The Influence of "Junk" Science in Manipulating and Shaping the Health Care Marketplace

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For the second time in the past 15 years, the Journal of the American Medical Association has published an article attacking the reliability of the test results produced by laboratories doing hair tissue mineral analysis.[1,2] Both times, I found that the test results and conclusions published in JAMA ran totally counter to my personal and professional experience with hair tissue mineral analysis.[3,4] My curiosity was aroused by the fact that a well-executed press release and media campaign immediately accompanied each of these JAMA articles so I reviewed copies of each of the articles. Not surprisingly, each of the "research" articles was based on a very small sample–hair cut from either one or two subjects. In the 1985 JAMA study, shoulder length hair was used for collecting the hair samples. Samples should be cut no more than one inch from the scalp. This and other methodological problems raised a number of serious questions about the findings and conclusions of that study.

The more recent JAMA article (January 3, 2001) attempted to correct some of the obvious weaknesses of the 1985 study by submitting hair samples collected from one person to 6 different laboratories! At best, this 2001 JAMA study was a very small limited study, yet it was accompanied by a large-scale media campaign with an immediate press release attacking the reliability of hair tissue mineral analysis. This was the same pattern used in 1985, also with a limited highly questionable study. Why would JAMA mount a large-scale media campaign about the results of such limited studies that are so obviously open to criticism? What are the most obvious weaknesses of this 2001 study? One is that the authors included an unlicensed laboratory's data when they could have included data from another licensed laboratory. This had a major effect on the outcome of the data analysis.

Among the several hair mineral analysis laboratories, there is a difference of opinion about the manner in which a hair sample should be prepared for laboratory analysis of mineral and toxic metal content. This is a factor that can lead to different measures of certain minerals, especially sodium and potassium. The laboratories that wash the samples extensively before doing the analysis will typically report significantly lower measures of the sodium and potassium content. Therefore, the most appropriate comparison of the accuracy and the reliability of results from a hair tissue mineral analysis should be done by comparing two or more laboratories that use the same procedure for preparing and washing the samples. The authors of the article published in the January 3rd, 2001 issue of JAMA made several major errors in their handling of the data. One is that they compared the accuracy of the test results from labs using different sample preparation procedures. This is like comparing apples to oranges. They also did not divide their data into (1) essential nutrient minerals, (2) other minute obscure minerals, and (3) toxic metals. When they handled their data, they took very precise parts per million data and re-grouped all three of the above categories into three new categories: above normal, within normal, and below normal. This procedure leads to a confounding of reliability assessment with clinical validity. It also resulted in a gross distortion and transformation of the original precise data.[5]

The basic data reported by the laboratories doing hair tissue mineral analysis are in

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parts per million, a very precise numerical form. This is a uniform measure of the quantities of essential nutrient minerals found in a human hair sample – calcium, magnesium, sodium, potassium, copper, zinc, iron, phosphorus, manganese, and chromium. These are the minerals that are most closely related to the psychophysiology of the stress response and to the body's energy producing pathways.[6] The laboratories also measure and report some toxic metals such as lead, cadmium, mercury, and aluminum.

This distortion and transformation of the data is clearly seen when we compare the original parts per million essential nutrient mineral data for labs ARL & TEI with the transformed data for these same two laboratories. These two laboratories are comparable in their procedures for preparing the hair samples for analysis. Therefore, one would expect to find that they have very accurate and highly reliable results when they analyze comparable hair samples from the same person. This is indeed the case when we compare the essential nutrient mineral data reported for these two laboratories in Table 3 in the JAMA 2001 article. As is clearly evident **Table 1** (below), six of the 10 essential nutrient minerals are identical for these two laboratories. The other 4 essential nutrient minerals are very close in value and well within the error of measurement. In other words, the accuracy and reliability of these data are extraordinarily highThese numbers above are in milligrams per cent: parts per million divided by 10 so that all of the relationships between numbers remain the same arithmetically.

In contrast, these precise highly reliable data were distorted and transformed by the authors of the JAMA study leading to a spurious and very misleading statistical result. This statistical artifact served as the basis for their conclusion that hair mineral analysis is highly unreliable.

These very precise numerical data were transformed and categorized as "above normal", "within normal", and "below normal" that adds an interpretation to the actual measured data. This transformation or interpretation is presented in **Table 2**, (p. 3). A good example of this transformation process is noted in the manner that the JAMA phosphorus data were handled. Both ARL & TEI reported a phosphorus level of 12 mg/%–identical measures–on a scale with 16 mg/% as their ideal level for phosphorus. This phosphorus level of 12 mg/% was classified as below normal for ARL and within normal for TEI even though the ideal readings were identical (16 mg/%) for the two labs and the JAMA sample measures of phosphorus were identical. The statistical analysis that included these transformed data was reported as indicating a significant difference between labs and served as the basis for the authors' conclusion that hair mineral analysis is highly unreliable.

