TRACE ELEMENTS, INC.
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ZINC/COPPER RATIOS AND BRAIN FUNCTION: SPECIAL IMPLICATONS FOR EDUCATION AND SPECIAL EDUCATION

----- Richard Malter, Ph.D. ----------

In recent years, there has been a dramatic increase in the interest shown in the relationship between brain chemistry and various psychological functions including memory, perception, learning, emotions, and behavior. Of particular interest for this discussion is the role of copper in brain functions and dysfunctions. Research and clinical studies have shown that excess copper tends to be stored in brain tissue. Copper toxicity is strongly associated with a broad spectrum of psychological disturbances and dysfunctions. Of particular concern is the association of copper toxicity with hyperactivity, attention deficit disorders, and learning processing problems in school age children.

It has been suggested that copper and its antagonist, zinc, tend to be associated with brain dominance. That is, a high Zn/Cu ratio tends to be associated with dominance of the left cerebral hemisphere, which controls verbal analytical-sequential functions. In contrast, a low Zn/Cu ratio tends to be associated with dominance of the right cerebral hemisphere, which controls visual-spatial simultaneous functions involving perception of the whole. In general, school curricula tend to emphasize verbal analytical- sequential functions. If there is validity to the above relationships between Zn, Cu and brain hemisphere dominance, then any change in the Zn/Cu ratio of the school population may have profound implications for our schools and the curricula taught in them. That is, if the Zn/Cu ratio of the school population shifts dramatically from a high Zn/Cu ratio (Zn dominant - left hemisphere dominant) to a low Zn/Cu ratio (Cu dominant - right hemisphere dominant), then our traditional left brain curriculum (verbal analytical- sequential functions) will be increasingly difficult for larger and larger numbers of children and adolescents. This may be one of the reasons why there appear to be increasing numbers of learning disabled children in our schools' classrooms. If it can be determined that copper toxicity is increasing from one generation to the next, this would have profound implications for our schools and our educational system. One of the implications would be that our curriculum would need to be changed from an emphasis on left brain (verbal analytical-sequential) functions to include more right hemisphere functions.

Another way of looking at the problem is that our schools are becoming more and more out of synchronization with the children who are trying to learn. As this "out-of-sync" process continues, our schools are becoming more and more dysfunctional as systems of education. The more dysfunctional our schools become, the more they become breeding grounds for addictions of various types including alcoholism, drug abuse, eating disorders, etc. This is another way in which copper toxicity contributes to dysfunction and addictions.

To the extent that there is validity to the thesis presented here, then two major implications need to be considered. One has been mentioned above, namely to make fundamental curriculum changes in the direction to educate the public and professionals to the problem of copper toxicity and how it may be reversed. Nutrition education and appropriate detoxification programs are urgently needed.

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DYSLEXIA AND HTMA RESEARCH

----- David L. Watts, Ph.D., Director of Research ----------

In the previous article, Dr. Malter has keenly illustrated the implication of a nutritional imbalance on brain function in children and the way it can affect our present educational system. Research is now beginning to recognize that because neurological function is very sensitive to nutritional requirements, it is often the first system to be affected by nutritional imbalances.

Tissue mineral analysis (HTMA) studies of the hair at Trace Elements, Inc. strongly indicates that copper toxicity is becoming more prevalent in this generation. Copper intake in the United States is estimated to be five to six milligrams per day. Common residential and commercial water pipes have been found to contribute to increased copper exposure. Copper also enters our food chain through its addition to animal feeds and its use in sprays used for the prevention of fungal and algae growth on vegetables and grains. This in addition, to high copper content in many vegetarian foods has led to increased copper consumption and retention by vegetarians.

Through our HTMA studies, we have seen a correlation between tissue copper toxicity and dyslexia. This condition responds readily to a metabolic nutritional approach aimed at correcting mineral imbalances found in HTMA patterns. As an example, figure 1 (see original) shows the handwriting of an 11-year-old child diagnosed as learning disabled (L.D.), or dyslexic. He required special educational classes, which dealt with his problems, but not their cause. His HTMA pattern was typical of a "dyslexic" profile, which among other abnormal patterns, included a markedly elevated copper level. Figure 2 (see original) dramatically shows the change in handwriting of the child after three months on a specific metabolic rebalancing program. Observations from family, friends, and instructors revealed improved attention, better grades, and generally a more agreeable nature. By the following school year, he was re-evaluated and was found no longer to require any special educational classes.

The relationship of (right/left) brain dominance and zinc/copper ratios also affects adults. Men who are usually more left-brain dominant, or intellectually orientated, show an increase in zinc relative to copper. Women who tend to be more emotionally orientated, or right hemisphere dominant, usually show an elevated copper relative to zinc. We often find that adults, male or female, who show increased tissue copper accumulation relative to zinc have a tendency to be more emotionally oriented and artistically inclined. Their occupations or hobbies usually involve creativity. Artists such as sculptors, musicians, and actors, invariably tend toward either a high tissue copper or a low zinc/copper ratio, whereas individuals with a low tissue copper or high zinc/copper ratio often follow intellectual pursuits.

Iron also affects neurological function. Iron deficiency can lead to minimal brain dysfunction (MBD) and defects in attention and cognitive functions. Through HTMA studies we

have observed that individuals who show increased iron accumulation are left hemisphere or intellectually oriented, and right hemisphere dominant or emotionally orientated with low tissue iron. Decreased left hemisphere activity has been confirmed in iron-deficient patients through EEG studies.

Special education today appears to be dealing with dysfunctional children without taking into consideration the cause of their dysfunction. If these causative factors are not addressed, the demand for special educational facilities will continue to increase.