Project #05R: **Xiaoping Hu** and **Jue Zhang**: *Quantitative fMRI and Network Analysis of Acupuncture Induced Brain Activity*

Functional magnetic resonance imaging (fMRI) is an area of active research and holds great potential for biomedical applications. Drs. Hu and Zhang are both conducting research in the development and application of fMRI. The 2008 Georgia Tech / Emory University – Peking University Collaborative Research Seed Grant provided the opportunity for the two labs to establish a successful collaboration that have performed a quantitative fMRI study of acupuncture. This collaboration proved fruitful as it allowed us to establish quantitative fMRI as a viable approach to study acupuncture and led to very interesting results. The establishment of these techniques and preliminary findings have led to more specific research questions that require further experiments. The next stage of this research requires further collaboration between the two labs, which have synergistic yet complementary expertise and interests. In addition to his continued interest in further development, validation and application of quantitative fMRI and in expanding quantitative fMRI to the study of alternative medicine, Dr. Hu is interested in applying several analysis methods of brain networks developed in his lab to the study of acupuncture. Having a great deal of experience in imaging pulse sequence design for simultaneous BOLD and CBF imaging and having gained hands-on experience with fMRI through the collaboration, Dr. Zhang is interested in gaining more in-depth experience with advanced fMRI techniques and in further application of fMRI to traditional Chinese medicine. Now that quantitative fMRI has been established in his lab and Peking University students have been trained in related analysis methods, further training is appropriate on the network-based methods developed by Dr. Hu's lab. Furthermore, Dr. Zhang's expertise in designing acupuncture experiments will be critical for the follow-up experiments. Quantitative fMRI and network-based analysis are emerging as promising techniques that have been applied in other settings. Dr. Hu's interest in further development and application of quantitative fMRI, Dr. Zhang's interest of gaining more in-depth experience with advanced fMRI techniques, and their common interest of studying acupuncture more quantitatively have led to proposed continuation their collaboration of acupuncture fMRI. The objectives and expected outcomes of this project are to 1) further the collaboration between two groups, 2) provide Dr. Zhang hands-on experience in fMRI based network analysis, 3) further understand the reproducibility and specificity of different fMRI contrasts, 4) ascertain network effects of acupuncture in sensory and limbic systems, and 5) obtain additional experimental data on fMRI in alternative medicine for seeking large scale grants.