

## Beyond Potassium Deficiency: The Role of Copper Toxicity

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In a recent article <http://www.naturalnews.com/022589.html>, Polly Wise discussed the problem of potassium deficiency. Her article provided a valuable health service by calling attention to an important mineral deficiency that too often goes unnoticed and undetected. However, in my view, the problem of potassium deficiency is far more prevalent and far more complex than is evident in Ms. Wise's article. This raises several important questions that will be addressed in more detail here. One question is how to best measure a person's potassium status. Another question has to do with causes of potassium deficiency. Conspicuous by its absence in Ms. Wise's article was any discussion of the effect of estrogen and copper on potassium status. In fact, the effect of estrogen and copper on potassium status has drawn very little attention over the past 30 years since the late Carl Pfeiffer, MD, PhD discussed estrogen and copper in mental health.

In her article, Ms. Wise accurately points out that potassium has a strong relationship with calcium, magnesium, and sodium. Balance between these vital minerals is essential for good health. She advocates an increase in overall level of mineral intake in the diet through raw foods, especially fruits and vegetables. These recommendations are generally commendable. However, certain individuals who have a high potassium and low calcium level would not benefit by a blanket recommendation to increase their dietary potassium intake. Also, most individuals today have some type of nutrient mineral imbalance that may not be correctable with just dietary intake alone. This is where a valid assessment of potassium status and overall nutrient mineral balance comes into play. Since blood content of nutrient minerals is strongly influenced by powerful homeostatic mechanisms, blood tests cannot provide an accurate assessment of nutrient mineral status at the cell and tissue level. The first signs of a nutrient mineral deficiency or imbalance often occur at the cell and tissue level.

Assessing nutrient mineral status by means of a hair tissue mineral analysis (TMA) is far more likely to detect critical nutrient mineral deficiencies and imbalances than a blood test would. A potassium deficiency is much more likely to be detected by a hair TMA than by a blood test. Also, a hair TMA would more clearly show the vital relationships between calcium, magnesium, sodium and potassium, including the sodium/potassium and calcium/magnesium ratios. The **LEVELS** of nutrient minerals measured in a hair TMA are very important. But, perhaps even more important are the **RATIOS** between certain nutrient minerals. This is because many of these minerals are involved in **REGULATING** important physiological, psychological, and metabolic functions such as blood sugar level, blood pressure, thyroid and adrenal gland activity.

The hair TMA also measures copper and zinc levels. Copper tends to lower the potassium level in cells and tissues. Zinc tends to raise the potassium level and helps to

retain it in cells and tissues. Copper tends to also raise the calcium level in cells and tissues. As copper lowers the potassium level and raises the calcium level, the calcium/potassium ratio tends to increase, resulting in a high calcium/potassium ratio. A high calcium/potassium ratio is strongly associated with lower energy due to diminished activity of the thyroid gland. Estrogen has been shown to raise the copper level in cells and tissues. Therefore, estrogen, by means of its effect on copper, will also have the same effects on nutrient mineral status as copper itself.

Given the widespread use of estrogen for birth control and hormone replacement therapy over many decades, it should not be surprising to find that potassium deficiency is at epidemic levels today. In fact, prescriptions for estrogen far exceed the use of licorice. Therefore, estrogen and excess copper are far more important in “causing” a potassium deficit than is licorice. Excessive calcium supplementation also is likely to induce a potassium deficiency or to exacerbate a potassium deficiency.

On the graphs below, potassium (K) deficiency is shown. The number “1” level is the ideal level for each nutrient mineral shown on these graphs. Figure 1 shows a slow metabolic type graph with a very low potassium level, but with good balances between calcium (Ca) and magnesium (Mg) as well as between sodium (Na) and potassium (K).

Figure 2 shows the typical effect of a very high copper (Cu) level on the nutrient mineral pattern. A very high Ca/Mg ratio occurs as excess Cu raises the calcium level above the magnesium level. The high Ca/Mg ratio illustrates a relative deficiency of magnesium. Therefore, this mineral pattern indicates a relative magnesium deficiency as well as a substantial potassium deficiency.

