



# Practitioner Select

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AUTISM SPECTRUM DISORDER

## Autism and The Gut

It is well known that gut-related disturbances are very common in approximately 90% of individuals with autism, and therefore if the gut is not functioning optimally, then perhaps neither will the brain. We know that the majority of toxins we are exposed to are absorbed by the gut and taken into our blood system and circulated around the body. Everything that is absorbed across the gut membrane is taken to the liver for detoxification. Many individuals with autism have liver stress and an inability to get rid of toxins, due to low levels of glutathione and deficiencies in nutrients that support toxic elimination.

These issues are not to be taken for granted or rationalized as 'part of the condition'; they are symptoms of an underlying serious health condition that may be exacerbating the symptoms of your child's autism, and could even have caused or triggered it.

There is growing evidence that a positive link exists between the gut, which is often referred to as the second brain, and the way in which the brain functions. Surrounding the gut is the enteric nervous system, the second largest mass of nerve cells in the human body behind the brain. Accordingly, the gut has a very close relationship with the brain, sharing many receptors and neurotransmitters. Since the vagus nerve connects the two organs, it is understood that toxins may pass from the gut to the brain and alter the way in which it functions. In summary, the health and function of the gut is vital to the functioning of the brain.

### Gut flora – why is it so important?

Many children with autism display a multitude of gut related disturbances, which may be due to microbial imbalances in the gut. The human digestive tract (the gut) contains trillions of bacteria; in fact, the gut contains more bacterial numbers than we have human cells making up our body. These are known collectively as the gut flora. These complex colonies of microorganisms serve a vital purpose in stimulating the body's immune system, especially immunoglobulin A (Sec IgA), representing the first line of immune defense. Sec IgA accounts for approximately 80% of our total immunity, keeping us healthy by suppressing or warding off bacterial, fungal, parasitic and viral pathogens (germs) and toxins, and preventing them from spreading or penetrating through the gut wall to cause infection or disease.

Beneficial flora also play a part in the digestion and absorption of food and nutrients, such as fermenting soluble fiber into short-chain fatty acids, synthesizing B vitamins, and so on.

Human health, digestion, immune function and metabolic balance depend to such an extent upon maintaining colonies of good bacteria that some people consider the gut flora to constitute an organ in its own right. An imbalance in the gut flora leading to the overgrowth of harmful bacteria and yeast in the gut is known as dysbiosis. Many people believe that dysbiosis lies at the root of many serious health complaints such as irritable bowel →





syndrome (IBS), chronic fatigue, eczema, multiple sclerosis, rheumatoid arthritis and depression, and other mental disorders, and this is common among individuals with autism. It is vital that gut integrity, health and function are optimized for the brain to remain protected and can function to capacity.

When a baby is born its immunity is acquired initially from its mother, first when descending through the birth canal and second, via colostrum and Secretory IgA from breast feeding. According to the American Academy of Pediatrics, a breastfed baby will develop many bifidobacterium species accounting for approx 47% of the total gut bacteria whereas a formula fed baby will have a gut populated by other strains of bacteria and only 15% by bifidobacterium. Babies delivered via C section have different microbial populations to babies delivered vaginally. The bacteria present in the babies gut is supportive of the development of its immune system and if challenged by excessive unhealthy foods, toxins, and pathogenic bacteria, the immune system may be over stimulated and may increase susceptibility to autism.

Levels of beneficial bacteria can be adversely affected by a number of factors including disease, the effects of stress, poor diet and the use of antibiotics, which can deplete gut flora colonies, wiping out large numbers of good bacteria and thereby reducing the gut's defenses against illness and infection. In the absence of beneficial bacteria, resistant bacteria, parasites, viruses and yeasts are allowed to "overcolonize" the intestinal wall.

The use of antibiotics can impair the gut flora's ability to self-regulate by suppressing bad bacteria and may lead to a range of secondary infections. Two of the most common infections include *Clostridium difficile* (aka "C-Diff") and *Candida albicans* (aka "yeast infections") both of which are normally suppressed by secretory IgA and the natural dominance of good bacteria in the gut.

