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Dopamine channel & parkinson pathology

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Dopamine (D) molecules, through binding to different subtypes of dopamine receptors, regulate life processes such as motor function, cognitive activity and emotion, which are closely related to the pathology and treatment of Parkinson's disease, schizophrenia, and other disorder illnesses[1-4] . Obviously, dopamine molecules only move within dopamine receptors able to exert the functions[3,4] . At ptesent, there exist five subtypes of dopamine receptors to be found, which maintain very high homology each other5. We used the D_3R crystal structure[6] to study and obtain the fine structure of complex D3R protein with dopamine, and then on which probed the active cavity structure composed of the active residues to store dopamine molecules and to exert the functions7 , and furrther studied to get the domanine channels within D_3R[3]. The dopamine channels within D3R are divided into two types. The first type is called dopamine functional channel which is closely associeted with Parkinson's disease, and the second type is regarded as dopamine protective channel which closely associeted with schizophrenia. The dopamine molecules released among the intercellular space must need to pass through the dopamine functional channel and reach the active cavity for exerting the functions such as controlling the movement, rest, thought, and emotion of the living body. Dopamine molecules that can reach functional active cavity can really function as signal transduction and regulation. These dopamine molecules to really exert funtions are called as functional dopamine. Other dopamine molecules are regarded as non-functional dopamine that will be reabsorbed or broken down. Clearly, functional dopamine occupies a very small part of total dopamine, similar to drinking water occupying a very small portion of total water. For the relationship of content between functional dopamine and total dopamine, we have studied to establish the following formula to represent:

$G_D = f \times TD$ (1). Among them, G_D is the functional dopamine content; TD is the total dopamine content (expressed as a percentage); f is the dopamine functionalization factor normalized to a value of 1 for normal healthy persons. According to the new concept of functional dopamine, we can scientifically define Parkinson's disease as "Functional Dopamine Deficiency Syndrome (FDDS)"; can discover new pathophysiology of Parkinson's disease, can discover new drugs for treating Parkinson's disease, and can establish new efficacious treating programs for Parkinson's disease. Furthermore, by the new concept of functional dopamine, we can scientifically resolve and explain the principle for DBS (Deep Brain Stimulators) to work effectively. The functional dopamine formula also has more important applications to study the pathophysiology and treatment of schizophrenia and depression4 .

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