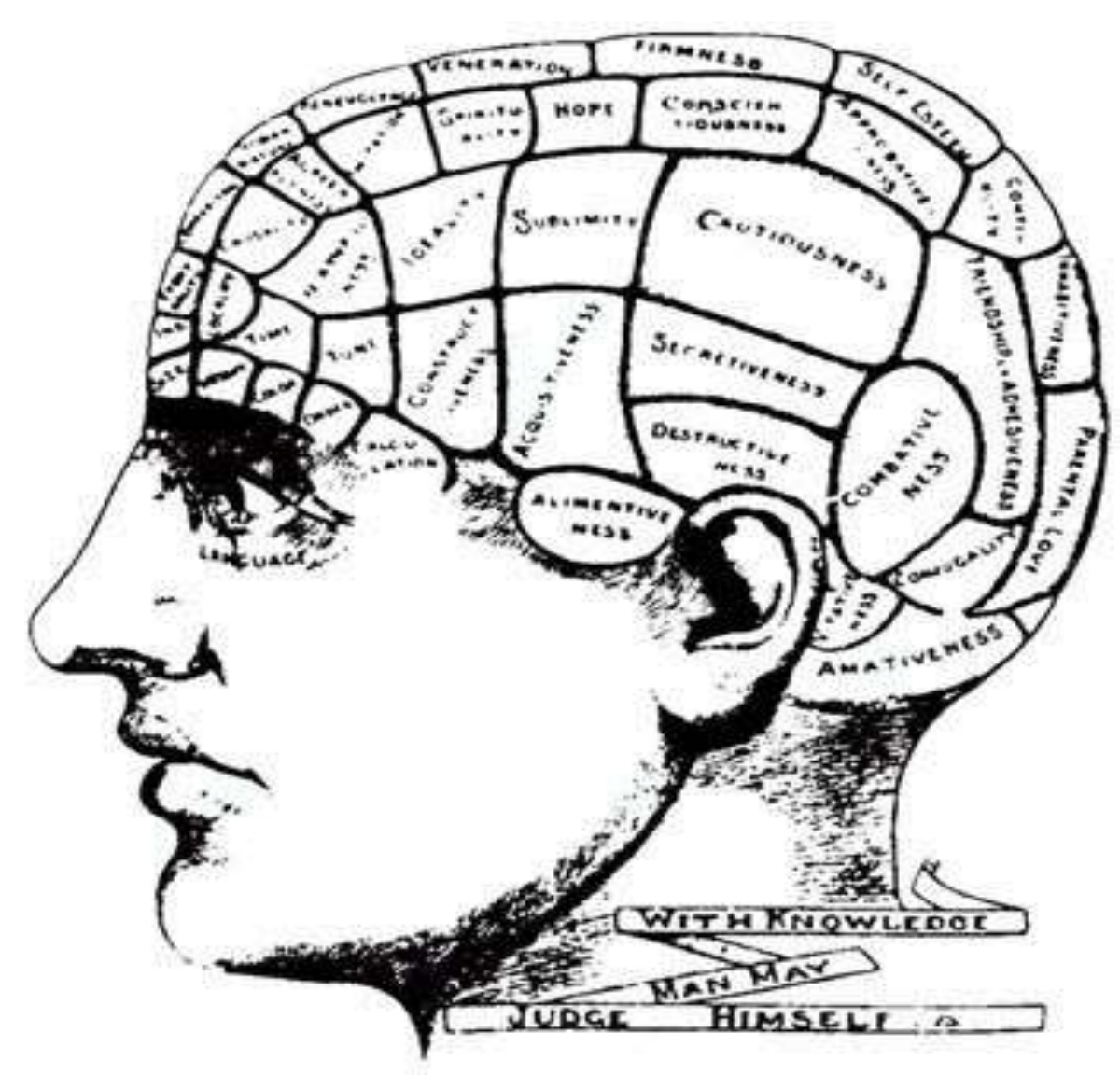
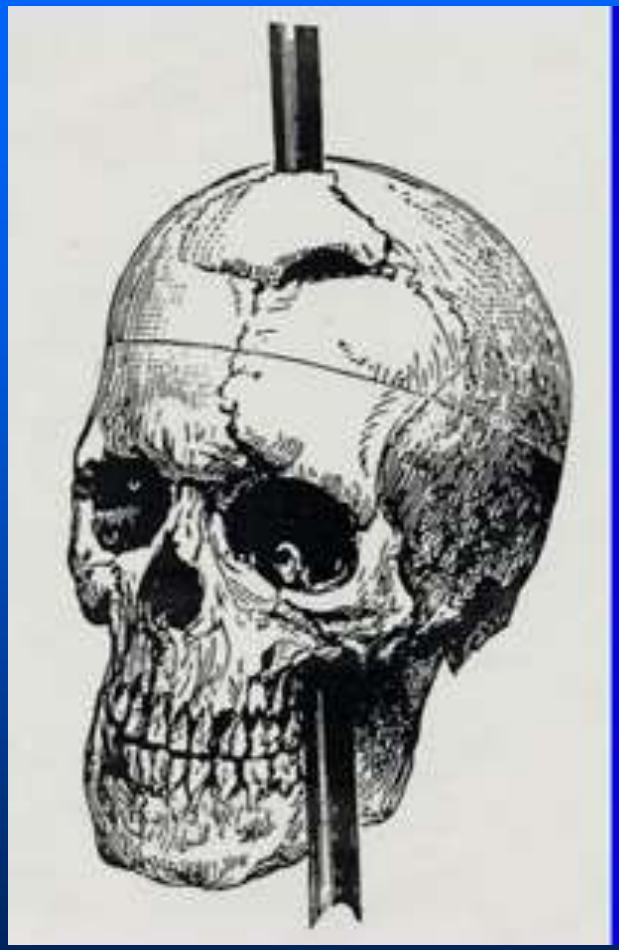


Heads from the *Phrenological Journal* showing location of the mental organs (1885)

Phineas Gage



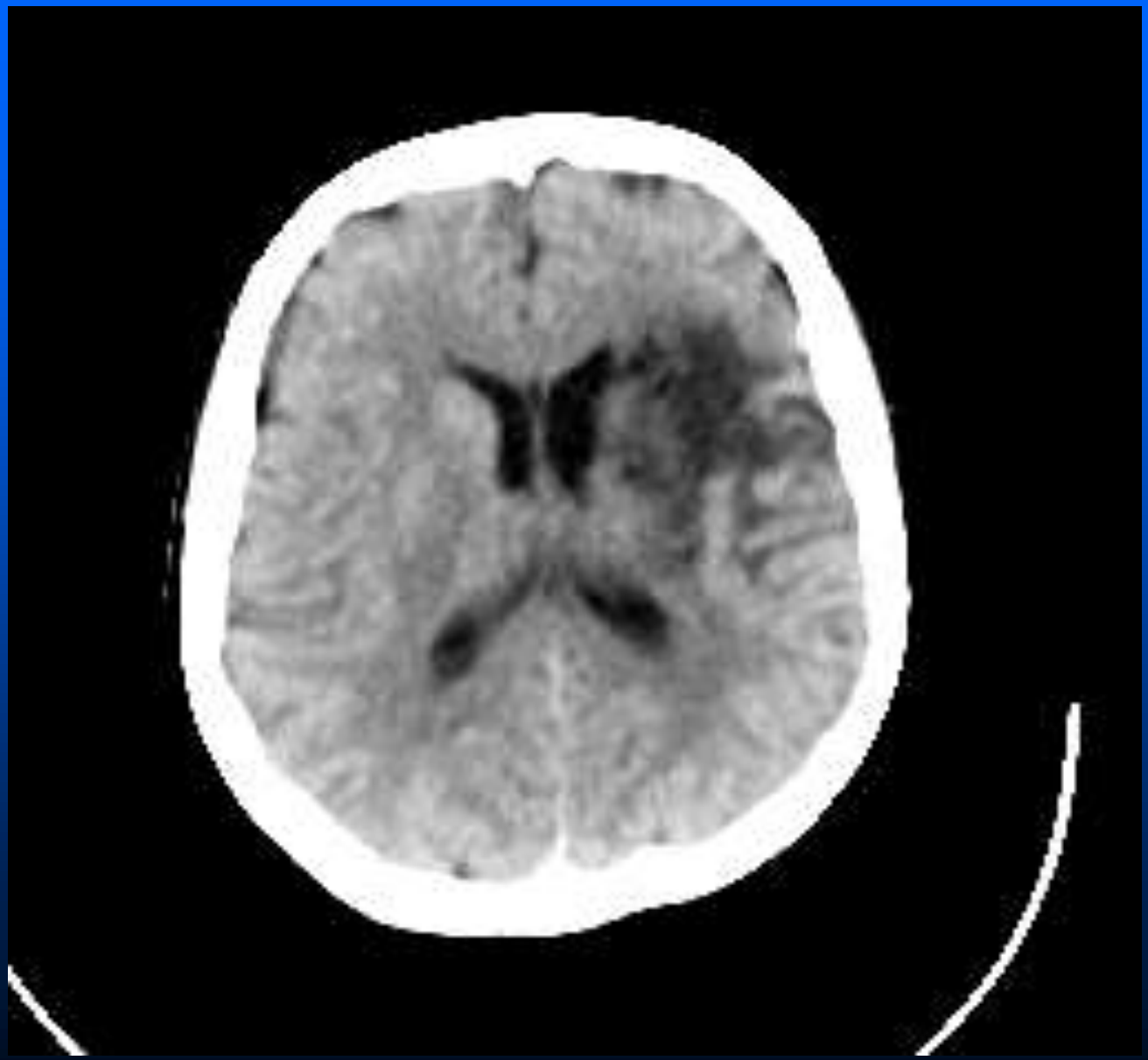

B

Brain Imaging

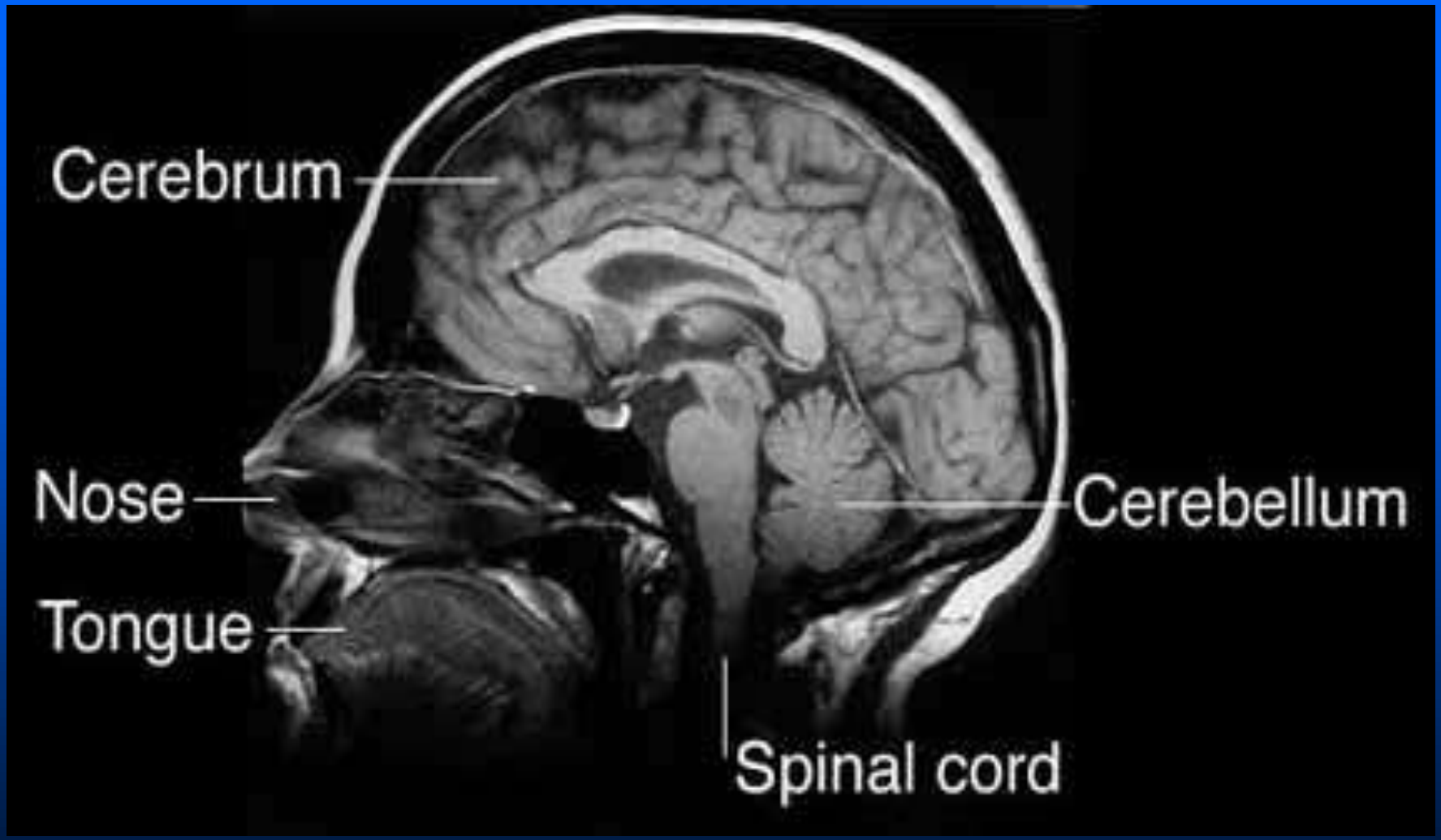
Tecniche:

