

[Updated Gut protocol 4/4/06](#) -- Dr. Yasko's Gut Protocol

(<http://www.autismanswer.com/forum/viewtopic.php?t=3365&start=0&postdays=0&postorder=asc&highlight=>)

Gut, Sinus, Microbial Support/Thyroid Support

The use of vitamin C and Biotene toothpaste or mouthwash (available at your local pharmacy) may be useful in combating chronic streptococcal infection. The Biotene toothpaste, mouthwash and gum may also aid the mitochondria in detoxification and help to support SOD and glutathione mutations. Many individuals have issues with chronic streptococcal infection or chronic issues with other bacterial infections in the body. In addition chronic gut issues can indicate an underlying bacterial infection in the body.

Streptococcal infection in the gut can serve as a reservoir to reinfect the sinuses. Chronic streptococcal infection has been associated with OCD behavior as well as tics, over stimulatory behavior and perseverative speech. Streptococcal infection can also lay the groundwork for leaky gut which can relate to decreased weight gain or slower growth. Xylitol nasal spray will help to eliminate nasal strep, reduce ear infections and has been reported to help with leaky gut, most likely by decreasing the flow of streptococci from the sinuses into the gut. Xylitol is also available as a sugar for cooking and in Biotene gum, toothpaste and mouthwash. Another tip is to add in papaya enzyme with increased doses of vitamin C. This helps to support the body to eliminate chronic sinus issues as well as the reservoir of strep in the gut. I suggest that you use as much papaya enzyme and vitamin C as your body can tolerate without causing loose stools. ImmunFactor 5 once every other day will aid the body in addressing the bacterial issues as well as the use of Microbial Support RNA on a daily basis. The supplement IP6 may help to reduce stimulatory behaviors and OCD behaviors associated with chronic streptococcal infection as will the use of benfotiamine. The use of lactoferrin is also excellent to support the body in addressing streptococcal and other bacterial issues as it helps to limit the availability of iron for the microbes. This may also be helpful in reducing elevated levels of RBCs and high hematocrit values. Many microbes require the presence of iron for growth and/or virulence.

Aside from the toxic effects of mercury on the body, aluminum and lead toxicity can cause toxicity in the body. Bacteria seem to be able to hold onto aluminum. Aluminum is known to inhibit glutamate dehydrogenase which is an enzyme that converts glutamate to alpha keto glutarate. In addition aluminum interferes with the production of BH4. Therefore the presence of aluminum may be affecting levels of serotonin as well as dopamine in the body and may be affecting BH4 levels regardless of whether there is an MTHFR A1298C mutation. Malic acid, EDTA and horsetail grass are all helpful in binding aluminum in the body. As chronic bacterial infection is addressed it should help to aid in aluminum excretion.

As already mentioned the gut may be a source or reservoir for chronic bacterial infection if it is an issue in the body. There are a number of herbs that are useful in supporting the body to address bacterial imbalances in the gut. One natural mixture that appears to work includes neem, myrrh, golden seal, cranberry, Oregon grape, barberry, uva ursi; using 1/2 to one whole capsule

of each three times per day for one month (or more if needed). If a CDSA test indicates that organisms are resistant to any of these natural herbs a substitution can be made such that the resistant herbs in question can be replaced in the mixture with caprylic acid, oregamax, olive extract or GSE (grapefruit seed extract). Using a mixture of herbs such as these seven or more herbs simultaneously is less likely to lead to resistance than using single herbs to support the body in addressing microbial issues. Using seven different herbs at a time gives you the flexibility of using a small dose of each of the seven daily, or as one parent has suggested, using a different herb each day of the week at a slightly higher dose (one full capsule three times per day).

Cranberry is also excellent for support for the body to address E.coli and neem is supportive for parasites as well as for bacterial issues. Low levels of BH4 as a result of high aluminum in the body or as a result of mutations (MTHFR A1298C or CBS up regulations) can lead to more severe parasitic infections. The use of Paradex is also helpful for supporting the body to address parasites. Rosemary, sage, juniper berry and garlic also have antimicrobial activity. While garlic is particularly useful against a range of microbes, it is a sulfur containing herb that can be a problem in high doses for those who are CBS + or SUOX -.

