**Neuroplasticity: What Does that Mean In Veterinary Practice**

RM Clemmons, DVM, PhD

**Disclosure:**

Roger M Clemmons teaches at the Chi Institute in Reddick, FL; he has a consulting arrangement with Westlab Pharmacy, Gainesville, FL; but has no other financial relationship with any company mentioned in this article.

**Objectives:**

1. Attendees will be able to understand the processes of neuroplasticity.

2. Attendees will be able to assess new information about neuroplasticity and use its principles in patients with neurologic injuries.

Neuroplasticity is the term that describes both synaptic plasticity and non-synaptic plasticity which lead to changes in neural pathways and synapses due to changes in behavior, environment, neural processes, thinking, emotions and nervous system injury. The concept of neuroplasticity replaced the previous theory of neural localization; that the brain is physiologically static. The neuroplastic theory and explain how the nervous system can change and adapt during the course of a lifetime.

Neuroplasticity occurs on a variety of levels, ranging from cellular changes (due to learning) to large-scale changes involved in cortical remapping in response to injury. The role of neuroplasticity is now widely recognized as a key to healthy neural development, learning, memory, and recovery from brain damage. During most of the 20th century, neuroscientists maintained a scientific consensus that brain structure was relatively immutable after a critical period during early childhood, but this belief has been challenged by findings revealing that many aspects of the brain remain plastic even into adulthood.

Many avenues of research have shown the remarkable capacity of the nervous system to change and adapt to new environmental challenges and to compensation for injuries. There is a concept of “use it or lose it” when it comes to neural processing. Blind individuals compensate by using ther visual cortices to processes enhanced auditory information providing more acute hearing to compensate for their visual loss. In this sense, ther nervous system follows the rule that is abhors a vacuum and neurons which are not being utilized will find new ways to remain active.

So, even though there are critical periods for neural development and shaping the function of the nervous system, the capacity for recovery from injury persists throughout life. Enriched environments can help stave off the development of cognitive decline that occurs in aging. Maintaining activity both physical and mental can help recover from neurologic injury. Early intervention with regimented physical therapy and engagement in rehabilitative activities can help with neural recovery even months or years after injury. Because neuroplasticity is the norm and not the exception we can no longer accept that recovery from injuries in not possible if any remnants of the nervous connections survive. Offering advice and direction for aggressive rehabilitation, while a somewhat specialized area of veterinary medicine, should be incorporated into therapy for neural injury.