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The cortico-pallidal projection in the human: a tracking study with DTI technique

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We investigated the globus pallidus starting from basal ganglia circuits scheme based on cortico-basal ganglia-thalamo-cortical loop. Globus pallidus represents the exit module from previous cited loop and having the role of locking or unlocking the motor gesture through its inhibition state. Such activities are regulated by direct, indirect and hyperdirect ways. Some studies demonstrated an immediate globus pallidus activation after cortex stimulation; another one provided the existence of a bundle of cortico-pallidal fibers, not crossing the neostriatum, in laboratory animals. Existence of such pathways is not demonstrated in human beings.

Using DTI tecnique in this study we found an ipsilateral fiber bundle starting from prefrontal cortex and clearly directed to the globus pallidus. The existence of such direct cortico-pallidal projection, not crossing the neostriatum, was suggested by Testut and Latarjet and following asserted anatomically and by neuronography.

Furthermore the presence of glutamatergic and dopaminergic receptors in the animal globus pallidus, already demonstrated in other studies, reinforces the validity of the results obtained in the present one also if should be important to demonstrate the presence of such receptors in humans.

Keywords: Globus pallidus, cortico-pallidal projection, prefrontal cortex, DTI.