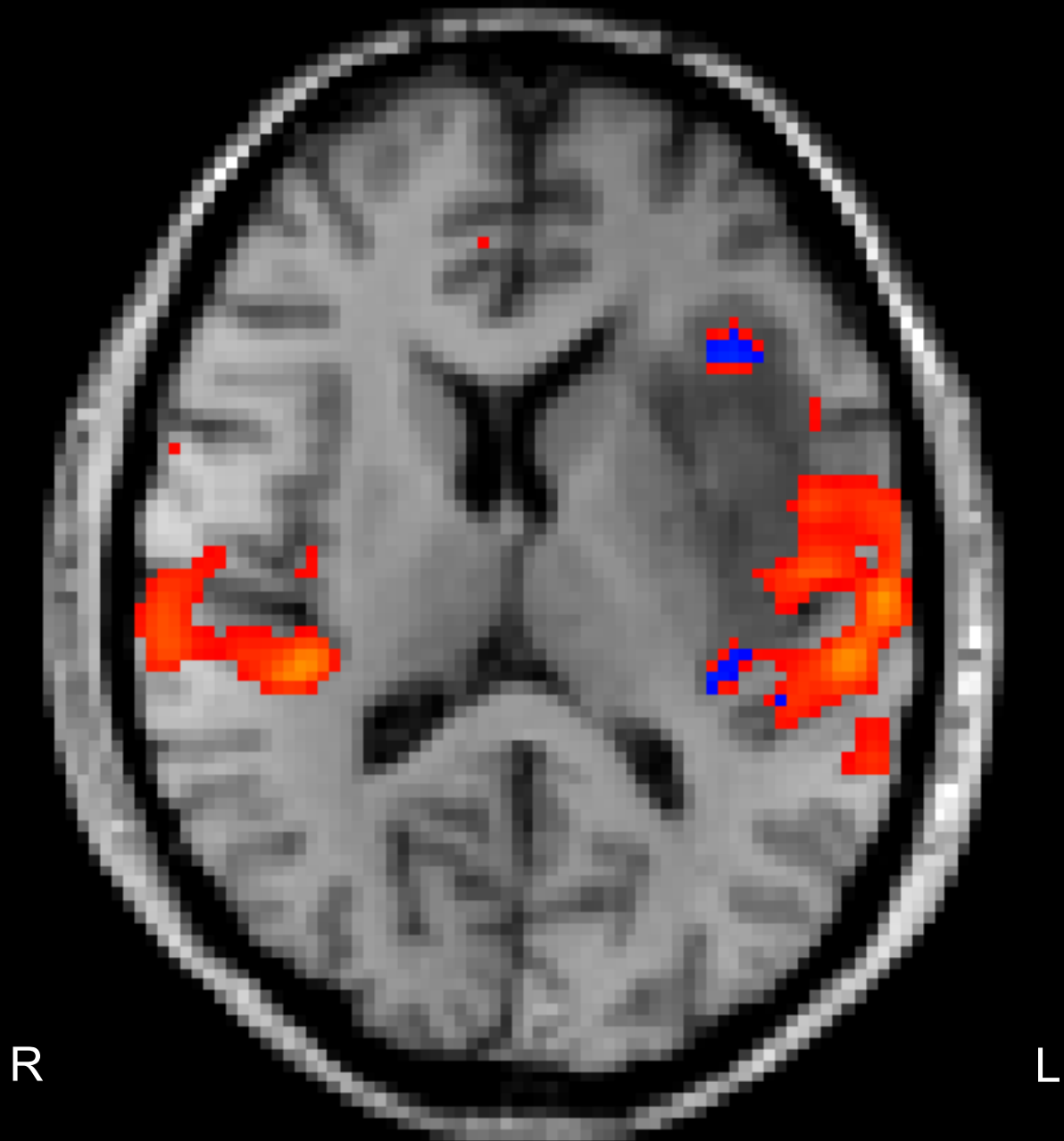
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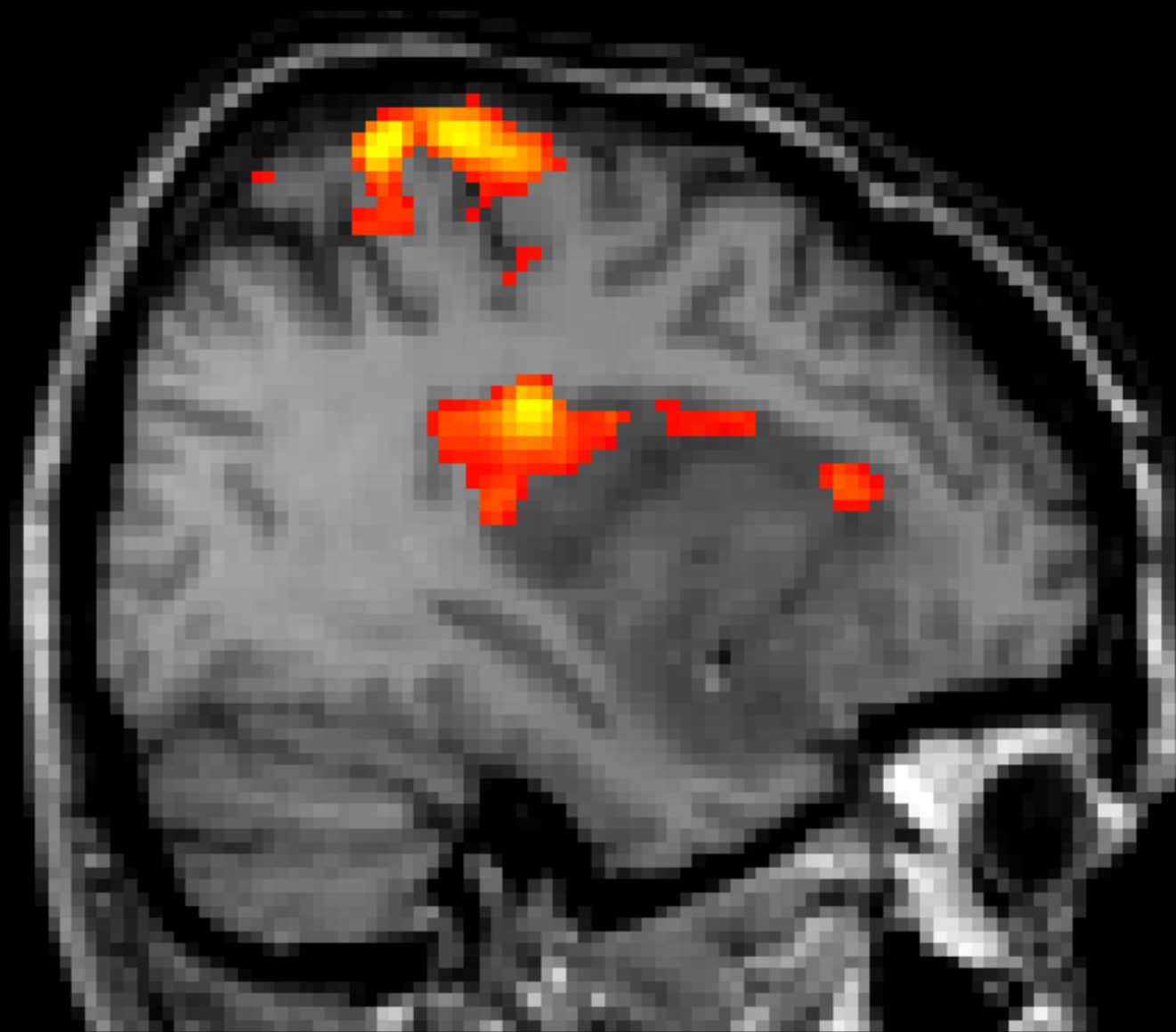
