

NUTRITIONAL INTERVENTIONS CAN HELP YOUR CHILD WITH FASD

Diane Black, Ph.D.

d.black@planet.nl

September, 2004

This pamphlet is a summary of nutritional measures which have helped our three children with FASD over the past five years. None of these measures are new, indeed many of these ideas come from literature on alcoholism, autism, schizophrenia or other mental disorders. I am a biochemical researcher, not a physician, so I cannot give medical advice. If any of the ideas in this pamphlet seem applicable to your child, I encourage you to discuss them with your doctor, nutritionist, or naturopath.

OUR STORY

We adopted our three children, siblings and all with FASD, over eight years ago. Misha, the oldest at three years of age, was hyperactive, destructive, oppositional and dangerous to himself and others. He spent most of his time running back and forth screaming nonsense words. He would impulsively pick up a stick and strike somebody in the eyes. He didn't seem to care about his family, though he was charming to strangers. He didn't learn from experience, repeatedly doing the same things that had frightened or hurt him. He had a high pain tolerance, and was always covered with cuts and bruises. As he grew older, he began to have tics, twitching his nose, jerking his shoulders, or snorting for hours. He walked on his toes and stared into bright lights. He saw animals and monsters that were not there. Family and friends unofficially diagnosed him as "crazy."

At adoption, Nata (16 months) made not a sound, she didn't even cry. She was very serious, but caring about people and she quickly bonded to me. Her twin, Vova, was volatile, either crying or giggling manically with his eyes rolled up to the ceiling. His social interactions were strange; he never made eye contact, and would kick or bite people and seem astonished at the yells of pain elicited. If he wanted a toy, he would sometimes take my hand and place it on the toy, as if my hand were a tool for getting toys. As time went by, he would sit and spin the wheels of a car rather than driving it. He was very sensitive to noise and would cover his ears if I turned on some music. When stressed, he crawled around in small circles meowing like a cat.

When we first saw them, the children were small, with swollen bellies and hair that pulled out in clumps. They threw up frequently and had liquid stools after each meal. Their breath was terribly foul in the mornings. In the ensuing months, they developed a rash on the cheeks and around the mouth. Ear infections and bronchitis were constant. They all slept poorly. Misha "slept" with open glassy eyes four or five hours a night. Nata awakened screaming up to seven times a night. When she learned to talk, she would cry, "My feeties hurt," though there was no sign of muscle tension or cramps. She heard voices talking in her head "like a radio." Vova spent his time either giggling manically with his eyes rolled up to the ceiling or wailing in frustration at toys that wouldn't do what he wanted them to do. He was lost in his own little world.

The dozens of doctors, psychologists and psychiatrists we consulted told us that everything was fine, and that the children just needed love. Love, however, did not seem to help the craziness nor the diarrhea and rashes. Then I heard from a friend about dietary measures that had helped her child, and I began to research the subject. I was skeptical. As a biochemist, I did not think changing a few foods could affect mental status, and I thought that high doses of vitamins were wacky or even dangerous. However, I learned some surprising things from the research literature, and began to put a few basic principles into practice.

We based our new diet on healthy, fresh foods. We eliminated gluten and milk from our diet, as well as artificial food colorings and a few other foods which caused us trouble. We added cod liver oil and high doses of some B vitamins (under professional advice). We began to supply long chain essential fatty acids from fish oil and evening primrose oil, and boosted intestinal health by taking supplement of "good" intestinal bacteria.

Fast forward to the present day: many of our problems melted away rapidly with our new diet. Tics, toe-walking, perseveration, sensory issues, hallucinations, diarrhea, and hyperactivity became a thing of the past. Concentration and learning improved, and the typical FASD learning plateaus disappeared. Social

relations improved radically as autistic behaviors reduced. The children currently all attend the local public school, where they function reasonably well academically as well as socially. They need extra help with things like multiplication tables and spelling, and Misha particularly needs strong supervision when in a group. The children all have friends and participate in sports activities. They speak both English and Dutch fluently. Certainly problems remain, but I can *breathe* nowadays, a luxury which I did not have six or eight years ago.

GLUTEN AND CASEIN INTOLERANCE: THE GFCF DIET

Children with FASD have damaged intestines, kidneys and livers [1-4], which impairs their ability to digest food, absorb nutrients, and eliminate toxins. Gluten and milk are common culprits in intestinal irritation, leading to diarrhea or constipation, nausea and stomachaches. Both gluten and milk can lead to spacey or wild, unpredictable behavior. Gluten, from wheat, rye, oats, and barley, as well as casein, the major milk protein, have been implicated in the mental disturbances of autism, schizophrenia, and elderly dementia [5-8].

