

Health Bits and Pieces (HFN 31:3)

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The myelin sheath is a protective covering on the nerves, even the nerves of the brain. Damaged or destroyed myelin sheaths impede the nerves from sending messages to other parts of the nervous system. This causes a loss of functioning to those areas of the peripheral nervous system and also in the brain itself. Myelin is a white, fatty substance that acts like an insulator for nerve fibers and that contains and directs their electrical impulses. Myelin is made by Schwann cells in the peripheral nerves and by cells called oligodendrocytes in the central nervous system. In a disease of the central nervous system like multiple sclerosis, loss of myelin results in erratic nerve signals that cause weakness or paralysis, impaired sensation, vision problems, and lack of coordination.

The most common acquired disease (non-congenital) that destroys the myelin sheath is multiple sclerosis but recent research shows that demyelination is also a feature of Alzheimer's, Parkinson's, and a list of other more rare diseases. Although there is no cure for these diseases, there are therapies that help to rebuild the myelin sheath and help to return the brain to a normal functioning state.

Until recent years medical science believed that the nervous system was not able to repair itself, but it is now known that this is not true. The ability of the body to repair the myelin sheath has implications for several nervous-system diseases that have been considered incurable.

Foods high in choline and inositol like eggs, beef, beans, and some nuts are important for myelin rebuilding. Vitamin B-1, also called thiamine, and Vitamin B-12 are physical components of the myelin sheath. Healthy oils from olives and avocado are also essential. Stem-cell research and environmental medicine may ultimately provide the answer for many nervous system disorders, but nutritional medicine will also play a necessary role.

Vitamins and Minerals

Vitamin B-12 is part of the composition of the myelin sheath. Deficiencies of Vitamin B-12 have been found in the blood and cerebrospinal fluid of patients with demyelination. Vitamin B-12 has a very important role in the formation and function of myelin. Vitamin B-12 deficiency compromises the ability of the body to repair the damaged myelin after an attack to the nerve tissue. Blood levels of Vitamin B-12 may not accurately reflect the availability of Vitamin B-12; that is, a person with blood test results that show normal levels may actually be deficient. Some doctors consider the normal range of B-12 to be much higher than the standard blood tests measure, so a value low in the normal range would still be considered insufficient. Another way to determine if B-12 is deficient is to measure levels of the chemical homocysteine. If homocysteine, a cardiovascular risk factor, is elevated, then B-12 can be considered to be functionally deficient.

Miller A, Korem M, Almog R, Galboiz Y, "Vitamin B-12, demyelination, remyelination and repair in multiple sclerosis," *Journal of Neurological Science* (2005) Volume 233, Issue 1, Pages 93-97.

Researchers have shown that on average, people with myelin-sheath degeneration are severely Vitamin-D deficient. This may be one reason that myelin-sheath damage is more prevalent in northern latitudes, where people get less sun exposure. Populations that eat a lot of cold-water

fish, like herring, salmon, mackerel and sardines, have a lower incidence of myelin-sheath degeneration even when they live in colder northern climates. It is necessary to take Vitamin D3 or cholecalciferol, which is the natural form of vitamin.

Chabas J-F, Stephan D, Marqueste T, Garcia S, Lavaut M-N, et al., "Cholecalciferol (Vitamin D₃) Improves Myelination and Recovery after Nerve Injury," (PLoS ONE 8(5):e65034. doi:10.1371/journal.pone.0065034.

Using nutritional magnesium in a novel technique to promote the regeneration of nerve cells across the site of severe spinal cord injury, researchers have restored bladder function in paralyzed adult rats. The rats were not able to walk again, but the restoration of bladder control was deemed significant. Magnesium supplementation has been shown to significantly improve functional recovery in various neurological disorders.

Pan H, Sheu M, Su H, et al., "Magnesium supplement promotes sciatic nerve regeneration and down-regulates inflammatory response," Magnesium Research, 2011 Jun;24(2):54-70. doi: 10.1684/mrh.2011.0280.

Amino Acids

A study showed that the amino acid compound acetyl l-carnitine works to regenerate the myelin sheath of nerves and even help produce new nerve fibers. It also appears to improve the function of important synapses and helps to re-establish innervation of nerves to target organs.

Wilson A, Hart A, Wiberg M, Terenghi G, "Acetyl-l-carnitine increases nerve regeneration and target organ reinnervation - a morphological study," Journal of Plastic Reconstructive and Aesthetic Surgery, 2010 Jul;63(7):1186-95, doi: 10.1016/j.bjps.2009.05.039. Epub 2009 Aug 6.

Glutathione is severely deficient in almost all patients with chronic neurological disorders. Supplementing glutathione either intravenously, with liposomal glutathione or orally with glutathione precursors such as non-denatured whey protein powder can have remarkable effects. Intravenous infusions of glutathione have resulted in striking benefits to patients with Parkinson's disease.

Cammer W, Tansey F, Abramovitz M, Ishigaki S, Listowsky I, "Differential localization of glutathione-S-transferase Yp and Yb subunits in oligodendrocytes and astrocytes of rat brain," Journal of Neurochemistry, 1989; Mar;52(3):876-83.

Other Nutrients

Lecithin is an essential ingredient for myelin sheath regeneration. Lecithin can help improve memory performance and is a source of phosphatidylcholine for the brain and nerves.

Gould R, Dawson R, "Incorporation of newly formed lecithin into peripheral nerve myelin," Journal of Cell Biology, 1976 March 1; 68(3):480-496. PMID: PMC2109647.

Mucopolysaccharides are long chains of sugar molecules that are found throughout the body, often in mucus and in fluid around the joints. A study shows that treatment of rats with mucopolysaccharides stimulates regeneration of peripheral nerves and promotes re-innervation into muscle. Mucopolysaccharide treatment significantly increased the number of muscle fibers re-innervated and also accelerated the restoration of muscle twitch tension elicited by nerve stimulation in rats with crushed sciatic nerves.

Gorio A, Lesma E, Vergani L, Gi Giulio A, "Glycosaminoglycan supplementation promotes nerve regeneration and muscle reinnervation," European Journal of Neuroscience, 1997 Aug;9(8):1748-53.

And Hormones

We know that hormones are secreted by the system of endocrine glands, but most of us do not know that there can be other remote sources of hormones outside the glandular system. Evidence from French research shows that progesterone, the so-called pregnancy hormone, may play a role in battling certain nerve diseases and help to repair the damage from them by replacing the myelin sheath.

The research shows that progesterone is synthesized by Schwann cells in the peripheral nervous system, where it promotes myelin formation during nerve regeneration. When researchers added either progesterone or its precursor pregnenolone in the vicinity of damaged nerves, there was a significant increase in the thickness of newly-formed myelin sheaths. The new sheaths appeared normal in structure even when examined under an electron microscope.

Lead researcher Dr. Etienne-Emile Baulieu, a professor at the University of Paris, said that the synthesis and function of progesterone in the nervous system shows that it is more than a classic sex hormone and should also be classified as a neurosteroid. Steroid hormones do not always act as sex hormones, particularly when they have local effects near certain sites where they are made. Vitamin D, for example, is also a steroid hormone. Their work shows that the same compound made in different parts of the body can play totally different roles at different sites. But, most significantly, this research could eventually lead to a breakthrough in using hormone therapy to treat neurological disorders.

Koenig H, Schumacher M, Ferzaz B, Baulieu E, et al, "Progesterone synthesis and myelin formation by Schwann cells," Science, 1995 Jun 9;268(5216):1500-3.