

Reduction Of Movement In Neurological Diseases: Effects On Neurogenesis

Dr.Daniele Bottai, Assistant Professor, Ph. D., Department of Health Science, University of Milan, Italy

Abstract:

Many scientific works indicate that exercise can counteract the effects of neurological diseases. The positive role of exercise in both healthy and pathological individuals was recently brought to light when it was demonstrated that Alzheimer's patients regained some of their brain capabilities after appropriate and controlled physical training [1]. On the other hand, we can hypothesize that the absence, or reduction, of movements - especially those with antigravity effects - could induce deterioration of the brain.

Adult neurogenesis is restricted to few areas of the mammalian brain: the sub-ventricular zone of the lateral ventricles (SVZ), the sub-granular zone of the dentate gyrus of the hippocampus and the spinal cord [2]. Low levels of exercise are thought to represent a major risk factor of developing metabolic alteration [3] that could affect the central nervous system and in particular some neurogenic areas [4, 5].

Our analysis shows that NSCs derived from the SVZ of motor deprived (HU) mice have a reduced proliferation capability and an altered cell cycle. Furthermore, Neural Stem Cells (NSCs) obtained from HU animals present an incomplete differentiation/maturation.

The results of this work support the existence of a link between the reduction of exercise and muscle disuse and metabolism in the brain. Indeed, it represents valuable new information that could clarify how circumstances such as the absence of load and the lack of movement that occurs in people with some neurological diseases, may affect the properties of NSCs and contribute to the negative manifestations of these conditions.

Biography:

- 1) Okonkwo, O. C. *et al.* *AD. Neurology* **83**, 1753-1760, doi:10.1212/WNL.0000000000000964 (2014).
- 2) Bottai, D. *et al.* *Journal of hematotherapy & stem cell research* **12**, 655-670 (2003).
- 3) Laaksonen, D. E. *et al.* *Diabetes Care* **25**, 1612-1618 (2002).
- 4) Bottai, D. & Adami, R. *Brain pathology* **23**, 613-622, doi:10.1111/bpa.12071 (2013).
- 5) Adami, R. & Bottai, D. *Journal of neuroscience research* **94**, 310-317, doi:10.1002/jnr.23711 (2016).

The Interests of Research and Collaboration: (within 50-100 words)

My main interests are: the role of movement in neurogenesis, neurological pathologies such as spinal muscular atrophy, multiple sclerosis, amyotrophic lateral sclerosis, Cornelia de Lange syndrome. My most important collaborations are with Professor Monica Canepari regarding how movement impairment could affect the neurogenesis and with Dr. Valentina Massa about Cornelia de Lange syndrome.

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