Table 1. Signs that your child may need a GFCF diet

Rapid mood swings
Reduced reaction to pain
Self injurious behavior
Poor eye contact
Sometimes doesn't seem to hear you
Pupils sometimes very dilated or very small
Pupils non-reactive to light
Glassy-eyed
Stomach aches
Gastric reflux
Diarrhea and/or constipation
Sticky unformed stools
Fatty fluffy floating stools
Very smelly stools
Swollen belly after meals
Very bad breath
Bright red ears or nose
Night sweats
Craves gluten or milk-containing foods
Limits diet to foods containing gluten and milk
Craves strong flavors (pickles, radishes)

What kind of results can I expect from the GFCF diet?

Initially, the child will crave gluten and milk-containing foods, and will likely go through a few rough days of withdrawal. You can minimize this by phasing in the diet gradually over a period of a few weeks. Depending on the size of the child and how efficient the body is at processing the gluten and milk residues, withdrawal will occur within perhaps one to six weeks. Usually the first results are that the stools firm up and normalize, and improvement in eye contact occurs.

What must we avoid?

You must avoid wheat, rye, oats, barley, and milk products. Triticale, kamut, and spelt are also forms of wheat. Beware of wheat starch or other unidentified starch, and barley malt. Soy sauce contains wheat. Dried fruits may be dusted with flour to facilitate packing, and this is NOT listed as an ingredient. Buy dried fruits that are oiled to prevent sticking. Be aware that "crispy French fries" are often coated with flour. Read all labels.

What can we eat?

As for grains, you can use rice, millet, buckwheat, corn, sorghum, amaranth, and quinoa. You can buy or mix up your own gluten-free flours for baking, or buy gluten-free products at the health food store. The Schaer gluten-free pastas are widely available and delicious. Check celiac cookbooks and websites for recipes and shopping ideas.

As for milk, avoid milk, butter, cheese, yogurt, etc. Use a dairy-free margarine. You can replace ice cream with fruit sorbets, soy ice cream, or homemade fruit juice popsicles.

You will need a source of calcium when not using milk. There are calcium-enriched milk substitutes made from rice or potato, or use calcium supplements. Check your health food store.

How strictly must we keep the diet?

You must keep the diet 100%, and you will soon see why. Even one bite of normal bread or a gluten-containing cookie can send the child into wailing tantrums or aggressive biting for a week or two.

Is the GFCF diet healthy?

Definitely yes! Take care that your child gets adequate calcium via calcium-enriched milk substitutes or a calcium supplement. Otherwise, the GFCF diet provides all the nutrients of a normal diet. Indeed, your child will be healthier than ever as damaged intestines heal and the brain functions better.

What about medications?

You should continue with all normal medications as you begin GFCF. Just be sure they contain no gluten or milk, and watch out for food colorings if they pose a problem for your child. After a few months, you may find it possible to reduce doses of psycho-active medications, always in consultation with your doctor.

What about social events and vacations?

Notify the school teachers and mothers of your children's friends about the special diet. Provide approved snacks, or give them a list of foods which are permitted. On vacation, we find no trouble getting plain broiled or sauteed meat and boiled potatoes and vegetables for the children.

We have been on the diet for six weeks, and see no improvement yet.

Some people take longer to show improvement. Dr. Reichelt, an expert on the diet, says it can take up to seven months for gluten and milk residues to be eliminated from the body. Review your diet, and make sure you are not getting a hidden source of gluten. Another problem may be that the child is very sensitive to other foods in addition to gluten and milk. See the section below on additional food intolerances.

Can the diet be more flexible later on?

Some people find they can be more flexible a year or two down the road. We now occasionally use yogurt, and the children tolerate reasonable amounts of goat, sheep, or mare's milk products. Special enzyme supplements such as SerenAid (www.klairecom) or Enzymaid (www.kirkmanlabs.com) help to digest the gluten and casein, and may help to survive an occasional diet infraction.

Has this diet been proven to help children with FASD?

The GFCF diet has never been clinically tested for children with FASD, though it has been proven in clinical trials to help children with autism and adults with schizophrenia. However, it is still considered to be controversial, especially as the way it helps has not been proven [9]. A number of children with FASD are on this diet, and all have shown improvement. Since the diet is not dangerous or costly, and does not have the side effects of psycho-active medications, many parents try the diet first.

