**Introduction To Copper Toxicity**

**Introduction**

In the course of tissue mineral research, copper toxicity is a common finding. By correlating thousands of tests with symptoms and diagnoses, a picture has emerged of the detrimental effects of copper toxicity on human health, both physical and emotional.

Copper toxicity is a much-overlooked cause of many important health conditions today, including fatigue, premenstrual syndrome, anorexia, depression, anxiety, migraine headaches, allergies (food and environmental allergies) and many others. This article represents an exploration of some of the symptomatology and pathophysiology associated with excessive tissue copper.

**Why Do Copper Imbalances Develop?**

Adrenal insufficiency: The Major Cause of Copper Toxicity

Although there are numerous reasons for the prevalence of copper toxicity, the most important cause is adrenal gland insufficiency. Individuals with adrenal insufficiency are unable to utilize copper properly. The reason for this is that copper can only be utilized in the body if it is attached to a protein substance for transport and storage.

The major protein that copper is attached to is called ceruloplasmin. Ceruloplasmin is a protein which binds copper so that it can be utilized in biochemical reactions.

When the adrenal glands are underactive, they are unable to send out a message to the liver to release ceruloplasmin from the liver and, therefore, copper becomes bio-unavailable.

As a result of excessive tissue storage of bio-unavailable or unbound copper, a deficiency of available copper occurs, even when dietary intake of copper is more than adequate. The result may be a craving for foods high in copper, such as chocolate, avocados, etc. The other result is multiple bodily dysfunctions as a direct or indirect result of copper imbalance.

Other Contributing Causes of Copper Toxicity

The following factors are also major contributing factors to copper toxicity: use of birth control pills, copper intra-uterine devices, anti-biotic therapy, stress, strict vegetarian diets and refined food diets which are deficient in zinc.

**Dysfunctions Associated With Copper Toxicity**

Anorexia Nervosa: An Example of Copper Toxicity

Many people have become aware of anorexia nervosa because of the death of Karen Carpenter, the famous singer. There are approximately 2 million women in the U.S. suffering from anorexia. My research indicates that a principal cause of anorexia is an excessive buildup of copper in various body tissues and organs, principally the brain and liver. An excess of tissue copper will suppress the appestat mechanism in the brain, which regulates one's appetite. The principal mineral regulators of this appestat mechanism are zinc and copper.

It is to be noted that anorexia is much more prevalent in women then men. This can be explained, in part, by the fact that copper levels are approximately 1/3 higher in women than in men. This means that an excessive elevation of copper can more readily occur in women, making them more prone to this disorder.

**Copper and Mental Illness**

Although not yet fully accepted by the medical profession, there is considerable evidence that copper toxicity is responsible for certain forms of mental illness. Carl Pfeiffer, MD, Ph.D. devotes an entire chapter in his book, Mental and Elemental Nutrients, to the detrimental effects of copper on mental health. We have confirmed this connection through tissue mineral testing.

Why is copper involved?

Dr. George W. Crile pointed out many years ago that liver problems usually precede psychological and emotional problems. The liver is the primary storage site for excess metals such as copper, iron and manganese.

Whenever you see a person who has serious mental or emotional problems of various kinds, it would be prudent to determine if liver problems associated with heavy metal toxicity exist.

**Copper Affects Brain Chemistry**

Storage of toxic metals in the brain also contributes to mental illness. When the liver becomes over-burdened with deposits of various metals and cannot safely store any more of these metals, the body begins to store the excess of these metals in secondary reservoir sites.

In the case of copper, manganese and iron, the secondary storage area is the brain. Excessive levels of copper in the brain are associated with symptoms ranging from depression, anxiety and mood swings to schizophrenia.

**Copper and the Biogenic Amines**

Copper is known to stimulate production of the biogenic amines, which are neurotransmitter substances that enhance brain activity. They include epinephrine, norepinephrine, dopamine and serotonin. Copper toxicity is associated with symptoms of mind racing, insomnia and inability to stop thoughts, which may be due to imbalances in these neurotransmitter substances.