It is also important to support normal flora. One successful strategy is to rotate the normal flora to get a good mixture and variety. Preferred sources of normal flora include suprema dophilus, Prescript assist, kyodophilus, Ultra dairy support (even if you are not eating dairy this is a good source of flora), a sprinkle of Toueff, Colon Health Support and allerdophilus. If possible use 1/2 to one whole capsule of a different source of normal flora each day of the week. You can also use the Mycology Support RNA and Candex and IMF #7 once a day, as well as the Bowel Support and Stomach pH RNA to help to balance the gut. By following this plan, you create an environment where the normal flora can thrive and as a result you will help to eliminate the offending organisms. At the end of a month it is a wise idea to run a complete diagnostic stool analysis (CDSA) to confirm that the gut flora is in balance.

In addition to its role in pancreatic support, CCK also appears to aid in addressing chronic bacterial loads in the body. As a result, the dose that is tolerated will depend in part on the bacterial load in your system. In order to use the CCK to address chronic bacterial issues it may require a much higher dose than the 1/4 tablet used only for pancreatic support. I suggest that you consider increasing the dose slowly from the 1/4 per day. You will get a sense over time of the maximum dose needed to help to aid in chronic bacterial issues. I suggest you consider starting with the 1/4 tablet along with 1/8 dropper CCK Support and gradually increase the CCK tablet by 1/4 amounts over time to three per day.

It is important if you have a history of problems keeping the gut flora in balance, to look at implementing all three aspects of the gut program.

- The use of Bowel support, Stomach pH, CCK/BioThyro (or alternating BioThyro with low dose prescription BH4)/malic acid/EDTA/horsetail grass is designed to help to change the gut environment so that it is less conducive to the growth of non ideal organisms and encourages the long term growth of beneficial organisms. That combination should also help

to chelate aluminum that is excreted as a function of elimination of imbalanced/dysbiotic flora.

- The use of a mixture of normal flora is designed to help to colonize the gut with a variety of normal flora. I have found that using the concept of rotating the sources of normal flora helps in establishing a nice balance of gut flora.
- The third arm of the gut program is to help to eliminate nonideal gut microbes. The use of the mixture of gut herbs (tailored to reflect the sensitivity testing results seen on a CDSA), along with the microbial support formula, IMF 5 and lactoferrin is designed to address bacterial imbalances. In a similar fashion the use of the mycology support formula, along with Candex, herbs as noted on a CDSA sensitivity test, IMF 7, and lactoferrin is designed to address yeast imbalances.

The situation regarding the bacterium *Clostridium* deserves special mention. There is some indication that *Clostridia* infection may have an impact on language. A severe expressive language delay was noted for an autistic child with a duplication of 28 genes on chromosome 7 (NEJM. 353:1694, 2005). This is the identical region that is deleted in children with Williams Beuren Syndrome, a condition that is characterized by accelerated language development. The implication is that one of these 28 genes plays a role in language. As I discussed at the conference in February, 2006 in Arizona, a close inspection of these 28 genes yields several candidates that may be involved in the apraxia noted in the autistic child with the gene duplication. Two of the 28 genes are involved in the binding of *Clostridia* toxins. In addition, I have come across a recent case where very high *Clostridia* levels were associated with decreased language for an individual. This does suggest that high levels of this anaerobic bacterium may play a role in limited language. There are several types of tests available to ascertain if *Clostridia* infection in the gut is an issue. Particular OAT/MAT tests indicate the levels of HPPA, which is described to be elevated with *Clostridia* infection. Levels of DHPPA on other OAT/MAT tests have formerly been discussed as relating to *Clostridia* levels. Since there continues to be some disagreement over the implication of the levels of these biochemical intermediates and their relationship to *Clostridia* levels, it is wise to run a specific stool test to confirm the presence of *Clostridia* toxins if you see elevated levels of HPPA or DHPPA listed on an OAT/MAT test. *Clostridium* is an anaerobe, which means that it does not grow well (if at all) in a high oxygen environment. Approaches for addressing *Clostridia* in the gut include the use of Oxydrene (1/2 once or twice daily), O2 Plus, Cell food (2 to 3 drops daily), Penta water; the herb bay leaf has been reported to be very effective against *Clostridia*, and Florastor to replace the presence of *Clostridia* with normal flora. An apraxia support formula is also under development at this time. Addressing *Clostridia* infection may also help with loose stools. The toxins excreted by *Clostridia* cause gaps between the cells lining the gut, adding to leaky gut issues.

