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# Newsletter

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## Orthopedic Disturbances And Nutritional Status

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Orthopedics is defined as a specialty concerned with the preservation, restoration and development of form and function of the musculoskeletal system, extremities, spine and associated structures. As a specialty in the medical field, orthopedics is approached with surgical, physical and medical methods. As a chiropractic specialty, methods include physical, manipulative, physiotherapy and nutrition.

The musculo-skeletal system refers to the integration of the muscular and skeletal system and in conjunction with the nervous system provides the ability for locomotion or movement. This integrated triad is termed the neuro-musculo-skeletal (NMS) system. Development, form and function of the NMS is influenced by the endocrine system and the biochemical or nutritional status, which is often overlooked by medical specialists.

### Nutrition and the NMS System

The relationship of calcium, magnesium and phosphorus upon the mineralization and integrity of osseous tissues are well known. However, Lowe has explored the relationship between mineral deficiencies and vertebral subluxations. It may be more correct to state that an imbalance between these minerals contributes to subluxation rather than deficiency alone.

Calcium is required in adequate amounts for normal muscular contraction and magnesium is required for muscular relaxation. A relative increase in the cellular calcium to magnesium concentration could lead to hyper tonicity of the musculature, whereas a relative increase of magnesium relative to calcium leads to hypotonicity. Simply put, changes in tissue concentrations of these two minerals can lead to muscular abnormalities even if a frank deficiency is not present. For example, a significant decrease in magnesium relative to calcium allows calcium to accumulate in soft tissues affecting periarticular structures and contributes to joint stiffness and osteoarthritis.

Calcium and phosphorus are largely contained within the medullar portion of bone while magnesium is largely stored in the cortical portion. An imbalance among these elements can lead to musculoskeletal dysfunction and bone fragility.

### Vitamins C and D

Everyone is aware of the rickettsial effects of vitamin D deficiency. However, excessive intake of vitamin D can produce similar changes as that of a vitamin D deficiency. This is due to the pro-calcium action of vitamin D which can increase calcium absorption and retention relative to magnesium. If there is an existing magnesium deficiency, it can be exacerbated by high vitamin D intake contributing to soft tissue calcium deposition and a reduction in cortical bone integrity, muscular contraction and recurring subluxations.

Vitamin C is involved in collagen synthesis, a major constituent of the bone matrix as well as hyaline, elastic and fibrocartilage. Collagen formation is greatly impaired in the presence of vitamin C



deficiency. Vitamin C requirements are dependent upon mineral status and can prove detrimental in excessive amounts and will be explained further below.

## **Copper**

The mineral copper is involved in cross-linking of collagen which gives collagen its strength and integrity. An excess or deficiency of copper can contribute to orthopedic disturbances. An early sign of copper deficiency is osteoporosis. Lathyrism is a condition that occurs in humans and animals resulting from excessive consumption of legumes and grains from the lathyrus genus. The condition is characterized by scoliosis, spondylosis, and kyphoscoliosis as well as other conditions associated with abnormal collagen formation such as hernias, aneurisms and exostoses. A chemical contained in these foods inhibit the copper-dependant enzyme lysyl oxidase, which is responsible for collagen cross linking. This explains how excessive vitamin C intake could contribute to orthopedic disturbances when taken in supraphysiological dosages by individuals with a marginal copper status. Vitamin C is a known antagonist to copper and can even contribute to copper deficiency.

Excess copper can also contribute to spinal distortions, particularly scoliosis. This can be explained by the relationship that exists between copper and zinc.

## **Zinc**

Zinc is antagonistic to copper as well. Excessive zinc relative to copper can contribute to poor collagen formation due to this antagonism. Excess zinc can therefore contribute to ligamentous laxity and joint instability. However, excess copper can contribute to a relative zinc deficiency and reduce protein synthesis, which is dependant upon zinc.

## **Neuroendocrine Activity and the NMS System**

The nervous and endocrine systems (NES), particularly the sympathetic and parasympathetic groups can significantly impact the NMS system since the NES activity affects metabolic and cellular enzymatic activity, which in turn affects nutritional status. When dominant the sympathetic branch of the NES increase requirements of certain nutrients such as calcium, magnesium, copper, vitamins D, B2, and B12, while the parasympathetic branch increases requirements for phosphorus, zinc, manganese, iron, vitamins A, E, B1, B3, B6, etc.