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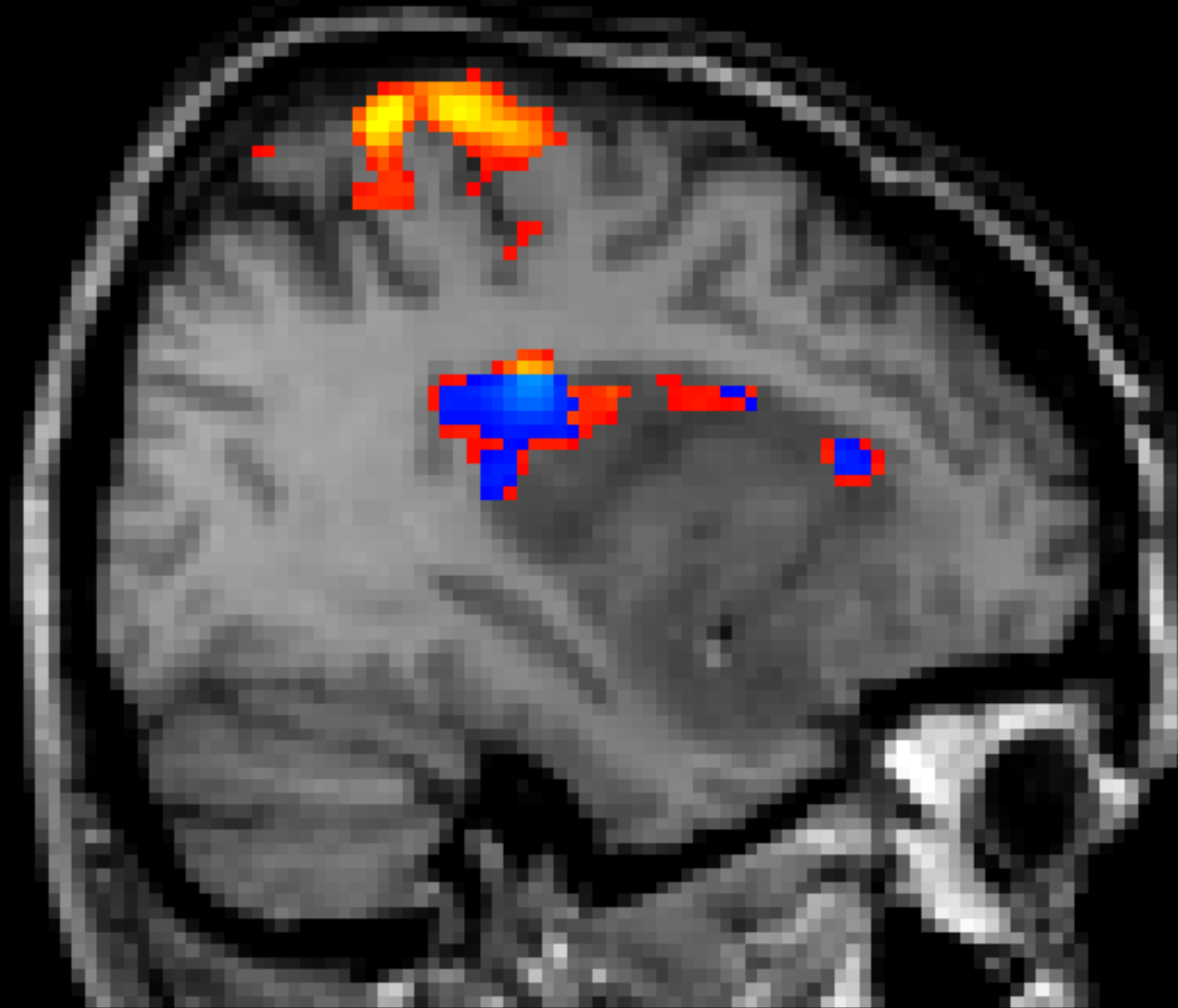