OTHER FOOD INTOLERANCES

Other foods than gluten and milk may also cause behavioral problems [10-15]. Common culprits are beef, white fish, chicken, eggs, corn, soy, peanut, beet sugar, food colorings, certain food additives, chocolate. Many children also get red ears, glassy eyes and become hyperactive in response to fruits containing natural salicylates, such as apples, grapes, and cucumbers. See the Feingold website www.feingold.org for advice on food additives (E numbers) and fruits which contain salicylates.

The best way to identify other problem foods is the elimination/challenge. Thus for ten days, you follow a very cleaned-up diet of simple foods that have low risk of intolerance, and then introduce one new food at a time and observe for reactions. A sample elimination diet would include only foods listed in the table below. This is a well-balanced diet as long as you provide a source of calcium, so, while it may be a bit boring, it is not dangerous to follow such a diet; in fact you and your child may feel healthier than ever as you eliminate unsuspected problem foods! Be aware that after three days or so, you may actually feel ill as your body

eliminates toxins. You may get diarrhea or vomit, urine may be highly colored, and you may sweat heavily. Drink plenty of pure water. This de-toxification stage will pass within a day or two.

Table 2. Foods with low risk of allergenicity

Meats and pulses	Grains and starches	Vegetables	Fruit	Condiments
turkey lamb salmon lentils split peas yellow split mung	white rice basmati rice millet potatoes sweet potatoes	carrots zucchini green beans spinach (most vegetables are tolerated)	pears pineapple if tolerated lemon juice	olive oil lemon juice sea salt cold-extracted honey

After ten days on this diet, you may give a test meal of one food, such as a beef patty, for the first meal of the day. Observe over the day for reactions, which may occur within a few minutes, or take some hours to develop. Reactions may be: red ears, red nose, dark circles under the eyes, fussiness or hyperactivity, head-banging, bed-wetting, etc. My children, for example, are fussy on the day after consuming beef or chocolate. Wait until reactions wear off (one to four days) before introducing another new food. Never test foods which you know will cause a life-threatening reaction. Keep a food diary, so that you can begin to associate food consumed with behavior. See the book by Doris Rapp for advice on elimination/challenge testing.

Blood tests for food allergies and intolerances have not proven to be very useful in the identification of problem foods. The blood tests rely on identification of antibodies in the blood, but in fact many of the food reactions observed are not antibody reactions. Thus a food which tests negative in the blood test may still cause the child to feel ill in some other way. The elimination/challenge is considered to be the "gold standard" in the medical literature on food allergy and intolerance [16-18], but is usually not performed by physicians due to the intensive work involved.

VITAMINS, FOOD SUPPLEMENTS, AND HIGH DOSE VITAMIN THERAPY

Vitamin recommended allowances were set as a minimum daily dose for normal healthy people, but many of us are not even getting the minimum. Studies have shown that the diet of many European children is deficient in consumption of vitamin-rich fruits and vegetables [19-23].

There are several reasons to take a good hard look at your child's vitamin status. First of all, due to digestive problems and malabsorption of nutrients, your child may not derive even a minimum daily allowance of vitamins from a "normal" healthy diet. Second, many FASD children are picky about their food and are not eating even a "normal" healthy diet. Third, stress, illness, sleep deprivation, and certain medications deplete vitamin stores rapidly. Finally, for genetic reasons, some people do require more than the recommended daily allowance of a particular vitamin. High doses of vitamin B6, for example, have been shown to be frequently beneficial in mental illness.

Signs of vitamin deficiencies.

The earliest signs of vitamin deficiency for many vitamins include feeling fatigued and depressed. With moderate deficiencies, clinical signs appear which are more or less specific for each vitamin or group of vitamins. You can find descriptions of vitamin deficiency symptoms in many nutrition books or in the Merck Manual, a highly respected medical reference which is available on-line.

<http://www.merck.com/mrkshared/mmanual/home.jsp>

My children showed several signs of nutritional deficiency: bright red tongue and rash around the mouth (vit B3 deficiency), hallucinations (vit B3), hard pimply spots on outside of upper arms and thighs (vit A), tingling hands and feet (typical of lack any of the soluble B vitamins), no dream recall (B6), tics (B6),

aphthous ulcers (irregularly shaped blisters on the gums, typical of general malnutrition), white spots on the fingernails (zinc), very slow healing of wounds (zinc), they bruised easily and had frequent copious nosebleeds (vit K). Blood tests showed them to be seriously deficient in almost everything, including calcium, though they ate over a quart of yogurt daily and took a children's multi-vitamin tablet. They were deficient in vit K, which is normally impossible, as intestinal bacteria provide vit K in normal healthy people. In retrospect, I see that their malnutrition was due to the constant diarrhea resulting from gluten intolerance. The intestinal flora was certainly also disbalanced, as shown by the serious deficiency of vit K. Elimination of gluten and milk, and giving at least recommended daily allowances of all vitamins and minerals has eliminated signs of deficiency for us.

