

Nutrition, Biochemistry, and Tinnitus

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Abstract: Biochemical mechanisms are a significant factor in neurootological problems. Investigation of biochemical causes of neurootological problems, such as tinnitus, are warranted and can be cost-effective. Dietary, nutritional, chemical, hormonal, immunological, and stress factors are involved directly in neurootological problems and must be evaluated and considered in designing the treatment regimen for patients complaining of tinnitus.

The process of chemical conversion of energy within the inner ear identifies the inner ear as an integral body organ and, therefore, relates the inner ear to other internal body organs, such as the kidney, liver, and thyroid. The functions of sugar and fat metabolism, of hormonal control, and of the immune and stress systems are involved in the chemical control of inner-ear biochemistry. The source of the chemicals involved in all these processes is the food that each of us eats.

The processing of the chemicals that originate in our food and the transport of the chemicals to the inner-ear fluids involves a three-step obstacle course. These obstacles are the gastrointestinal wall, the blood-brain barrier, and the endolymphatic sac and duct. At each step along the way, differential absorption allows passage of only the necessary chemicals at the proper concentration for efficient inner-ear function.

Can anyone question, then, that proper nutrition is significant? Is not supplementing our diet with necessary nutrients important? Incorporating nutritional management is far better than using drugs without therapeutic effect and with many side effects.

What then are the tests that must be performed to determine the proper therapeutic regimen? After a complete history and physical examination are obtained, the confirmatory tests include the following: audiological evaluation, vestibular function testing, biochemical, immunological, and hormonal testing, and imaging and brain-mapping tests.

The necessary tests within the audiological area are the following:

Pure-tone air and bone conduction audiometry
Speech reception thresholds and discrimination tests
Tympanometry and stapedial reflex tests
Auditory brainstem-evoked responses to include middle and late latency function tests
Tinnitus matching and suppression tests
Otoacoustic emissions

This battery of audiological tests is useful for identifying the lesion site.

The biochemical metabolic evaluation of neurootological patients should include the following tests:

Cholesterol
Triglyceride
Thyroid
Glucose tolerance response, electronystagmography monitored
Blood urea nitrogen
Serum glutamic-oxaloacetic transaminase
Complete blood cell count
Fluorescent treponemal antibody absorption test
Prolactin level in women
Uric acid
Radioallergosorbent test immunological studies
Fasting blood sugar

The number of abnormal test results in neurootological patients has been greatest in fat metabolism, sugar metabolism, radioallergosorbent studies, and fluorescent treponemal antibody absorption tests. Abnormality has been found next most commonly in the prolactin testing. Some abnormalities of liver and kidney function and an occasional abnormality in the thyroid testing have been found.

In the fat metabolism area, triglyceride abnormality has been the most common abnormal finding. Management of these abnormalities is based on phenotype,

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low-density lipoprotein, and high-density lipoprotein measurements. These are performed before a routine of treatment and dietary instructions are given to the patient.

Control of sugar metabolism abnormalities, both in the hyper- and hypoglycemic states, is accomplished by diet. A great number of patients with poor nutritional habits have been found and confirmed on the basis of electronystagmography-monitored glucose tolerance curves (flat).

Both clinical and research confirmation has corroborated convention allergy triggers as the cause of neurootological abnormalities. Inhalant allergies are by far less commonly responsible than are food and chemical triggers. The anecdotal reports of the past have been corroborated by research documentation. Immunological causes have been responsible for the neurootological symptoms in 15% of my patient population. Also, in many more patients with neurootological symptoms, immunological triggers occur in combination with other biochemical or metabolic factors.

The abnormalities found on the complete blood count studies have been anemias, polycythemias, and an occasional case of leukemia. Abnormalities of liver function with the serum glutamic-exaloacetic transaminase test have been found to be primarily in alcoholics. Most alcoholics do not admit that they are, in fact, alcoholic when their history is taken. The relationship between kidney abnormality and inner-ear abnormalities for both hearing and balance problems has been discussed in the medical literature for many years. We have found an occasional problem that fits into this category of abnormality.

The relationship between prolactin levels in women and neurological abnormalities have been described by Katsarkis, Growdon and Wurtman. The most interesting relationship is the fact that a deficiency in tryptophan in persons who have poor dietary intake, especially women, causes an elevation of the prolactin levels and, therefore, inner-ear abnormality. Such patients' disorders are controlled easily with a change of diet and with tryptophan supplementation. Tryptophan is involved in the serotonin cycle, and this well may be the neurotransmitter basis of the problem.

The high levels of zinc normally found in the cho-

roid of the eye, the inner ear, and prostate have been described by a number of investigators, particularly Shambaugh [1]. The use of zinc supplementation is a method of treating patients in whom the levels of zinc or calcium, or both, are low and may be the cause of tinnitus, hearing loss, or dizziness.

Biochemical evaluations have been extremely rewarding in the search for etiological mechanisms in neurootological patients. These mechanisms can be directly related to nutrition.

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