In my own case, before I understood that taking a mineral does not necessarily raise that mineral, I once took 60 mg of zinc to correct a suspected zinc deficiency. Disturbing psychological symptoms such as anxiety, fearfulness and paranoia appeared from out of the blue. I couldn't understand what was wrong. Many years passed before I realized the extremely powerful effects, for good or bad, that a trace metal such as zinc could have.

**Copper, Compulsiveness, Exercise and Diminished Pain**

Joggers frequently suffer from shin splints, fractured bones, torn tendons, severe muscle cramping, etc. and yet it is impossible for them to refrain from running. Their doctor warns them to stop running yet they continue to run despite their injuries, suffering and pain. Many individuals who run in triathalons and marathons become severely exhausted and yet they keep on running. You can't stop them. What is the reason for this compulsion to keep running? Let's explore this further.

**Stress Seeking**

Unaware, the individual who suffers from copper toxicity is a stress-seeker. Exercise provides the stress they seek.

Here is the mechanism. As a rule, individuals with a copper toxicity suffer from a low rate of metabolism, due to adrenal exhaustion. They feel much better when their metabolic rate is increased towards normal.

He or she can temporarily increase their metabolic rate in a number of ways - by running, other exercise, fasting, or by creating a stress situation. Stress forces the adrenal glands to function. Also, under stress, zinc is lost resulting in an increase in one's sodium level. A rise in one's sodium level results in increased physiological and psychological excitability.

Individuals with a high copper level or low zinc/copper ratio are tired, in other words, can become compulsive about anything that gives them a lift.

In the end, their compulsion is self-defeating, inasmuch as they are not doing anything to rebuild their weak adrenal glands. While exercise serves temporarily to increase adrenal activity, in the long run, complete exhaustion occurs, together with a permanent inability of the adrenal glands to respond to exercise, or any other stimulant.

**Copper and Premenstrual Syndrome**

In our research of the medical literature, we find that copper levels often correlate well with estrogen levels. It is known that the liver normally detoxifies estrogen and copper metabolism is also related to liver function (ceruloplasmin production).

Disturbance of copper metabolism is associated with many female difficulties including amenorrhea, dysmenorrhea, fibroid tumors, miscarriages, infertility and premenstrual syndrome.

**Copper and Impaired Protein Metabolism**

Copper plays a vital role in protein metabolism. Too much or too little copper results in impaired protein metabolism. Copper is necessary to link polypeptides (disulfide bonds), to give protein its required tensile strength.

A spider web will serve as a good example. A spider web is cross-linked, i.e., strands run both horizontally and vertically. If you just had vertical strands in the web it would be easily broken. However, cross-stranding, or what is referred to as cross-linking, reinforces the web-like structure and gives it strength. A copper imbalance is dangerous inasmuch as excess copper causes a dissolution of protein structures by interfering with the cross-linking process.

**Copper and Aneurysms**

An aneurysm is a ballooning effect due to a weakness in the protein structure of an artery. Since arteries must withstand considerable pressure, it is vitally important that their protein structure be maintained at all costs.

A copper deficiency results in a tendency to lose protein structure in the blood vessel as well as all the other tissues in the body. When this occurs, the tensile strength of the blood vessel is diminished and an aneurysm can occur.

Even if you have normal blood pressure, one day the weakened blood vessel can burst, resulting in death. Structural problems in the smaller blood vessels of the brain (capillaries), due to a copper deficiency, result in capillary breakage and leakage, which may lead to small strokes.

**Copper, Low Rate of Metabolism and Insomnia**

Individuals with a high copper level, together with a low rate of metabolism, frequently suffer from an inability to fall asleep or remain asleep. They frequently get up at night and go out for a walk, or drink hot chocolate. This increase in activity results in an increased rate of metabolism, which enables them to go back to sleep.