- Tomografia Computerizzata (TC)
- Risonanza Magnetica (RM)
- Diffusion MRI
- Single Photon Emission Tomography (SPECT)
- Positron Emission Tomography (PET)
- Risonanza Magnetica Funzionale (fMRI)
- Spettroscopia (RM)

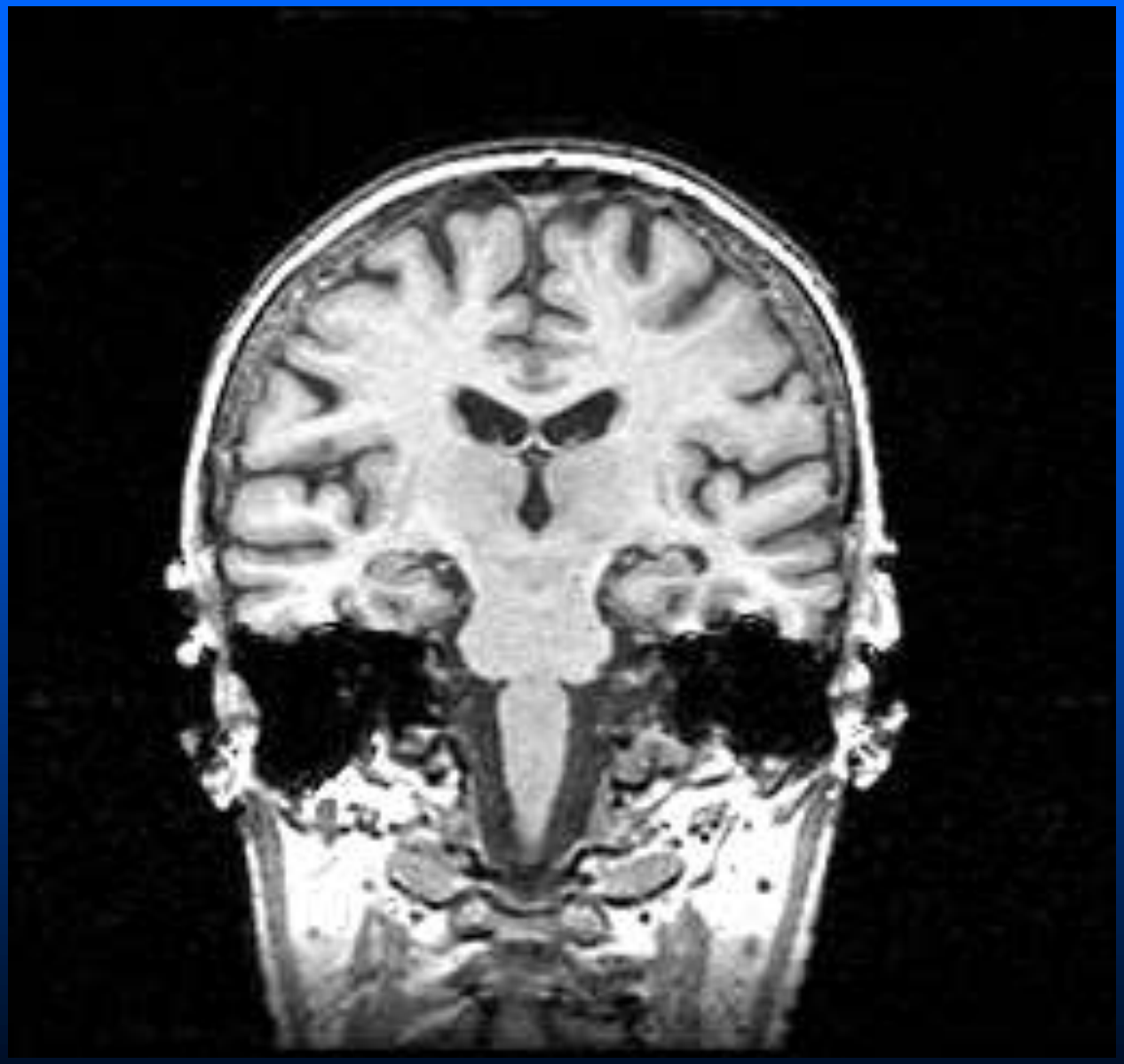
TC: sezione assiale



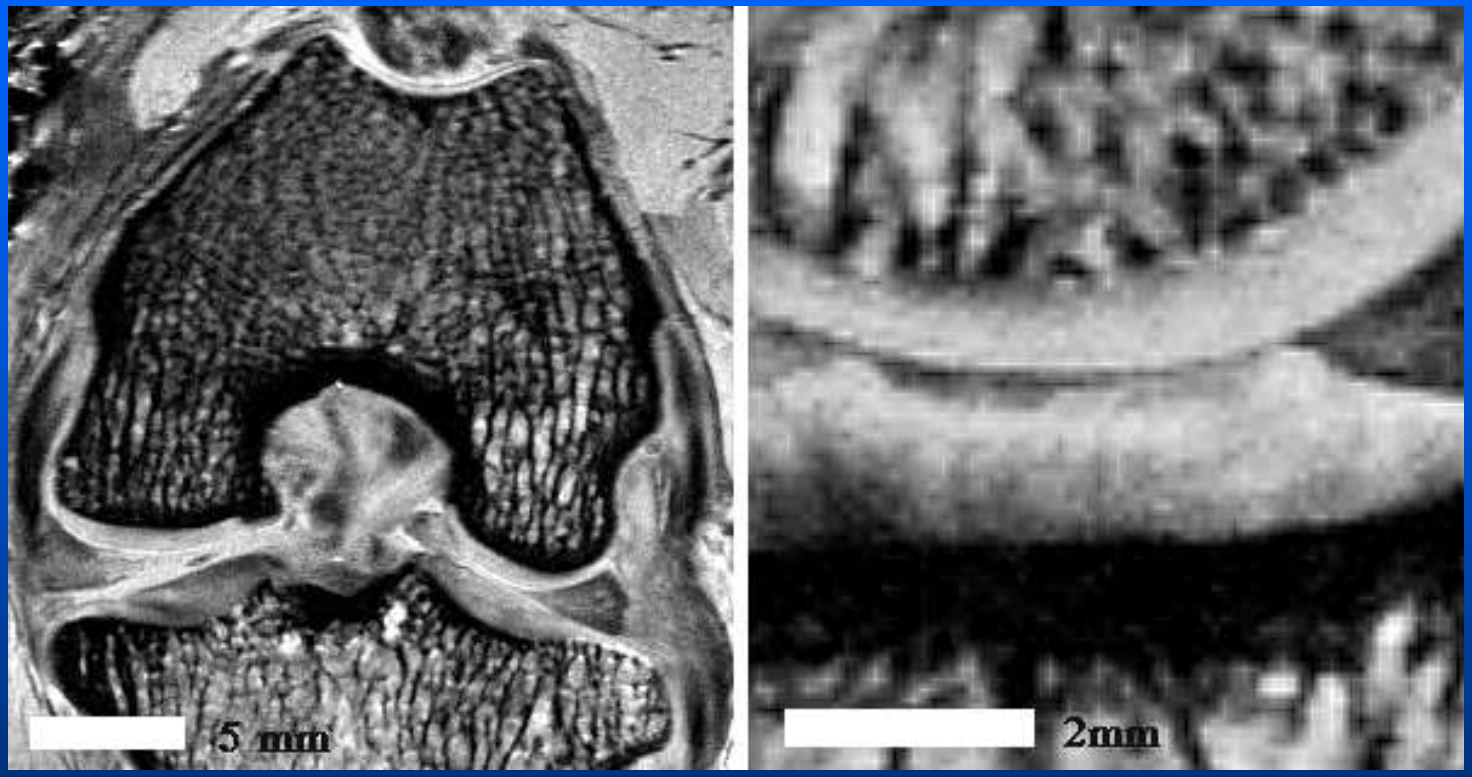
RMN: sezione sagittale



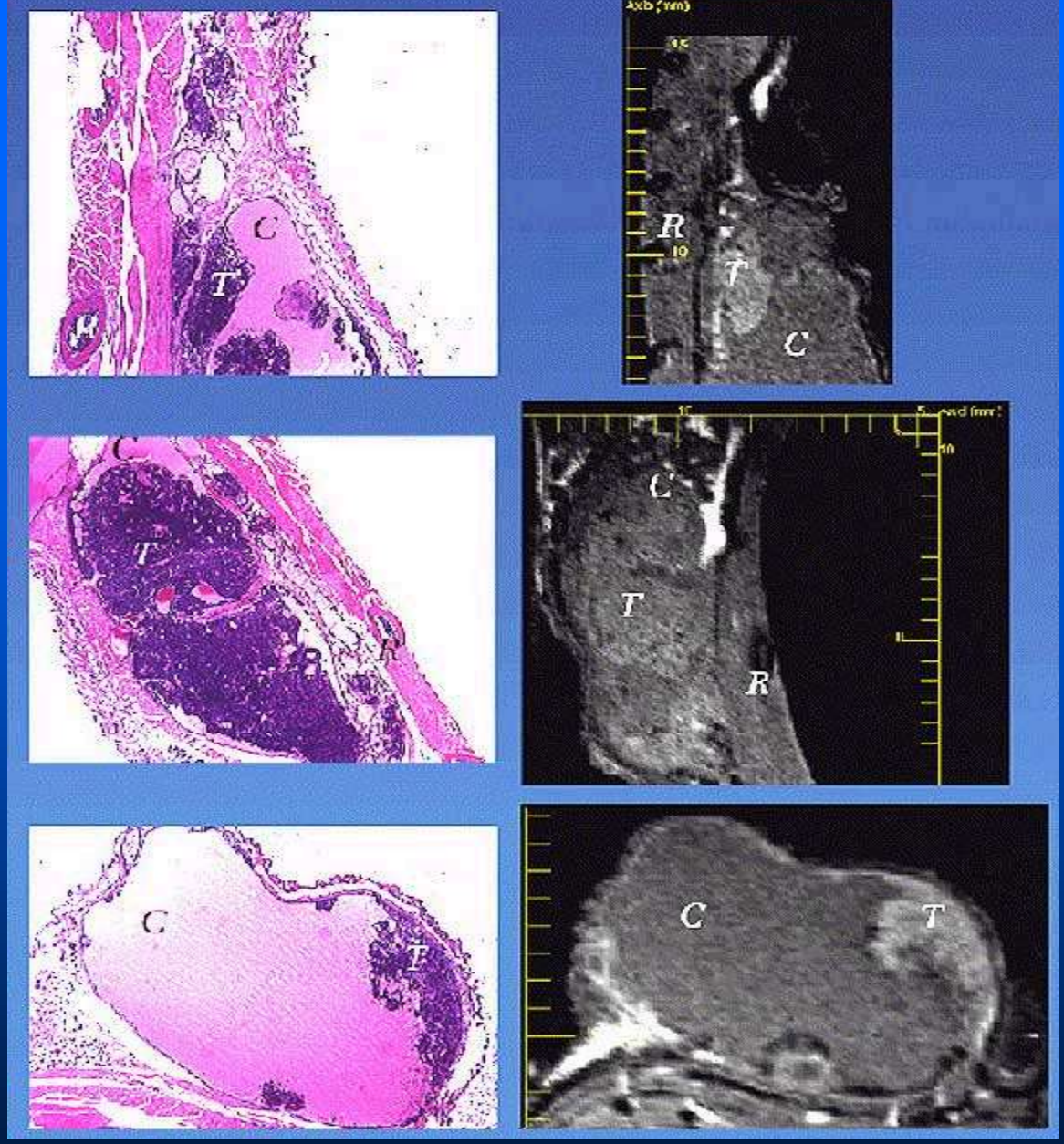
RMN: sezione coronale



Microscopic Magnetic Resonance



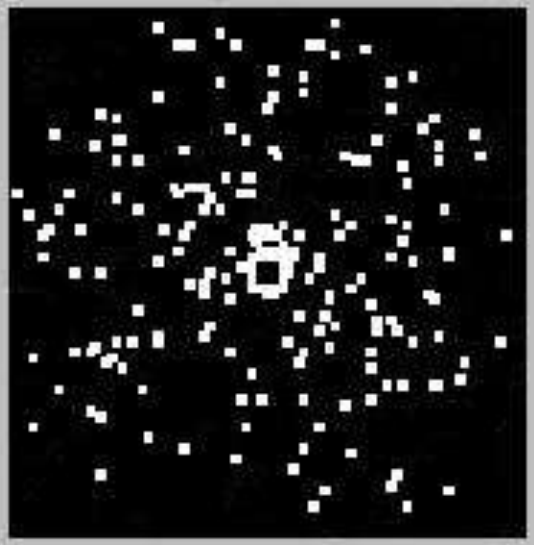
(coronal section, 78 μm resolution)

