AbstractID: 6638 Title: Implementation of a Recursive Correlation Coefficient Analysis Technique on a Commercially Available Real-Time fMRI System with Rapid Fusion of Anatomic Data

Functional MRI has become a widely used technique for the noninvasive mapping of cortical activity in humans and is particularly useful in presurgical planning for patients suffering from brain lesions. Real-time fMRI offers the advantage of having immediate availability of the results, allowing experiments to be reacquired if significant motion or noncompliance with the task is observed. A commercially available real-time fMRI package offers the ability to generate blood oxygenation level dependent (BOLD) statistical parametric maps using the *t*-test. However, correlation coefficient analysis is in many ways preferable due to its flexibility of application to any waveform, and its ability to detect both positive and negative correlation. Neurosurgeons currently use high-resolution anatomic MR images in image guided surgery (IGS), but typically use hardcopy of the off-line processing to view the fMRI results prior to surgery. In this study, a real-time correlation coefficient algorithm was implemented on a commercial real-time fMRI package, and the validity of this algorithm was tested against a widely used off-line processing package. The difference in the correlation coefficient between the real-time and off-line analysis was found to be less than 0.01 for each pixel in a series of test cases. The results of the real-time fMRI analysis were then merged with high resolution anatomic data in a format compatible with the IGS systems, allowing the neurosurgeon to view the functional results during the surgery. This process proved successful and has been used on patient data in a limited number of pilot cases.