Blood tests may be useful for indicating serious deficiencies, but a "normal" blood level of a given vitamin does not necessarily mean that the vitamin is provided at adequate levels in the cells where it is needed and to the enzymes which require it. Thus good observation and trial and error are more useful.

High dose vitamin therapy [24]. Some people, for genetic reasons, may require very high doses of certain vitamins. *This does not mean that everybody should take large doses of any or all vitamins; this is not only unnecessary, but can be dangerous.* However, there are many studies showing that *certain people* do need one or another vitamin in high doses to boost the activity of a deficient enzyme. Research has shown that these enzymes are defective in binding the vitamin co-factor, but that radically increasing the vitamin concentration in the body may force the enzyme to bind some of the vitamin and allow some recovery of enzyme activity.

Vitamin B6 (Pyridoxine) and the B6-B3-Tryptophan connection. High dose treatment with vitamin B6 (pyridoxine) has been used for many years in treatment of depression, autism, schizophrenia, epilepsy, and drug-induced dyskinesias. Vitamin B6 plays a central role in many of the pathways for the metabolism of tryptophan, an amino acid derived from protein in the diet. Tryptophan is the precursor for serotonin and melatonin, and is also used to make vitamin B3. Our bodies cannot make enough B3, so it is also an essential vitamin in the diet. In fact, if we eat enough B3, we can preserve the supply of tryptophan for making serotonin and melatonin.

We have found vitamin B6 effective at stopping tics; I give just enough to keep tics at bay. Vitamin B6 must always be given with adequate magnesium and zinc in order to avoid a toxicity reaction due to mineral depletion. We have recently begun using Depyrrol Basis, a formulation with the active form of vitamin B6, pyridoxal phosphate, zinc, and molybdenum. My children each get 450 mg of the normal pyridoxine form of vitamin B6 per day and two Depyrrol Basis for an added 120 mg of B6. They also get 500 mg magnesium per day. www.keac.nl and www.hpu-info.gmxhome.de.

Vitamin B3

Vitamin B3 has also been used for years in treatment of mental disturbance caused by dietary deficiency. Some of the causes of deficiency are inadequate diet or poor absorption due to chronic diarrhea or alcoholism[25,26]. The classical signs of B3 deficiency are dermatitis, diarrhea, and dementia. This vitamin is effective for many in stopping sensory disturbances such as dyslexia and auditory or visual hallucinations. Vitamin B3 supplements are commonly available in three formulations. The first form, niacin (nicotinic acid), gives a hot flush over the face or the whole body which lasts for about 15 minutes. When giving niacin, doses should begin low (say 50 mg) and be gradually increased over a period of days to the desired dose. The second form, niacinamide (nicotinamide), does not give a hot flush, but is not effective for some in treating psychiatric symptoms. A newer form, the inositol ester, does not result in a hot flush, and is effective for us. In some cases, high dose niacin therapy has resulted in jaundice which disappeared upon stopping the niacin. If jaundice occurs (check yellowing of eyeballs), the niacin should be stopped until symptoms subside, and then, if necessary, a different form of vitamin B3 can be tried. High doses of niacin should be taken only under medical advice.

In my children, I observed a bumpy dermatitis around the mouth which gave the skin a dark red color, diarrhea and swollen red tongue, lips, and anus, terrifying nightmares and hallucinations. We currently give 1 gram per day of the inositol ester of niacin to eliminate deficiency symptoms. My younger son hallucinates when he has a high fever, but this is stopped within a few minutes by 500 mg of niacin.

Other B vitamins. Some of the other B vitamins, notably B5, have been observed to help psychiatric symptoms in some cases [27], though we have no experience of them. My children receive a daily B-50 formulation which also provides 400 mcg of folic acid. Folic acid is very important for nerve development

Vitamins A, D, E, and K. These fat-soluble vitamins should not be taken in high dosage, as they can be toxic in excess. However, deficiencies may be observed in children with poor intestinal absorption of fats. A deficiency of vitamin A results in hair that pulls out easily, in hard white pimples on the upper arm and thigh, and in slow adaptation of the eyes to the dark. Many people's bodies do not process the dietary forms of vit A found in carrots and green vegetables sufficiently well, and cannot use the form of vit A ester found in vitamin pills. The best solution is cod liver oil, which may be swallowed or rubbed onto the skin [28]. This will also provide vitamin D. *Be careful not to overdose on vitamins A and D; if you use cod liver oil, then do not take a vitamin pill which also contains A and D.* We use cod liver oil, separate vitamins C and E, and a B complex.

