Neuroplasticity [1]

You and Your Adaptive Brain

The human brain is astonishing. It gives us the capability to process widely varied information faster than the blink of an eye, store complex experiences and adapt to changes within and outside our body. This amazing adaptive ability of the brain as applied to ever-changing internal and external factors is called as “neuroplasticity.”

This capacity of the brain to act and respond to both intrinsic and extrinsic changes enables the billions of nerve cells called neurons to aid in the different learning processes by means of continuously creating and/or rearranging neural pathways through which communication between the nerves occurs.

Neuroplasticity allows the adaptive brain to store a new set of information or master a new skill. Without it, we would not have the ability to memorize things that are new to us, or even adjust to the new environment we’re in. This important attribute of the brain is not only present in humans, but also in animals.

A. How Neuroplasticity Works

There are two ways in which neuroplasticity occurs inside the brain.

1. It enables the creation of new connections from neuron to neuron.
2. It deletes old connections mainly due to damaged neurons which may become defective.

This process of creation and deletion is called synaptic pruning. When there are neural connections that are not working properly anymore, or are less frequently used, neuroplasticity tends to “shut down” these ports. And while it deletes a connection, it creates another connection which involves neurons highly routed with data and information. Our ability to learn new things and remember knowledge or skills which are previously learned may heavily depend on synaptic pruning. To have more active neural connections for doing a badminton smash, for example, we must practice this skill as often as possible so that the neurons involved in the pathways concerning “badminton smashing” skill remains active.

B. Neuroplasticity in Damaged or Disabled Brain

When the brain is damaged or disabled (through accidents, head injuries, etc.), neuroplasticity becomes the unsung hero in maintaining and improving body functions controlled in the area where damage occurred. Whether it’s because of a disease, genetic problems or physical trauma, neuroplasticity tends to rebuild neural pathways in unaffected neurons so that complications would be lessened and disabilities would be reduced at certain degrees. Basically, it tends to reroute damaged neural connections so the life systems of the individual are maintained accordingly.

C. Clinical Importance

Many researchers have proposed that neuroplasticity can be a key to the development of new and effective treatments for degenerative diseases such as Parkinson’s, Alzheimer’s and cerebral palsy. Also, adaptive brain capacity shows promise in improving treatments for stroke patients. People who have damaged brain due to traumatic brain injury are usually able to recover faster when plasticity of the brain works effectively and only a few neurons are damaged.

Today, experiments on the so-called “directed neuroplasticty” are still ongoing. Scientists and clinicians hope for this approach to cause specific and desirable changes in the brain. These studies show promise in the rehabilitative program of stroke or traumatic injury patients.