Copper-toxic individuals are unconsciously, temporarily changing their mineral levels towards a more favorable balance, which is helpful to promote sleep.

**Infections, Failure to Thrive and Stress**

Infection - Mobilization of copper from the liver plays an important role in the body's infection-fighting mechanisms. Indeed, several antibiotics function by mobilizing copper from tissue storage. We can also give copper to help fight infections.

The suppression of appetite during infection may also be related to an increase in copper and loss of zinc during infections.

Failure to Thrive - In the failure-to-thrive syndrome, increasingly common in children today, we find serious imbalances in copper and zinc, usually acquired from the mother who herself was deficient in zinc or other elements. These children often develop a huge appetite and often grow rapidly, when copper and zinc levels are brought into balance.

Stress and Copper - Sudden or severe stress causes immediate loss of zinc from the body, upsetting the zinc/copper ratio. Prolonged or severe stress can precipitate all the symptoms of copper toxicity, including loss of appetite, migraine headaches, emotional difficulties, skin rashes, etc.

**Factors In Assessing Copper Toxicity**

A Low Zinc/Copper Ratio is Still Copper Toxicity

An excess of copper can contribute to many symptoms: e.g., depression, spaciness, paranoia, alternating moods, anxiety, panic, fearfulness, schizophrenia, phobias, etc. However, individuals may have any or all the above signs and symptoms of a copper toxicity and yet not have a high tissue copper level on a tissue mineral test.

It is absolutely necessary to consider the zinc/copper ratio. The ideal zinc/copper ratio is 8:1. If an individual's zinc/copper ratio is below 6:l, a copper toxicity must be considered as a cause of the above mentioned signs and symptoms. To repeat, one does not have to have a high copper level to suffer from anorexia nervosa or other copper-related disorders. Anorexia related to copper imbalance can be strongly suspected if the zinc/copper ratio is less than 6/l.

**Correct Laboratory And Sampling Procedures**

Hair Must not be Washed at the Laboratory

Severe distortion of water-soluble minerals takes place if a trace element lab washes hair samples at the laboratory. While some researchers advocate washing, studies reported upon in this article may not hold true if hair is washed at the laboratory.

**How Copper Interacts With Other Minerals And Vitamins**

Vitamin C

Over 30 years ago, Hoffer and Osmond discovered that Vitamin C was helpful in the treatment of certain, not all, schizophrenics. They did not know why.

We know today, from hair analysis research, that the type of schizophrenia that responds favorably to massive doses of vitamin C, is what we refer to as copper-induced schizophrenia. It is the accumulation of excessive amounts of copper in the brain, which is responsible for this particular type of schizophrenic behavior. The knowledge that vitamin C will lower an excessively high copper level is very important in treating such cases.

Vitamin C causes copper to be chelated and removed from liver and brain reservoirs.

**Importance of Testing Before Administering Nutrients**

You might read in the medical literature that mega-doses of vitamin C are recommended by Hoffer and Osmond for schizophrenia.

However, if the patient didn't have a high copper level, large amounts of vitamin C might not only prove ineffective, but in certain cases may actually be detrimental. For example, using megavitamin doses of vitamin C could very well exacerbate the symptoms of a schizophrenia induced by iron toxicity because vitamin C enhances iron absorption. Tissue mineral testing is one of very few methods to distinguish metabolic causes so that treatment can be specific and effective.

**Other Nutrients That Affect Copper Levels**

Other vitamins which help reduce excessive copper buildup in the tissues are vitamins B1, B3, B6, folic acid, inositol and choline.

Minerals which are copper antagonists include zinc, manganese, iron, sulfur and molybdenum. Ordinarily, any or all of these may be given in a nutrition program to reduce excessive copper levels.

**Conclusion**

Copper toxicity is an important contributor to at least one hundred different symptoms and disease conditions. By understanding how copper imbalance comes about and how it causes metabolic dysfunctions, we can gain many meaningful insights into the correction and prevention of some of today's most prevalent health problems.

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