Vitamin E is an anti-oxidant, and a supplement may be taken or rubbed onto the skin. A deficiency of vit K results in easy bruising and poor blood coagulation, for example, having frequent copious nosebleeds. Normally, intestinal flora make vit K, so deficiency does not occur. If you see signs of deficiency, take supplements of acidophilus, bifidus, etc. to normalize intestinal bacterial flora. Supplements of vit K should be taken only under medical advice, as excess can be dangerous.

Vitamin C and anti-oxidants. We have found anti-oxidants to be helpful to general health. My children take 1 gram of vitamin C per day, and we use lots of fresh vegetables and fruits. We try to include one serving per day from the cabbage family, as these vegetables contain highly effective anti-oxidants not found in other foods. Acetyl-cysteine is useful if the child produces a lot of phlegm or is subject to bronchitis.

Minerals. Generally speaking, minerals should not be taken in excess of the governmentally set standards, as high doses can disrupt the balance of other minerals in the body or result in toxicity. I give my children supplements providing 100% of the RDA of calcium, magnesium, iron, and all trace minerals. Our only exception is zinc. A deficiency of zinc results in white spots on the fingernails, reduced or absent senses of taste and smell, and slow wound healing. For reasons which we do not understand, my children and I require about 100 mg of zinc per day to allow wound healing, which is several times the RDA. However, if we do not take this much, a small cut takes many weeks to heal. High doses of zinc should be taken only under expert advice, as excess can be dangerous.

Essential Fatty Acids

We need long-chain polyunsaturated fatty acids of the omega-6 and omega-3 families for the health of the skin, eye, brain and nervous system. Normally we consume medium-chain fatty acids in our diet, and our bodies make them longer. Thus the most common omega-6 fatty acid in our diet, linoleic acid (LA), is found in our common cooking oils. The most common medium length omega-3 fatty acid is alpha-linolenic acid (ALA) from green leafy plants, linseed, and other plant sources. We get the longer omega-3 fatty acids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from fatty fish.

Many of us have inadequate supplies of the necessary long-chain fatty acids. In our modern diet, we consume far too much of the omega-6 LA relative to the amount of the omega-3 ALA [29]. Our enzyme systems tend to work on the omega-6 fatty acids, so that very little of the ALA is made into DHA which we need. One solution to providing adequate long-chain omega-3 fatty acids is increase consumption of fatty fish and take supplements of fish oil (omega-3 fish oil and/or cod liver oil).

The omega-6 fatty acid GLA is the precursor for prostaglandin E1, which is involved in mood control. Inadequate amounts of prostaglandin E1 may contribute to mood disorders. This problem is easily solved by taking supplements of Evening Primrose Oil or Borage Oil.

We have observed that deficiency of essential fatty acids causes nervous irritability, dry skin, and excessive dark ear wax. We give our children cod liver oil orally, and rub other oils on their backs at bedtime.

They get one large capsule of omega-3 fish oil, two capsules of evening primrose oil, and one capsule of vit E per day. Omega-3 oils thin the blood, so if nosebleeds increase, we cut down on these omega-3 fish oil.

IMPROVING DIGESTION AND INTESTINAL HEALTH

FASD is more than "just" brain damage. We sometimes forget that prenatal alcohol exposure has damaged not only our children's brains, but their intestines, livers, and kidneys as well. Their ability to digest food, absorb nutrients, and eliminate toxins is reduced. They often have digestive disorders such as gastric reflux, stomach pains, abdominal distention after meals, diarrhea, steatorrhea (fatty floating stools due to poor absorption of fat from food), foul-smelling stools, vitamin deficiency due to poor absorption of nutrients. They may have problems with sucking, chewing, and swallowing. We have found it worthwhile to make food easily digestible and to take measures to improve digestion and boost the "good" bacteria in the intestines.