Loose stools are an issue for a number of individuals, and I do understand that the SCD (Specific Carbohydrate Diet) has made a big difference in these cases. However, if you are supplementing protein it is important to monitor ammonia levels to be certain that the body is able to dispose of the ammonia properly that are generated from the intake of high protein foods. The body uses two molecules of BH4 to detoxify one molecule of ammonia to urea. This is an expensive way to use your BH4. BH4 is also needed for dopamine and serotonin synthesis, as

well as language related function. Adequate levels of GABA, BH4, and dopamine appear to play a major role in language development. Since language is a primary problem for many children, using up limited BH4 to detoxify ammonia may not be the best use of it for the body. In addition, ammonia is reported to inhibit the metabolism of butyrate, along with other short chain fatty acids. Butyrate is a nutrient used by cells that line the gut. Butyrate synthesis can be inhibited by H2S and sulfites that are generated as a result of the CBS up regulation, low molybdenum or SUOX mutations. Paradoxically, butyrate has been reported to be a potent detoxifier of ammonia. Ammonia detoxification also depletes stores of manganese that are needed for healthy dopamine levels.

Excess stomach acid in the system can cause loose stools and severe stomach pain. Ammonia that is generated from excessive protein is alkaline. This may help to neutralize the stomach acid and would make the stools and gut pain better. However, using a high protein diet to address loose stools is not dealing with the root of the problem if it is caused by excess stomach acid. Creating high ammonia levels via diet to neutralize acids treats the symptom but not the underlying imbalance in the body. Stomach acid is triggered by histamine reacting with H2 receptors in the stomach. So a high protein diet may be increasing ammonia which is neutralizing the stomach acid and improving the gut issue. However, it is not addressing why you have excess acid in the first place nor is it considering why there may be high histamine in the system (histamine is related to methylation function). In addition it is important to evaluate ammonia levels and to consider the consequences of high ammonia. I am not suggesting that individuals abandon the SCD diet, especially as it has made a positive difference for many people. However, I would suggest a test for *Helicobacter pylori* as that is often a causative agent for excess stomach acid (stool tests are now available in addition to the saliva test). The use of mastica gum is reported to be very helpful for addressing this organism. I would suggest 1/2 mastica gum, Stomach pH and Bowel support with meals. I would also suggest that you consider running a DDI urine amino acid test so that you can look at ammonia levels and amino acids while on the SCD diet.

On a related note other helpful tools for addressing bacterial and viral infection and supporting the body in the process include the use of Ora Triplex, Immuno Forte, Moducare and the ImmunFactors (IMF). In particular IMF 4 should be helpful for viruses related to childhood vaccines. The IMF 1, 2 and 6 should be helpful in supporting the body for herpes related viruses and I have found that the IMF 5 works nicely for support for bacterial infections. Those individuals with CBS up regulations should limit their use of IMFs to one per day due to lipid acting components in the product.

Chronic bacterial infection and its effects on tryptophan breakdown are part of the reason why I suggest only low levels of P5P for individuals with chronic bacterial issues and CBS up regulations. P5P also helps to push the CBS reaction as well as to aid in the conversion of kynurenic to quinolinic. The kynurenic that is generated via the breakdown of tryptophan by bacterial infection is calming; however P5P helps to convert it to quinolinic which is excitatory.

In animal models vitamin B2 (riboflavin) has been shown to speed the clearance of bacteria from the body and to lower mortality rates from bacterial sepsis. In addition, riboflavin is reported to be helpful in reducing inflammatory mediators. Another B vitamin, vitamin B3, is