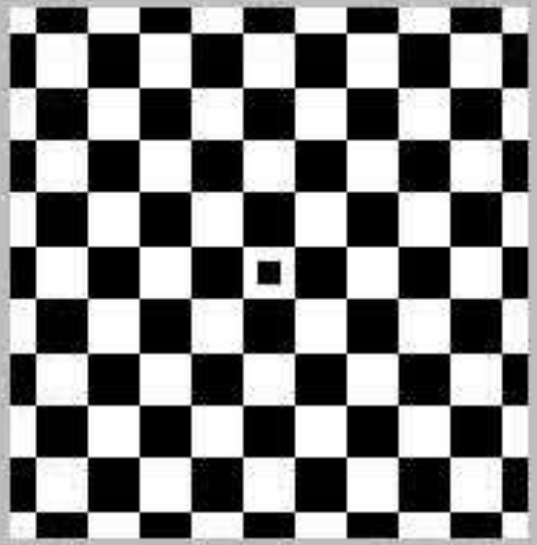


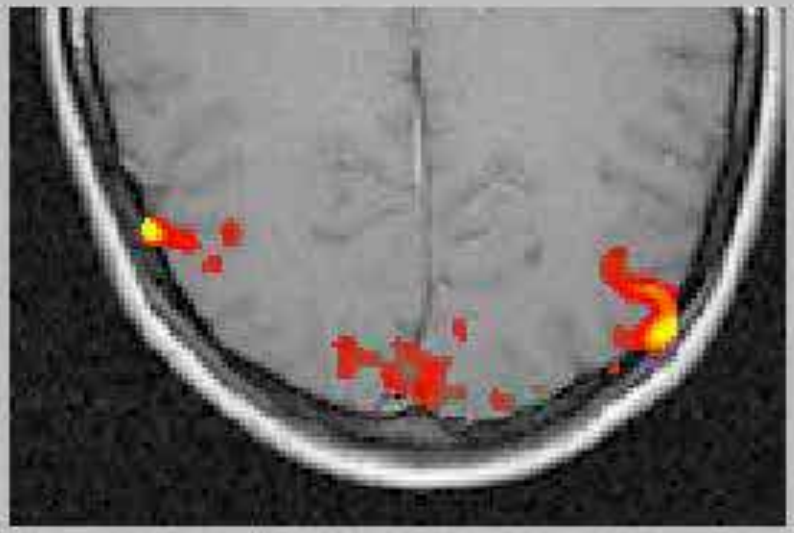
Comparison of histology and MRI transgenic mammary tumors in adult mice (7 Tesla).

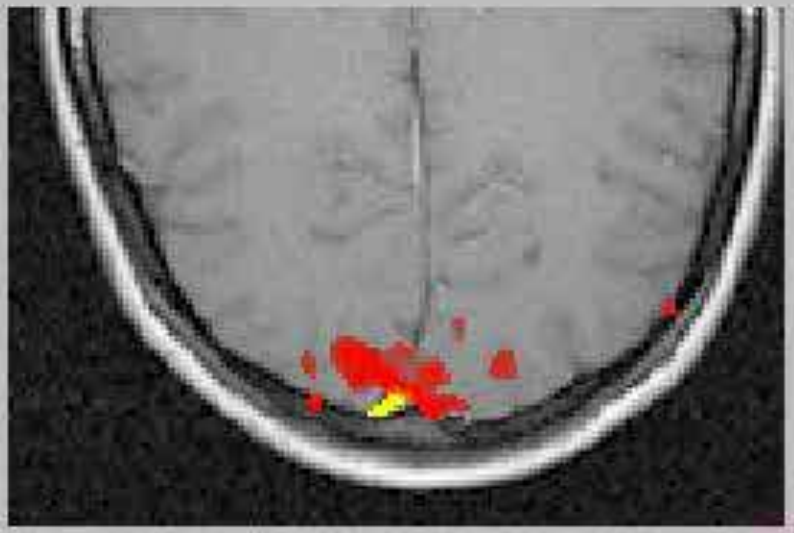
New diffusion MRI technology provides unprecedented detail of the connections in the brain. The fibers are color-coded by direction: red = left-right, green = anterior-posterior, blue = ascending-descending.

fMRI activity in visual brain areas V1 and MT .

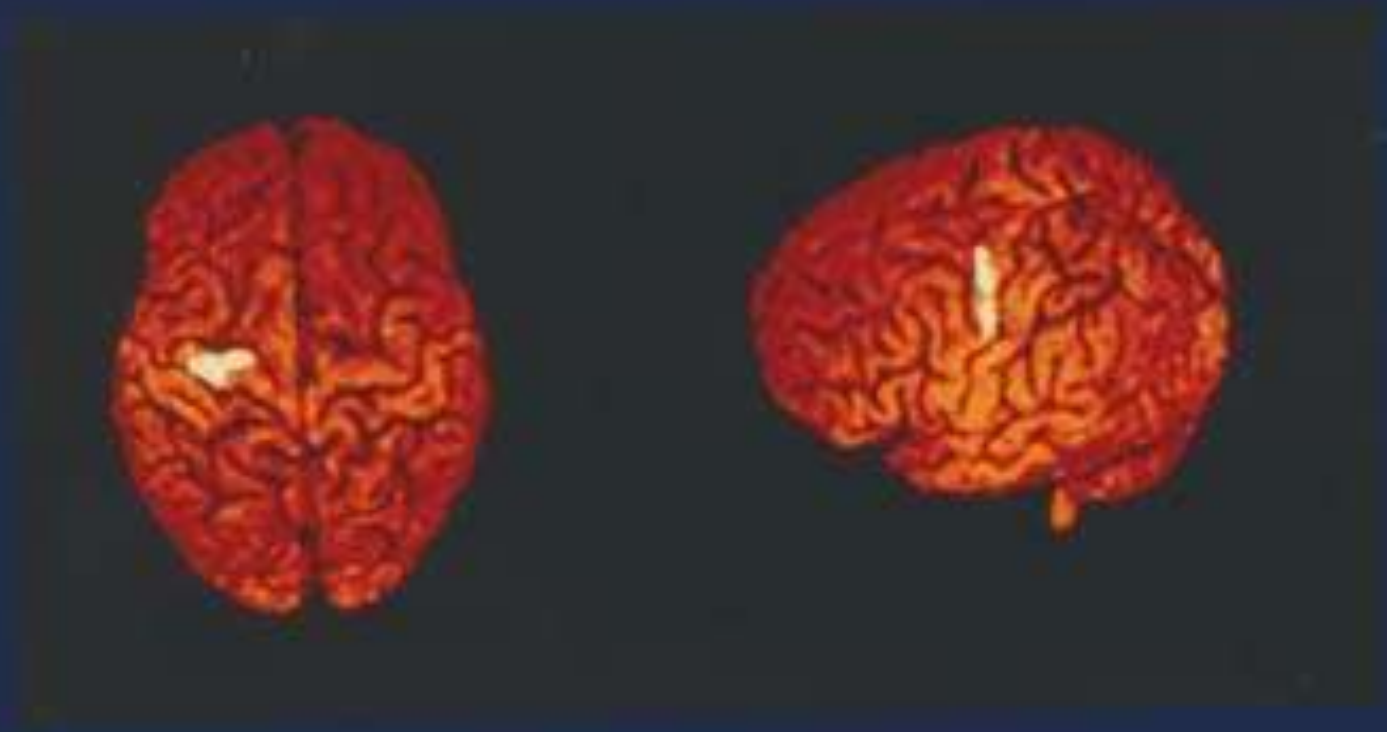






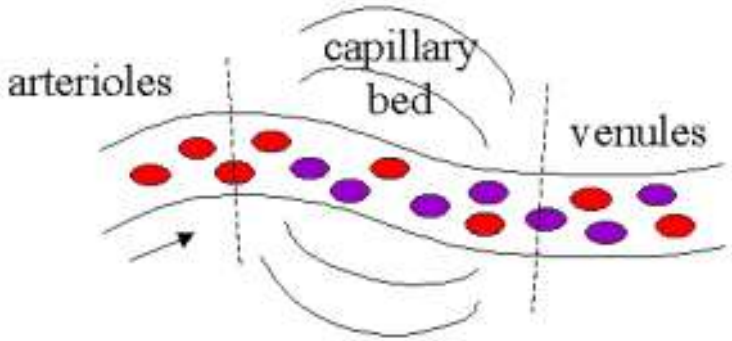


LEFT MOTOR CORTEX ACTIVATION



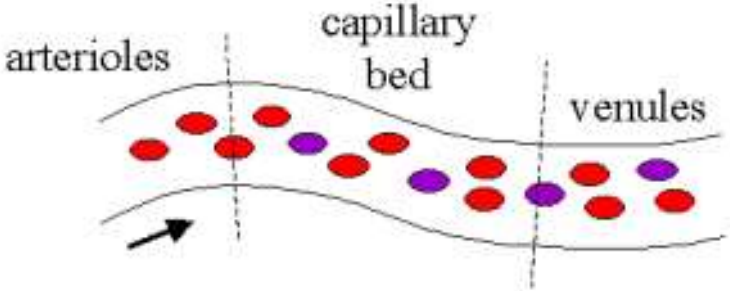
fMRI BOLD: Rapid Overview

Basal state



- normal flow
- basal level [Hbr]
- basal CBV
- normal MRI signal

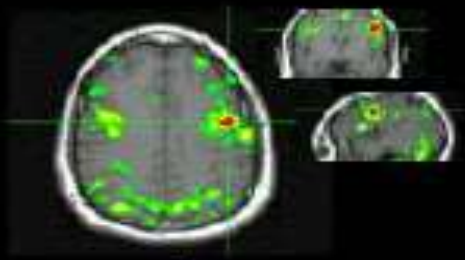
Activated state



- increased flow
- decreased [Hbr] (*lower field gradients around vessels*)
- increased CBV
- increased MRI signal

