Neuroplasticity – Basis for Lifelong Learning

Jürg Kesselring

Head of the Department of Neurology and Neurorehabilitation, Rehabilitation Centre Valens, Switzerland

Abstract

Neuroplasticity is the continuous adaptation of synaptic networks to the requirements from internal external environment. It is the basis of learning. Neurorehabilitation is its clinical application.

Keywords

Neurorehabilitation, neuroplasticity, learning

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Three Important Aspects of Learning

As in all behaviour, genetic aspects play an important role. ‘Genetic’, however, is not interchangeable with ‘unchangeable’. The second point in learning is imitation, which is natural in children. An important new development in neuroscience is the description of mirror neurons and the knowledge about the vital role the play in human behaviour. A third way of learning is learning by doing. The historical metaphor for it is the boat of Odysseus, which over the 20 years of his absence from home was completely rebuilt. Naturally all the parts had to be replaced, only the principle has remained the same. The same is most probably true for the brain which materially may be completely replaced over time but the person remains (more or less) the same.

Lifelong Learning

We try to understand the brain as the organ of learning and of interpreting the world. In our large neurorehabilitation clinic, we see many patients after stroke or brain injuries and we always try to find an approach to what is called so beautifully ‘the person’: per-sonare derived from Latin means ‘sounding through’. Diseases or injuries may lead to changes of body structures and functions, but, we believe, that the person himself or herself remains unaffected and it is our task to find openings in these walls so that the person can ‘sound through’ again. Examples from practical experience demonstrate that recovery of function after an injury or a disease of the brain follow similar laws and pathways, which occur in normal development in a healthy child. Adult patients should be allowed to use similar mechanisms, which in childhood have led to success, viz. normal behaviour. A common denominator for changes in the brain is (motor) activity. Brains that have been trained are clearly different from untrained brains. Accomplishments and completions of daily activities lead to changes of structure and functions of the brain up until an advanced age.