

THE UPLINK

Merging Contemporary Chiropractic Neurology and Nutritional Biochemistry in the Tradition of Applied Kinesiology

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THE AMMONIA SNIFF TEST

In the previous issue of *THE UPLINK* we reviewed the olfactory challenge procedure – the bleach sniff test. This issue we will also discuss another olfactory challenge - The Ammonia Sniff Test - which was first presented at the ICAK meeting in the summer of 1989.

Ammonia (NH₃) metabolism plays critical roles in many metabolic pathways in the body, not the least of which is the synthesis and degradation of amino acids for protein metabolism. The primary enzymes which move NH₃ around the body are called transaminases (to “transport ammonia.”) These include the SGOT and SGPT blood tests where the “T” stands for transaminase. (See next page.) All transaminase enzymes are dependent on vitamin B-6 in its activated pyridoxal-5-phosphate (P5P) form. The erythrocyte GOT test (EGOT) is a functional lab test which has been used as an indicator of B-6 status.

SIMPLIFIED PROCEDURE SUMMARY

All of the major biochemical pathways associated with ammonia metabolism are covered in the following procedure. The order of testing is based on the frequency of findings in our office. Your patients might exhibit a different prevalence pattern. There are some less frequent nutrients which occasionally occur, and these can be found listed in the original paper and in a more thorough algorithm which can be found on our web site. (See next page.)

1. Ammonia sniff weakens a strong muscle.
2. Test an inhibited muscle and orally test each of the following nutrients for strengthening:
 - a) B-6 (PYRIDOXAL-5-PHOSPHATE)
 - b) MOLYBDENUM
 - c) IRON
 - d) CAC FACTORS: B-1, B-2, B-3, Mn, B-5, LIPOIC ACID, BIOTIN, Mg.
 - e) ARGINASE (Requires Mn) (Argizyme by Biotics; Arginex by Standard Process)
3. Test the strengthening nutrient(s) while the patient sniffs ammonia to find which one(s) negate its weakening effect.
4. Supplement with those nutrients which block the weakening effect of the ammonia sniff.

GETTING RID OF AMMONIA WASTE

The previous procedure will identify nutrients which are necessary to make the following pathways function properly. Some ammonium ion (NH₄⁺) is excreted in the urine, but most ammonia is excreted by 3 major metabolic pathways via:

- 1) the urea cycle,
- 2) purines (e.g., uric acid), and
- 3) creatinine.

When an ammonia sniff induces inhibition, it suggests that there is an excess buildup of NH₃ due to a *functional* problem with one of these normal routes of ammonia excretion, usually due to a need for the appropriate nutrient(s). (We must also consider that there could be a *pathological* state occurring such as kidney failure.)

1) The synthesis of urea by the urea cycle depends on adequate activity of the citric acid cycle (CAC.) The CAC produces two substances which are essential to urea cycle function: carbon dioxide (CO₂) which combines with NH₄⁺ to begin the urea cycle, and aspartate (via amination of oxaloacetic acid.) The urea cycle also requires several other nutrients and the enzyme arginase to free up urea for urinary excretion. Arginase is manganese dependent.

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2) Uric acid is the breakdown product of purines and each molecule of uric acid contains four nitrogen groups derived from NH_3 . The body must convert purines to uric acid to eliminate these nitrogen (NH_3) groups. This process requires iron (Fe) and molybdenum (Mo.) The lack of Mo is often found in Candida (and other fungal) patients. This is due to depletion of Mo which is used up in metabolizing the toxic acetaldehyde given off by the yeast or mold.

3) Arginine (ARG) from the urea cycle (or elsewhere) combines with glycine and is converted into creatine phosphate (for energy needs) and further converted into creatinine which spills into the urine. This pathway serves as a back-up system for NH_3 waste removal if the conversion of arginine to urea gets blocked in the urea cycle.

TYPICAL PATIENTS

Do this test in ANY neurological symptom (NH_3 has significant neurotransmitter effects), in ANY water holding problems including menstrual and premenstrual problems, or ANY difficult patient.

■ **DO YOU TREAT DISTANCE ATHLETES?** A rare but interesting example of the NH_3 weakening effect is related to the depletion of the creatinine pathway (See #3 on previous page.) Screening for this problem is NOT covered in the Simplified Procedure. This pattern occurs in some long distance athletes (marathoners, triathletes) within hours to days after a race. During the race, the athlete will deplete ATP and all other energy stores including creatine phosphate. In the process, ARG will shunt from the urea cycle to combine with glycine (GLY) and phosphorus to produce creatine phosphate, thereby depleting GLY, phosphorus and possibly ARG. This depletion, along with increased NH_3 from muscle breakdown, creates a slowing of the recovery process.