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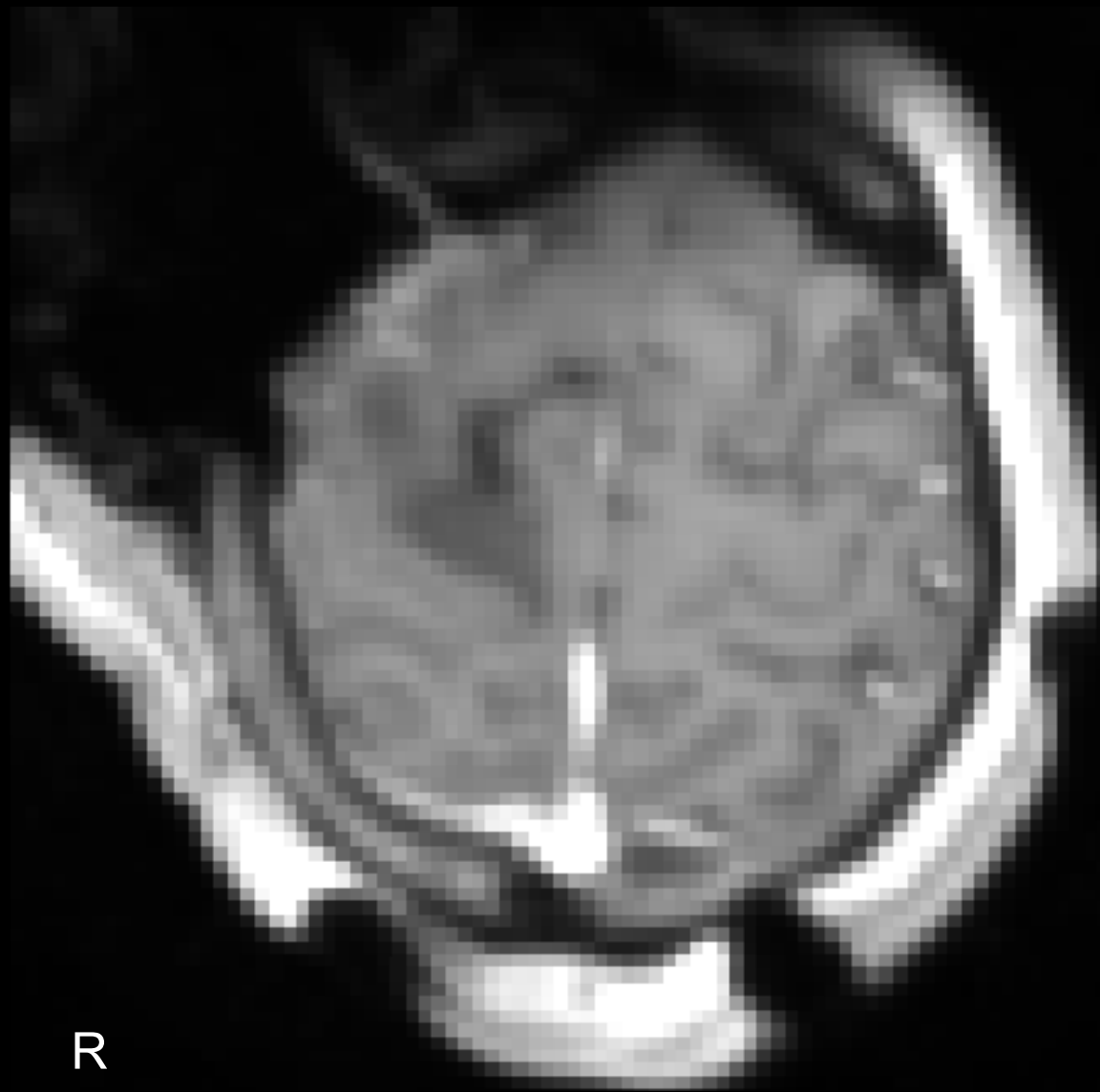
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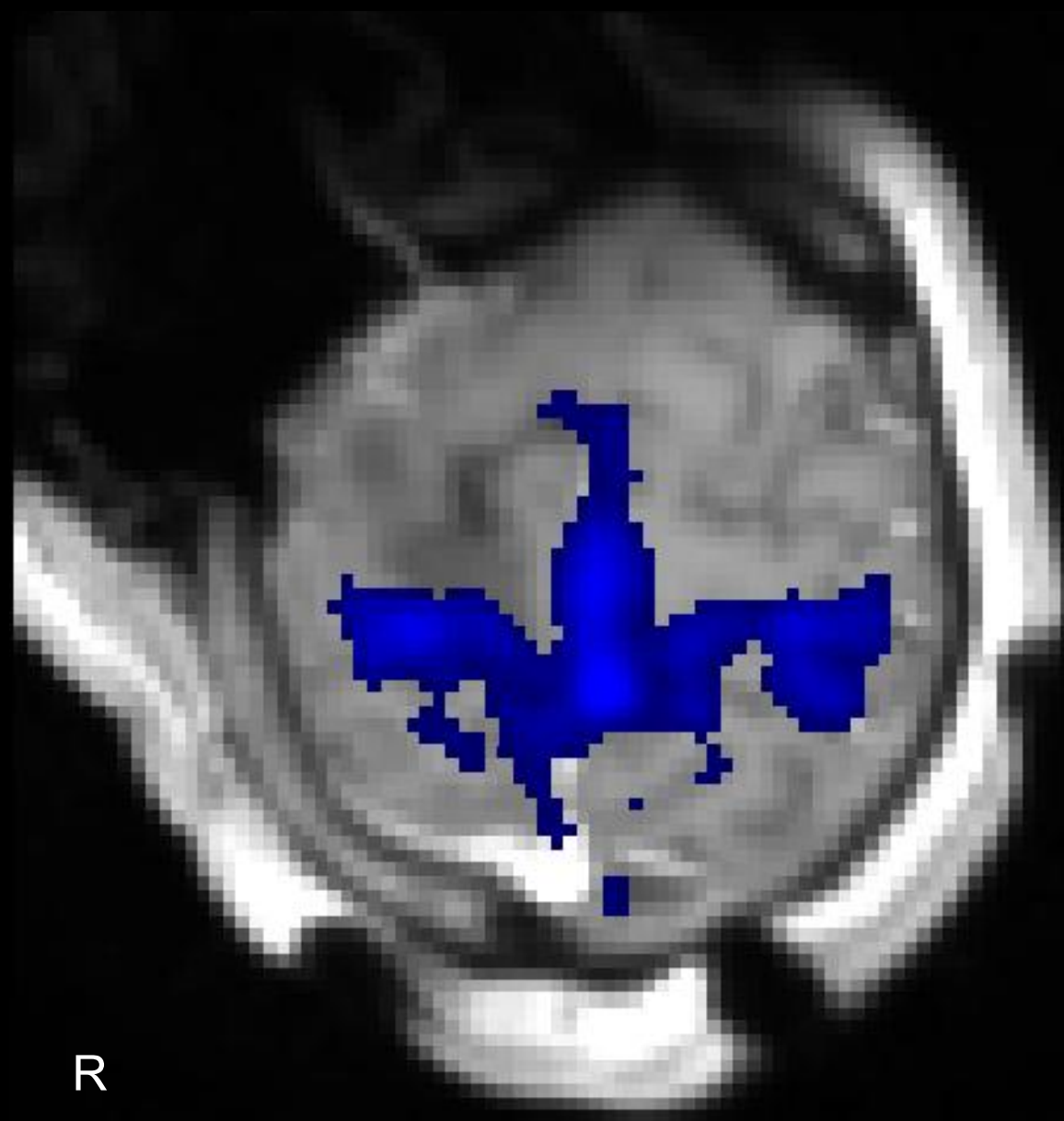