= HbO_2
= Hbr

Segnale fMRI



Aumento locale dell' attivita' neuronale

→ Aumento locale del metabolismo

→ Aumento del flusso ematico

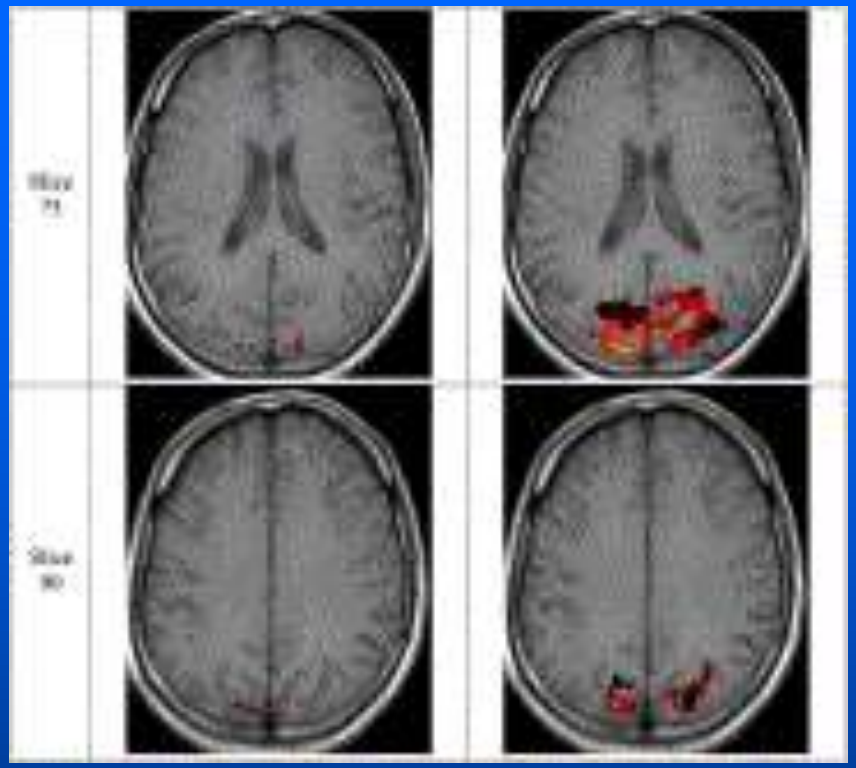
→ Aumento di HbO_2

→ Consumo di O_2 meno del fornito

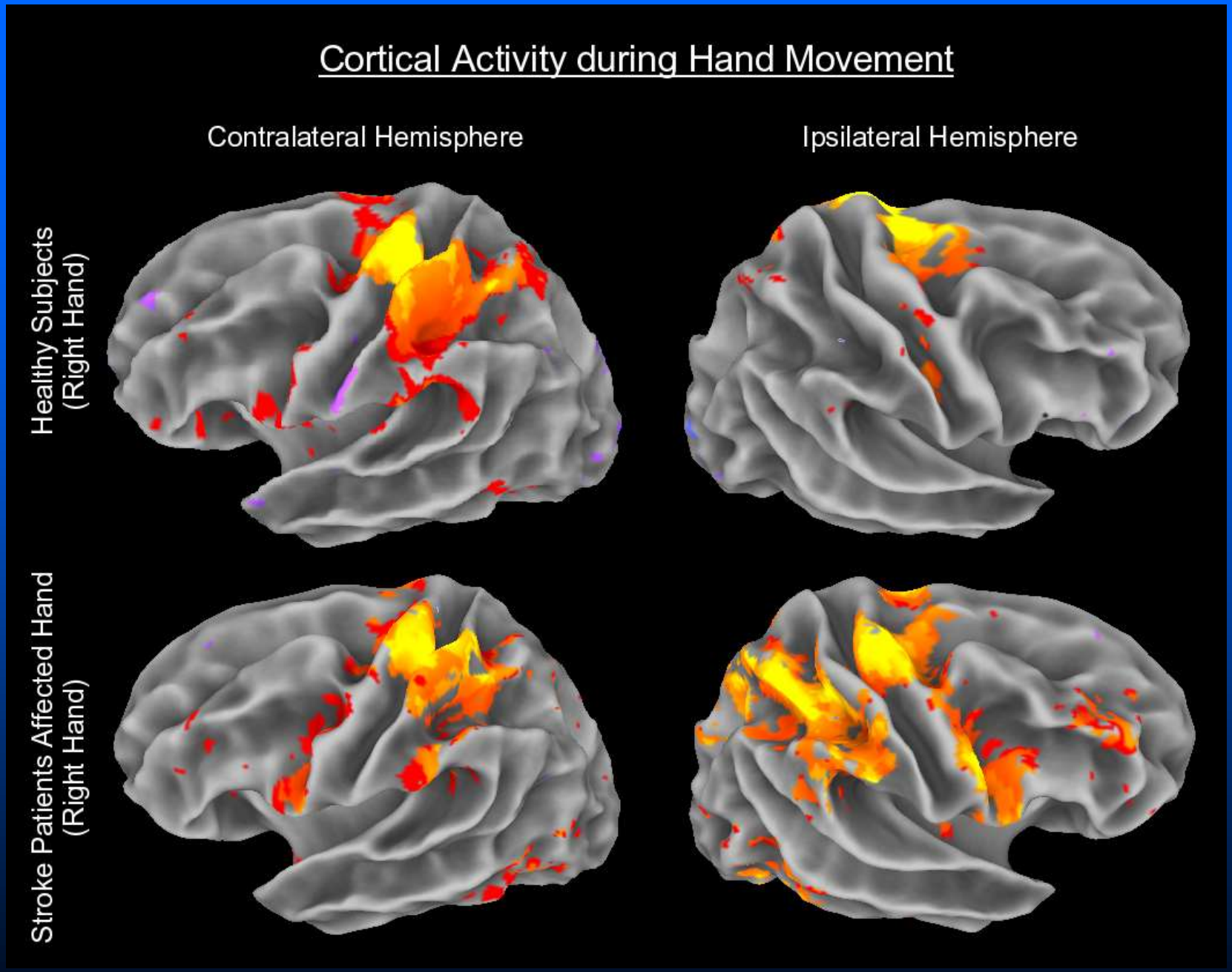
→ Surplus di ossiemoglobina

→ Riduzione relativa di desossiemoglobina

→ Aumento locale del segnale fMRI in T2*

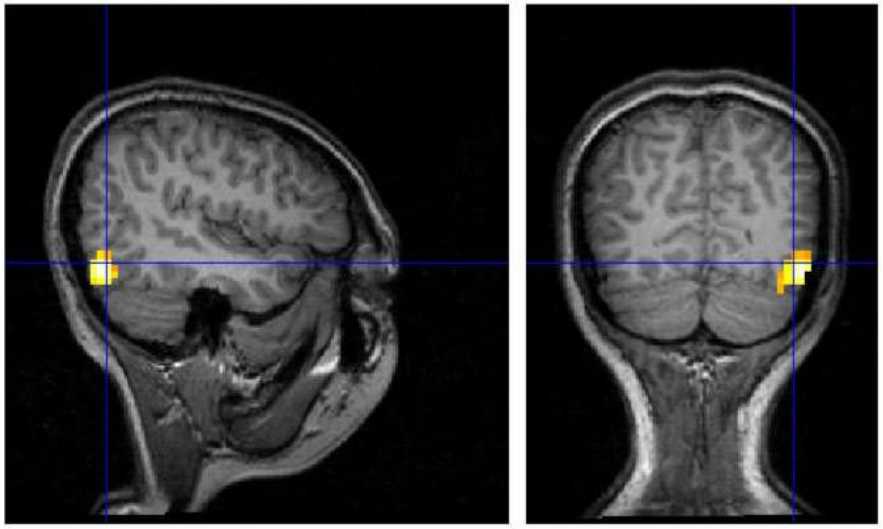


visual-stimulation fMRI

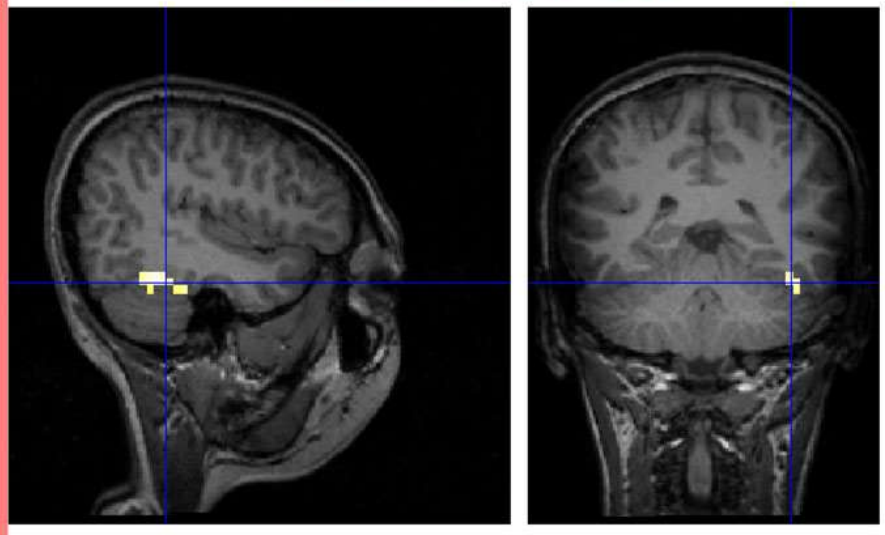

Cortical Activity during Hand Movement
Contralateral Hemisphere
Ipsilateral Hemisphere
Healthy Subjects (Right Hand)
Stroke Patients Affected Hand (Right Hand)

BRAIN ACTIVITY RESPONSE TO:

VIEWING A CAR

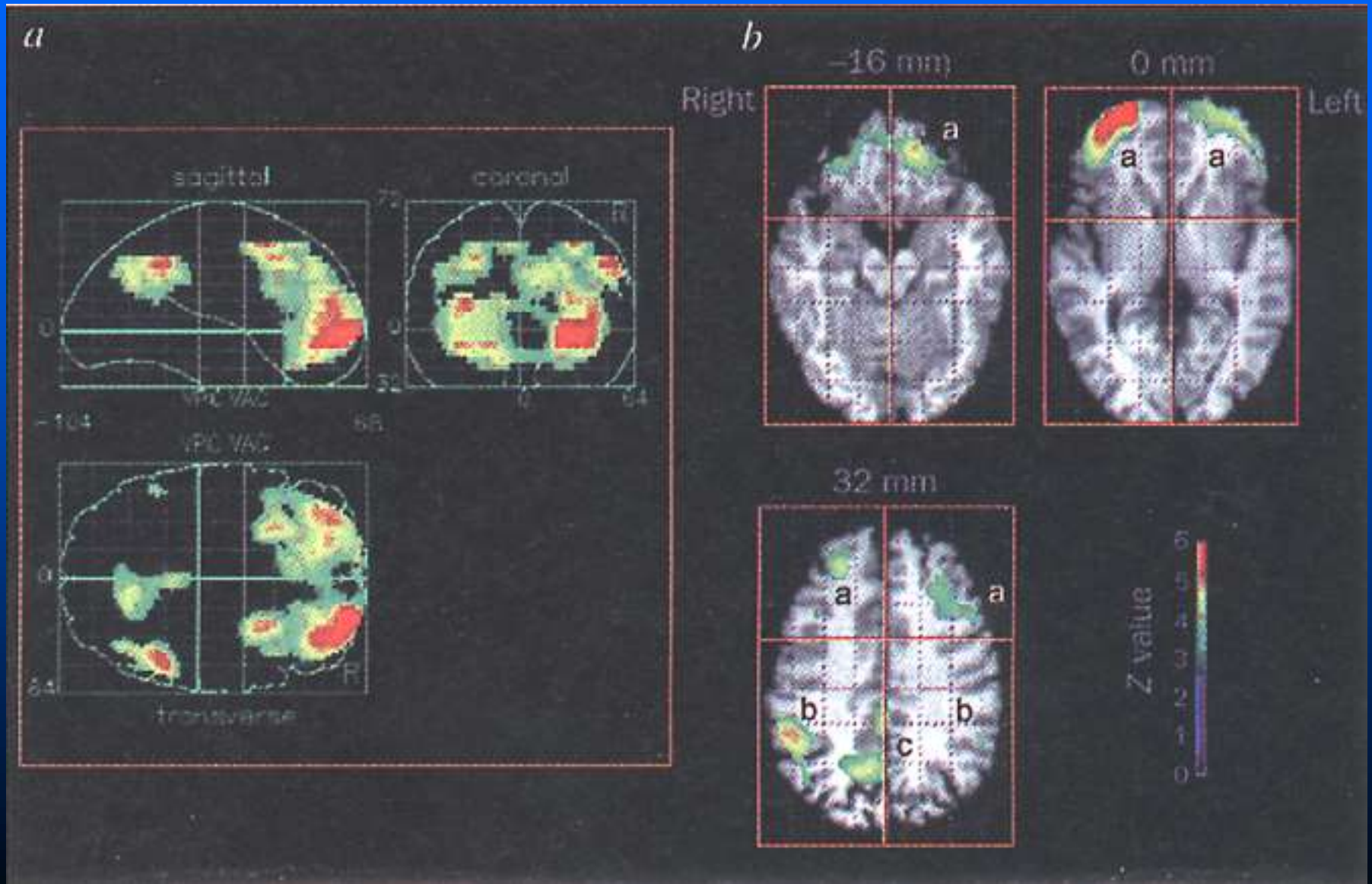


VIEWING A FACE

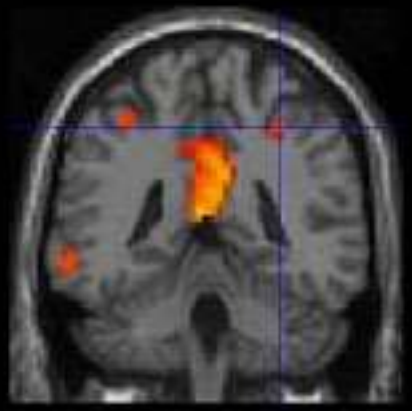


fMRI scan: Areas in the brain's prefrontal cortex (yellow/red) stayed activated during the pause, when there was no face in view, indicating a predominant role in maintaining the image of the face in mind -- working memory.

