



# THE INFLUENCE OF GUT MICROBIOTA ON NEUROGENESIS IN STROKE: IMPACT OF NEUROPOLEN

**Major Gheorghe Giurgiu<sup>1</sup>, Prof Dr Med Manole Cojocaru<sup>2,3</sup>**

**<sup>1</sup>Deniplant-Aide Sante Medical Center, Biomedicine, Bucharest, Romania**

**[deniplant@gmail.com](mailto:deniplant@gmail.com); Telephone: +40 744 827 881**

**<https://orcid.org/0000-0002-5449-2712>**

**<sup>2</sup>Academy of Romanian Scientists**

**<sup>3</sup>Titu Maiorescu University, Faculty of Medicine, Bucharest, Romania**

**[cojocaru.manole@gmail.com](mailto:cojocaru.manole@gmail.com); Telephone: +40 723 326 663**

**<https://orcid.org/0000-0002-7192-7490>**



**Stroke is an emergency medical condition due to neuronal death ensuing from a reduced blood flow.**

**Either a vascular obstruction (ischemic stroke in over 80% of cases) or a vascular rupture with bleeding within the brain (hemorrhagic stroke) are the offending mechanisms.**

**Studies show that 3 months after a stroke, almost half the patients have persistent functional limitations.**

**An intriguing and potentially therapeutically relevant effect of stroke is the robust stimulation of neurogenesis in the adult brain.**

