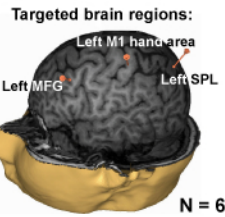




Deriving TMS-evoked BOLD HRFs from multiple cortical areas at 3T

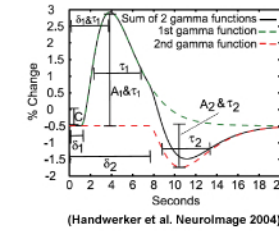
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Does the BOLD HRF response vary significantly across different cortical areas? We applied transcranial magnetic stimulation (TMS) during fMRI over several brain regions to directly evoke responses.



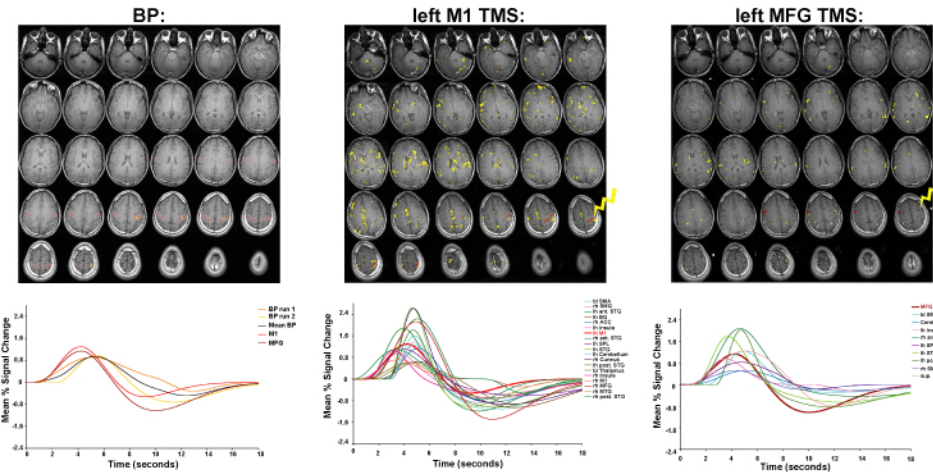
"Button press (BP) runs"
 - Visual cue = right thumb button press (20x per run)
 - To evoke HRFs in somatosensory cortex
 - Two separate runs to show variability of responses across time
 i.e. test-retest approach

"TMS runs"
 - 20 single TMS pulses per run
 - 110% of rMT intensity, scalp-cortex distance corrected

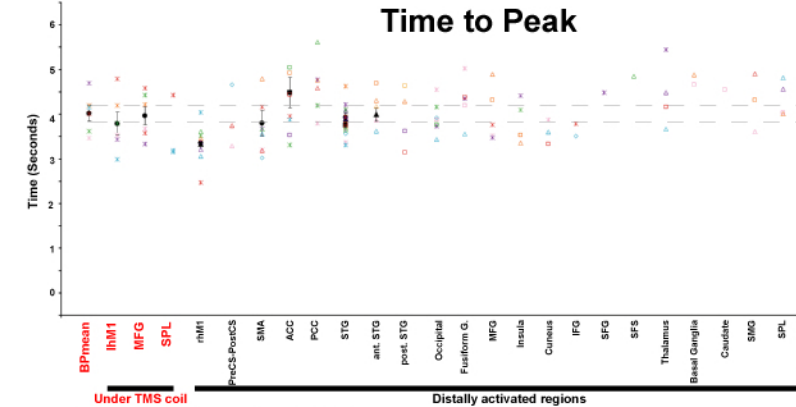
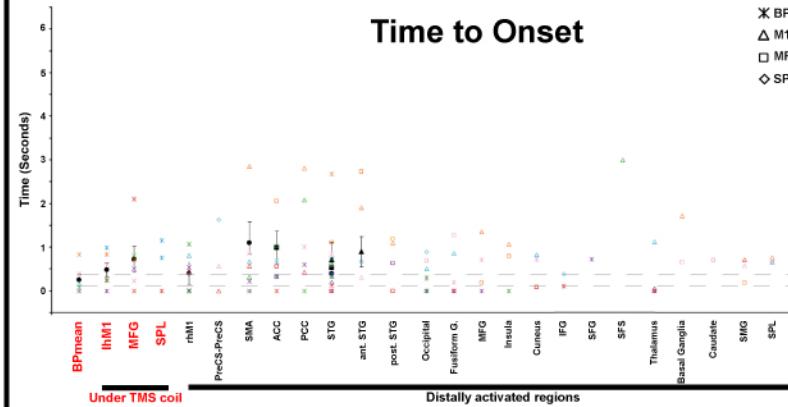


- Estimated response magnitudes at each voxel using GLM with sinusoidal basis functions
- F test identified significance
- Quantified the shape of evoked HRFs by fitting the sum of two gamma functions to the fMRI data
- Four parameters from first gamma fit estimated. Mean BP parameters compared with parameters from TMS-evoked regions (under and distal to TMS coil)

