

Functional, Behavioral and Morphological Changes in a Rat Model of Parkinson's Disease: Protective Effect of Curcumin.

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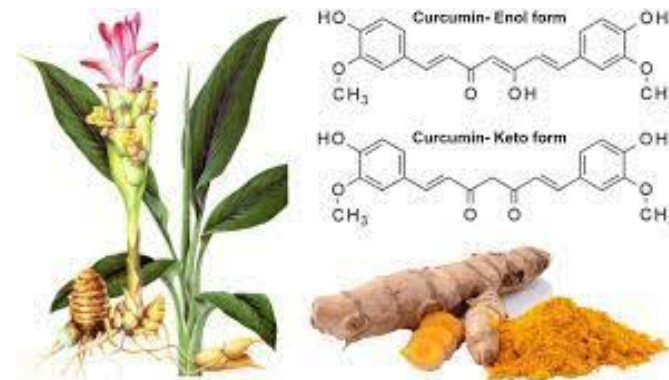
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Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disorder that affects nerve cells, or neurons, in the part of the brain that controls movement. A hallmark feature of PD is the degeneration of the dopamine neurons in the substantia nigra (SN) pars compacta and the consequent striatal dopamine deficiency. Yet, the pathogenesis of PD remains unclear. The lack of dopamine causes the primary symptoms of Parkinson's disease - tremor, slowness of movement, muscle stiffness and balance problems. In vivo animal models have simulated most, although not all, of the hallmarks of PD and are useful for testing new neuroprotective approaches. Research is devoted to the study of systemic compensatory reactions of the rat's brain developing in response to rotenone-induced animal model of PD under the conditions of neuroprotective intervention of Curcumin.

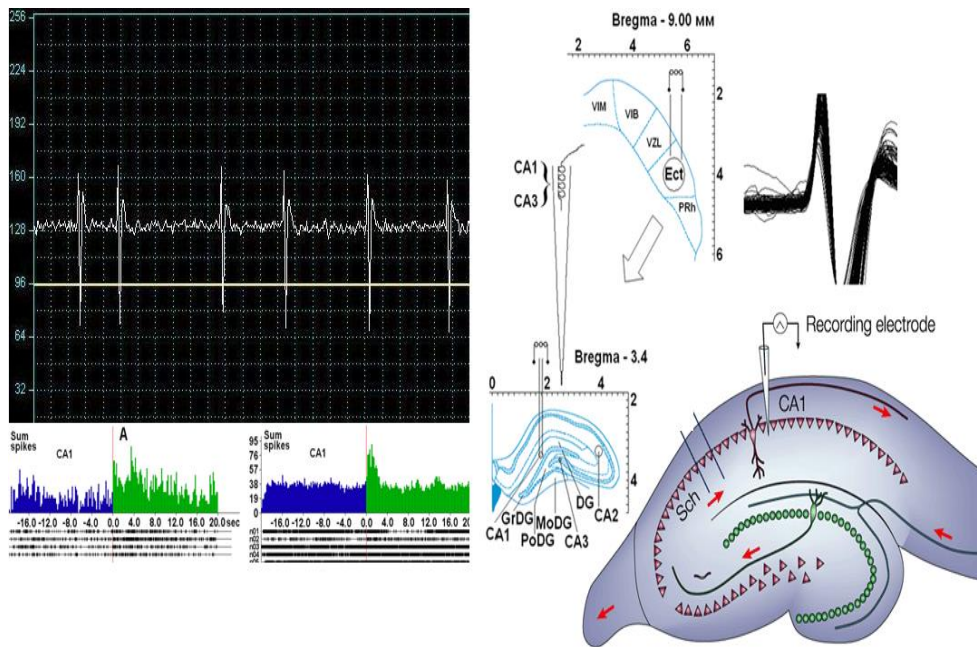
Curcuma rhizome, belonging to the Zingiberaceae family, is the root of Curcuma longa plant. Curcuma has a long history of use in traditional medicine of China and India, and it is used as a curry spice in food preparation .

In Parkinson's disease rat model Curcumin increased the contents of monoaminergic neurotransmitters, such as dopamine and norepinephrine



