Neuronal Correlates of Memory fMR in Human Cortex

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EB2663 NEURONAL CORRELATES OF MEMORY fMR IN HUMAN CORTEX

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AIM: IN HUMAN ASSOCIATION CORTEX, ESTABLISH RELATION BETWEEN fMR AND NEURONAL ACTIVITY (action potentials, local fields, electrocorticogram) DURING SAME BEHAVIORS, IN SAME SUBJECTS, AT SAME SITES

WHY: WANT: NEURONAL ACTIVITY (esp action potentials)
IMAGE: METABOLISM AND BLOOD FLOW
- CONTROVERSIAL RELATION IN ANIMAL MODELS
- MANY EXAMPLES OF LOCALIZATION MISMATCHES, fMR VS OTHER TECHNIQUES, IN HUMAN CORTEX

EB 2663 PROGRESS 10-03 TO 3-04

ESTABLISHED CHANGES IN SINGLE NEURON ACTIVITY AND ECoG AT fMR NEGATIVE SITES DURING MEMORY TASKS (3 PATIENTS)

DEVELOPED PROTOCOL THAT MORE RELIABLY HAS fMR ACTIVATION IN AREA OF CORTEX AVAILABLE FOR MICROELECTRODE RECORDING (Must be in individual subject, not group data)

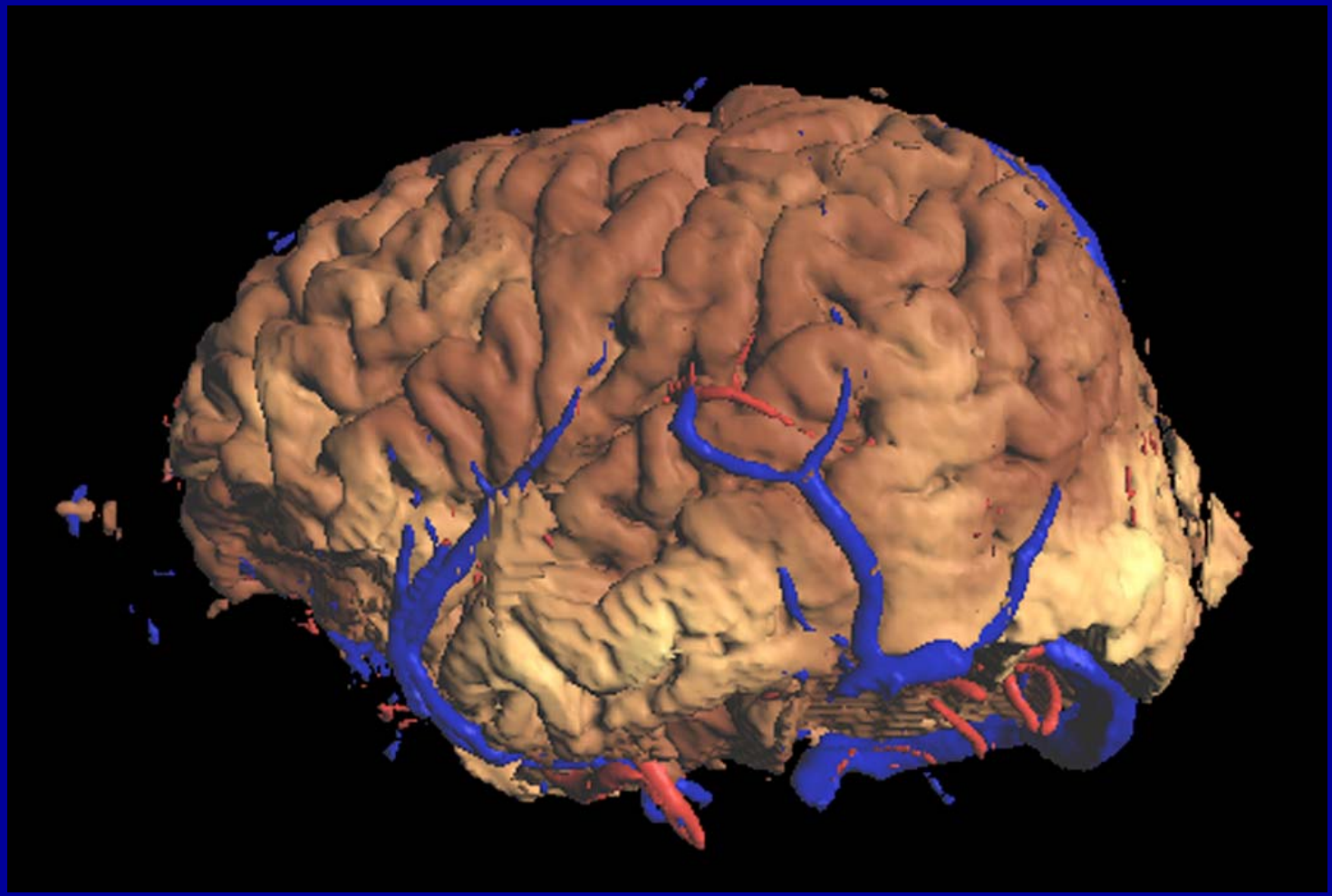
ESTABLISHED METHOD FOR IDENTIFYING fMR+ SITES ON CORTEX AT OPERATION

RECORDED NEURONAL ACTIVITY FROM fMR + AND – SITES WITH NEW PAIRED-ASSOCIATES LEARNING PROTOCOL (3 PATIENTS)

Case 0309 L Temporal
Working memory task. Compare encoding to fixation
Two anterior temporal recording sites: 20,21
No significant fMR changes at either site.

Summed neuronal activity: No significant changes
Individual neurons: Site 20: 1/5 neurons: significant decrease with encoding
Site 21: 3/5 neurons: significant changes decrease for encoding, recall; increase storage
ECoG and LFP: Site 21: evoked potential positive peak at 1200ms of storage

0408 PA VS ID



RECORDING SITES: 21 (ant), 20

Case 0408 L Temporal Paired-Associate (PA) task.
Two recording sites: 20,21

PA- Identification (ID): fMR positive site 20, not 21
Summed neuronal activity:
20: not significant
21: significant, PA more active
Individual Neurons:
20: 2/4 significant, one PA, one ID more active
21: 2/4 significant, one PA, one ID more active
ECoG: 20:+ potential 1200ms; 21: - 350ms,+800ms

Other comparisons: PA-fix: No fMR, neuron changes
ID-fix: no fMR changes; 20:1/4, 21:2/4 neurons, fix more