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How do we know that we have Obsessive-Compulsive Disorder?

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The brain is a network of neurons that control our pleasure, emotion, motivation and is important for all types of learning. The objective of the overall research in the OCD's group is to examine the changes in brain circuit, or neuroplasticity that cause Obsessive-Compulsive Disorder (OCD). Such interdisciplinary study requires information of many types: neuroanatomy (relevant regions), neurophysiology (cellular firing) and neurochemistry (neurotransmitters). The specific objectives were to assist with hypothesis development for OCD, to systematically collect information listed above and to work with modelers to develop a computational model for OCD in primates. The basis of this research is the hypothesis that the normal interactions of prefrontal cortical neurons with basal ganglia, thalamus, and amygdala are altered due to OCD, although the primary alterations and interactions remain unknown. Examination of the neuroplastic processes in these pathways will help uncover mechanisms of OCD. This analysis is facilitated by a two-tiered mathematical model for the representation of the brain circuits. At the cellular level (first tier), models can serve to highlight the mechanisms of neuroplasticity affecting firing of the neurons in the circuit. At the network level (second tier) the interactive effects between the brain regions can be studied. Data from primate and rat literature will be used to develop the model. A reliable computation model will help analyze the underlying causes systematically to comprehend the cellular/molecular mechanisms of OCD. After validation, the model can be used for predictive purposes including drug design and to further our understanding of the brain.