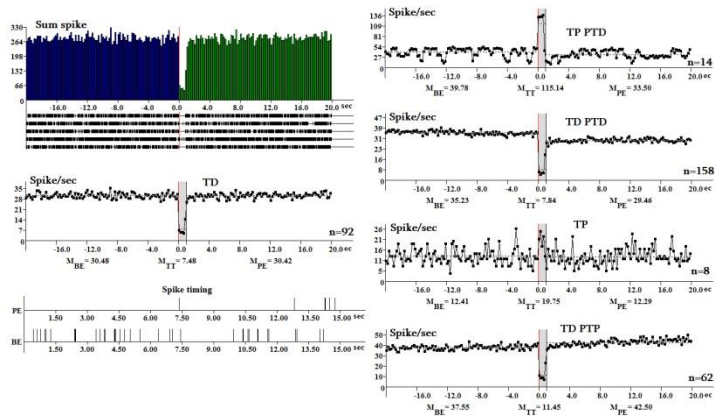
Methods

Electrophysiology and data analysis In acute in-vivo experiment the animals were anesthetized (Urethan 1.2 g/kg), immobilized with 1% ditiline (25 mg/kg i/p), fixed in a stereotaxic head frame and were transferred to artificial respiration. The effects of Curcumin on the rat behavior were studied by cylinder test. The animals were placed in a clear Plexiglas cylinder (20 cm in diameter and 30 cm in height) in order to evaluate motor asymmetry. After each electrophysiological experiment, animals with a three-week PD model were sacrificed; the brain was fixed in 10% formalin solution. Serial frozen midbrain sections were stained with 1% methylene green solution or Nissl toluidine blue. Nissl staining method is one of the main histological methods and widely used in modern research to detect both structural and functional state of neurons, as well as to assess the normal state and pathological changes of nerve cells. A rat brain atlas was used for the analysis of histological preparations.

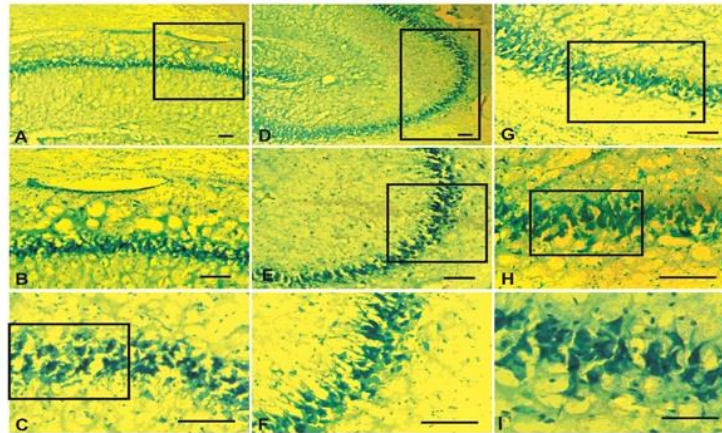


Results

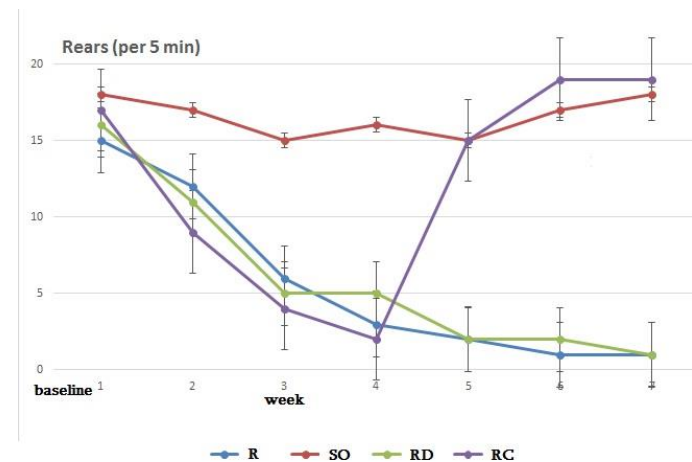
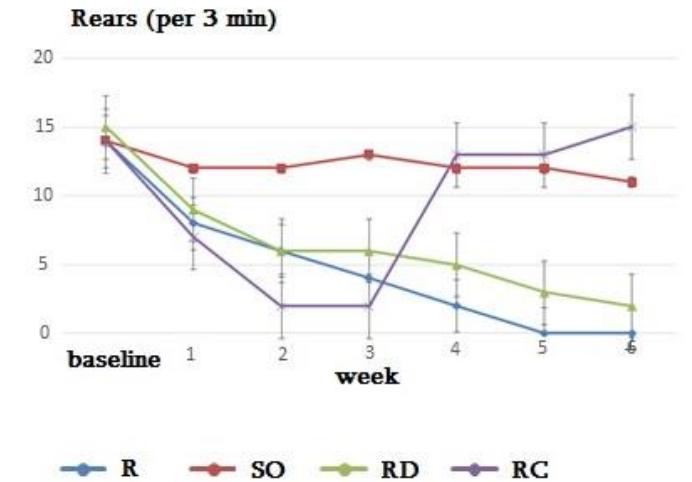
An electrophysiological analysis of Curcumin group. Hippocampal neurons with TP, TD PTD, TD PTP, TD and TP PTD responses.



Curcumin protects hippocampal neurons against rotenone-induced cell death.



After curcumin treatment, the rearing and postural disorders observed in the R and RD groups were restored. The results of tubular test in the group RC were almost completely restored at 4, 5, 6 weeks after rotenone administration and were close to the initial values of group SO and N (norm group).



Discussion

Our experimental results show that rotenone has an inhibitory effect on synaptic transmission in hippocampal neurons. The inhibitory effects are presumably the result of an indirect influence switched through GABAergic cells. After curcumin treatment, the rearing and postural disorders mainly were restored.