

**Mark Cohen (P.I.):**

**A. PROFESSIONAL PREPARATION**

Stanford University, AB (Human Biology), 1973-74, 1976-79

Massachusetts Institute of Technology, 1974-76

The Rockefeller University, Ph.D. (Neurobiology and Behavior), 1979-1985

**B. PROFESSIONAL APPOINTMENTS**

Professor (2001-present) and Associate Professor (1993-2001) of Psychiatry, Neurology, Radiological Sciences, Biomedical Physics; UCLA School of Medicine.

Assistant Professor (1992-93) and Instructor (1990-91) of Radiology; Harvard Medical School.

Senior Applications Scientist; Advanced NMR Systems, Inc. 1988-1990

MR Applications Scientist; Siemens Medical Systems, Inc. 1985-1988

**C. PUBLICATIONS**

**(i) Five Most Closely Related**

Karlsgodt, K. H., Shirinyan, D., Erp, T. G. M. v., **Cohen, MS**, & Cannon, T. D. (2005).

Hippocampal Activations During Encoding and Retrieval in a Verbal Working Memory Paradigm. *NeuroImage*, in press.

**Cohen, MS**. (1997). Parametric analysis of fMRI data using linear systems methods. *NeuroImage* 6, 93-103.

Breiter, HC, Rauch, SL, Kwong, KK, Baker, JR, Weisskoff, RM, Kennedy, DN, Kendrick, AD, Davis, TL, Jiang, A, **Cohen, MS**, Stern, CE, Belliveau, JW, Baer, L, O'Sullivan, RL, Savage, CR, Jenike, MA, Rosen, BR. (1996). Functional magnetic resonance imaging of symptom provocation in obsessive-compulsive disorder. *Archives of General Psychiatry* 53, 595-606.

**Cohen, MS**, Kosslyn, SM, Breiter, HC, DiGirolamo, GJ, Thompson, WL, Bookheimer, SY, Belliveau, JW, Rosen, BR. (1996). Changes in Cortical Activity During Mental

Rotation: A mapping study using functional magnetic resonance imaging. *Brain* 119, 89-100.

Belliveau, JW, Kennedy, DN, McKinstry, RC, Buchbinder, BR, Weisskoff, RM, **Cohen, MS**, Vevea, JM, Brady, TJ, Rosen, BR. (1991). Functional mapping of the human visual cortex by magnetic resonance imaging." *Science*, 254: 716-719.

**(ii) Five Other Significant**

**Cohen, MS**, Weisskoff, RM. (1991). Ultra-fast imaging. *Magnetic Resonance Imaging* 9, 1-37.

Goldman, R. I., Stern, J. M., Engel, J., Jr., & **Cohen, MS**. (2002). Simultaneous EEG and fMRI of the alpha rhythm. *Neuroreport* 13(18), 2487-2492.

Martínez-Montes, E, Valdés-Sosa, PA, Miwakeichi, F, Goldman, RI, **Cohen, MS**. (2004). Concurrent EEG/fMRI Analysis by Multi-way Partial Least Squares." *NeuroImage*, 22(3), 1023-34.

**Cohen, MS**. (2001). Real-time functional magnetic resonance imaging. *Methods* 25, 201-220.

Kwong, K, Belliveau, J, Chesler, D, Goldberg, I, Weisskoff, R, Poncelet, B, Kennedy, D, Hoppel, B, **Cohen, MS**, Turner, R, *et al.* (1992). Dynamic magnetic resonance imaging of human brain activity during primary sensory stimulation. *Proc Nat'l Acad Sci.* 89, 5675-5679.

**D. SYNERGISTIC ACTIVITIES**

1. **MRI Technology/Physics/Applications.** My work since 1985 has focused on the technology and applications of MRI for both basic science and medical applications. My earliest work in this area was in the pursuit of more rapid means of data collection, and on user interface design, all at Siemens Medical Systems. I moved to Advanced NMR Systems (ANMR) in 1988 working as one of the four member physics group to design and build the first practical Echo Planar Imaging (EPI) device for commercial applications. This work included all aspects of Systems engineering, fabrication, circuit design and software engineering. I promoted the use of EPI in applications in cardiac, abdominal, angiographic and neurological applications and developed means to flexibly control

contrast and resolution in these contexts, first at ANMR and later at Harvard University (reviewed in Cohen and Weisskoff, 1991).