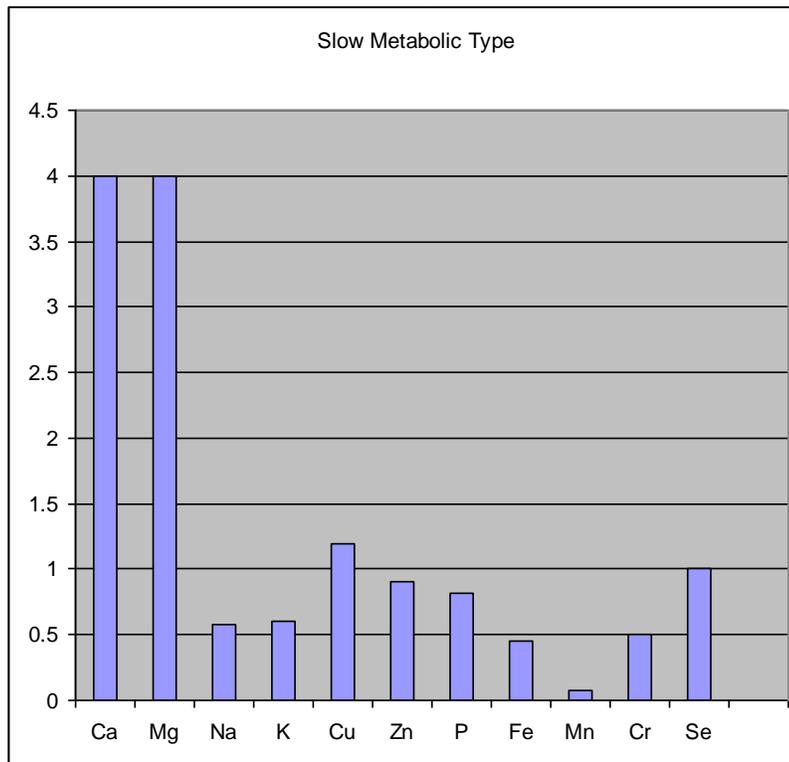


Fig. 1

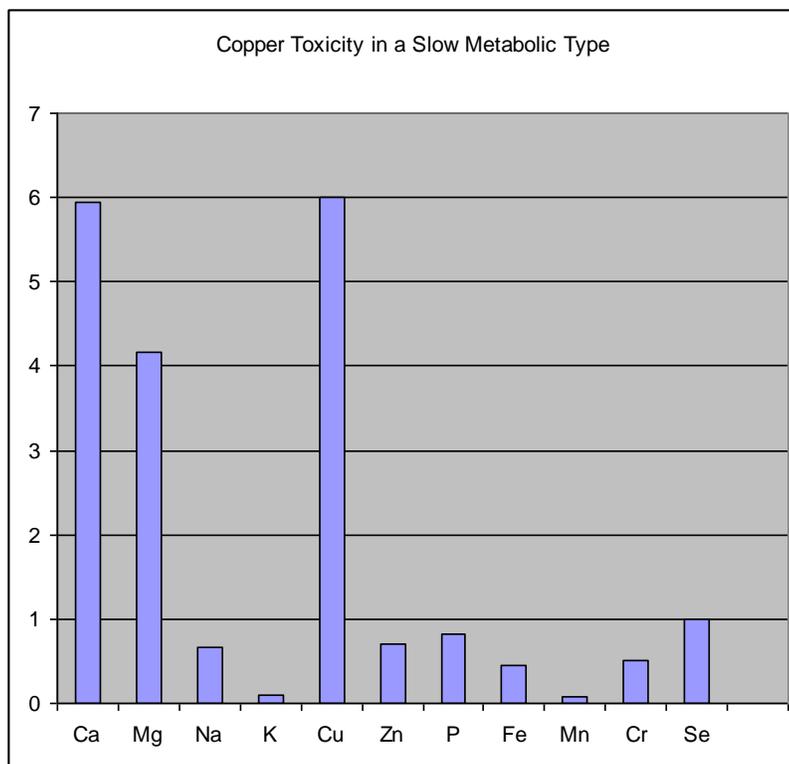


Fig. 2

Figure 2 also shows a high Na/K ratio as well as the high Ca/Mg ratio. The high Na/K ratio indicates an intense stress mineral pattern and dominance of the adrenal glands over thyroid activity. A person with this mineral pattern is very likely to be highly reactive to stress that will produce both physical and psychological symptoms such as those that Ms. Wise mentioned in the first paragraph of her article. The nutrient mineral imbalances in Fig. 2 are much more likely to produce the plethora of symptoms that she describes than are likely to occur with the mineral imbalances in Fig. 1. However, both graphs show a substantial potassium deficiency, but Fig. 2 makes it very clear that other significant nutrient mineral imbalances are important to consider. It is much more likely that the nutrient mineral imbalances shown in Fig. 2 account for most of the symptoms described in Ms. Wise's article than the mineral pattern shown in Fig. 1. She asserts that "there is a correlation between potassium deficiency and anxiety, irritability, anger and depression. Lack of potassium may also play a role in insomnia, constipation, and too much acidity in the body." Correlation indicates a relationship between two or more factors, but the magnitude of the correlation tells how strong the relationship is.