Cooked foods. In cases of malabsorption of nutrients, certain measures may be taken to improve digestion and avoid gas. Meat should be well-cooked and minced to ensure adequate digestion. Consumption of fiber should be minimized to avoid gas formation. White bread and rice are recommended. We use only cooked foods, which are easier for the body to digest (think baby food). In order to avoid gas formation, we do not use beans and onions, but use split peeled lentils and mung beans from Indian and Asian stores to make purees and soups which are low in roughage and easy to digest. We use applesauce and cooked pears and cooked carrots rather than the raw forms. White rice and basmati are easier for delicate digestive systems to handle than brown rice (again think of what you would feed a young baby). We are often told that raw vegetables and brown rice contain more vitamins, yet if the child's damaged digestive tract cannot process these foods, he/she will derive no benefit from them.

Light evening meal. If possible, eat the biggest meal of the day at noon, when digestion is at its best, and have a lighter evening meal. We eat meat and vegetables at noon, and soups and gfcf bread in the evening. We find the digestive tract handles this better, we all sleep better and have pleasant dreams.

Digestive spices. Ethnic cuisines use many spices in their cooking, which not only taste good but stimulate the secretion of digestive enzymes. Ginger, cumin, turmeric, coriander, etc. improve digestion by stimulating the action of intestinal and pancreatic enzymes [30]. For gas, chew a pinch of fennel seeds and swallow, or brew a cup of tea from a teaspoon of fennel seeds per cup of boiling water, and let steep for five minutes. For heavy feeling of indigestion, chew a piece of candied ginger. Check out Indian and Middle Eastern cookbooks for recipe ideas.

Sugar. Sugar promotes the growth of yeast in the intestine, which will cause irritation and further intestinal damage. Signs of yeast overgrowth in the body are thrush, itchy anus, athlete's foot, fungal infections of the nails, yeasty smelling stools, and vaginal yeast infections in girls. We find it impossible to live without some sugar, but we keep it to a minimum and use unrefined cane sugar, which seems to cause us less trouble than refined beet sugar. Sometimes we take a course of Nystatin to reduce yeast overload, but usually we try to control yeast by increasing the "good" intestinal bacteria.

Intestinal flora [31,32]. "Good" bacteria are now known to be important for overall health. Many of the "good" bacteria do not form permanent colonies in the intestine; they need to be regularly replenished. We use supplements of intestinal flora, such as acidophilus, bifidus, lactis casei, etc. Naturally fermented sauerkraut or pickles also contain "good" bacteria.

GETTING STARTED (PERSONAL ADVICE)

If your child needs a GF/CF diet, and I think that many children with FASD do, then I think this is the most important measure to start. It is cheap, safe, and the results can be both rapid and amazing. Other nutrients or medications will not override the need to eliminate gluten and milk from the diet. You will need the cooperation of all family members, school or day-care teachers, and neighbors or friends whom your child visits. Even the youngest children should understand that they are being given special food to help them feel better. In our family, we all went GF/CF, so that no-one had to feel deprived or different.

Initially, the diet does take extra work and planning, but after a while cooking this way becomes second nature. Even our 82 year old Oma has become a whiz at making gluten-free food which accommodates all our allergies and intolerances!

At the same time that you begin GF/CF, consider giving your child a vitamin and mineral supplement to at least the recommended daily allowance, give supplements of essential fatty acids and "good" bacteria such as lactobacillus and bifidus. After a few months on the diet, if you see signs of vitamin deficiencies, then consider a trial of a few weeks at a higher dose to see if this will help.

After a few months on GF/CF, when life begins to stabilize, you may wish to do the ten day elimination diet to try to identify other food intolerances. Begin keeping a diary to help you identify what foods or other exposures (cat fur, chemicals at hairdresser, swimming pool chlorine, etc.) may set off reactions. For example, in addition to gluten and cow's milk, my children must avoid beef, soy, codfish, pumpkin and winter squash, corn, apples, red grapes, cherries, food colorings, beet sugar, and chocolate.