2. **Functional Magnetic Resonance Imaging (fMRI).** With colleagues at Harvard Medical school, while at ANMR I performed the first experiments using MRI to localize functional activations in humans (Belliveau, *et al.*, 1991). These led ultimately to a radical change in the usage patterns of MRI, from primarily clinical applications to experimental cognitive neuroscience. At Harvard, we were later able to develop the first fMRI methods that work without the use of extrinsic contrast agents (Kwong, *et al.*, 1992). Known as BOLD fMRI, this is the dominant tool in use today for functional imaging of humans. It is based on the availability of high spatiotemporal resolution imaging, almost entirely through the use of EPI acquisitions.
3. **Cognitive Neuroscience.** I received predoctoral training in Neurobiology and Behavior learning methods in both electrophysiology (mentors: Victor Wilson, Susan Schwartz-Giblin) and behavior (mentors: Donald Griffin, Donald Pfaff). While fMRI was used first primarily to validate known pathways in humans, I have since applied the tool to more abstract questions of neuroscience, for example, in the area of mental imagery (Cohen, *et al.*, 1996). I have collaborated widely in this work, developing and testing applications in sensory pathways and perception, schizophrenia, Alzheimer's disease, epilepsy, mechanisms of human memory, brain plasticity and many others.
4. **Electrophysiology and MRI.** Signaling in the human brain is ultimately best understood in the vocabulary of action potentials and electrical activity. I have worked since 1994 to develop a practical means combining electrophysiology and fMRI. This has culminated recently in a software/hardware method that reliably resolves signals in the microvolt range (Cohen patent, Goldman, *et al.*, 2002) which we have used, for example, to create tomographic representations of the sources of the alpha band EEG rhythm. This work is continuing with a growing focus on intracerebral recording of extracellular potentials. I believe that it has the long term potential to allow the observation of the consequences of single unit firing on distributed processing of information in the human brain.

## **F. COLLABORATORS & OTHER AFFILIATIONS**

### ***(i) Collaborators in the prior four years (partial, due to space constraints)***

**UCLA:** J. Mazziotta, A. Toga, A. Brody, R. Olmstead, R. Bhidayasiri, J. Bronstein, S. Sinha, S. Krahl, S. Ahn, E. Benhke, R. Frysinger, T. Van Erp, D. Shirinyan, N. Sicotte, R. Voskuhl, S. Bouvier, R. Klutch, M. Green, S. Bookheimer, G. Small, M. Sigman, J. Stern, J. Kroger, C. Fales, J Demer, S. Oh, M. Zeineh, R. DuBois, R. Woods, S. Engel, R. Poldrack, B. Knowlton, F Sabb, Z Bilusic, D Madsen, E London, J Bramen, S Krahl, J Xu, A Mendrek, M Jarvik, S Simon, J Monterosso, J Engel, J Grinstead, T Allison.

**Other Institutions:** D. Glahn (UT San Antonio), R. Goldman (Columbia University), D. Mitchell (Thomas Jefferson University), D. Baird (Univ. of S. Carolina), R. Davidson (Univ. of Wisconsin), E. Martínez-Montes, P. Valdés-Sosa, F. Miwakeichi, N. Trujillo (Cuban Neuroscience Center). V-P Poutanen, S Therman, S. Bava, M Huttunen, J Lonqvist, C Standerskjold-Nordenstam, M Manninen. Univ of Helsinki. K Schaper, KA, J Arnold, J Liow, J Stern, J. Sled, D Shattuck, A Worth, R Leahy, D Rottenberg, University of Minnesota

### ***(ii) Graduate and Postdoctoral Advisors***

S. Schwartz-Giblin (graduate). Presently at SUNY Downstate

### ***(iii) Thesis Advisor and Postgraduate Scholar Sponsoring (prior five years)***

**UCLA:** Richard DuBois, graduate student (1997-2004), Robin Goldman, graduate student (1999-2003), Sam Harris, graduate student (2001-present), Jennifer Bramen, graduate student (2002-present), David Glahn, Post-doctoral fellow (2000-2003).