



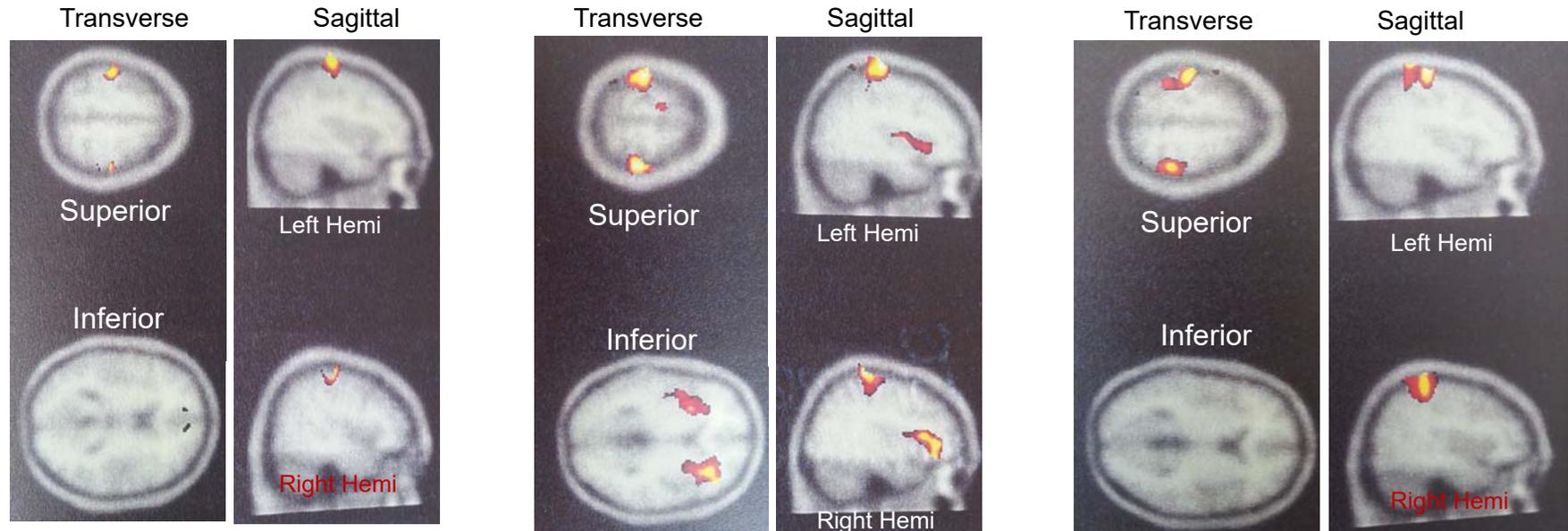
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Illusory Hand Changes Amputees' Brain Activity

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Condition CB: Controls moving Both hands. Average of 11, P<.001.

Condition AB: Amputees moving both sound and residual hand. Average of 4, p<.001.

Condition ABI: Amputees moving both sound and illusory hand. Average of 4, p<.001.

Methods

Many amputees experience a 'phantom limb' (PL), where they perceive their lost limb. We studied brain activity using fMRI in 4 persons with single upper-limb loss in comparison with 11 persons having no limb loss. Subjects were instructed to move their sound hand and their PL while observing them. To present an illusory hand, a mirror was positioned at waist level so that a mirror image of their sound hand was superimposed on their residual limb. They could thus visualize an illusory hand functionally connected to their residuum, opposing their sound hand during motion. Controls were asked to move both hands while observing them. Ten runs of these manipulations were done for each subject, and scans were averaged for each group.

RESULTS

Control subjects displayed functional activity only in the primary motor cortex (bilaterally), and none in the inferior slice as seen in the left figure. Amputees, in contrast, showed bilateral activity in the motor cortex and in the inferior slice, near the Insula. (p<.001). When the illusory hand was superimposed (right figure), the inferior activity was absent. These results suggest that an area of the brain near the Insula is active in amputees when they observe their residuum, but this is silent when an illusory hand is superimposed.

Acknowledgements

New Jersey Commission
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In Memorium: Our cherished colleague
Dr. Evangelia Micheli-Tzanakou
For her brilliance and spirit