Scientific references

1. Bhalla S, Mahmood S, and Mahmood A, Effect of prenatal exposure to ethanol on postnatal development of intestinal transport functions in rats. *Eur.J.Nutr.* 43: 109-115, 2004.
2. Murillo-Fuentes ML, Murillo ML, and Carreras O, Effects of maternal ethanol consumption during pregnancy or lactation on intestinal absorption of folic acid in suckling rats. *Life Sci.* 73: 2199-2209, 2003.
3. Moore CA, Khoury MJ, and Liu Y, Does light-to-moderate alcohol consumption during pregnancy increase the risk for renal anomalies among offspring? *Pediatrics* 99: E11, 1997.
4. Robinson RS and Seelig LL, Jr., Effects of maternal ethanol consumption on hematopoietic cells in the rat fetal liver. *Alcohol* 28: 151-156, 2002.
5. Rousset H, [A great imitator for the allergologist: intolerance to gluten]. *Allerg.Immunol.(Paris)* 36: 96-100, 2004.
6. Dietrich W and Erbguth F, [Neurological complications of inflammatory intestinal diseases]. *Fortschr.Neurol.Psychiatr.* 71: 406-414, 2003.
7. Bruzelius M, Liedholm LJ, and Hellblom M, [Celiac disease can be associated with severe neurological symptoms. Analysis of gliadin antibodies should be considered in suspected cases]. *Lakartidningen* 98: 3538-3542, 2001.
8. Singh MM and Kay SR, Wheat gluten as a pathogenic factor in schizophrenia. *Science* 191: 401-402, 1976.
9. Millward C, Ferriter M, Calver S, and Connell-Jones G, Gluten- and casein-free diets for autistic spectrum disorder. *Cochrane.Database.Syst.Rev.* CD003498, 2004.
10. Bateman B, Warner JO, Hutchinson E, Dean T, Rowlandson P, Gant C, Grundy J, Fitzgerald C, and Stevenson J, The effects of a double blind, placebo controlled, artificial food colourings and benzoate preservative challenge on hyperactivity in a general population sample of preschool children. *Arch.Dis.Child* 89: 506-511, 2004.
11. Schnoll R, Burshteyn D, and Cea-Aravena J, Nutrition in the treatment of attention-deficit hyperactivity disorder: a neglected but important aspect. *Appl.Psychophysiol.Biofeedback* 28: 63-75, 2003.
12. Schulte-Korne G, Deimel W, Gutenbrunner C, Hennighausen K, Blank R, Rieger C, and Remschmidt H, [Effect of an oligo-antigen diet on the behavior of hyperkinetic children]. *Z.Kinder Jugendpsychiatr.Psychother.* 24: 176-183, 1996.
13. Uhlig T, Merckenschlager A, Brandmaier R, and Egger J, Topographic mapping of brain electrical activity in children with food-induced attention deficit hyperkinetic disorder. *Eur.J.Pediatr.* 156: 557-561, 1997.
14. Rowe KS, Synthetic food colourings and 'hyperactivity': a double-blind crossover study. *Aust.Paediatr.J.* 24: 143-147, 1988.
15. Brenner A, A study of the efficacy of the Feingold diet on hyperkinetic children. Some favorable personal observations. *Clin.Pediatr.(Phila)* 16: 652-656, 1977.

16. Perry TT, Matsui EC, Kay Conover-Walker M, and Wood RA, The relationship of allergen-specific IgE levels and oral food challenge outcome. *J.Allergy Clin.Immunol.* 114: 144-149, 2004.
17. Niggemann B and Gruber C, Unproven diagnostic procedures in IgE-mediated allergic diseases. *Allergy* 59: 806-808, 2004.
18. Eigenmann PA, Do we have suitable in-vitro diagnostic tests for the diagnosis of food allergy? *Curr.Opin.Allergy Clin.Immunol.* 4: 211-213, 2004.
19. Andersen LF, Overby N, and Lillegaard IT, [Intake of fruit and vegetables among Norwegian children and adolescents]. *Tidsskr.Nor Laegeforen.* 124: 1396-1398, 2004.
20. Royo-Bordonada MA, Gorgojo L, Martin-Moreno JM, Garces C, Rodriguez-Artalejo F, Benavente M, Mangas A, and de Oya M, Spanish children's diet: compliance with nutrient and food intake guidelines. *Eur.J.Clin.Nutr.* 57: 930-939, 2003.
21. Kreijl CF , Knaap AGAC , Busch MCM , Havelaar AH , Kramers PGN , Kromhout D , Leeuwen FXR van , Leent-Loenen HMJA van , Ocke MC , and Verkley H (eds). *Ons eten gemeten. Gezonde voeding en veilig voedsel in Nederland. Rijksinstituut voor Volksgezondheid en Milieu Rapport 270555007; Volksgezondheid Toekomst Verkenning , 365 p in Dutch, 2004.*
22. Beitz R, Mensink GB, Fischer B, and Thamm M, Vitamins--dietary intake and intake from dietary supplements in Germany. *Eur.J.Clin.Nutr.* 56: 539-545, 2002.
23. Bates CJ, Pentieva KD, and Prentice A, An appraisal of vitamin B6 status indices and associated confounders, in young people aged 4-18 years and in people aged 65 years and over, in two national British surveys. *Public Health Nutr.* 2: 529-535, 1999.
24. Ames BN, Elson-Schwab I, and Silver EA, High-dose vitamin therapy stimulates variant enzymes with decreased coenzyme binding affinity (increased K(m)): relevance to genetic disease and polymorphisms. *Am.J.Clin.Nutr.* 75: 616-658, 2002.
25. Pitsavas S, Andreou C, Bascialla F, Bozikas VP, and Karavatos A, Pellagra encephalopathy following B-complex vitamin treatment without niacin. *Int.J.Psychiatry Med.* 34: 91-95, 2004.
26. Hegyi J, Schwartz RA, and Hegyi V, Pellagra: dermatitis, dementia, and diarrhea. *Int.J.Dermatol.* 43: 1-5, 2004.
27. Brenner A, The effects of megadoses of selected B complex vitamins on children with hyperkinesia: controlled studies with long-term follow-up. *J.Learn.Disabil.* 15: 258-264, 1982.
28. Megson MN, Is autism a G-alpha protein defect reversible with natural vitamin A? *Med.Hypotheses* 54: 979-983, 2000.
29. Sanders TA, Polyunsaturated fatty acids in the food chain in Europe. *Am.J.Clin.Nutr.* 71: 176S-178S, 2000.
30. Platel K and Srinivasan K, Influence of dietary spices and their active principles on pancreatic digestive enzymes in albino rats. *Nahrung* 44: 42-46, 2000.
31. Rastall RA, Bacteria in the gut: friends and foes and how to alter the balance. *J.Nutr.* 134: 2022S-2026S, 2004.
32. Ried K, Gastrointestinal health. The role of pro- and pre-biotics in standard foods. *Aust.Fam.Physician* 33: 253-255, 2004.

