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**SMALLEST
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SAMPLE:
1995 Annual Meeting
San Diego, California
November 11-16, 1995

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MONDAY, MAY 1, 1995

Presentation Preference

Check one: poster slide

Themes and Topics

See list of themes and topics, pp. 17-18.
Indicate below a first and second choice
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1st theme title: Other Systems of
the CNS theme letter: H

1st topic title: Brain metabolism
and blood flow topic number: 109

2nd theme title: Sensory Systems
theme letter: F

2nd topic title: Visual Cortex
striate topic number: 86

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2 slide projectors
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Key Words: (see instructions p. 4)

1. <u>Human</u>	3. <u>Blood Flow</u>
2. <u>FMRI</u>	4. <u>Perfusion</u>

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The signing member certifies that any work with human or animal subjects related in this abstract complies with the guiding policies and principles for experimental procedures endorsed by the Society. This signature acknowledges that each author on this abstract has seen and approved the final version of the abstract and has given consent to appear as an author.

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FMRI DEMONSTRATES SUSTAINED BLOOD OXYGENATION AND FLOW ENHANCEMENT DURING EXTENDED DURATION VISUAL AND MOTOR CORTEX ACTIVATION. P. A. Bandettini*, K. K. Kwong, T. L. Davis, A. Jiang, J. R. Baker, J. W. Belliveau, R. M. Weisskoff, and B. R. Rosen. Massachusetts General Hospital - NMR Center, Charlestown MA

Sustained blood flow and oxygenation elevation during extended cortical stimulation was demonstrated using T1-weighted (blood flow sensitive) and T2*-weighted (blood oxygenation sensitive) echo-planar MRI. Seven subjects were studied. Flow sensitive (inversion recovery EPI: TI = 1000ms, TR = 3000ms, TE=20ms: spin-echo) and blood oxygenation sensitive (gradient-echo EPI: TR = 3000ms, TE = 40ms) time course series were obtained using a 1.5 T GE Signa scanner retrofitted with an ANMR resonant gradient system. Five subjects underwent 10 Hz full field black and white alternating checkerboard visual stimulation. Timing was: 1 min.off, 1 min.on, 1 min.off, 20 min.on, 1 min.off, 1 min.on, 1 min.off. Two subjects performed repetitive finger tapping for up to 20 minutes during T2*-weighted image collection. Motion correction was also performed.

All subjects demonstrated sustained elevation of flow and oxygenation during the 20 minute stimulation period. A post-stimulation undershoot was observed with the T2*-weighted sequence but not with the T1-weighted sequence. These studies demonstrate that flow and oxygenation elevation are *not* transient effects for these types of stimuli. Minimal-neuronal habituation occurs and oxygen extraction does not sufficiently increase to cause a decrease, over time, in blood oxygenation sensitive MR signal. Ongoing studies of extended duration stimulation of visual cortex tissue known to have high cytochrome oxidase concentrations, "blobs", and therefore higher oxidative metabolism, are being performed to determine the sensitivity of the blood oxygenation-sensitive MR signal to differences in oxidative metabolic rate.