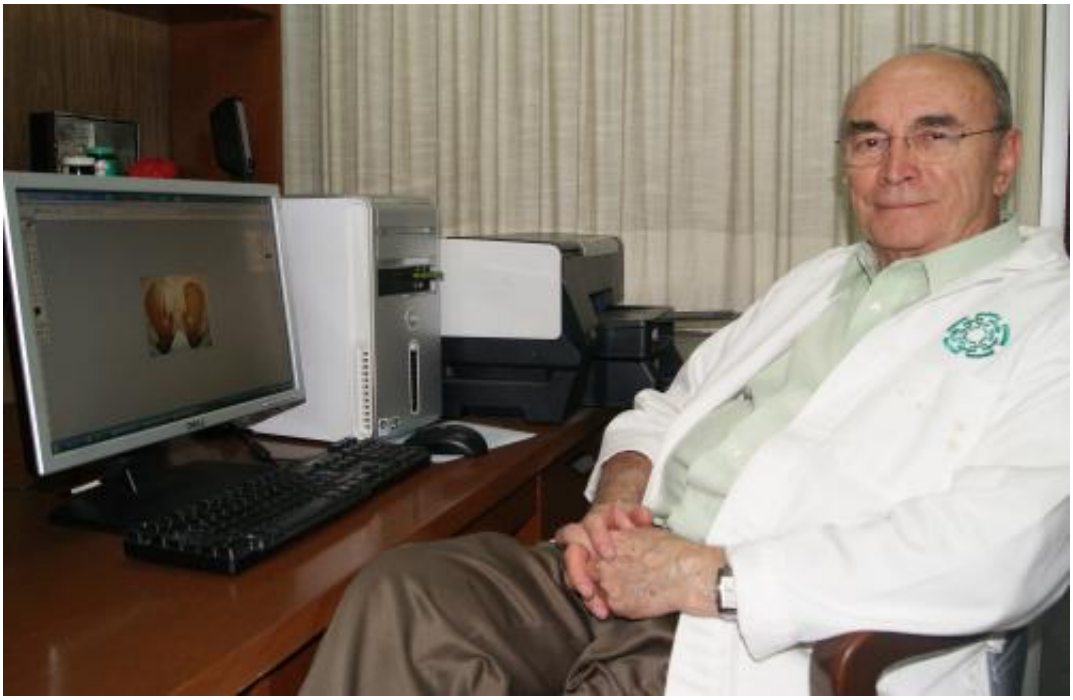
Parkinson's disease reverted at a experimental stage

December 19 2014



Mexican scientists demonstrated experimentally, with adult rats, that mobility can be restored in patients with Parkinson's disease, the major degenerative disease of the motor system worldwide. The experiments have not yet been transferred to humans, but are a scientific, measurable and repeatable basis to fight against this disease.

The Mexican study, led by Jorge Aceves Ruiz, an expert in physiology

and emeritus researcher at the Center for Research and Advanced Studies (CINVESTAV), uses stem cells to generate dopaminergic nerve cells and reactivate the production of dopamine in the brain of rats with symptoms of shaking palsy or Parkinson's disease.

Aceves Ruiz's group has over 35 years of experience in research on brain physiology, but particularly in a region near the base in which the basal ganglia are located. In that area, there are accumulations of nerve cells that make and release neurotransmitters such as dopamine. The treatment they have designed and tested in the laboratory uses stem cells that develop into dopamine producers.

"Our treatment has allowed us to recover these motor impairments, which is associated with the recovery of neurons and dendritic spines of striatal neurons, which is the first thing that gets damaged in Parkinson's disease," explained Aceves Ruiz, who belongs to the permanent Seminar in Science and Technology of Mexico in the medical center "XXI Century" in Mexico City.

"We found that apparently the treatment by neurogenesis allows these newly formed neurons to be able to innervate, meaning that from stem cells present in the tissue itself, cell differentiation towards dopaminergic phenotype is induced".

After, at least four processes occur before regaining motor behavior: new dopaminergic cells send their terminals to the striatum, functionally reinnervate neurons, induce recovery of dendritic spines and recover the functionality of the cortical input, said the physiologist graduated from the National Autonomous University of Mexico (UNAM).

Stimulating dopamine

Until 35 years ago virtually nothing was known about the part of the

brain called the basal ganglia, which are clusters of nerve cells at the base of the brain in which different molecules that help transmit messages between neurons are produced.

Following a period of study at the University of Cambridge, Aceves Ruiz met his Argentine colleague Claudio Cuello, with whom he began conducting experiments to see if they could produce dopamine by electrical stimuli. With trepidation he initiated a research path that has generated over 73 pioneering papers in pharmaceutical neurology.

"Now we know that, for example, basal ganglia are organized primarily in two ways: one that facilitates movement and one that inhibits it, under the action of dopamine," says Aceves.

"We know how the neurotransmitter works, and this has enabled us to design experiments that allow us to recover motor activity, we also determined through experiments that dopamine can promote or inhibit the movement under normal conditions; the problem is knowing when it promotes and when it stops, and to perform the process it uses different receptors".

Experiments with adult rats to give back control of movement continues, but also Mexican research has opened other fields of study on the action of dopamine and the consequences of its absence, for example, its effects on motor hyperactivity syndrome.

"We are the only group that knows, through our experimental work, what does the D4 receptor do, whcih activation causes decreased motor activity, because it would be acting in this special kernel that controls attention and partly motor activity " explained Aceves Ruiz.

Provided by Investigación y Desarrollo