Also, it is important to note that the nutrient mineral imbalances shown in Fig. 2 are much more likely to produce the symptoms that, today, are easily "diagnosed" as Bi-polar disorder rather than multiple nutrient mineral imbalances. I call such a "diagnosis" of Bi-polar disorder "pseudo" Bi-polar disorder because the hair TMA pattern shown in Fig. 2 clearly show the role of excess copper and nutrient mineral imbalances underlying this common psychiatric "diagnosis" today. The "pseudo" Bi-polar diagnosis is really a blind diagnosis because it is made without any real biochemical data that account for the symptoms of the disorder. Excess copper is known to store in both brain and liver tissue

so that both physical and psychological problems are likely to manifest. The high calcium and very low potassium levels induced by the presence of a high copper level also result in substantially diminished thyroid activity. The low energy associated with diminished thyroid activity will often produce depression. Hypoglycemia and digestion problems also commonly occur with this mineral pattern. The high Na/K ratio accounts for the anxiety, anger, and mania of the “pseudo” Bi-polar condition. Coffee and other stimulants such as Ritalin are likely to trigger manic episodes in a person who has the mineral imbalances shown in Fig. 2 in which potassium deficiency also is plainly evident.

Ms. Wise’s dietary recommendations to increase potassium intake certainly make a lot of sense, but in my experience, diet changes alone are unlikely to correct the substantial nutrient mineral imbalances that are revealed in a hair mineral pattern as shown in Fig. 2. The combination of diet and nutritional supplements that include magnesium and potassium are much more likely to support the nutritional needs of a person with these mineral deficiencies and imbalances. Zinc and vitamin C are also helpful to the person with this mineral imbalance in order to reduce the excessive copper level and allow the low potassium level to increase. However, one needs to be extremely cautious in providing high doses of zinc and vitamin C supplementation when a high copper level is present. These nutrients may trigger a substantial copper detoxification process that can temporarily intensify both psychological and physical symptoms such as those shown on the Health History Checklist below. Individuals who are attempting to reduce the excess copper level may become overwhelmed by the intensity of the symptoms that flare-up with a heavy copper detoxification.

### **Health History Checklist**

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Circle the number for any current problems; place an "X" beside any past problems

1. PMS
2. Fatigue & exhaustion
3. Allergies
4. Mind is in a fog
5. Headaches, migraines
6. Mood swings
7. Supersensitive, weepy
8. Cold hands, and/or feet
9. Depression
10. Dry skin
11. Chocolate cravings
12. Feeling of loss of control
13. Paranoia
14. Despair, suicidal feelings, hopelessness
15. Arthritis, calcium spurs
16. Constipation
17. Racing heart, pounding heart
18. Adverse reaction to vitamins & minerals

19. **Problems with concentration and memory**
20. **Short attention span, "spaciness"**
21. **Eating disorders: anorexia, bulimia, overeating**
22. **Panic attacks, high anxiety, free floating anxiety**
23. **Yeast infections (*candida*)**
24. **Aching muscles or muscle cramps**
25. **Hypoglycemia**
26. **Mind races -- insomnia, interrupted sleep**
27. **Cysts**
28. **Mononucleosis**
29. **Low blood pressure**
30. **Obsessive thoughts**
31. **Hypothyroid (slow thyroid)**

### References

1. Watts, D. L. "The nutritional relationships of copper." *Journal of Orthomolecular Medicine*. 4, 2, 1989.
2. Watts, D. L. *Trace Elements and Other Essential Nutrients: Clinical Application of Tissue Mineral Analysis*. Trace Elements, Inc., Dallas, Texas, 1997.
4. Mason, Karl E. "A conspectus of research on copper metabolism and requirements of man." *Journal of Nutrition*, vol. 109, no. 11, November, 1979. (pp. 1979-2066).
5. Mehta, S. W. & Eikum, R. "Effect of estrogen on serum and tissue levels of copper and zinc." *Advances in Experimental Medicine & Biology*. 258: 155-62, 1989.
6. Pfeiffer, C. *Mental and Elemental Nutrients: A Physician's Guide to Nutrition and Health Care*. New Canaan: Keats, 1975.
7. Pfeiffer, C. & Mailloux, R. "Excess copper as a factor in human diseases." *Journal of Orthomolecular Medicine*, 1987, 2, no. 3, 171-182.
8. Malter, R. F. "Biochemistry and Psychodiagnostics: A Historical Perspective" in Malter, R. F. *The Strands of Health: A Guide to Understanding Hair Mineral Analysis*. E.H.R. of AZ, Cottonwood, AZ, 2003.
9. Colburn, T., Dumanoski, D., & Myers, J. P. *Our Stolen Future*. Dutton-Penguin, NY, NY, 1996.
10. Malter, R. F. "Trace mineral analysis and psychoneuroimmunology." *Journal of Orthomolecular Medicine*, 2nd quarter, 1994, Vol. 9, No. 2, 79-93.
11. Malter, R. F. "Trace mineral analysis and psychoneuroimmunology." *Townsend Letter for Doctors & Patients*. Port Townsend, Washington, April, 1996.
12. Malter, R. F. *The Strands of Health: A Guide to Understanding Hair Mineral Analysis*. Education and Health Resources of AZ, Cottonwood, AZ, 2003.
13. Malter, R. F. "A Developmental Study of Sex Differences in Hair Tissue Mineral Analysis (HTMA) Patterns at Ages 6, 12, and 18." *Journal of Orthomolecular Medicine*, fourth quarter, 2005 Vol. 20, No. 4 245-254.

