Pantothenic Acid and Muscular Function

Don C. Hemingway, DVM[1]

I have considered for many years that girls, boys and adults that run by swinging their feet out to the side to be an abnormal gait. The normal running gait is to bring the knees forward, up and the lower leg and foot moves straight forward in the same direction the body is moving. Some children run 'straight' the first few years of life and the "swinging" gait becomes severe at puberty. Girls that run with the "swinging" gait are accepted socially because they are the majority. Boys that can not run are ridiculed and can develop self image problems. They can not be competitive with their peers in play or sports that require running.

Confinement raising of swine became popular in the 1950's resulting in deficiencies and disease conditions that had not been seen before. A condition of Hyper-metria called "Goose Stepping" became common in sows and some young pigs. The hips and legs make lateral movements during the forward stepping motion. The severity of the disability varies from mild to inability to walk to feed and water. The condition was more severe in swine that were growing quickly and being fed a corn ration.

Pantothenic acid (B_5) was discovered and described by Dr. Roger Williams[1] about 1940. Veterinarians soon learned that by adding Calcium pantothenate to the swine rations corrected the condition known as "Goose Stepping". Goodwin[2] in 1962 described the clinical signs in swine in naturally occurring deficiency as inappetance, poor growth, loss of hair and locomotor incoordination. Histologically there is evidence of nerve tissue degeneration of the peripheral nerves, posterior root ganglia, posterior roots and funiculi of the spinal cord. Degenerative changes of predominantly sensory nerves occur in B_5 deficiency. This results in Hypermetria from loss of proprioceptive impulses from limbs. There is interference with the normal function of the reflex arc.[3]

Blair and Newsome[4] state that B_5 is essential in the synthesis of lipids. The locomotory effects may be related to defects noted in the myelin of the sciatic, brachial nerve and the dorsal root ganglion. In severe deficiency the swine may be unable to use the hind legs.

A search of the literature through the Medline computer system shows that very little work has been done with humans and B_5. Some authors believe that B_5 is so plentiful in natural foods that a deficiency does not occur. Apparently a human B_5 deficiency is not recognized except in nutrition trial where the diet is made deficient for the trial. Most Governments have not established a Recommended Daily Allowance (RDA).

Meats tend to be low in B_5 by the time it reaches the dinner table. Unprocessed vegetables have good levels of B_5 but many people dislike raw vegetables. Stress and refined carbohydrate diets increase the body's needs for pantothenic acid. Absorption decreases with age so it is very possible that many people are not receiving optimal amounts.

Pantothenic acid is required for the production of Coenzyme A in the metabolism of energy from protein, carbohydrates, and fats.[5] It is also used in the brain coenzyme A energy systems. Borets[6] showed that a deficiency of B_5 was associated with heart failure. As the content of B_5 was restored the energy processes of heart muscle also improved. Kimura[8] reports the occurence of a drug induced Reye-like syndrome in children in Japan. The same drug causes a B_5 deficiency in rats. Perhaps we should check for a B_5 deficiency in Reye-syndrome patients.

I have seen three young ladies that were taking supplemental pantothenic acid along with a B-complex tablet improve their running gait without any running technique coaching.

1. Box 704, Boissevain, Manitoba ROK 0E0.

One girl who had not been able to do a "push-up" in her life was able to do five without difficulty. All three noticed a great improvement in the distance and accuracy when throwing a baseball. The extra B_5 was discontinued and there was a regression to the "swinging" gait of all girls but not completely back to the pre-B_5 level. The B-complex was continued. The improvement in running was not an anticipated benefit so no video of pre-trial running is available for comparison.

My observations are that girls with low body fat and mammary gland development are the ones that run "straight". The boys that run with the "swinging" gait have feminine fat deposits, some mammary development and less facial and body hair than normal. It appears to me that the B_5 requirements or metabolism is related to female hormone production.

Cohenour[9] et al reported that only one girl in a group of pregnant teenagers was consuming 10 mg of B_5 per day, the amount suggested by the Food and Nutrition Board. Girls may have a higher requirement for B_5 than boys. Teenage boys often have a larger food intake than girls and are able to meet their requirements on basis of volume of food intake.

Research and clinical cases have shown that Thiamine is needed for nerve regulation of heart rhythm and peripheral nerve to extremities. Niacin and Pyridoxine are required for nerve function in memory storage and recall. Perhaps the model described above in swine is similar to the swinging gait in humans and pantothenic acid is the nutrient that helped the young ladies to run "straight". Correct muscle action could reduce the stress on joints, ligaments and spinal column, reducing what is now considered to be stress injuries. Reduced stress could prevent some arthritis and "back" disabilities.

It has been my privilege for the past few years to learn of the nutritional approach to disease prevention and treatment from the contributors to Orthomolecular Medicine. Some of the readers may wish to research the ideas expressed here and add to our collective knowledge for the benefit of all people.

References

1. Williams RD: *Advances in Enzymology.* 1943, pp 253-287.
2. Goodwin RFW: /. *Comp. Pathol.* 1962, 72:214.
3. Bradley and Done: *Swine Diseases,* 6th ed. pp. 63.
4. Blair R and Newsome F: /. *An. Sci.* 1985, 60(6) 1511.
5. Plesofsky: *Vig. Annual Rev. Nutr.* 1988, 8:461-482.
6. Borets VM: *Vopr - Pitan.* 1983, (l):45-49.
7. Spector R: *Am. J. Physiol.* 1986 Feb., 250(2pt2) R292-7.
8. Kimura A et al: *Brain Dev.* 1986, 8(6): 601-5.
9. Cohenour S et al: *Am. J. Clin. Nutr.* 1972, 25:512-517.