Intraoperative Functional MRI



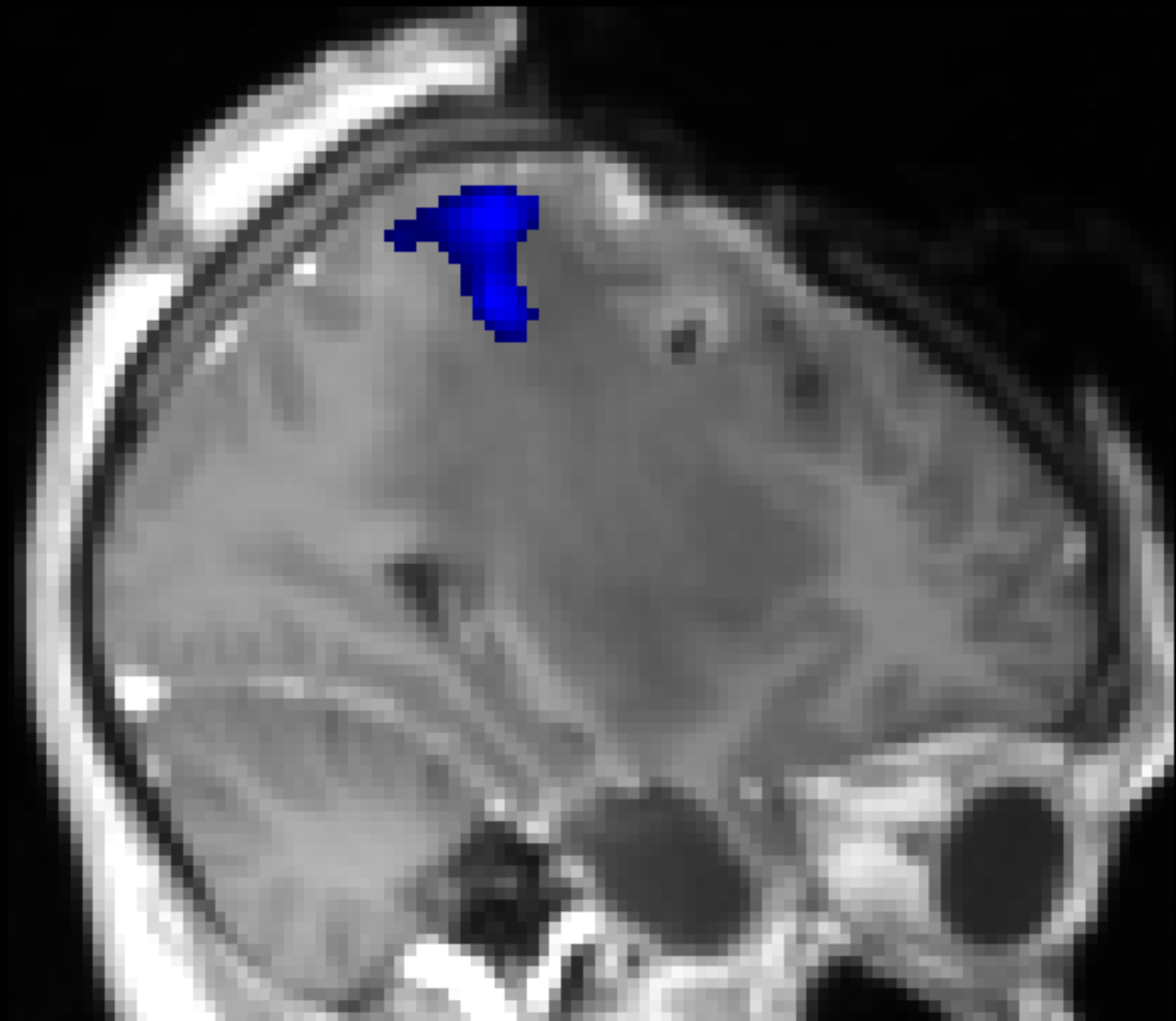
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Amyotrophic lateral sclerosis (ALS)



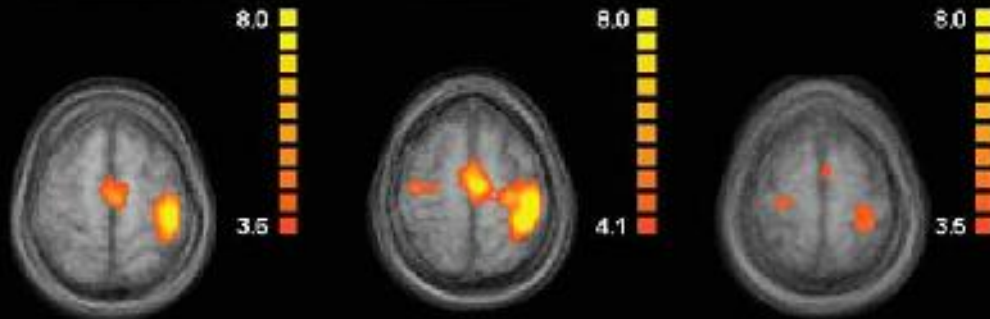
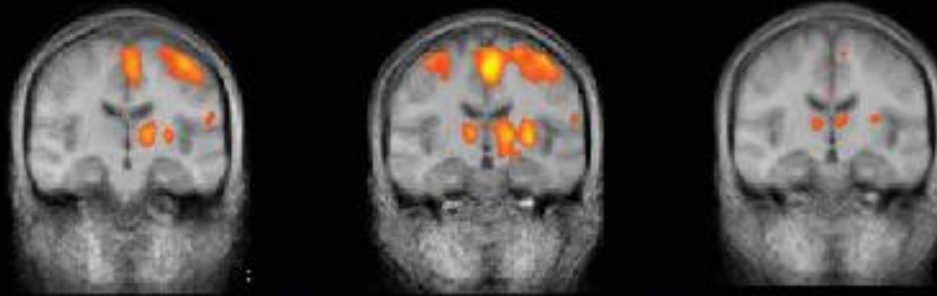
Amyotrophic lateral sclerosis (ALS)

- Is a progressive neurodegenerative disorder
- Disorder of upper and lower motor neurons
- Progressive limbic or bulbar muscular weakness and wasting
- The median survival from first symptom in ALS ranges from 2 to 4 years
- Extra-Motor symptoms

Healthy (n=22)

ALS-MRC 5 (n=11)

