

## **FMRI COMPARISON OF THE MACAQUE CORTICAL SUBSTRATES FOR SMOOTH PURSUIT AND SACCADIC EYE MOVEMENTS**

J.T.Baker<sup>1</sup>; G.H.Patel<sup>1,2</sup>; M.Corbetta<sup>1,2</sup>; L.H.Snyder<sup>1</sup>

*1. Anatomy & Neurobiology, 2. Neurology & Neurological Surgery, Washington Univ., St. Louis, MO, USA*

Smooth pursuit and saccades perform different functions for vision, though they both use visual inputs to move the eyes. The goal of the present study was to determine which macaque brain areas were active for both types of eye movement and which areas were specific to one type of movement. We compared the cortical substrates for smooth and saccadic eye movements using blood-oxygenation level dependent (BOLD) imaging at 3 Tesla in three awake, behaving monkeys.

Infrared video was used to track the eyes at 240 Hz, while animals performed blocks of either saccades or sinusoidal pursuits to one of four corners of a virtual square. Fixation intervals between movement blocks served as the baseline for a general linear model applied to the measured BOLD signal. Voxels where BOLD activity was captured by regressors for the saccade- and pursuit-related responses were examined relative to each other, and in relation to high-resolution structural anatomy.

As expected, both saccades and pursuit eye movements activated early and intermediate visual areas (V1, V2, V3A, PIP), with saccade-related activity occupying more peripheral retinotopic cortex. In the motion-processing complex (MT/MST/FST), pursuit responses generally dominated but overlapped with saccade responses in area MT. In frontal cortex, pursuit activation was observed consistently near the arcuate fundus with patches in FEF, while saccade activation was more extensive, covering the posterior principal sulcus and much of the anterior arcuate bank. In the parietal cortex, pursuit activation was confined to caudal IPS; we failed to observe pursuit-related activation in either LIP or VIP, although these areas were active for saccades.

These results are consistent with some, but not all, of the single-unit literature, and provide direct evidence for a partially overlapping network of frontal, parietal, and temporal areas for smooth and saccadic oculomotor control.

*Support Contributed By: McDonnell Center for Higher Brain Function and the EJLB Foundation*

**Citation:**J.T. Baker, G.H. Patel, M. Corbetta, L.H. Snyder. FMRI COMPARISON OF THE MACAQUE CORTICAL SUBSTRATES FOR SMOOTH PURSUIT AND SACCADIC EYE MOVEMENTS Program No. 166.9. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, 2005. Online.