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BIOAVAILABILITY OF SELENIUM

Introduction

Selenium is an essential trace metal for human and animals. The National Academy of Sciences recommends 200 micrograms of Selenium per day in the diet of a human adult.

The role of Selenium in the body has not been completely elucidated. However, Selenium has been found to be essential for formation and activity of glutathione peroxidase, an enzyme. This substance plays a role in the immune system of the cell. The enzyme is necessary to protect the body against inflammatory agents, mutagenic agents, and carcinogens. It also protects the tissues from oxygen-induced damage and is necessary for production of viable sperm in the male. Selenium has been found to be protective when the toxic heavy metals are consumed or breathed.

Bioavailability Study

Rats are the most commonly used animal to test the bioavailability of trace elements because their diet can be carefully controlled and large numbers may be easily maintained for long periods of time. Nine groups of 5 rats each were used for the study. They were all fed a Selenium deficient food (Nutritional Biochemicals) for 12 days. Then each group of 5 rats was fed a certain amount of selenium in one of three forms, inorganic selenium, sodium Selenite, amino acid chelate selenium and High Selenium Yeast. The amounts of selenium fed were 50 parts per billion (ppb), 100 ppb and 200 ppb in the diet. At the end of 33 days of selenium feeding, the rats were sacrificed and their blood and liver analysed for selenium by fluorescent assay. The results are listed:

Blood

Form of Selenium	Se in Food (ppb)	Average Selenium (ppb)
Inorganic	50	463
Inorganic	100	790
Inorganic	200	1249
Amino Acid Chelate	50	332
Amino Acid Chelate	100	560
Amino Acid Chelate	200	811
High Yeast	50	708
High Yeast	100	947
High Yeast	200	1533

Liver

Form of Selenium	Se in Food (ppb)	Average Selenium (ppb)
Inorganic	50	490
Inorganic	100	727
Inorganic	200	933
Amino Acid Chelate	50	503
Amino Acid Chelate	100	750
Amino Acid Chelate	200	1129
High Yeast	50	651
High Yeast	100	908
High Yeast	200	1597

From this data the relative bioavailability can be calculated. The slope of the plot of Selenium food (x-axis) as Selenium in Blood and Liver (x-axis) represents the bioavailability. The inorganic selenium for comparison purposes is said to be 100% bioavailable. The other forms of Selenium may then be compared by comparing the slopes to that of inorganic selenium. The results are listed below:

Blood

Form of Selenium	Slope of plot	Relative Bioavailability
Inorganic	5.15	100%
Amino Acid Chelate	3.10	60%
High Yeast	6.23	122%

Liver

Form of Selenium	Slope of plot	Relative Bioavailability
Inorganic	2.83	100%
Amino Acid Chelate	4.12	146%
High Yeast	6.39	226%

The concentration of Selenium in the blood represents the current Selenium status of the individual. Blood is the carrier of Selenium such as glutathione peroxidase are synthesised.