ALS-MRC 5 > Healthy

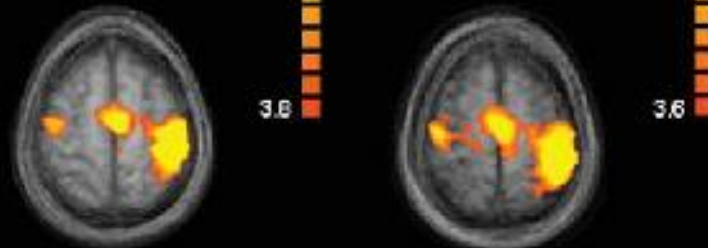
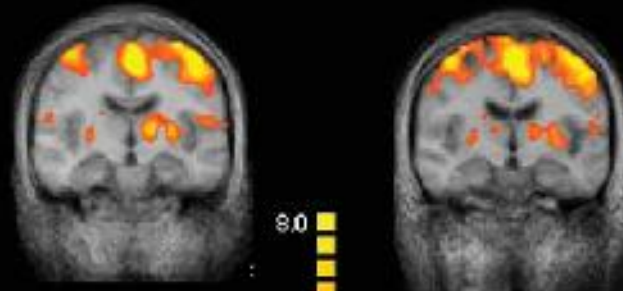


ALS-MRC 4 (n=17)

ALS-MRC 3 (n=19)