A recap of the many factors that can upset the delicate balance of the gut flora and gastrointestinal (GI) tract:

- Immune system dysfunction with low sec IgA production
- Frequent use of antibiotics
- Changes in gut pH
- Insufficient fiber within the diet
- Overgrowth of yeast, particularly *Candida* species
- Food allergies
- Non-steroidal anti-inflammatory drugs, such as ibuprofen
- Parasitic infection
- Viral infection
- Excessive stress
- Excessive toxins including heavy metals
- Poor diet: rich in refined carbohydrates, saturated fats and sugar

There is plenty of evidence to suggest that many of the factors involving the relationship between gut health and brain function are particularly relevant to people with autism who commonly suffer from:

- Diarrhea
- Constipation
- Foul-smelling stools



- Particularly light or dark stools
- Mucus present in the stool
- Increased intestinal permeability, or leaky gut
- Undigested food in the stool
- Parasites
- Dysbiosis and elevated proprionic acid level
- Biofilm presence
- Increased gut derived toxicity and detoxification impairments
- Bloating/abdominal distension/increased flatus (wind)
- Inadequate enzyme function, especially enzymes that break down proteins into amino acids (called proteases)
- Disturbed pH levels – either too alkaline or too acidic
- Inadequate hydrochloric acid production in the stomach (vital for a number of digestive and metabolic processes)
- Secretory IgA disturbances and inflammation
- Poor digestion and absorption of nutrients – low levels of amino acids, essential fatty acids, minerals, vitamins and trace elements
- High levels of proprionic acid released by bad bacteria (proprionic acid has been found to cause autistic behaviour in rats)
- Elevated levels of arabinose – an indicator of candidiasis
- The presence of parasites, pathogenic bacteria such as streptococcal, staphylococcal and clostridial species, yeasts (especially *Candida*) and viruses, often arising from gut-flora imbalance or dysbiosis

The functioning of the gut is inextricably linked with the food you eat, the stress you're under, the efficiency of your immune system and, the balance of gut flora, so anything that seems out of the ordinary means that something is awry and should be investigated by a qualified professional. Inflammation and damage to the lining of the gut may create leaky gut syndrome resulting in increased intestinal permeability and a thicker biofilm, lining the surface of the gut.

## What is a Biofilm?

A biofilm is a thin mucous membrane that builds up on the inside of the gut wall. 'Irritants' on the gut surface, such as pathogens – bad bacteria, viruses, parasites, fungus, and food allergens produce an immune response causing inflammation of the gut. The gut membrane produces mucus to 'dampen down' the inflammation and to get rid of the dead cells and debris. Inflammation in these damaged areas also increases the release of a substance called fibrin that is used as a cement to help give some form and solidity to the mucus. Fibrin also uses metals, such as iron, and minerals, such as calcium and magnesium, to help support its structure, and it can form a matrix capable of keeping pathogens away from the immune system (and from being killed by antibiotics). This film also reduces nutrient absorption.

Middle-ear infections and glue ear (otitis media and chronic otitis media), are very common in children diagnosed with autism, and are being increasingly linked to biofilm presence. This may explain why such infections tend to be resistant to antibiotic treatment.

The bacterial biofilm is alive and continues to leach toxins into the bloodstream while remaining protected from the immune system. If you carry out a stool analysis, these bugs may not even show up.

It is therefore extremely important that this problem is professionally treated to reduce the pathogens present in the gut and to reduce inflammation, as well as enhancing the absorption of nutrients, many of which are deficient in individuals with autism.



## What is leaky gut syndrome?

Increased intestinal permeability, is also known as leaky gut syndrome, and is present in many individuals with autism. This in particular may place them at an increased risk of food allergy, infection and increased toxicity.

One of the most widely espoused theories about the biomedical aspects of autism is that many people with autism suffer from damage to the lining of the intestines, enabling undigested or partially digested proteins (such as gluten and casein) and toxins to enter the bloodstream. This is often referred to as 'leaky gut syndrome', and can be caused by many factors such as an imbalance of gut bacteria, parasites, fungi and viruses creating inflammation, or by the use of non-steroidal anti-inflammatory drugs such as ibuprofen, or by food allergens and poor sulphation. (Sulphation is a series of chemical reactions that strengthen the gut membrane and support the production of our most important antioxidant, glutathione.) This has been identified by Dr Rosemary Waring, a human toxicologist at the University of Birmingham, who found that most people with autism were low in sulphate.

Under normal circumstances, the gut wall has a number of effective defenses. The first line of defense is the 'army' of helpful bacteria that live on the intestinal surface, providing a physical barrier and keeping the bad guys at bay. The second line of defense is the integrity of the gut wall itself, where in a healthy gut, epithelial cells are densely packed, with very tight 'junctions' between them that only allow small molecules to get through. However, in an unhealthy gut, these junctions get wider, allowing undigested food proteins, toxins and germs to enter the blood system and circulate to other parts of the body causing inflammation and damage.



## What are the symptoms associated with leaky gut?

The leakage of partially digested proteins as well as harmful bacteria and toxins into the bloodstream may cause the immune system to treat these molecules as foreign bodies and therefore 'learn' to attack them, leading to the development of food allergies, inflammatory responses and the production of free radicals, (highly reactive, unstable molecules) that cause cellular damage and are implicated in a range of serious health conditions.

