ASSESSING SELENIUM CHELATES IN A PROPER PERSPECTIVE

The biologic value of selenium supplementation, and for that matter most of the trace minerals, is highly dependent on its form; and for chelate forms - the type of ligand, and the completeness/strength of chelation of its valences, the inherent absorbability of the ligand, and finally the ability to be incorporated in the final functional form or functional retention.

Current findings have indicated that such minerals in their standard inorganic form are poorly absorbed (from less than 0.5% for selenium and chromium to a high of 25% for iron), and that attaching the metal ions to appropriate ligands (chelation) drastically improves absorbability.

Chelation of selenium using amino acids have allowed drastic improvements in its absorbability and eventual tissue retention and function.

There appears to be an emerging perception in the industry, resulting from elaborate information campaign of a manufacturer, that selenium methionine form from yeast or selenomethionine, is the most effective and appropriate form, in view of their finding that selenomethionine is the storage form of selenium in plants, algae and yeasts, that methionine is directly convertible to cysteine, and that the functional form of selenium is selenocysteine.

A proper perspective and understanding on the biologic function and utilization of selenium by the animal appears indicated.

A. Selenium has been identified as a functional part of an enzyme glutathione peroxidase (**GPX**). This enzyme is found all over the body, primarily as part of the antioxidant defense mechanisms, involved in protecting most cells from harmful effects of circulating radicals. It is particularly active in the circulatory and immune system, in the production and function of immune cells and immune response materials.

B. **GPX has been found to be a selenoprotein complex, made up primarily of selenium and three amino acids - cysteine, glycine and glutamic acid.**

C. Following the normal biologic flow of nutrients in an animal body, selenium, in its chelated form, is absorbed in the intestines into the portal circulation and to liver processing, and depending on its form, is either separated from its ligand, or if its ligand is identified by the cells as part of a final form, will be further built up with other components, then sent via the circulation to final target cells for final buildup or functional incorporation into the cell matrix.

D. **Selenomethionine is not produced by animals/mammals nor is it normally present in animal tissues.** Selenocysteine is a form present in animal tissues. **Selenomethionine is the form present in plants**

Although selenomethionine is chemically directly convertible to selenocysteine, their molecular characteristics, the basis of cellular level identification, are grossly different. Thus, the animal cells can not identify selenomethionine as a utilizable biologic form, and consequently separate

the selenium from the complex, then reattach the selenium to available cysteine, glycine, glutamic acid and other components to form the target GPX. Selenomethionine, in this respect, appears to be just a carrier/transport medium for absorption purposes, not as a functional, biologically utilizable form. Thus, selenomethionine is no different from other selenium chelates, as they eventually go thru the same biologic breakdown/synthesis processes after absorption.

Assuming also, for purposes of discussion, that selenium substituted methionine will be biologically recognized, as methionine is an essential and a limiting amino acid, chances are it will be used by the body as methionine, not converted into cysteine (which is not an essential or limiting amino acid and is therefore readily available), nor broken down to avail of the selenium. This effectively defeats the purpose of using selenomethionine as a way to supplement selenium. Thus, the reasons supporting the claim that selenomethionine is the form required by animals and is the most appropriate form for animals appears misplaced, as they are **not in consonance with recognized and established nutrient utilization processess in the animal body.**

A second vital point to be considered in selenomethionine from yeast is the basic digestibility, not of the selenomethionine, but of the yeast, where selenomethionine is an integral structural part.Yeast sourced selenomethionine is produced by growing yeast in a high selenium and methionine concentration growing media, where the growing yeast uptakes the two materials and incorporated in its tissues. Yeast cell wall is predominantly composed of ***beta*** form of xylose, a material **indigestible to monogastrics**. **This material in the yeast cell wall drastically reduces the digestibility of yeast to monogastrics, and therefore, very significantly reduces the bioavailability of the selenomethionine contained within.**

Considering the above, the logical preference for a selenium supplement will be a selenium chelate which utilizes either one or all of the three amino acids (cysteine,glycine and glutamic acid) present in the final, functional biologic form (GPX).

Major Sourcess:
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Sunde, R., Molecular Biology of Selenoproteins; Annual Review of Nutrition, 1990
Animal Clinical Nutirtion, Lewis, Morris & Hand.