Subject NH



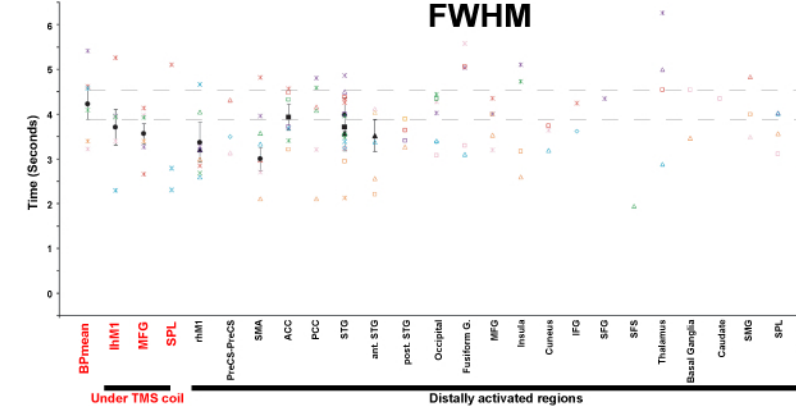
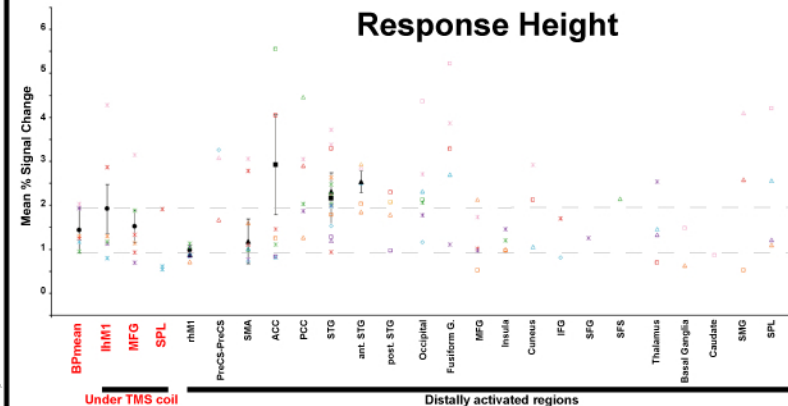
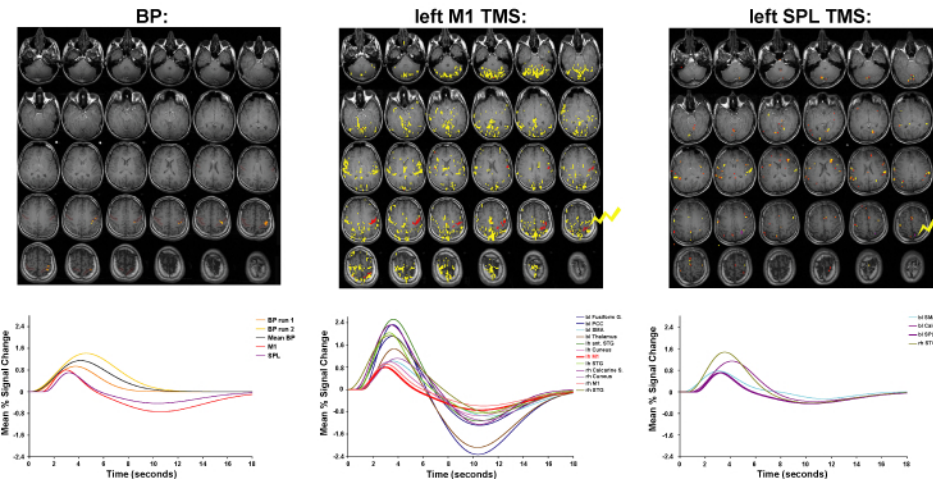
First gamma parameters estimated for each region activated by BP and TMS runs



For lh M1 (activated by left M1 TMS):
 2/6 subjects: *slower* Time to Onset compared to their BP Time to Onset range
 4/6 subjects: *within* their BP Time to Onset range

For lh M1 (activated by left M1 TMS):
 3/6 subjects: *slower* Time to Peak compared to their BP Time to Peak range
 3/6 subjects: Time to Peak was *within* their BP Time to Peak range

Subject MH



For lh M1 (activated by left M1 TMS):
 2/6 subjects: *greater* Response Height compared to their BP Response Height range
 2/6 subjects: *decreased* response height to their BP Response Height range
 1/6 subjects: *within* their BP Response Height range

For lh M1 (activated by left M1 TMS):
 1/6 subjects: *smaller* FWHM compared to their BP FWHM range
 5/6 subjects: *within* their BP FWHM range

Conclusions:

TMS produces physiologically valid BOLD responses, both directly and indirectly via TMS-induced neuronal activity.

Intra- vs. *Inter-*: Magnitude and shape of BOLD HRF are less variable across regions (but within subject) than across subject (even within brain region).