often depleted in individuals with chronic bacterial infections. You may also want to consider niacinamide (1/2 per day) as this may help to stem the breakdown of tryptophan that is often seen with bacterial infection. Kynurenate is part of the breakdown pathway for tryptophan. As the body breaks down tryptophan for this purpose it will also deplete serotonin. Lack of serotonin combined with streptococcal infection can lead to perseverative and OCD behaviors in addition to other effects. The new SNP panel looks for mutations in the MAO A gene, which is the enzyme involved in serotonin breakdown. Individuals with a MAO A + status may show decreased enzyme activity such that MAO A is less effective in degrading serotonin. This may mean that OCD type behaviors may be less of a problem or less noticeable, even if chronic bacterial infection is an issue. This may also be reflected in higher levels of serotonin, tryptophan or lower levels of 5 hydroxy indole acetic acid (5HIAA) on organic acid tests and urine amino acid tests. The final breakdown product of the tryptophan pathway is niacinamide. This B vitamin has been reported to have antimicrobial effects. It may be that the body is trying to address bacterial infection by breaking down tryptophan into niacinamide to help with infection. In some cases I have not found that the use of high dose B6 or P5P is always helpful. It can actually cause more overstimulatory or OCD type behaviors. While kynurenic acid is calming for neurotransmitters, the product that kynurenines are converted to by B6 is quinolinic acid. Quinolinic acid is an excitotoxin. So if you have high kynurenine and add B6 you can generate quinolinic acid which acts as an excitotoxin and can aggravate the nervous system. Increased levels of quinolinic acid have been implicated in Alzheimer's disease as well as with respect to excitotoxin damage of nerves. Quinolinic acid was found to be substantially elevated in patients with *Borrelia burgdorferi* (Lyme) infection and has been postulated to play a role in contributing to neurological and cognitive defects associated with Lyme disease. It is of importance to try to look at why you may have elevated activity in the tryptophan breakdown pathway in the first place. Decreased methylation, increased IDO (an enzyme that is also effected by methylation and other factors), and chronic streptococcal or even *B. burgdorferi* (lyme) infection can lead to stimulation of this pathway.

A future consideration may be to look at addressing the possibility of chronic Lyme infection in the body. Lyme disease has been implicated in a number of neurological conditions. Cat's claw is reported to be helpful for viral issues as well as for Lyme. Artemisia (wormwood) has also shown activity against Lyme. Wormwood is a component of Paradex that was already mentioned with respect to other parasitic infections. In addition, tick support RNAs and IMF 2 should help to support the body. Chronic issues with Lyme may overlap with thyroid dysfunction.

There is a complex relationship between thyroid function and bacterial infection. Healthy thyroid activity helps to address chronic bacterial/sinus infection. Conversely, the presence of chronic bacterial infection can impair thyroid hormone levels, creating a bit of a catch 22. Periodic thyroid tests and CDSAs to assess the status of bacterial infection and its effect on thyroid function are suggested for individuals who have issues with chronic bacterial infection, sinus infections, dental issues, or a past history of ear infections. One of the enzymes that is activated during chronic bacterial infection is also needed for thyroid hormone synthesis. Since low thyroid function is often found in association with a variety of neurological and cardiovascular conditions I felt this was a good time to raise potential problems so that you can be aware of them and watch for signs of these on issues in the future. Iodine levels also affect

thyroid function and there is a relationship between the methylation cycle, sulfur groups and iodine levels. Iodine levels will be impacted negatively by bromine that is used in bread. This is another reason to be vigilant with the gluten free aspect of the GF/CF diet. Lithium is concentrated in the thyroid and can inhibit iodine uptake. This is why it is important to monitor both the levels of iodine as well as lithium on essential mineral tests and supplement lithium only as needed for low values that may occur as a result of detoxification and excretion of mercury. Iodine is no longer included on the standard essential element test, and needs to be ordered as a separate test. As an alternative, a topical iodine test can be performed.

If iodine and thyroid hormone levels are an issue, the use of 1/2 to one Iodoral per day may be of help in supporting healthy iodine levels. The use of the herb guggul may help to balance T3 and T4. Natural thyroid supplementation is available in the form of thyroid/tyrosine supplements. After four to six weeks of nutritional support you should run a follow up thyroid test with your health care provider to confirm that thyroid hormone levels are in the normal range and an essential mineral iodine test to confirm healthy iodine levels (or the use of the topical iodine test). The thyroid hormone iodination cycle is tied to glucose 6 phosphate dehydrogenase levels. The use of supplements or chelating agents that deplete G6PDH levels can also affect thyroid hormone levels.

Chronic streptococcal infection, and possibly E.coli infection can also lead to a variety of inflammatory mediators as well as depleting neurotransmitters. Bacterial infection is also known to increase the levels of inflammatory mediators such as IL6 and TNF alpha. Mutations have been characterized that aid in increasing the levels IL6 or TNF alpha in the system. Elevated IL6 has been reported to inhibit the release of thyroid hormones in addition to its role in enhancing inflammation. The use of Health Foundation RNA, vitamin K, Kidney Support RNA, nettle, boswellia, Behavior Support RNAs and skullcap may help to balance the body so that these mediators are less of an issue. In addition curcumin and green tea may be helpful (not for COMT ++ individuals).