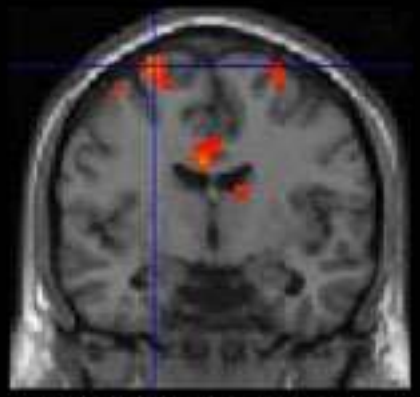
Brain Activity during REM Sleep



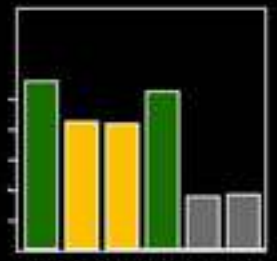
fMRI Results



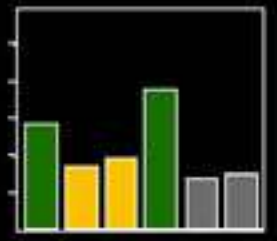
Intraparietal sulcus

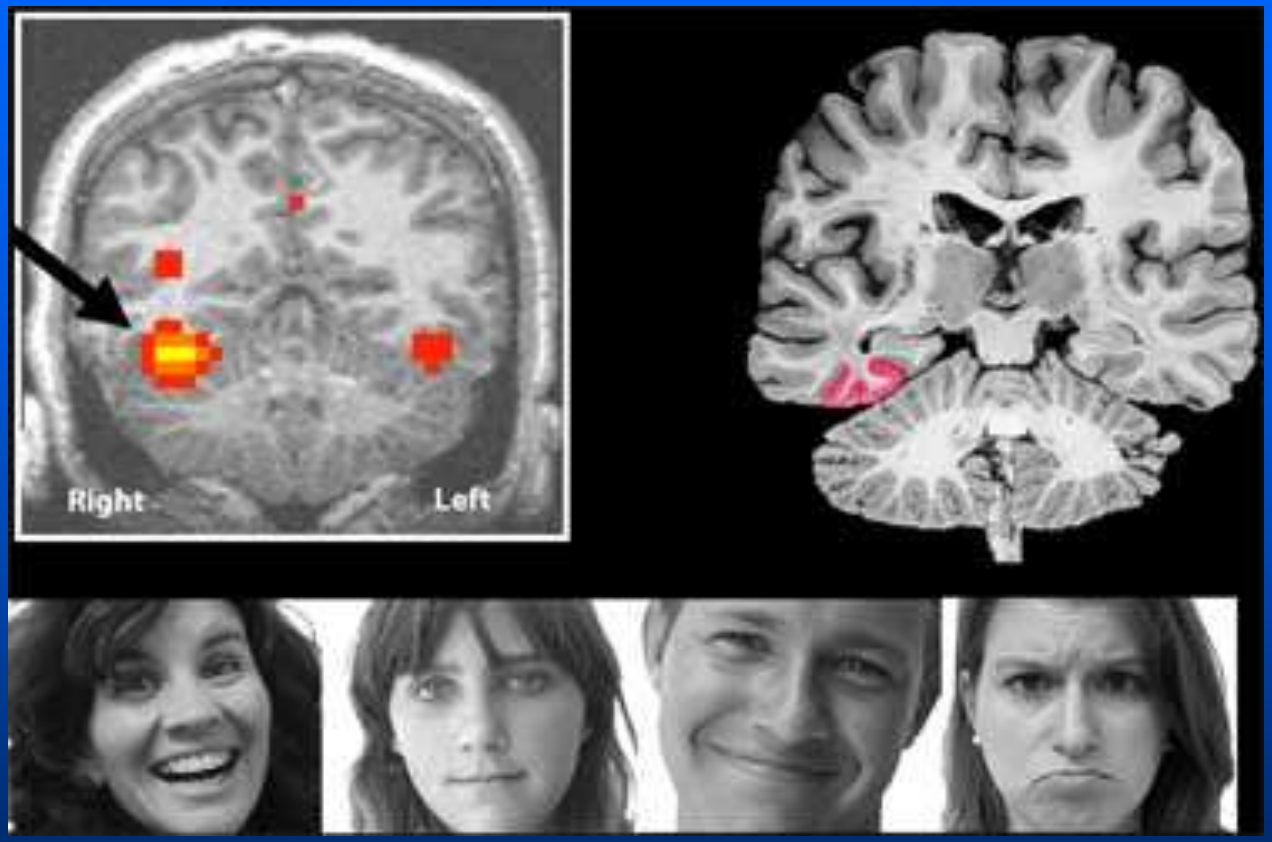


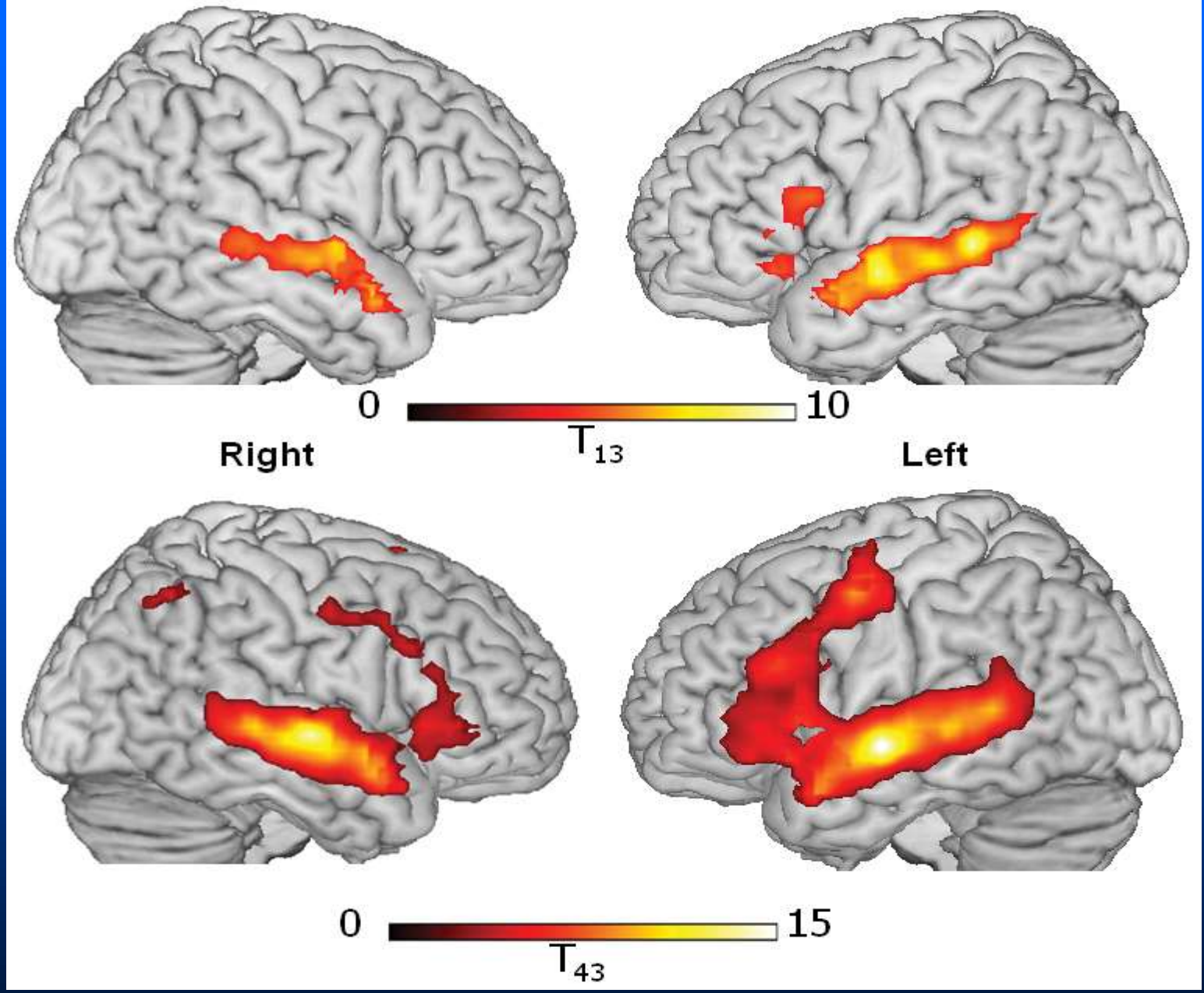
Dorsal premotor cortex



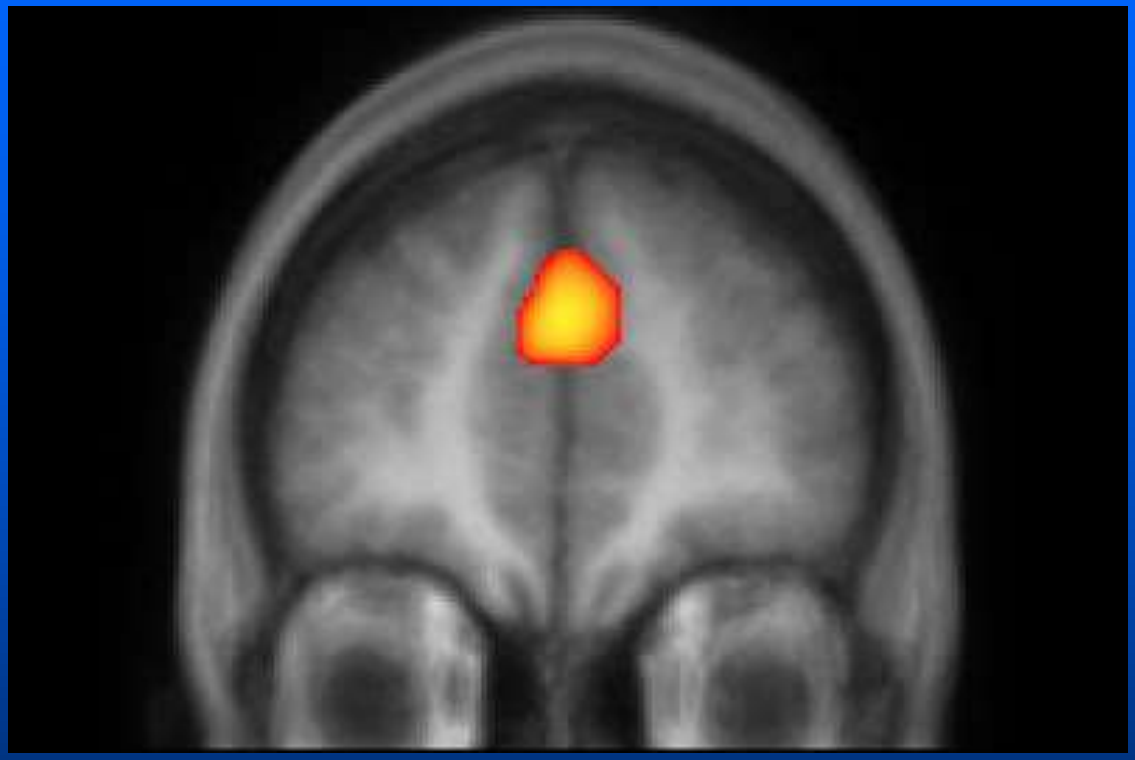
BB Ballet dancers viewing Ballet
BC Ballet dancers viewing Capoeira
CB Capoeira dancers viewing Ballet
CC Capoeira dancers viewing Capoeira
NB Naive subjects viewing Ballet
NC Naïve subjects dancers viewing Capoeira