**The induction of cerebral ischemia is accompanied by stimulation of endogenous neurogenesis**

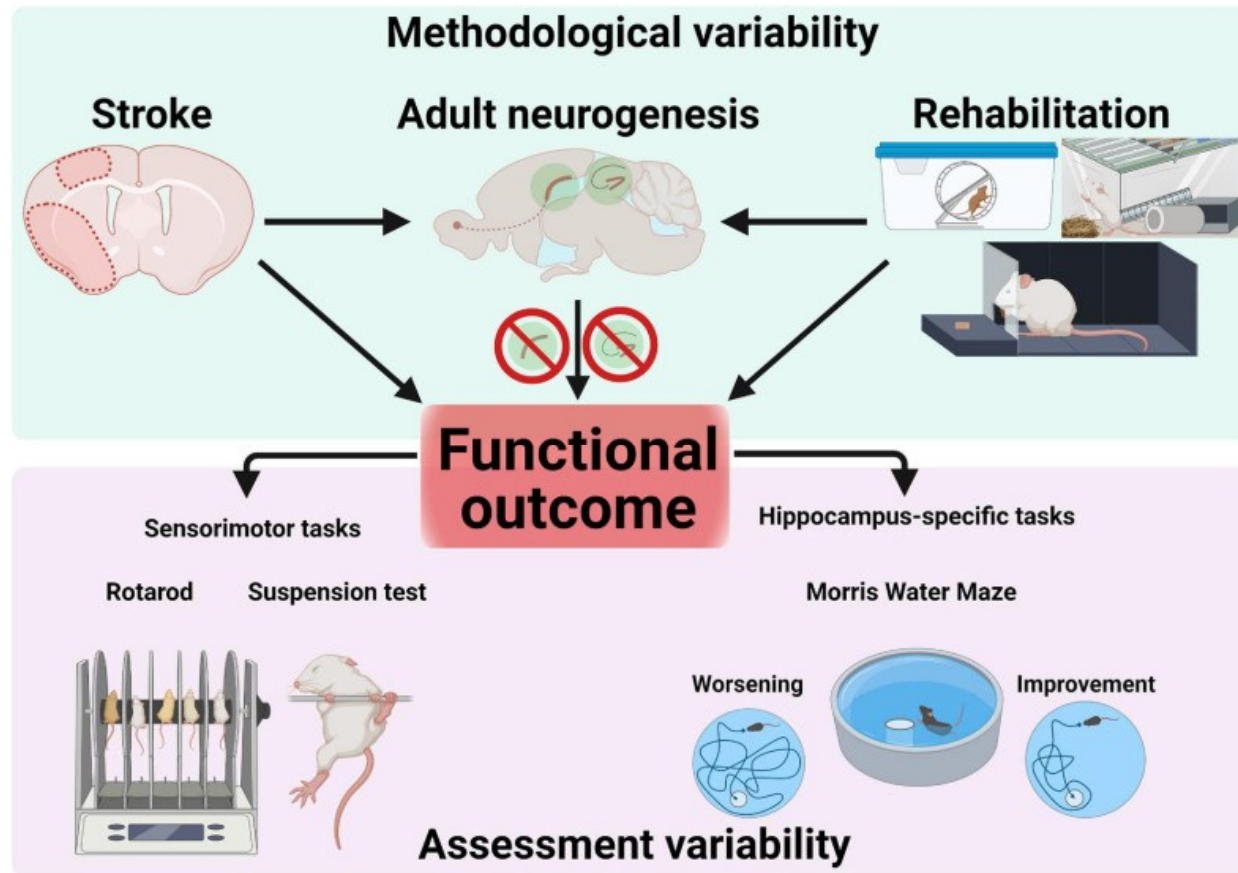


**A prominent delayed effect of stroke is the robust increase in adult neurogenesis, which raises hopes for a regenerative strategy to counter neurological deficits in stroke survivors.**

**There is persuasive evidence that the gut microbiome plays a role in a variety of physiological processes in the central nervous system.**

**Microbiota influences neurogenic processes, which can result in stroke.**

**Adult neurogenesis (i.e., the life-long generation of new neurons from undifferentiated neuronal precursors in the adult brain) may contribute to brain repair after stroke.**



## Sources of variability in research on adult neurogenesis after stroke.



**Knowledge about mechanisms regulating the different steps of neurogenesis after stroke is rapidly increasing but still incomplete.**

**Yet there is little data on the contribution of small molecule metabolites produced by the microbiome.**

**The functional consequences of stroke-induced neurogenesis and the level of integration of the new neurons into existing neural circuitries are poorly understood.**

**Based on the existing research, we propose that the administration of Neuropolen could normalize the gut microbiome in stroke.**



**In this review, we will summarize the current status of research on neurogenesis after stroke.**

**Stroke is a leading cause of chronic disability in humans.**

**Many different types of neurons and glial cells die in stroke.**

**Brain ischemia process can trigger neurogenesis in the adult brain.**

**Here we will focus on the stroke-induced formation of new neurons in damaged areas where neurogenic mechanisms do not normally operate.**



**Stroke is one of the leading causes of death worldwide**

**The gut-derived metabolites are in part responsible for regulating critical signaling pathways in the brain, especially during neural development.**

**The microbiome has been implicated in neural development and function, and consequently, perturbation of the microbiota is implicated in stroke.**

**In this review we summarize the current knowledge regarding the effects of ischemic stroke on neurogenesis.**



**It is known that metabolites act as communication signals between host and microbiome in the form of neuromodulators or neurotransmitters.**

**The vagus nerve and enteric nervous system are sensitive to gamma amino butyric acid, serotonin, histamine, and acetylcholine, all of which are produced by the gut microbiota.**

**Small molecules such as short-chain fatty acids produced by the gut microbiota can enter the blood stream via the intestinal lumen and cross the blood-brain barrier where they can then interact with the brain and affect neural transmission.**



**The regeneration of motor functions after cerebral ischemia during neurological rehabilitation is based on the one hand on the plastic properties of the central nervous system and on the other hand on compensatory strategies to regain lost functions.**

**It has also been shown that cortical neurogenesis after stroke can be triggered or enhanced by additional manipulation.**

**The role of inflammation for stroke-induced neurogenesis is, however, complex, and microglia can most likely also be beneficial.**

**In addition to innate immune cells, adaptive immune cells, in particular, T cells, are recruited within central nervous system injured areas, take part in the repair process, and might influence neurogenesis**



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**Neuropolen is a nutraceutical (food with a dual role of nutrition and health) for the regeneration of destroyed nerve cells.**

**The use of the components of Neuropolen in the solution of human medical conditions was made long before the appearance of the product under this name.**



**Neuropolen is a natural neuroregenerator of the nerve cell.**

**Neuropolen contains freeze-dried pollen from Deniplant plants, cocoa bean and carob seed powder, brewer's yeast.**

**Combining them we managed to obtain a product with a wide spectrum of action without side effects or side effects.**

**The components themselves are foods that we can eat daily.**

**That's why Neuropolen has the slogan "Eat and heal"**





## Conclusion

**After a stroke, the brain may attempt to repair itself by inducing neurogenesis. But this self-repair mechanism must be enhanced to have a substantial impact on recovery.**