$P < 0.001$

$Q(\text{FDR}) = 0.01$

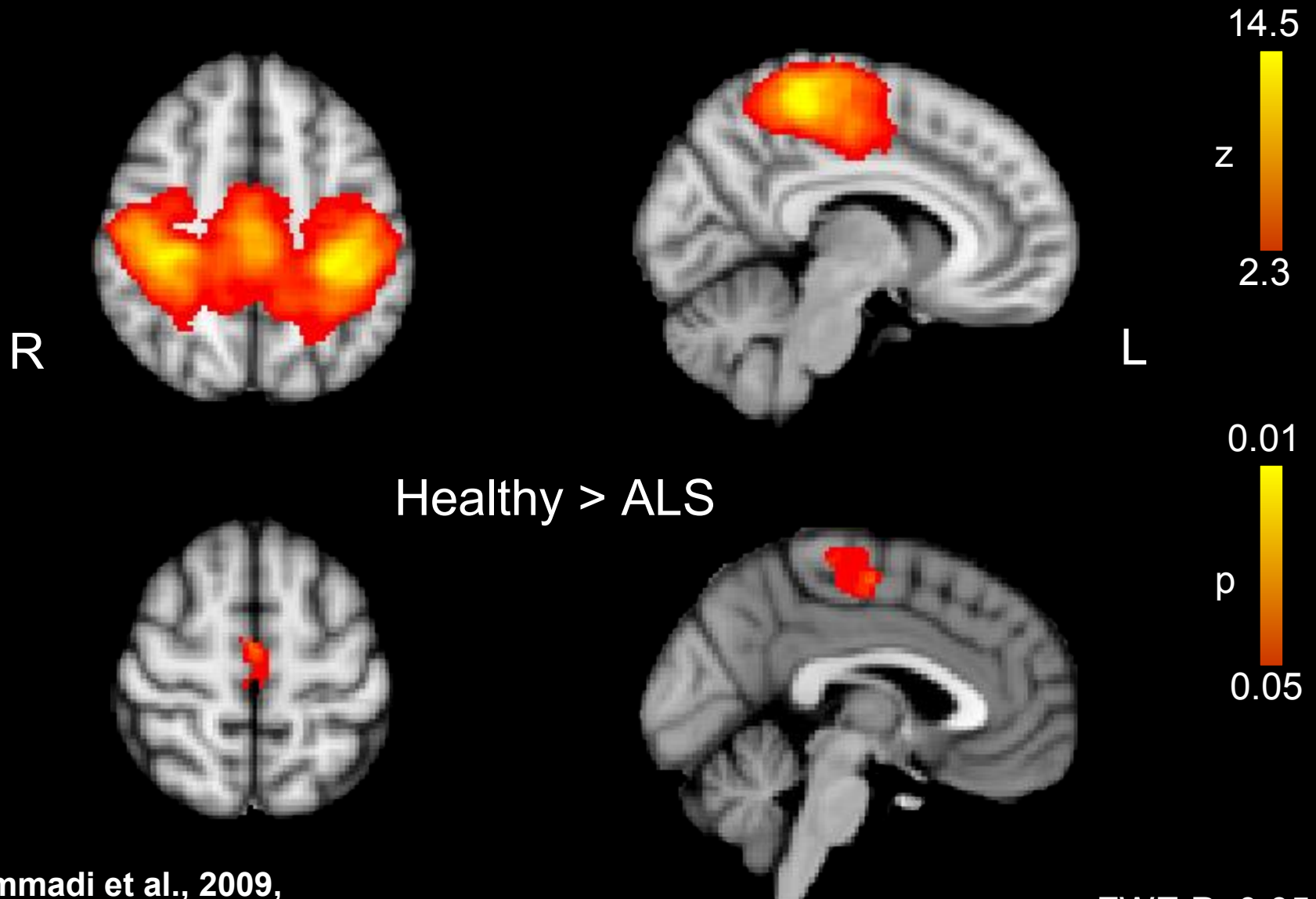


Mohammadi et al., 2010,
Human Brain Mapping

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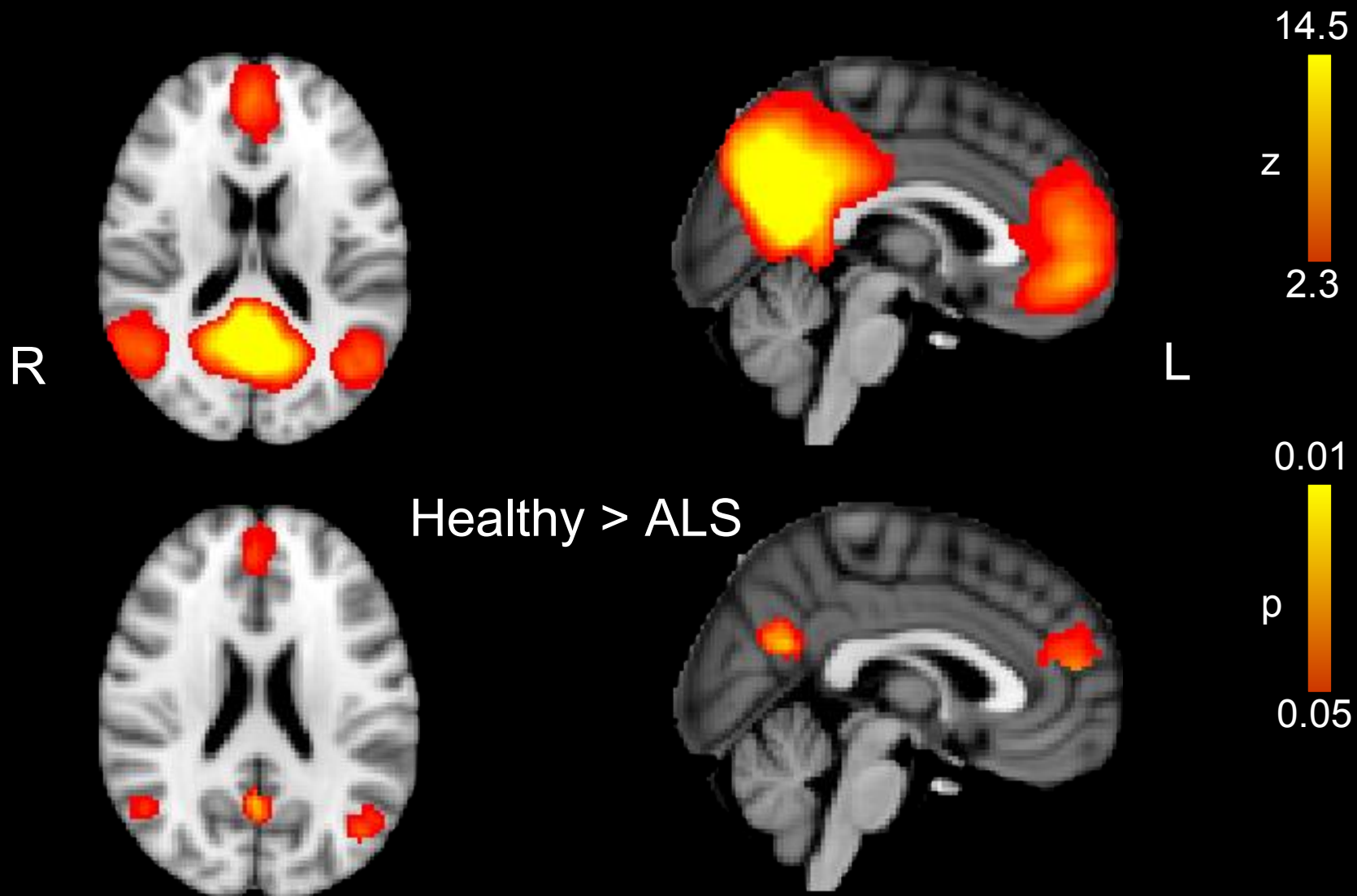
Sensori-Motor Network (SMN)



Mohammadi et al., 2009,
Experimental Neurology

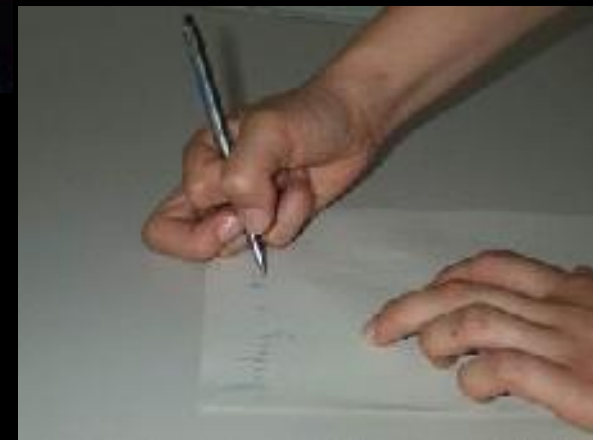
FWE; $P < 0.05$

Default-Mode Network (DMN)

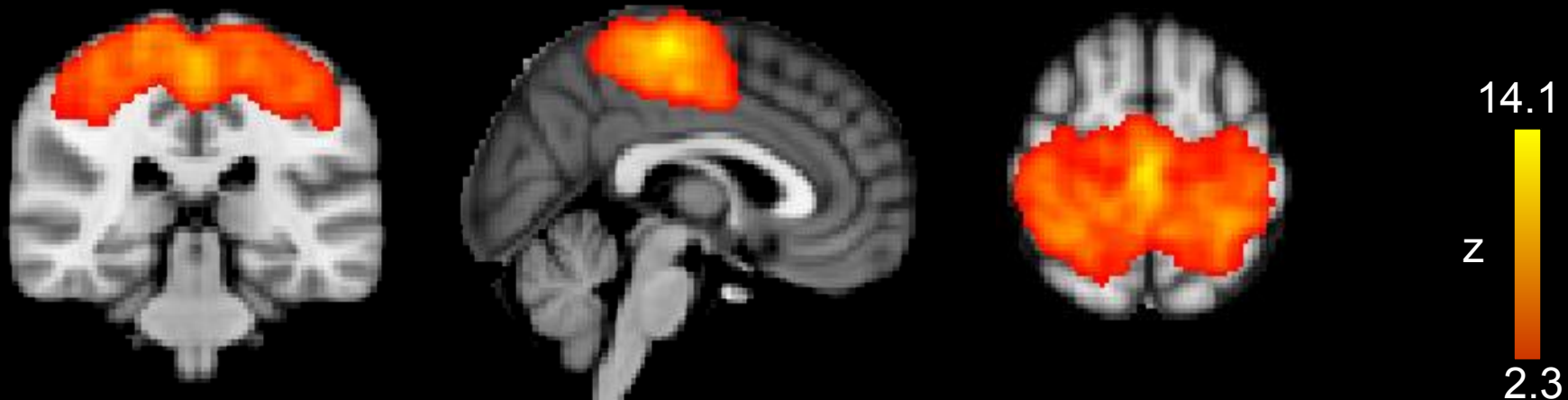


- Two different patterns considering the bulbar or limb involvement
- Two different phases considering the motor system during the course of disease
- Changes in motor and extra-motor networks even at rest