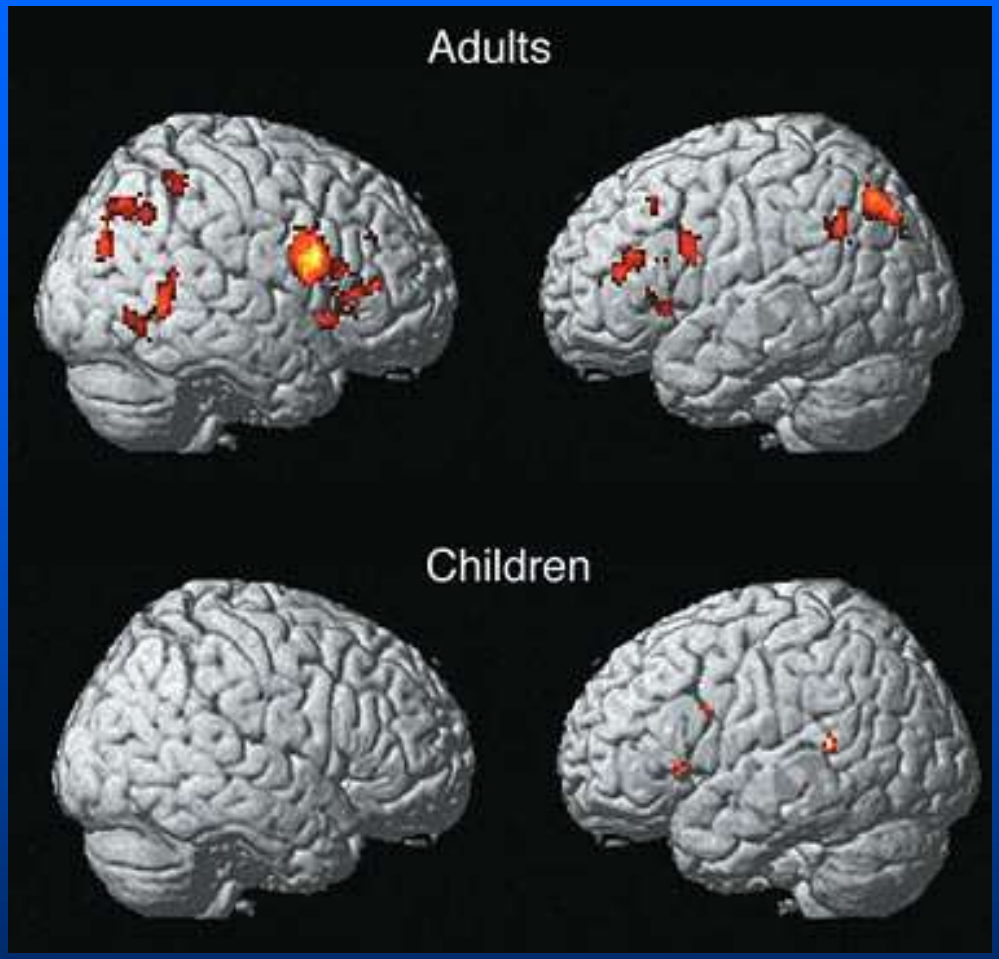

Right
Left



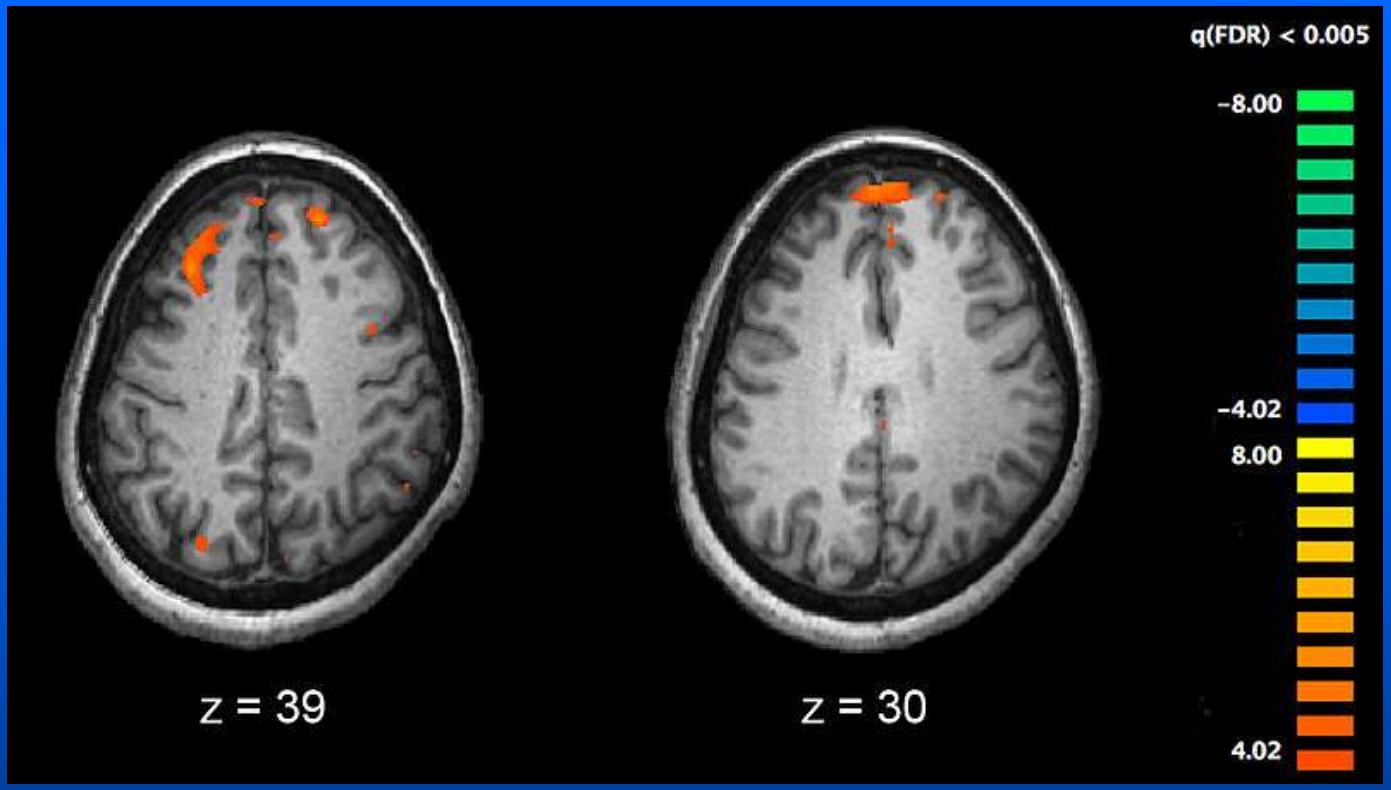
Brain activity during a language comprehension task that engages syntax in healthy young (top) and mature (bottom) volunteers



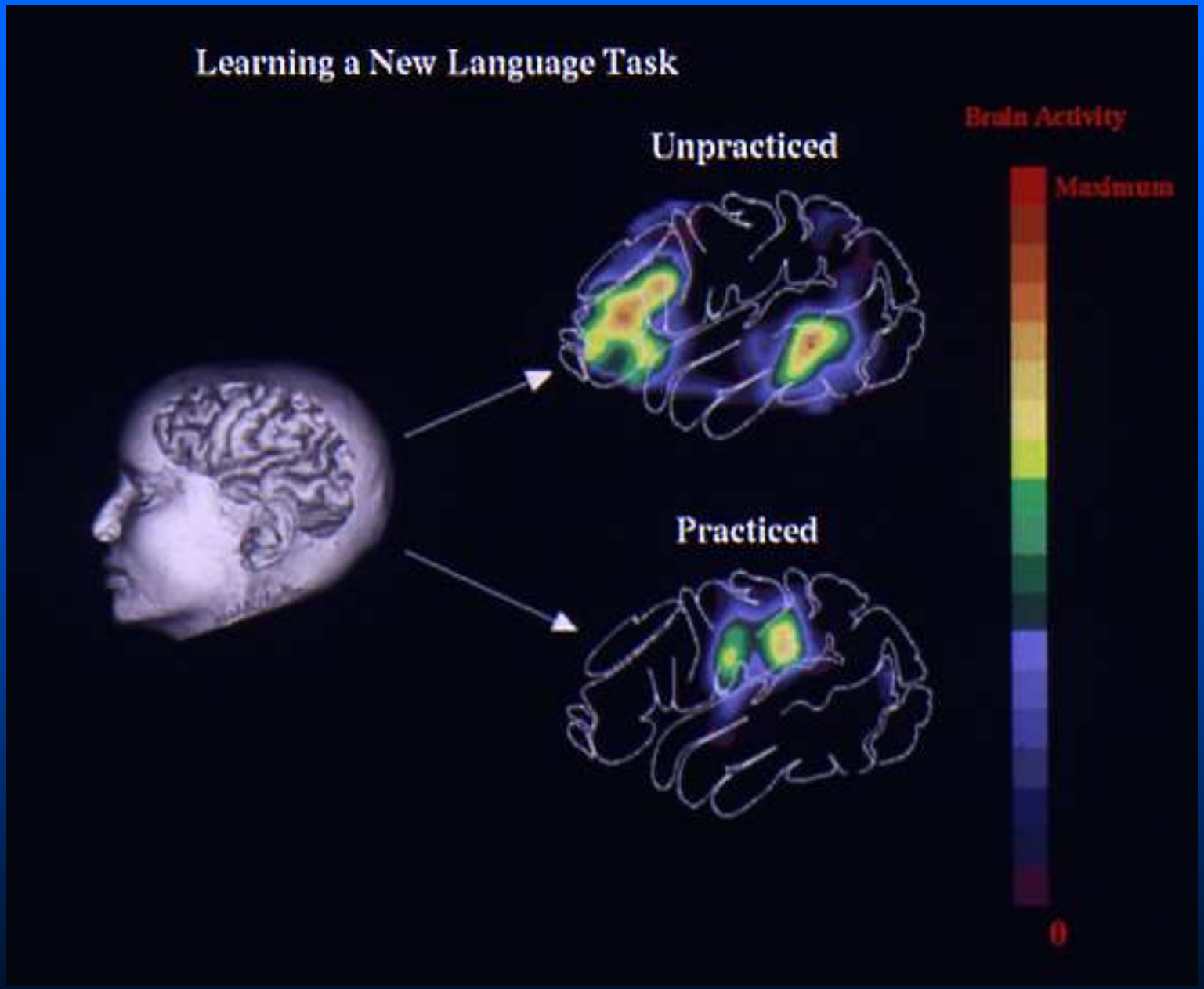
Region of the brain in medial prefrontal cortex where patterns of activity can be decoded to determine who someone is thinking about

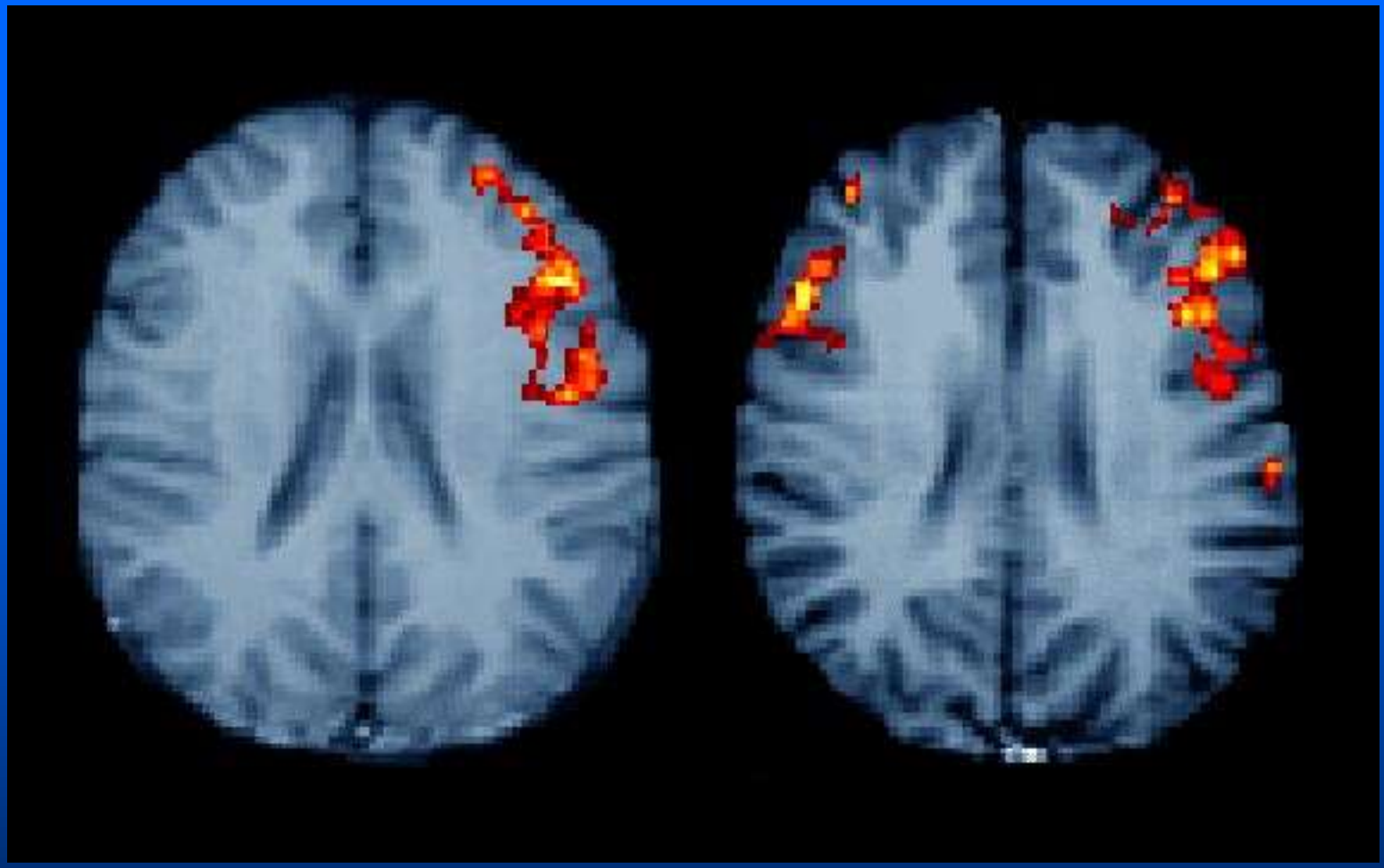


Adults are more capable than children of activating a "control" network in prefrontal