Pathological endocrine dysfunctions such as Cushing's disease, myasthenia gravis, scleroderma, etc, have been described extensively. However, mild or subclinical forms of NES disturbances can affect the NMS system. For example, sympathetic NES dominance contributes to weakness of the adductors and hamstrings muscles and parasympathetic NES dominance may produce weakness of the psoas, gluteus medius, deltoid and bicep muscle groups.

## **Stiff Man Syndrome**

A notable structural condition associated with adrenal insufficiency is the flexion contraction or stiff man syndrome which is found in patients with Addison's disease. However, similar symptoms may also be seen in milder forms of adrenal insufficiency. The condition is characterized by stiffening of the pelvic girdle and thigh muscles with flexion contractures. This results in a flexed posture when standing. The condition has been ascribed to the shortening of the tendon and fascia with increased contractures of the adductors and hamstrings which are painful upon palpation. The condition responds to hormonal replacement and or adrenal support as well as thyroid support. Adrenopause is common in the elderly which can explain the flexed posture of many aged individuals.

## **Chemical Subluxations**

There have been a number of observations among orthopedists, that following a spinal injury with

intervertebral disc prolapse, the acute pain may not be associated with disc or vertebral nerve pressure and is a frequent finding during surgical interventions. It has been concluded that often the nerve root irritation is from a chemical irritant rather than an osseous subluxation. Tissue examination reveals that glycoprotein extracts from the nucleus pulposus contains significant amounts of histamines and other proteins that have histamine-like effects. The beneficial effects of cortisone which readily relieves pain may be due to its' action of reducing peripheral tissue sensitivity to histamine and histamine-like substances.

Histamine is freed easily and locally in an active form and readily produces inflammation. It would appear likely that micro-traumas could lead to nerve irritation and pain in any joint. It is known that histamine levels are often elevated in the synovial fluid of patients suffering from rheumatoid arthritis.

High histamine foods may exacerbate symptoms in susceptible individuals and the avoidance of high histamine foods may prove beneficial in controlling pain. Some high histamine foods include;

Mackerel	Herring
Sardine	Tuna
Gouda	Camembert
Cheddar	Swiss
Parmesan	Sausage
Salami	Ham
Sauerkraut	Spinach
Eggplant	Ketchup
Wine	Beer
Champagne	

Other foods even though they are not high in histamines have a capacity to release histamines directly from mast cells and can also exacerbate problems caused by high histamines. Foods with histamine releasing properties include;

Citrus	Papaya
Strawberries	Pineapple
Peanuts	Chocolate
Tomatoes	Shellfish

Egg white  
Spices.

Liquorice

Drugs, such as antidepressants, anti-hypertensives, diuretics, analgesics, antibiotics and muscle relaxants can also enhance the effect of histamines.

Histamines have a contractile action and can cause vasoconstriction contributing to migraine headaches, high blood pressure and aggravate musculo-skeletal problems. Therefore, reducing high histamine foods, foods that release histamines and medications that can enhance histamine effects can aid in relieving NMS disturbances.

It should be noted that Vitamins C, B6, copper, calcium and pancreatic enzymes can help in degrading histamines and reducing pain.

### Conclusion

The etiologies of many orthopedic conditions are unknown with the exception of conditions caused by trauma. Symptoms such as arthritis, osteoporosis, and scoliosis are merely signs of underlying disturbances that may have multi-causal origins. Orthopedic conditions are associated with neuroendocrine, biochemical and nutritional disturbances resulting in biomechanical or NMS imbalance. These systems are intricately interrelated, each having an effect upon the other. Medical care of orthopedic conditions most often does not address these many interrelationships or underlying contributing causes. Chiropractic care can directly impact the NMS system through manipulation. Manipulation and other physical measures by virtue of impacting the CNS via sympathetic and parasympathetic stimulation or sedation, in turn affects the biochemical and nutritional balance, which can also have an impact on the NMS system indirectly. Recognition of these interrelationships through hair tissue mineral patterns and the use of specific nutritional therapy will aid in enhancing response of patients with NMS system disorders.

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