One of the most significant consequences of leaky gut is hepatic stress, which is stress on the liver and its vital detoxification functions. The liver is





responsible for filtering out all the toxins, pathogens and undigested food particles that make it through the gut wall and into the bloodstream. The more toxins it has to deal with, the more stress the liver will be placed under, including depleting its reserves of sulfur-containing amino acids (such as cysteine and methionine, which are in turn vital to the production of the super-antioxidant, glutathione). The most familiar aspect of leaky gut syndrome is probably its association with gluten and casein allergy. The peptides derived from the proteins in wheat and milk (gluteomorphin/gliadorphin and casomorphin) would, under normal circumstances, be too large to be absorbed through the gut wall into the bloodstream, but are allowed to pass through under the conditions defined by leaky gut syndrome. These peptides act as opioids, where they replicate the effects of opiate drugs and can cause significant problems with speech, communication, behavior and social skills as well as various other effects similar to those of opiate drugs, including addiction. This may cause some people with autism to crave foods that are high in gluten and casein. Some studies have also found that people with autism are low in the enzymes (DPP1V) required to digest gluten and casein.

Although there is strong anecdotal evidence for the efficacy of a gluten-free and casein-free (GFCF) diet for some people with autism, one recent study has found that people with autism do not show abnormally high levels of opioid peptides in their bloodstreams. Given the extraordinary results that some people get after following a GFCF diet, this is puzzling, and may imply that only a particular subset of children with autism, who were not identified in

the study, are at risk from this phenomenon, or that some other immunological system is at work here. More research is definitely needed.

### **Gut problems and nutrient deficiencies**

Dysbiosis, inflammation and mucus secretions, damage to the small intestine, leaky gut and poor digestion and low enzyme secretions can have a dramatic effect on the levels of nutrients absorbed into the bloodstream and an increased demand for additional nutrients to help support the damaged gut and to help remove toxins and optimize nutrient status. The end result is that the body is starved of the nutrients and molecular building blocks it needs so that it can perform a vast array of vital functions.

The efficient way in which the food we eat is broken down into individual nutrients and then absorbed by the body is absolutely vital to overall health. Without the gut functioning optimally, health issues will arise, so these conditions must be identified and treated for health to be restored.



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# Practitioner Select “Restore” Gut flora package

As described earlier the vital importance of the bacterial colonies that live in the human gut cannot be overstated. The weakened gut defenses caused by the depletion of secretory IgA and beneficial bacteria through overuse of antibiotics or because of stress, poor diet, and so on, is a hugely significant contributor to leaky gut syndrome, various other malfunctions of the digestive system and an increase in gut-derived toxins; so much so that the function of ‘friendly bacteria’ has entered the public consciousness. Recent studies by Professor Jeremy Nicholson (head of the department of Surgery and Cancer at Imperial College in London) suggested individuals with autism have greater problems dealing with some of these gut-borne toxins released from bad bacteria. **Probiotics** are commonly dietary supplements containing live bacteria (and sometimes other active microorganisms, such as yeasts).

These probiotic supplements contain specific strains of what are known as ‘good bacteria’, such as *Lactobacillus* and *Bifidobacteria* in order to recolonize the gut flora, reinforce the immune system, help push out bad bacteria and to continue their good work. It is very important to utilize high levels of probiotics (Colony Forming Units) from the very best manufacturers who include pure strains of bacteria at high CFU’s. Beneficial bacteria need ‘open’ space to colonize, the correct pH and food; they do not kill off *Candida* and other bacterial species but competitively exclude them by dominating the available space and pushing them out, but only once they have been given the opportunity to occupy the vacant space in the gut.

## Dietary recommendations

**Prebiotics** are non-digestible substances found in some foods that actively ‘feed’, or stimulate, the growth of good bacteria in the gut.



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The two most widely used prebiotics are inulin and fructooligosaccharides (FOS). These are carbohydrates (sugars in this case) that occur naturally in a range of foods, the best being those richest in soluble fiber such as Jerusalem artichokes, Brussels sprouts, broccoli, cabbage, onions, leeks, garlic, sweet potatoes, oats, lentils, beans and other pulses, nuts and seeds.

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## Practitioner Select “Remove” bad bacteria and fungi package

It is important to remove pathogenic or foreign microbes in the gut. Removing foreign bacteria, fungi and parasites in the gut will increase the absorption of the toxins produced by them and this may initiate a “Herxheimer” or die off response. Symptoms may temporarily worsen until the body has eliminated these toxins. It is also important to remove allergenic foods such as gluten, corn, eggs, dairy products, sugar and refined carbohydrates as these promote fungi and nasty bacteria.