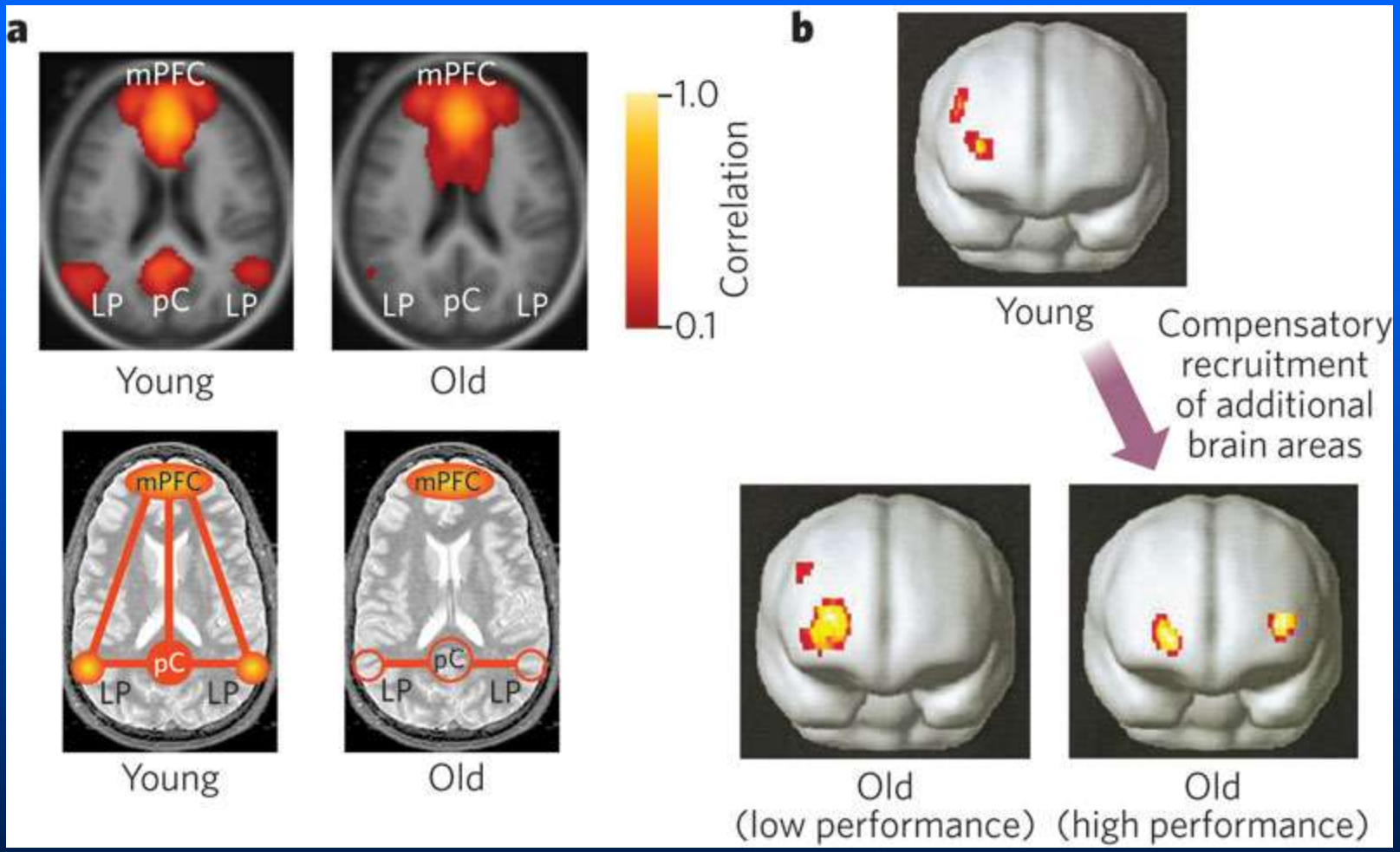


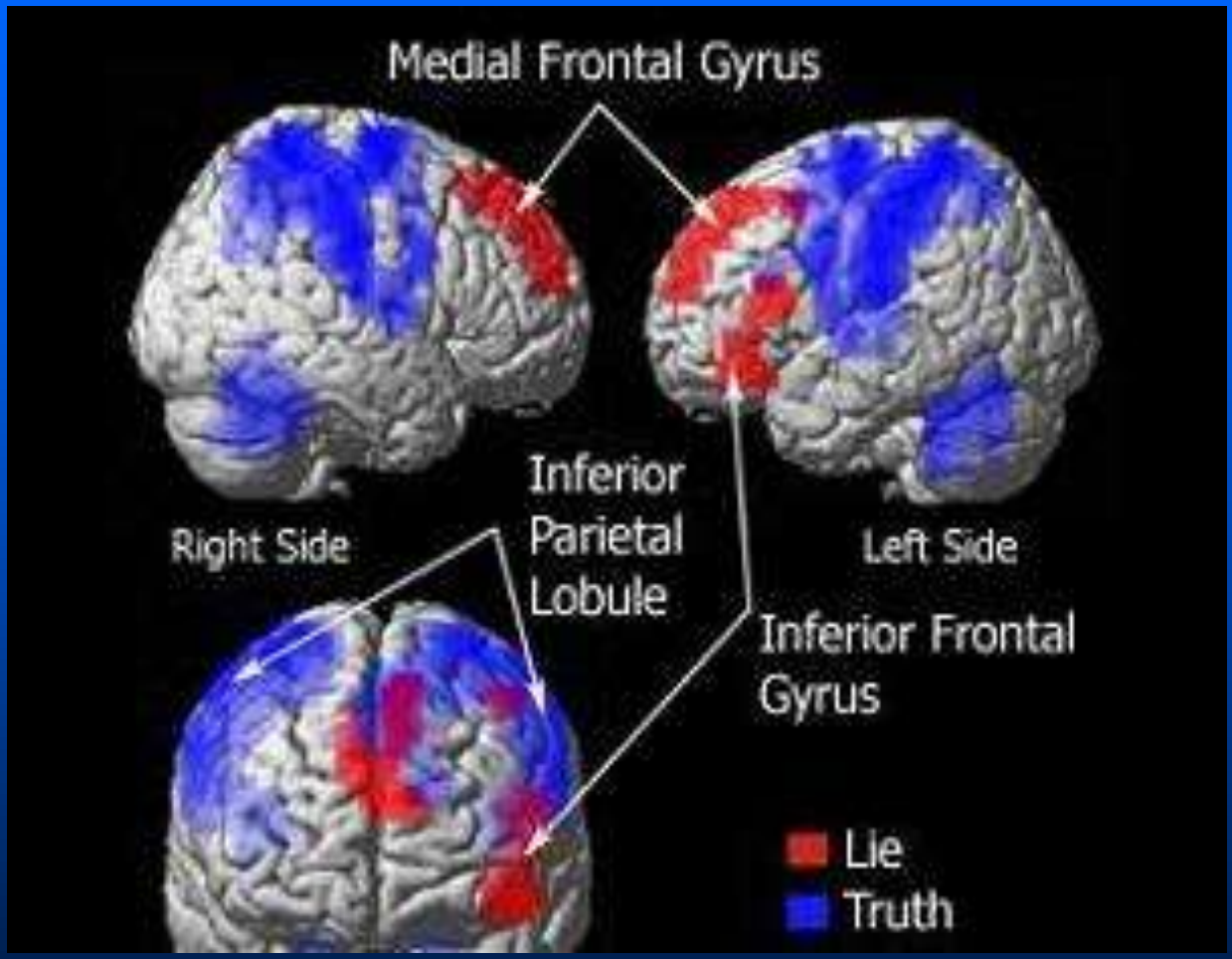
brain areas more active in controls than in schizophrenia patients during a working memory


Learning a New Language Task
Unpracticed
Practiced
Brain Activity
Maximum
0



Male (left) and Female (right) composite map of activations in the phonological processing.


a
mPFC
LP
pC
LP
Young
mPFC
LP
pC
LP
Old
1.0
Correlation
0.1
mPFC
pC
LP
LP
Young
mPFC
pC
LP
LP
Old
b
Young
Compensatory recruitment of additional brain areas
Old (low performance)
Old (high performance)


Medial Frontal Gyrus
Right Side
Inferior
Parietal
Lobule
Left Side
Inferior Frontal
Gyrus
Lie
Truth

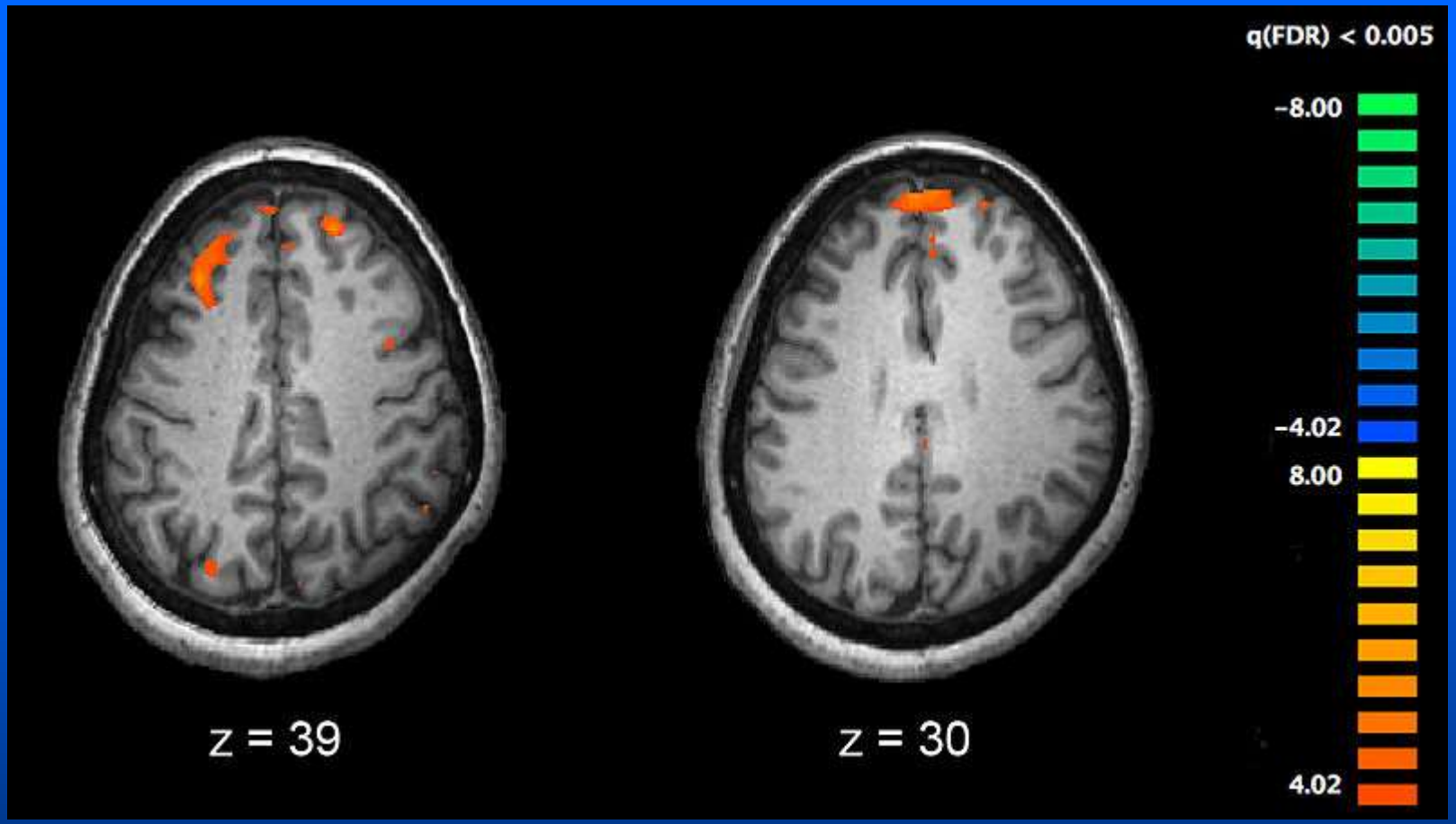
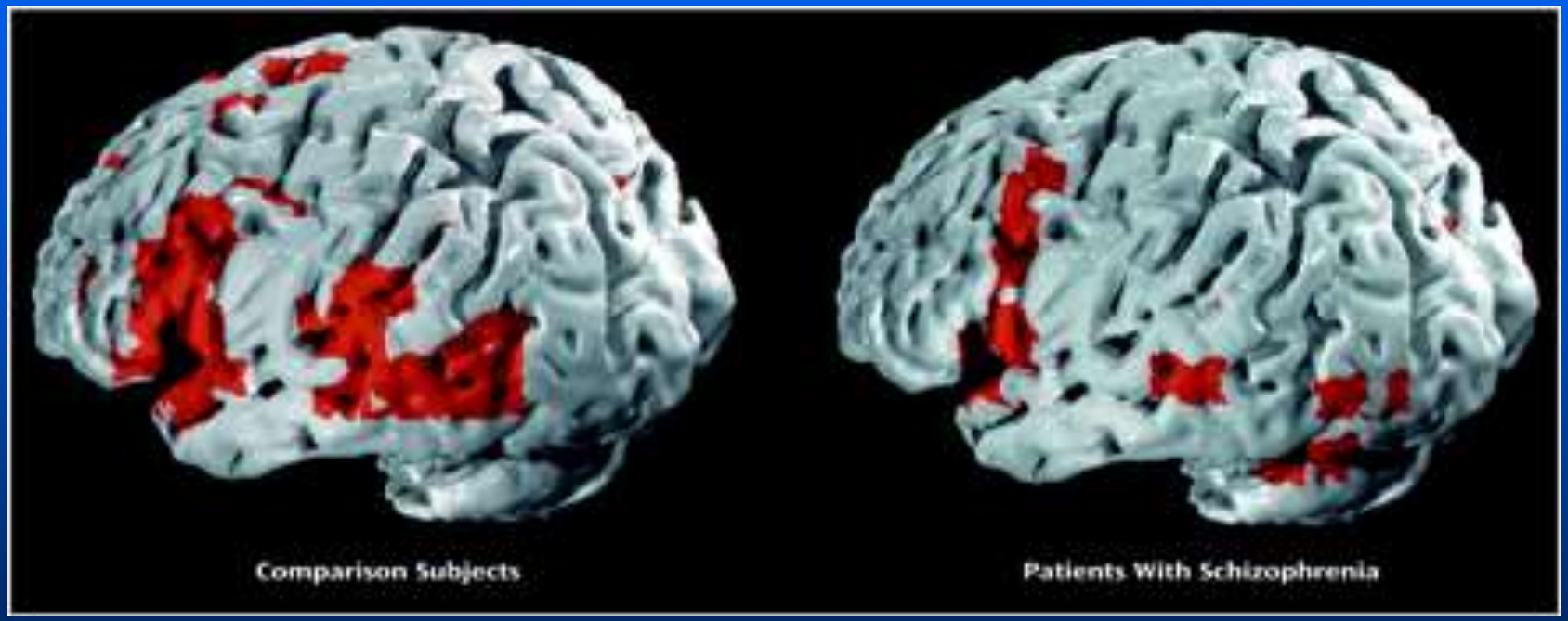


Image showing brain areas more active in controls than in schizophrenia patients during a working memory task during a fMRI study.

