Correlation matrices were created using MATLAB displaying neuronal connectivity among ROIs. Results suggest that segment the sleep into the 3ive sleep stages. The respective MR images were grouped, motion corrected, and spatially magnetic resonance imaging (fMRI) data, active brain regions during different stages of the human sleep cycle were identified. EEG wave characteristics like frequency and amplitude (Stages 3 and 4 – deep sleep with delta waves; Stage 2 – sleep spindles and K-complexes; high voltage delta waves (0-4 Hz)). With techniques allowing the simultaneous acquisition of electroencephalogram (EEG) and functional magnetic resonance imaging (fMRI), time intervals of the EEG data match with which images generated by fMRI. This is to be repeated with each volunteer. Using Mango software, visualize the brain in each sleep stage and the functional connectivity regions that are colored. Using Matlab to create correlation matrices for each sleep stage which show the connectivity of the fMRI quantitatively.

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• Previous results concluded that activity in EEG in REM sleep is widespread over various regions of the brain, while activity in fMRI is deep sleep stage two is restricted to the region of interest. These results are consistent with previous results.

• Limitations include the fact that sleep is uncertain in subject two, wakefulness, sleep stage one, and stage three all show activity throughout the entire brain, leading acts to believe that only in sleep stage two is the neuronal activity truly focused to the region of interest.

• Duration of each sleep stage varied as there were different number of volumes collected.

• Future work will include different subjects, as well as creating complex networks for normal subjects with each sleep stage.

• We would like to thank Dr. Todd Parrish, the head of the Parrish Neuroimaging Laboratory at Feinberg School of Medicine at Northwestern University, for serving as our primary investigator in this investigation. Their commitment, patience, and encouragement were crucial to this project.

• More inter-region activity in REM sleep.

• More inter-region activity in REM sleep.

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• More inter-region activity in REM sleep.