



ORIGINAL ARTICLE

THE TAURINE/MERCURY/GLYCINE CONNECTION

EPILEPSY - HEART DISEASE - CHOLESTEROL - GALL STONES

Sam Ziff & Michael F. Ziff, D.D.S.

"Taurine, one of the lesser-known amino acids, plays several important roles in the body and is essential to newborns of many species. Along with methionine, cystine and cysteine, it is a sulfur amino acid." "Glycine and taurine have virtually identical action on neurons during experimental conditions...Glycine, taurine and GABA are the major inhibitory neurotransmitters of the human brain." The quotes are from the outstanding book on amino acids written by Eric R. Braverman, M.D. with Carl C. Pfeiffer, M.D., Ph.D. published by Keats Publishing, Inc. New Canaan, CT. The book is entitled "The Healing Nutrients Within - Facts, Findings and New Research on Amino Acids."(1) Every health care provider should read this book. It is written in an easy to read style and contains a wealth of clinical applications in the use of amino acids to treat a myriad of health problems. The book is available from Bio-Probe at the cover price of \$27.95 plus \$2.00 postage.

Our interest in the sulfur amino acids is the ability of the toxic element mercury to seriously affect the biochemical pathways in the body. In Chapter 11 of Infertility and Birth Defects we explore, in some detail, how mercury affects the transsulfuration pathways and other biochemical pathways not under the direct influence of the sulfur amino acids.(2)

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When we think of sulfur amino acids, cysteine and methionine come immediately to mind because so much more has been written about them. Taurine was not considered an essential nutrient and thus did not receive much attention. However, the research that has been done in recent years proves that it plays a major role in electrically excitable tissues, being intimately involved in normal functioning of the brain, heart, gallbladder, eyes and vascular system. Taurine's involvement is in its ability to stabilize electrically the cell membranes by helping the passage of sodium and potassium into and out

HIGH LEVELS OF MERCURY FOUND IN THE BRAINS OF ALZHEIMER'S VICTIMS.

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of cells. There is also data showing the same kind of involvement with calcium and magnesium.

We found this of particular interest because of the ability of mercury to influence intracellular levels of all these electrolytes. For example, Shier and Du Bourdieu found that mercury can mimic calcium, competing for the same cellular binding site as calcium and through this mechanism induce cell death.(3) At about the same time, Miyamoto found that at motor nerve terminals, mercury caused irreversible depolarization leading to an irreversible block of transmitter release. This study indicated that the neurotoxic action of mercury was at an intracellular site, possibly involving sulfhydryl groups, and that entry was gained through both sodium and calcium channels(4)

In a recent in vitro study, using Glycera red blood cells, mercuric chloride rapidly inhibited taurine influx 95% within one minute of exposure. The results suggested that the sulfhydryl groups associated with transport protein are readily accessible to the mercury and that the sodium independent component of taurine transport is susceptible to inhibition. Furthermore, inhibition of transport also occurred without sodium in the medium suggesting that the mercury also acts on the sulfhydryl fraction of the carrier protein.(5)

Braverman and Pfeiffer state that in the developing brain, taurine is the most plentiful amino acid and that in the adult brain it is the second most plentiful. Further, within the brain taurine appears to be concentrated in the olfactory bulb (taste and smell), the hippocampus (memory center), and pineal gland thought to be involved in the body's responses to light and dark.(1) In a recent radiographic study with rats, taurine was found in the cortex of the kidney, the liver, pituitary, thymus, adrenals, eyes, nasal mucous membranes, salivary glands, heart and the mucous membranes lining the digestive tract.(6)

It is fascinating to note that in autopsy studies on humans, mercury has also been present in most of these same locations, which again only demonstrates the great affinity of mercury for sulfhydryls.

A recent study found that there are approximately two million children who suffer from epilepsy. The authors of the 450 page study concluded that little is certain about the prenatal and perinatal causes of epilepsy.(7) A neurotransmitter is released when a neuron or nerve cell is excited and helps to carry the nerve impulse across the synapse to the next nerve cell, which it inhibits or excites. An important role of taurine is to stabilize electrical activity and help maintain homeostasis, especially in the brain. In addressing the possible relationship of taurine to epilepsy, Braverman and Pfeiffer (1) bring out the following points:

1. One theory of the cause of epilepsy relates to abnormal amounts of glutamic acid in the brain. Taurine works by normalizing the level of glutamic acid and research with mice has shown that a lack of protein or taurine during the first two weeks of life permanently affects the level of glutamic acid in the brain.
2. Taurine increases the rate of action of glutamate decarboxylase, an enzyme which breaks down glutamic acid. Taurine's anticonvulsant action must be due to its ability to lower brain glutamic acid levels.
3. Vitamin B6 is necessary for the synthesis of taurine. Taurine is closely associated with or bound to zinc and manganese. Stress can deplete the body of zinc and B6 which may also lead to lowered levels of taurine. Certain types of seizure disorders are worsened by stress.
4. The total evidence suggests that brain taurine deficiencies can be corrected by oral taurine and this fact has been demonstrated clinically.
5. Newborns fed formula often develop higher levels of bilirubin (a red bile pigment that can cause jaundice). The main danger of high bilirubin levels at birth is their potential for causing brain damage. When the infant is breastfed or sufficient levels of taurine are added to infant formula, jaundice is rare.

Glycine is also a factor that must be considered when discussing neurological functions within the brain. "In the treatment of epilepsy, data about glycine seem to be similar to those on taurine, with increased levels of glycine in the brain, particularly at the epileptic focus. The brain naturally accumulates more glycine at