What Is Neuroplasticity?

Neuroplasticity

Genes, through the proteins they encode, determine all body processes, including how the neuron responds to challenges from the environment. A normal cell activates just the genes it needs at the moment and actively suppresses the rest

Neuroplasticity refers to the ability of neurons to alter their structure and function. Structural changes can occur in the number and type of post synaptic receptor sites, and eventually even to reshaping of the entire neuron (with newly developed dendritic connections). Neuroplasticity is a dynamic process and not a particular outcome, neurons are mutable and highly responsive to internal and external factors.

Neurons use multiple neurotransmitters to communicate at any given time. There are an estimated 150 trillion synapses. They can use entirely different combinations of chemical messengers at different times in response to changing internal and environmental conditions.

Following injury, inflammation and continued excessive excitatory stimulation of nociceptors can cause an increase in the release of excitatory neurotransmitters. Then accordingly, the number of excitatory receptors (at postsynaptic site) increase - while the number of inhibitory receptors decrease. This change in available connection sites leads to strengthening of transmission. These changes increase the likelihood that pain will become chronic and severe.

In other words...

When you first learned to walk, hundreds of millions of neurons fired neurotransmitters across their synaptic gaps before you were even able to stand up alone. The connection between balance and movement that is needed to walk is perfected because of the connections made between neurons. When any new sensation comes into your brain, it sends a flurry of activity surging through that particular network of neurons.

A baby learns to walk through a series of actions, positive and negative...forward and backward. Each neuron involved in learning passes on its message to other neurons, and at the same time also relays a signal back to the neurons that first alerted it. After the initial signal has faded, the neurons involved reinforce their connections with one another, so that they are prime and ready to fire more readily if the same sensation comes in again. If the sensation is not repeated, the connections begin to weaken, but the more a particular transmission is repeated, the more a particular pattern of neurons is strengthened. In neuroscience, plasticity is the ability of the connection between neurons to change in response to increasing use or disuse.

Repetition of a stimulus builds up a neural pattern in your brain. The connections between the sensory neurons that are involved in learning to walk improve with repeated transmission. After a while, you don't need to hold onto something or hold your arms out for balance to cross the room. Less happily, the connections between nociceptor neurons involved in relaying the message of physical pain also improve with repeated transmission.

Changes take place in the receptors, nerves, the spinal cord and in the brain following injury, inflammation, and continued stimulation of nociceptors. These changes can increase the likelihood that the brain will "learn" pain and pain will become chronic and severe.