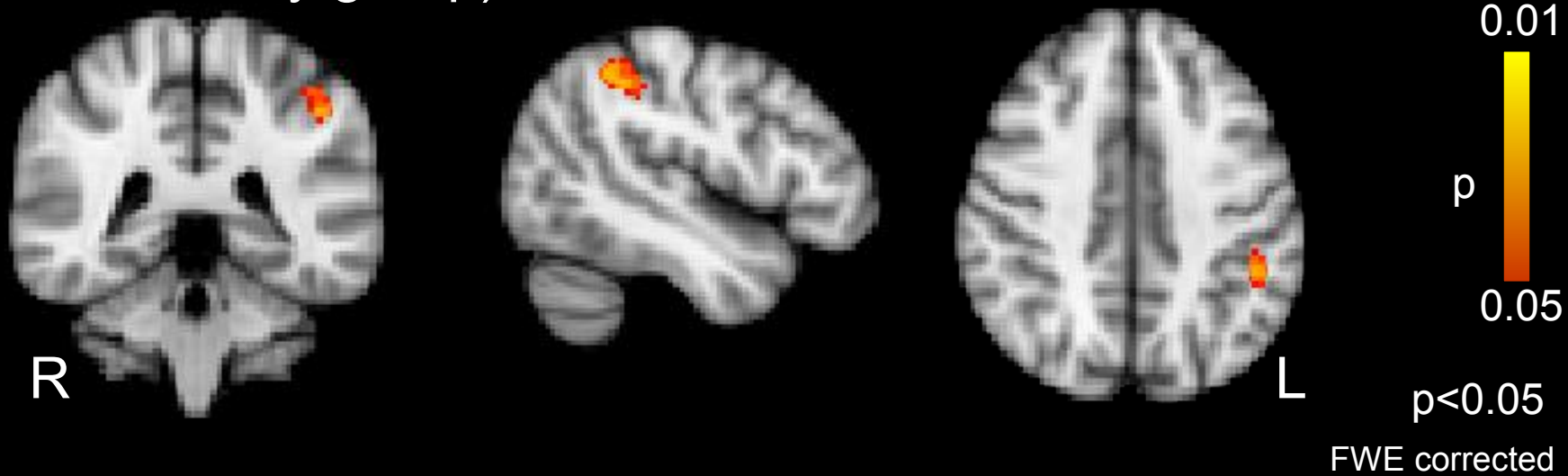
Writer`s cramp (WC)

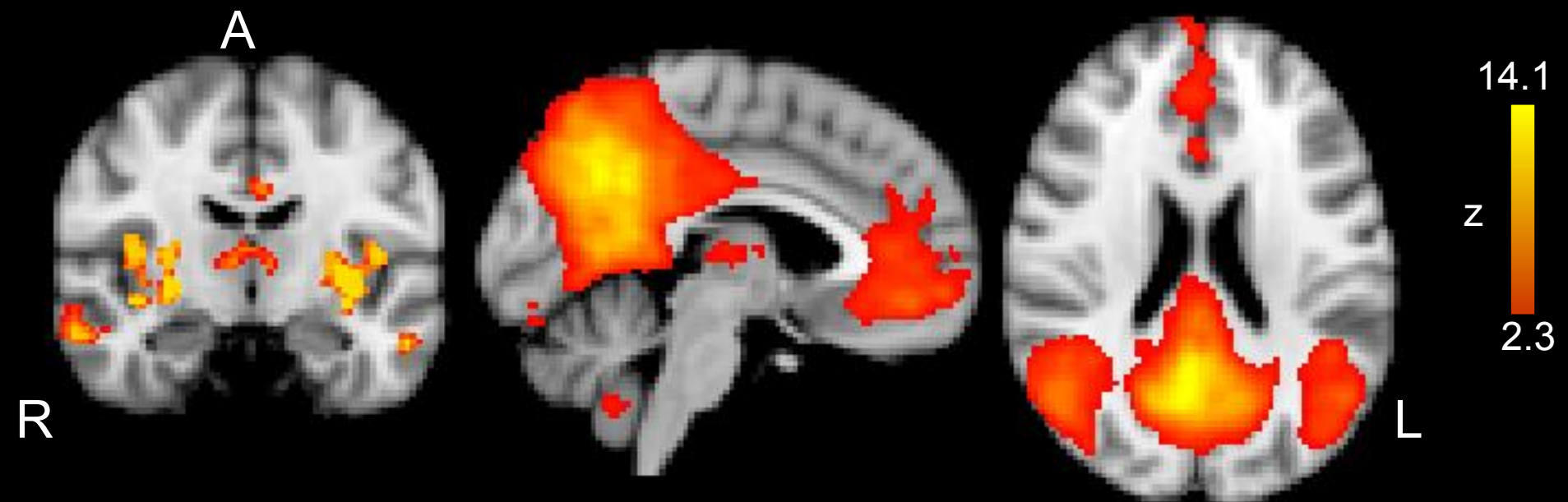


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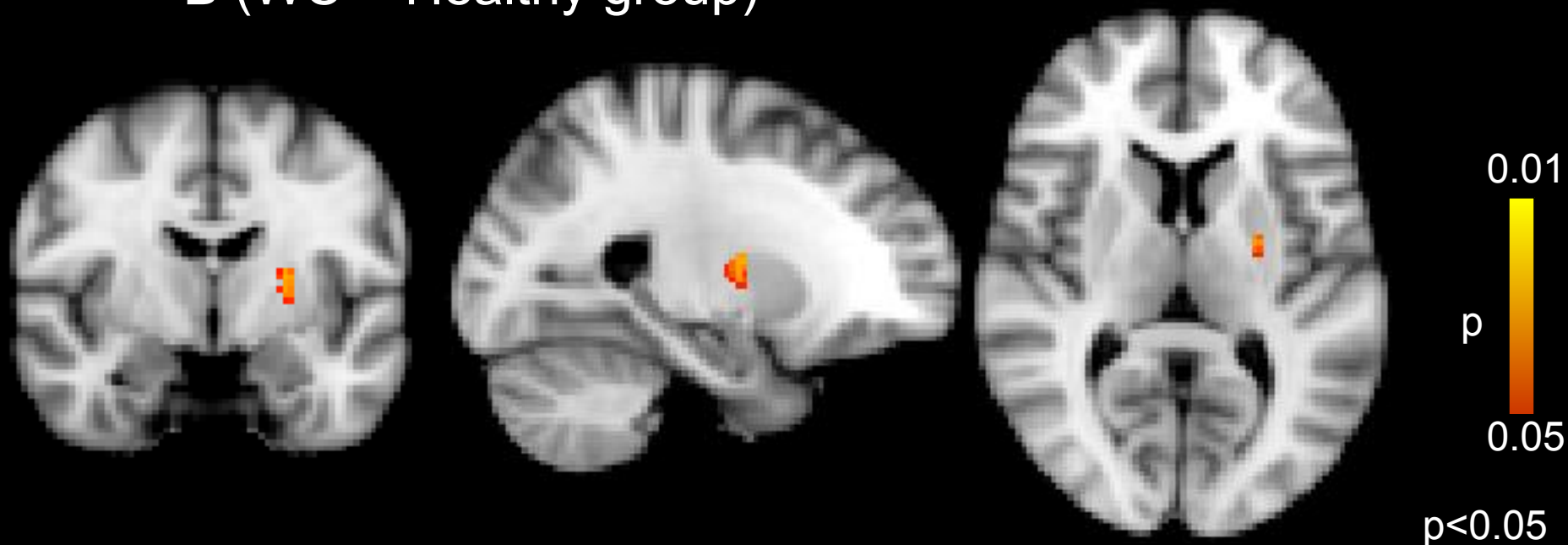