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## Practitioner Select “Repair Leaky Gut” package

The gut is a structure with the fastest cell turnover of any organ in the body. The cells of the gut wall need constant fuel and the two most important fuels are glutamine, an amino acid derived from the digestion of protein to support the small intestinal cells and butyrate, a short chain fatty acids derived from the fermentation of soluble fiber, to support the cells of the large intestine. Inulin, glucosamine, omega 3 essential fatty acids and zinc, vitamins A, E and C are also supportive nutrients.

Only once the gut lining has been repaired can it function optimally. Closing the junctions between the cells reduces intestinal permeability, reducing inflammation caused by poor foods especially gluten can assist and supporting the growth of the villi (finger like projections in the small intestine) will maximize nutrient absorption.



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## Practitioner Select “Biofilm” package – How to eliminate a biofilm

Identification of a biofilm is very difficult, although there are a number of likely symptoms for its existence. These can be mucus in the stool, nutrient-deficiency symptoms, a failure to thrive, diarrhea and/or constipation, odorous stools or undigested food in the stool. The following is therefore seen as a temporary treatment process to support elimination of the biofilm. The biofilm matrix needs to be removed from the system, but this has to be done with great care due to the fact that simply breaking down the structure of the biofilm will release its toxic contents (pathogens, toxins and heavy metals) into the gut, which would be counterproductive. The biofilm utilizes metal and mineral compounds (calcium, magnesium and iron) in its structure, so it is not recommended to supplement your diet with these minerals when a biofilm is present.

A number of steps and precautions must be taken to flush out the biofilm: breaking down the fibrin, introducing agents to bind heavy metals and toxins for excretion and supplementing the beneficial gut flora. This is a job for a qualified healthcare professional.



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### Recommended products



#### PRL Paratolin

As an antimicrobial and reduction of biofilm adhesion.

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#### BioRay NDF

To support the binding of heavy metals.

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#### ProThera Nattokinase NSK-ND

An enzyme that breaks down fibrin a major constituent of a biofilm.

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Natural zeolites and bentonite clay to support detoxification.

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## Practitioner Select “Digestive” package

Digestion is a vital component to gut health. Undigested foods can create food allergens as they are attacked by the immune system and remain undigested in the bowel. Undigested food will ferment and putrefy in the bowel creating additional harmful toxins, likely inflammation and dysbiosis. It is important that foods are completely digested to maximize nutrient availability and absorption. Enzymes are vital for digestion and low stomach acid and poor pancreatic function may reduce enzyme activity leading to insufficient digestion.

### Practitioner Select recommended products



#### Houston Enzymes TriEnza

Strong broad-spectrum enzyme product. All the protease enzymes for protein digestion from AFP-Peptizyde.

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#### Pure Encapsulations Taurine

Taurine for bile acids as Pure Encapsulations Taurine.

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## Practitioner Select “Gastric” package

The significance of good gut health and function is one of the most important areas to address, as individuals with autism have many issues associated with poor gut health and function. It should therefore be given priority.



#### PRL HCL Premier

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## Other Gut Supportive Nutrients

Apart from probiotics and prebiotics there are additional individual supplements that may be beneficial for the colonization and control of gut flora and to support the health of the gut membrane. It is important to consult with a qualified nutritionist before implementing such a regime for your child.

**L-Glutamine** is an amino acid that is the preferred 'fuel' for the cells in the small intestine. It is also required for the production of intestinal mucus and secretory IgA. It helps to re-establish the protective integrity and digestive function of the gut wall and can help prevent the translocation of bacteria from the gut to the bloodstream.

### Practitioner Select recommended products



#### PRL Glutamine

Glutamine Premier (100 Caps)  
Premier Glutamine delivers L-glutamine (free form), derived from beneficial bacteria (not synthetic).

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#### Klaire Micellized Vitamin A



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**Recommended**

**Butyrate** is a short-chain fatty acid that is required as a fuel to support the health of the large intestine. It is produced by beneficial bacteria from the fermentation of soluble fibre rich in certain foods such as Jerusalem artichokes, cabbage, Brussels sprouts, leeks, onions and garlic.

**Vitamin A** is also essential for the production of sec IgA. It helps maintain the intestinal mucosa and soothes inflammation.

**Vitamin D** is essential for the absorption of fats, phosphorus and calcium.

### Practitioner Select recommended products



#### PRL D3 Serum

PRL's one-of-a-kind, live-source vitamin D3 delivers premier cardiovascular and immune system support.

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**Zinc** is extremely important for the maintenance of the intestinal lining. It is required for cell growth and healing, and is essential to cells with a rapid turnover such as those of the small intestine, which are replaced about every 12 days.

### Practitioner Select recommended products



#### PRL Liquid Zinc Assay

An important mineral required to support gut health.

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