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## **Optimizing intrinsic mechanisms of neuroregeneration in the CNS: Utilizing mitochondrial and neurosteroid chemistry**

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Neuronal repair in the central nervous system through neuroregenerative processes has always been considered to be beyond the recuperative capability of the human body. It is now understood that neurogenesis does indeed occur in the CNS and can result in functional as well as structural restoration. However, the heterogeneity of ischemic, traumatic, and degenerative brain injury obviates the implementation of any single intervention or therapy. A parsimonious beginning would be the augmentation of mitochondrial number and energy production as this would address all cellular function including stem cell production and migration. While much is known about the contribution of CoQ10, carnitine, and pyrroloquinoline quinone, an integrative approach should include bioactive lipids in the mitochondrial membrane, sigma 1 receptors, and neurosteroids such as DHEA, pregnenolone, and progesterone produced *de novo* in the glia. These neurosteroids can be considered catalysts and promote neurogenesis and neurite outgrowth through their activation of sigma 1 receptors probably in the mitochondrial membrane lipid rafts of the endoplasmic reticulum. Activated sigma 1 receptors increase calcium in the mitochondria resulting in activation of the TCA cycle, increasing mitochondrial hypermetabolism ultimately resulting in neurite outgrowth. Increasing neurosteroids through exogenous administration, membrane maintenance with cholesterol and phospholipids, and augmentation of mitochondrial function would optimize intrinsic mechanisms of neuroregeneration.

### **Biography**

Lewis K Clarke obtained his Master of Science from University of Texas at Dallas in 1977 in Human Development with Biostatistics. In 1986, he completed his Doctor of Medicine degree from Texas Tech School of Medicine. In 1987, he received his PhD from the Department of Cell Biology and Neurobiology at University of Texas Health Sciences Center at Dallas. He completed his medical internship at Emory University and Baylor College of Medicine in 1986 and finished his residency training at Baylor College of Medicine in Physical Medicine and Rehabilitation. He has a clinical and research practice in the Houston Texas area and has started two rehabilitation hospitals.

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