Another distortion of the original precise hair analysis data involved combining toxic metal data with nutrient mineral data in an interpretive classification system

Table 1. JAMA 2001 Nutrient mineral data from ARL and TEI laboratories.

	Ca	Mg	Na	K	Cu	Zn	Fe	P	Cr	Mn
ARL	27	3	7	3	1.3	16	0.5	12	0.02	0.01
TEI	27	4	7	4	1.2	16	0.5	12	0.01	0.01

noted above–"above normal," "within normal", and "below normal." Such a system may make some sense for nutrient mineral data, but it makes no sense for toxic metal data. For nutrient mineral data, it implies that there is a biological norm for a particular nutrient mineral. The biological "norm" for a toxic metal is 0. The fact that in any given sample of people, there is a toxic metal reading above 0 simply indicates the extent of toxic metal accumulation due to environmental exposure. Therefore, the combining of nutrient mineral data with toxic metal data in a table classifying 19 "minerals" without noting this is a gross distortion of the data and leads to a spurious data analysis. The result of this transformation of data is clearly seen in the table below.

This distortion and transformation of the original precise and highly reliable data became the basis for the extremely misleading conclusion that hair tissue mineral analysis is very "unreliable" and, therefore, should not be used in clinical practice. The fact that a well executed press release and media campaign immediately accompanied this totally misleading conclusion raises some serious questions about the intentions at work here. This is especially so in light of the fact that a similar press release and media campaign accompanied an earlier article in JAMA published in August, 1985 that also was highly critical of the reliability of hair tissue mineral based on very sloppy "research" methods and data analysis.

Historically, this use of "science" publications with a large-scale media campaign has driven countless doctors and the public away from using hair mineral analysis to assess nutrient minerals such as calcium and magnesium at a cellular level. Since hair mineral analysis is one of the best ways to assess magnesium deficiency, one can only wonder how many people have died of heart attacks associated with cellular magnesium deficiency that could have easily been prevented with nutritional supplementation during the past 15 years.[7,8] How many more preventable heart attacks will occur as a direct result of this most recent JAMA article using unscientific methods to attack the reliability of hair tissue mineral analysis?

When a very limited and poor quality research article is published in a prestigious professional journal like JAMA and is immediately accompanied by a major media campaign before this article can be critically reviewed, it raises serious questions about the intentions behind the publication of this type of "junk" science. Was it done to undermine the use of hair mineral analysis and the nutritional supplements that are often used as a follow-up to the mineral analysis? Was it done to cast a negative view of hair tissue mineral analysis and to influence and manipulate the media, the health care professions, the general public and the government? Intention in science and in health care, especially when strong judgment and the media become involved, broaden the domain of the scientific enterprise to include psychological, economic, social and professional issues.[9]

Table 2. Classification of 19 minerals by ARL and TEI laboratories.

	ARL	TEI
Above Normal	1	1
Within Normal	4	10
Below Normal	14	8

References

1. Seidel S, Kreutzer R, Smith D, McNeel S, Gilliss D: Assessment of commercial laboratories performing hair mineral analysis. *J Am Med Assoc,* 2001; 285: 67-72.
2. Barrett S: Commercial hair analysis: Science or scam? *J Am Med Assoc,* 1985; 254: 1041-1045.
3. Malter, RF: It saved my life! Tissue mineral analysis in health maintenance.*www.rickmind com.* 1997.
4. Malter RF: Trace Mineral analysis and psychoneuroimmunology. *J Orthomol Med,* 1994; 9: 79-93.
5. Malter RF: Some problems with measurement and statistics applied to hair analysis. Unpublished paper. Education & Health Resources, Inc.1992. *rickmind@verdelonline.com*
6. Malter RF: Trace Mineral Analysis and Psychoneuroimmunology. *J Orthomol Med,* 1994; 9: 79-93.
7. Seelig M: Cardiovascular consequences of magnesium deficiency and loss: pathogenesis, prevalence and manifestations. magnesium and chloride loss in refractory potassium repletion." *Am J Cardiol,* 1989; 63: 4G-21G.
8. Malter RF: It saved my life! Tissue mineral analysis in health maintenance. *www.rickmind.com.* 1997.
9. Malter RF: The NAS Risk Assessment Model for Establishing Upper Intake Levels for Nutrients: A Critical Review from a Psycho-physiological Perspective. *J Orthomol Med,* 2000; 15: 69-81.