So if the NH_3 sniff weakens a long distance athlete after competition, and ARG strengthens, test for: B-6 (P5P), Mg, biotin, aspartate / CAC factors, all of which are necessary in the repletion of arginine, and especially PHOSPHORUS. If NH_3 sniff weakens, ARG weakens and GLY strengthens: test for GLY cofactors (folic, B-2, Mn, P5P) and PHOSPHORUS.

■ **WHEN THE NH_3 SNIFF STRENGTHENS:** You will occasionally find that an ammonia sniff strengthens a weak muscle. This can be due to several factors:

A) Most commonly, this is due to an inability of the body to supply adequate NH_3 molecules due to decreased transaminase activity because there is inadequate B-6 (P5P) activity to activate these enzymes.

If P5P strengthens, and B-6 does not, it suggests an inability of the patient to activate dietary B-6 to the active coenzyme P5P form. This usually indicates the need for another nutrient (Mg, Zn, B-2, or phosphorus), but can also be due to a genetic inability to make the conversion wherein the patient must be supplemented with P5P directly. (See *THE UPLINK* Issue #25.)

B) A deficiency of NH_3 due secondary to protein deficiency can also cause the NH_3 sniff to strengthen. Look for inadequate dietary protein intake, or poor protein digestion and absorption.

■ **BY ANY OTHER NAME:** The old transaminase tests, the SGOT and SGPT which have for eons been part of traditional liver evaluation, are most often now called by new names. The SGOT (serum glutamic-oxaloacetic transaminase) is now called the AST (aspartate aminotransferase.) The SGPT (serum glutamate pyruvate transaminase) is now called the ALT (alanine transaminase.) These enzymes, regardless of their names, are both B-6 (P5P) dependent. LOW levels on a blood test should direct you to assess B-6 status.

■ **10TH ANNUAL "SKI WITH WALLY" SEMINAR** will be held in **Snowmass Village, Colorado** on Thursday, March 11th, Friday, March 12th, and Saturday March 13th, 2004 from 4:00 PM to 8:00 PM each day. By popular demand, we will return to Snowmass and the Stonebridge Inn for the third year in a row. It may seem a little premature to announce this now, but it's never too soon to mark your calendar for Ski With Wally!

■ **STEP-BY-STEP PROCEDURE DOWNLOAD:** Go to our web site, www.theuplink.com and you can easily download a file which contains an algorithm for assessing ammonia metabolism as discussed on the previous page. (This file was originally designed to be printed on 8½ by 14 paper, so it might not fit on a regular 8½ by 11 sheet of paper without cutting and pasting or reformatting.) Also in the file is a separate algorithm for step-by-step assessment of the

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urea cycle as well as a copy of the urea cycle pathway. You will identify the urea cycle associated nutrients in the first algorithm, so it is not necessary to apply this one clinically. It is more of an academic approach to show how one can “pick apart” the metabolism using muscle testing for neurometabolic assessment.

■ **SPECIAL 100 HOUR AK COURSE IN DALLAS:** Dr. Schmitt is teaching his Special 100 Hour AK Syllabus in Dallas starting on September 27-28, 2003. This will be the only presentation of this syllabus in 2003-2004 and the only plans for a Texas presentation. The location will be on the convenient Parker Chiropractic College campus. See the seminar schedule for the dates of all sessions. We are applying for chiropractic continuing education for Sessions 1 and 8 in Texas, Louisiana, Arkansas, and New Mexico.

Go to our web site, www.theuplink.com for more details including: “Everything You Need to Know About the Texas 100 Hour Course,” the “Reading, References, & Resources list,” a registration form, and the “Reading List for Session 1.” You will also find “testimonials” from doctors and students who have previously taken this course. The feedback from those who have completed the course speaks for itself.

There are special *pre-paid discounts* (for both doctors and students) which can amount to getting one session for free if you pre-pay for all 8. There is also a *refresher fee* available if you have taken the same session with Dr. Schmitt at another location in 2001 to 2003. For further information, **call Michelle at (919) 545-8829.**

■ **FALL COLORS – ASHEVILLE IN OCTOBER:** The North Carolina Chiropractic Association is sponsoring a special seminar with Dr. Schmitt in Asheville at the height of the fall color season. The topic, “Head, TMJ, & Dental Pain Relief,” will teach pain relief techniques which are relevant to the types of patients we all see on a daily basis in our practices.