**We consider this evidence from the perspectives of neuroinflammation, microbial-derived metabolites, neurotrophins, and neurotransmitters.**

**This could therefore also represent a promising treatment strategy in stroke.**

**We have been reported neurogenesis after stroke, associated with improved functional recovery.**



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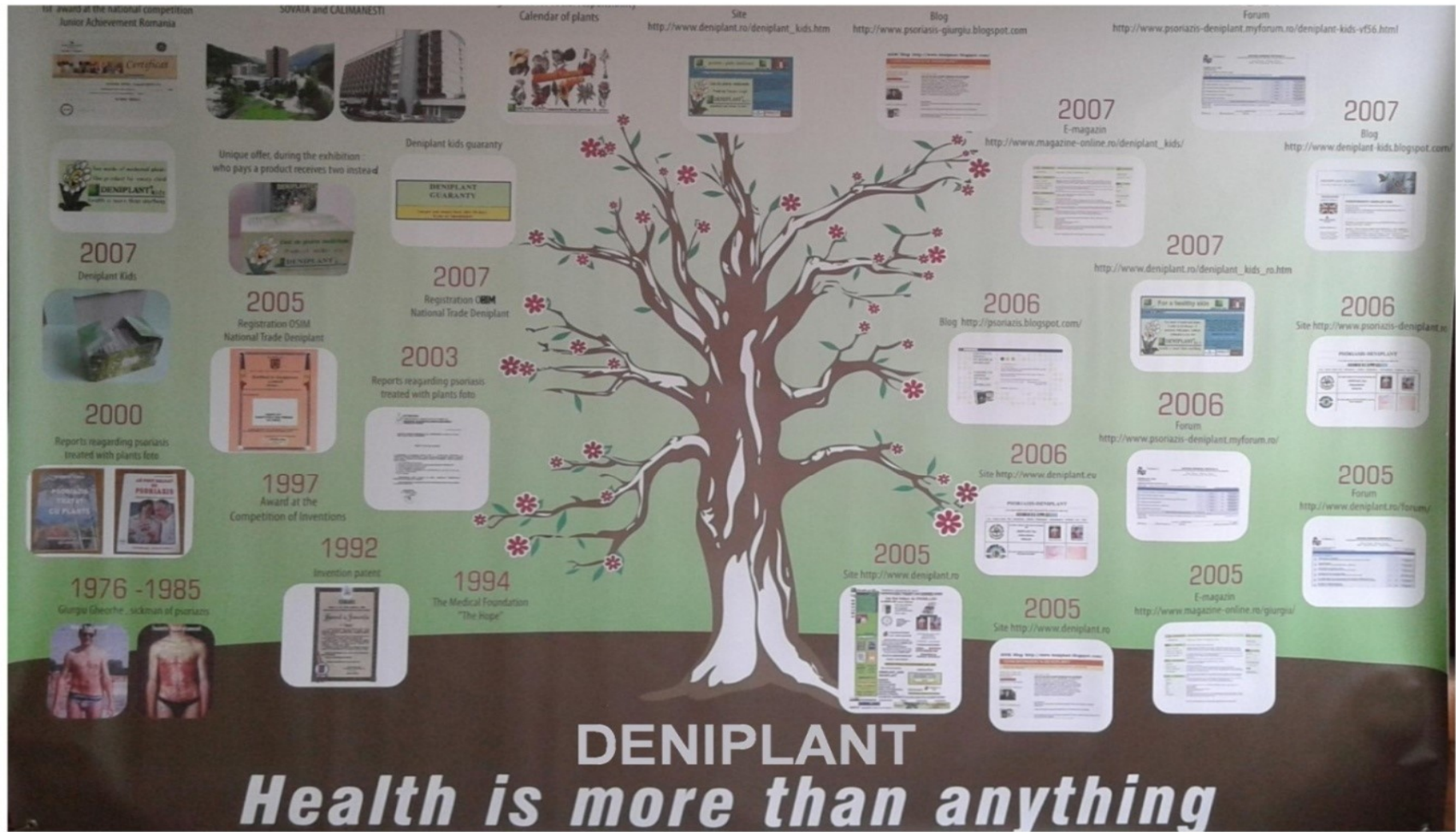
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