Attivazioni corticali durante task riconoscimento emotivo dei volti in pazienti schizofrenici e controlli sani



(Russel et al., 2000)

Limbic over-activity in depression during preserved performance on the n-back task

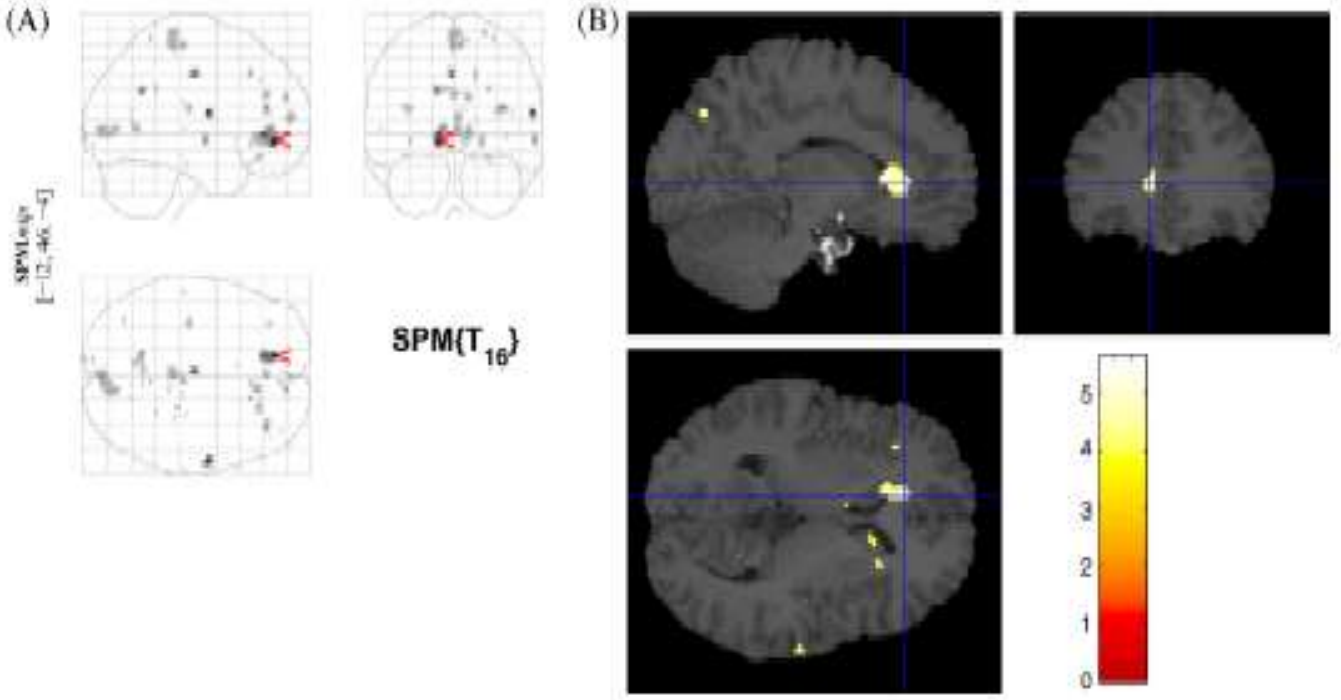


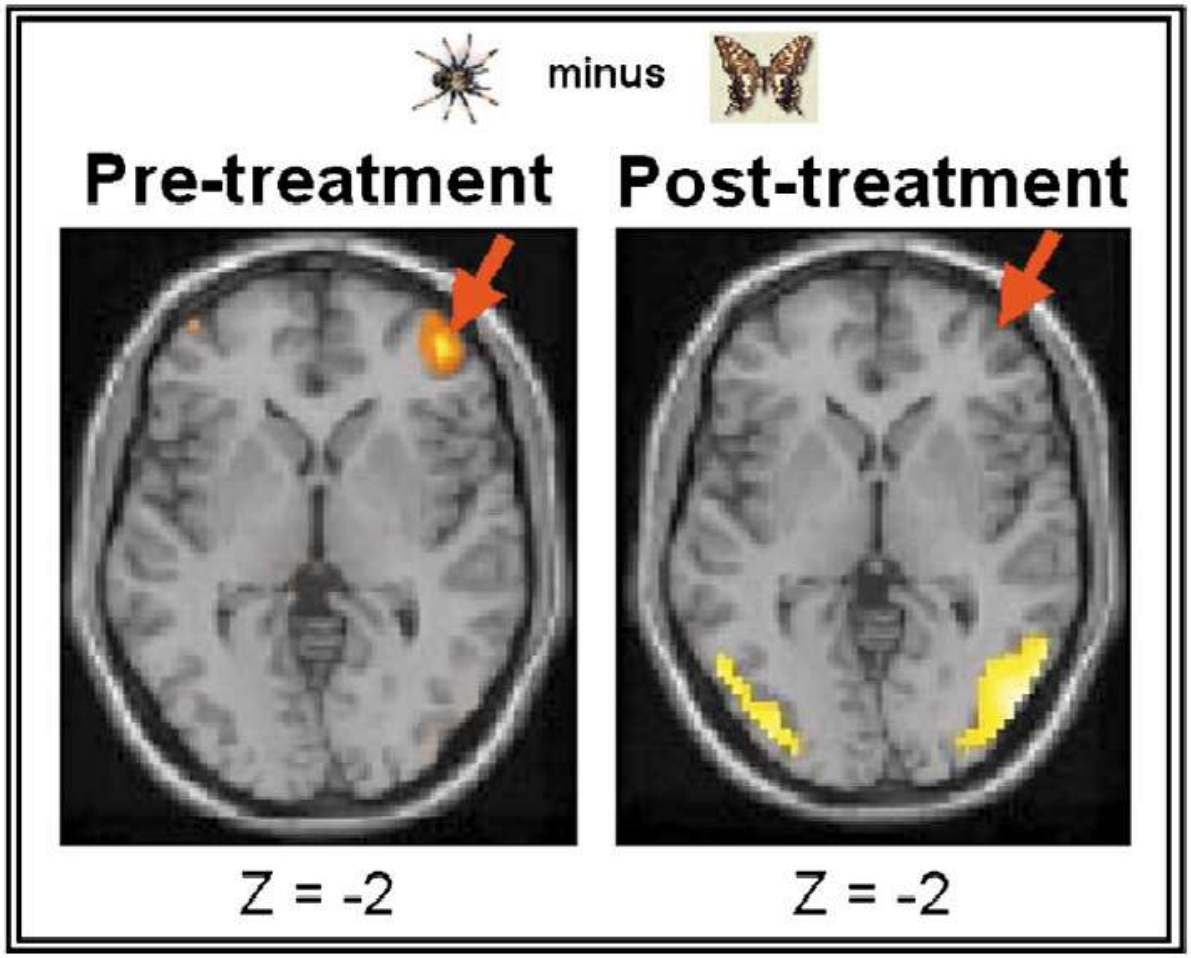
Fig. 4. Voxels of significantly different activation in depressed patients vs. healthy controls, associated with the linear increase in difficulty of the *n*-back task (random effects, $n = 9$ for both groups). (A) SPM99 glass brain rendering of the voxels of relatively increased activation. (B) Voxels of relatively increased activation rendered onto T1-weighted structural image, acquired from a single participant and co-registered to standard MNI space. Markers on both images indicate the cluster of relatively increased activation in depressed patients (i.e. medial orbitofrontal cortex/rostral anterior cingulate; $P_{(\text{corrected})} < 0.05$).

"Change the mind and you change the brain": effects of cognitive-behavioral therapy on the neural correlates of spider phobia

Vincent Paquette,[a,d] Johanne Lévesque,[a] Boualem Mensour,[b] Jean-Maxime Leroux,[b] Gilles Beaudoin,[b,c] Pierre Bourgouin,[b,c] and Mario Beauregard[a,b,c,d,*]

[b] *Départe* ...*ada*

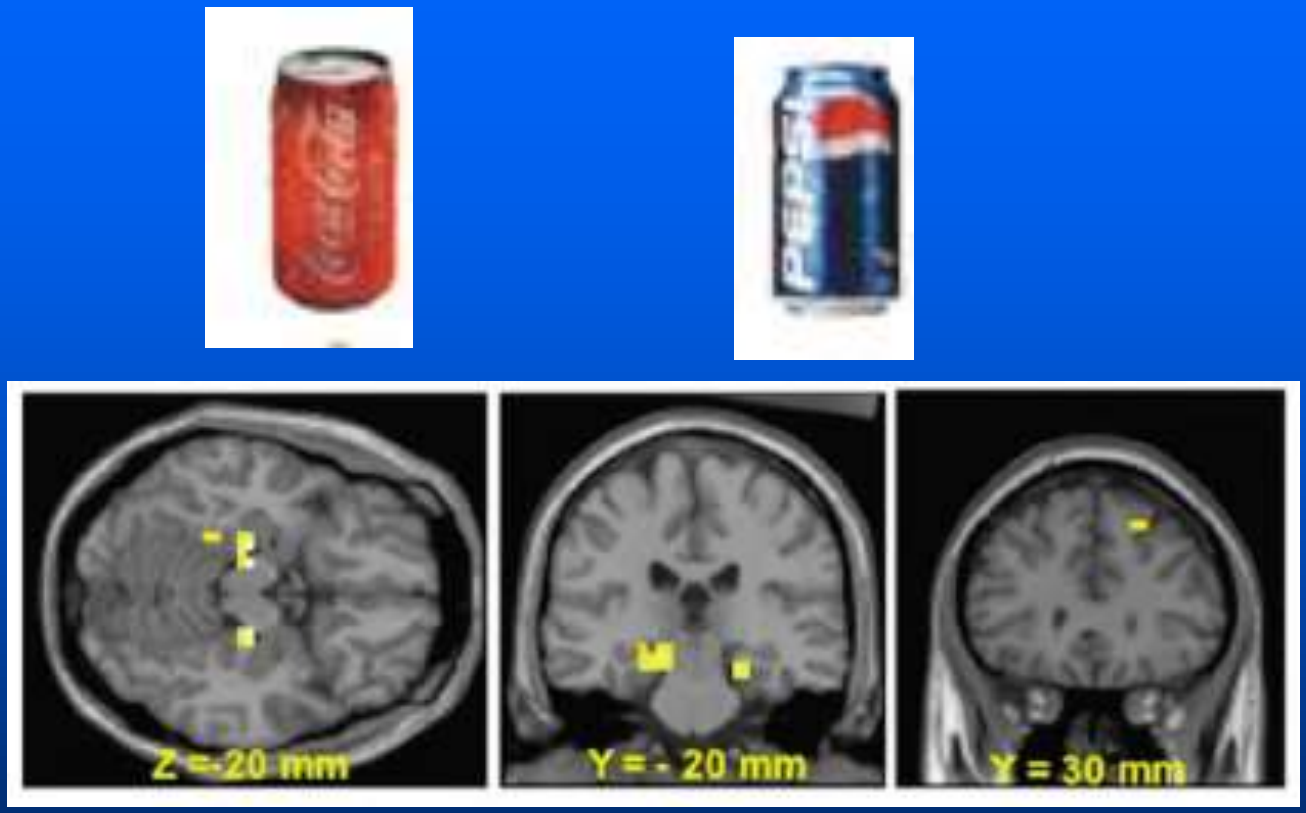
[d] *Centre de Recher* ...*tréal, Canada*



Il paradosso Coca Pepsi

Ventromedial Prefrontal Cortex

Il paradosso Coca Pepsi



Effect of Brand Knowledge

Hippocampus and Dorsolateral Prefrontal Cortex