IS OBSESSIVE-COMPULSIVE DISORDER A MATTER OF RUNNING MACROS? –2–

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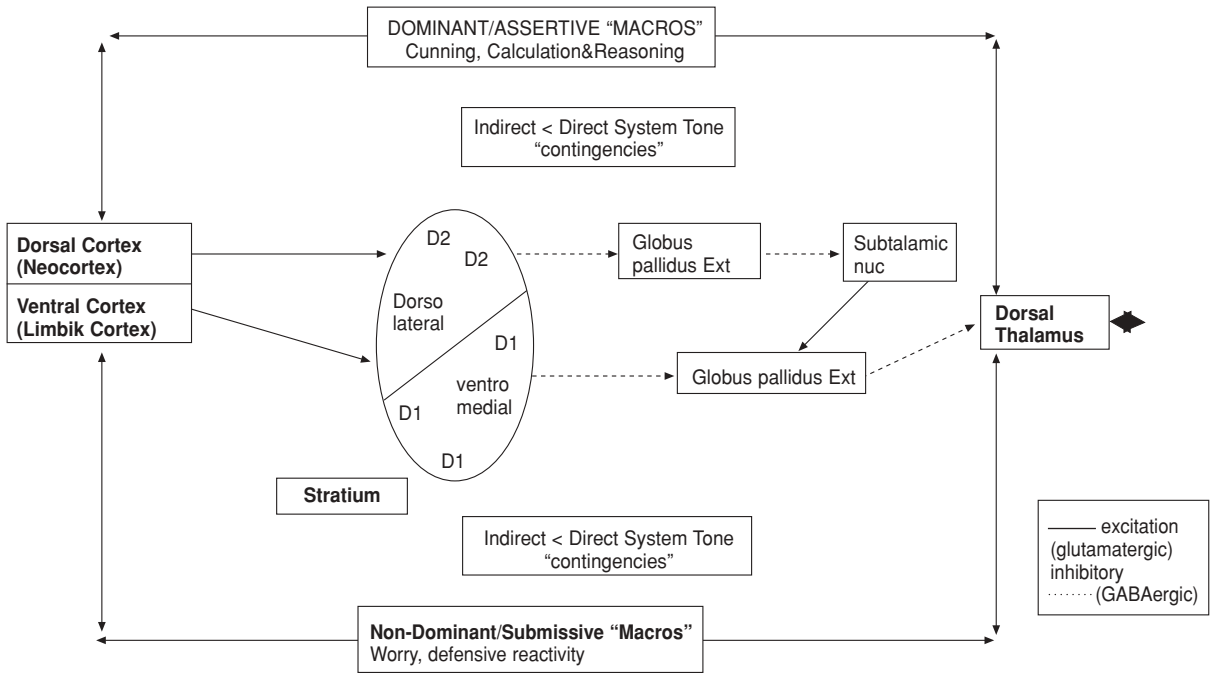
Neural activity from various cortical and limbic regions tends to course through the basal ganglia (nuclei) and thalamus via different subcompartments and channels. The lateral prefrontal association neocortex (LPFC) projects largely to the dorsolateral side of the caudate nucleus, while the orbitofrontal cortex (paralimbic isocortex) projects predominantly to the ventromedial regions of the same nucleus. On the cellular level, the striatum is highly organized into discrete islands or otherwise called striasomes, which are surrounded by matrix. In the striatum these structures together with receptors are very well organized in the striatum.

Striasomes are mostly located in the ventral part of the striatum and preferentially stimulate the direct basal ganglia pathways, while matrix which is located mainly in the dorsolateral side of striatum may be more involved with the regulation of the indirect system. The dopamine action at D1 receptors increase the neural tone in direct pathway, where as actions at D2 receptors decrease tone in indirect system. The net effect is that dopamine release in the striatum shifts relative neural tone so that direct pathway tone is greater than that in the indirect system, resulting in a more disinhibited dorsal thalamus. Another very important neurotransmitter serotonin acts on its receptors, 5-HT2, which is found only in striasomes but not in matrix. Serotonin changes the balance between direct and indirect basal ganglia systems.

As a summary, activity in limbic structures will tend to increase direct over indirect pathway tone, whereas for the LFPC, there is an opposite relationship (indirect/direct in the basal ganglia system). Cingulate cortex and inferior frontal cortex send almost all their projections directly to striasomes (we will talk more about cingulate cortex in the future). It is also known that these dorsolateral and ventromedial

Figure 1: A state of relative balance is illustrated



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systems are cross-inhibitory; stimulating one decreases the tone of the other. Let's say if the direct pathway is dominant, impulse action will be done with little check.

What about if once highly adaptive and necessary for survival macros become so pathological that one can not resist doing it or becoming highly inappropriate? What about if one start to suffer an uneasy feeling that his feeling that his responses indeed haven't been correct; one feels his responses must be repeated or modified until that special "feeling" of adequacy is obtained? This clinical situation is named as obsessive - compulsive disorder by psychiatrists.

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