

Environmental Factors Promoting Neural Plasticity: Insights from Animal and Human Studies

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Abstract

We do not all grow older in the same way. Some individuals have a cognitive decline earlier and faster than others who are older in years but cerebrally younger. This is particularly easy to verify in people who have maintained regular physical activity and healthy and cognitively stimulating lifestyle and even in the clinical field. There are patients with advanced Neurodegeneration, such as Alzheimer's disease (AD), that, despite this, have mild cognitive impairment. What determines this interindividual difference? Certainly, it cannot be the result of only genetic factors. We are made in a certain manner and what we do acts on our brain. In fact, our genetic basis can be modulated, modified, and changed by our experiences such as education and life events; daily, by sleep schedules and habits; or also by dietary elements. And this can be seen as true even if our experiences are indirectly driven by our genetic basis. In this paper, we will review some current scientific research on how our experiences are able to modulate the structural organization of the brain and how a healthy lifestyle (regular physical activity, correct sleep hygiene, and healthy diet) appears to positively affect cognitive reserve. Numerous clinical and experimental studies demonstrated that many environmental factors may affect both the physiological functions of the central nervous system (CNS) and its ability to counteract pathological changes. It has been demonstrated that experience shapes our neural circuits, making them more functional, keeping them "young." Experience is then the factor which induces our brain to be more plastic. In other words, experience may increase neuroplasticity. The complex of molecular and cellular processes known as neuroplasticity represents the biological basis of the so called "cerebral reserves." The first to introduce the concept of "reserve" was Yaakov Stern who noticed a higher prevalence of Alzheimer's disease (AD) in people with lower education. For Stern, the reserve is a mechanism, which may explain how, in the face of neurodegenerative changes that are similar in nature and extent, individuals vary considerably in the severity of cognitive aging and clinical dementia. Clinical studies provide evidence that people with a high level of education have a slower cognitive decline

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Biography

Laura Mandolesi worked as a professor in University of Naples Parthenope, at the same time he also worked in Laboratory of Experimental Neurophysiology and Behavior, IRCCS

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