B (WC < Healthy group)





B (WC > Healthy group)



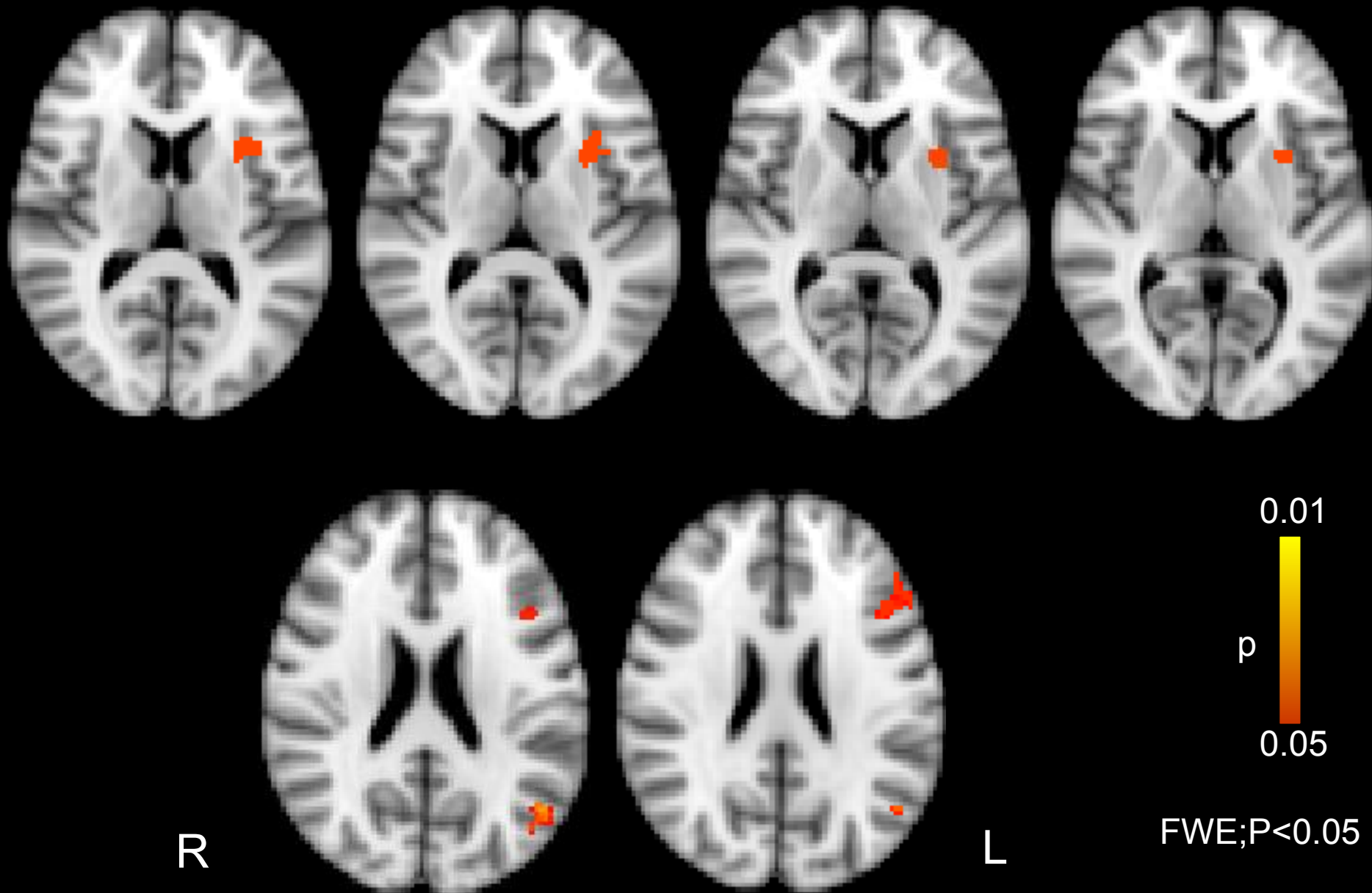
- patients may experience a decreased reliance on sensory input
 - disintegration of SMN
 - changed connectivity in somatosensory afferent system
-
- Disturbances of cortico-subcortical-circuits
 - Basal ganglia Interfering between sensory inputs & motor performance

The changed connectivity in both systems may result in
overflow of motor action leading in dystonic posture

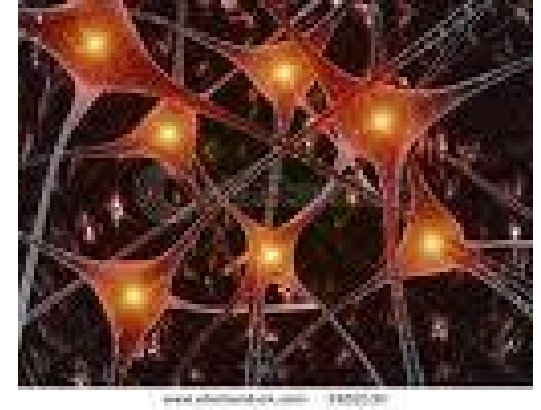
Ego-Shooter PC Games



Control > Player



- Functional connectivity (Resting-State)
Independent Component Analysis (ICA)
Seed-Based-Correlation-Analysis
- Functional connectivity (task related; PPI)
- DTI: TBSS (Tract-Based Spatial Statistics), Tractography
- Voxel based morphometry, Volumetric analysis
- Correlation with clinical data
- Multi-modal-imaging/analysis:
Clinical index, disease progression, pharmacological studies,
Diagnosis and prediction for individual patients



In cooperation with:

Medical School Hannover

University of Magdeburg

University of Lübeck

Neurology

Psychiatry

R. Dengler

Gregor R. Szycik

K. Kollwe

Bert Theodor te Wildt

S. Petri

T.F. Münte

M. Heldmann

I. Gerd

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**Leibniz Universität Hannover
Institut für Sportwissenschaft**

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Imperial College London

University of Oxford (UK)

Clinical Neuroscience Department

FMRIB Centre

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Präsident des International Neuroscience Institute**

Prof. Dr. med. Amir Samii