BOOKS AND WEBSITES

Cookbooks

Indian, Middle Eastern, and Chinese cookbooks are rich sources of ideas for gluten-free meals. Visit ethnic markets for split lentils, bean flours, rice crackers and cookies. Celiac cookbooks and websites also have recipes and support groups.

Nutritional or Mixed Approaches to Mental Health (in English)

Biological Treatments for Autism and PDD, by William Shaw, Ph.D.

Seven Weeks to Sobriety: The Proven Program to Fight Alcoholism Through Nutrition, by Joan Mathews Larson, Ph.D.

Is This Your Child? Discovering and Treating Unrecognized Allergies in Children and Adults, by Doris Rapp, M.D.

Unraveling the Mystery of Autism and Pervasive Developmental Disorder: A Mother's Story of Research and Recovery, by Karyn Seroussi.

Why Can't My Child Behave? Why Can't She Cope? Why Can't She Learn?, by Jane Hersey.

Children with Starving Brains: A Medical Treatment Guide for Autism Spectrum Disorder, by Jaquelyn McCandless.

Various books on chronic yeast infection by William G. Crook, M.D.

Nutrition and Mental Illness: An Orthomolecular Approach to Balancing Body Chemistry, by Carl C. Pfeiffer, Ph.D., M.D.

Healing ADD: The Breakthrough Program That Allows You to See and Heal the Six Types of ADD, by Daniel G. Amen, M.D. One of his six types runs in alcoholic families, and sounds a lot like FASD.

Websites

The Feingold Association has information on foods and food additives which can cause hyperactivity in some children. www.feingold.org/

The Autism Research Institute has information sheets on nutritional approaches to autism, and a fine newsletter. www.autism.com/ari/

The Autism Network for Dietary Intervention has information on the gfcf diet and a worldwide list of support parents to help you get started with gfcf. www.autismndi.com/

The website of Dr. Mary Megson, a physician specialized in ADHD, autism, etc. www.megson.com/

Jodee Kulp's site www.betterendings.org/ gives information on the nutritional measures that have helped her daughter who has FASD.

The on-line Merck Manual is a respected concise medical reference work. www.merck.com/pubs/mmanual/ Section 1, Chapter 1 gives general nutrition information. Section 1, Chapter 3 goes into the details of Vitamin Deficiency, Dependency [requirements for vitamin mega-doses], and Toxicity. Section 3, Chapter 30 covers celiac disease.

PubMed is the free public access to scientific research. You can quickly find articles by keyword, and usually you can view the abstract of the article by selecting it and then selecting View Abstract. You often get links to the publisher's website, with free or paid access to full-length journal articles.

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>