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Anthony Harkin, School of Mathematical Sciences, Rochester Institute of Technology, Rochester, NY 14623-5604, and **Darren A Narayan*** (dansma@rit.edu), School of Mathematical Sciences, Rochester Institute of Technology, Rochester, NY 14623-5604. *Modeling functional connectivity of the human brain and gauging the effects of sub-concussive hits on athletes.*

Over the past year the effects of concussions on football players and other athletes has dominated the national media. However, our preliminary data has shown that repeated milder sub-concussive hits can also have a significant effect on brain function. We have used metrics from graph theory to analyze data from functional MRI scans of football players. Our focus will be on resting state functional MRI scans where the patient is at rest but the brain is still very active. When regions of the brain are stimulated there is a local influx of blood and oxygen. By monitoring these changes in oxygen levels, we can construct a model of the brain network. In our model two regions of the brain are linked if there is significant correlation in the changes in oxygen levels in the respective regions. We will use several graph theory metrics to analyze functional connectivity of the brain, including characteristic path length, global and local efficiency, clustering coefficient, small-worldness, and betweenness centrality. (Received September 16, 2013)