Intestinal Problems and "Whole-Body" Symptoms
Gut 201 - The Intestinal Milieu
Tom O’Bryan DC, CCN, DACBN

Introduction

In the previous edition of The Autism File Global magazine (Issue 37, October 2010), we talked about the importance of eliminating foods a child is sensitive to. When children have food allergies, undesirable immune responses result that affect cognition, and undigested proteins also adversely affect cognition and behavior. So, the first step is to eliminate that which is causing adverse reactions. The next step is to repopulate the intestinal milieu with appropriate probiotics, and that is what we will discuss here today.

Susceptibility

Although food poisoning can be serious, most people will only get a little diarrhea and stomach pain. Out of 25 people at a wedding who eat the spoiled potato salad, why is it that only some of the guests get sick? Most commonly, it begins with a person’s first line of defense, the good bacteria (probiotics) in the intestines. But in individuals with dysbiotic intestinal flora who lack probiotic bacteria, the bad bacteria in the potato salad overpowers the protective effects of any remaining good bacteria, if any, and internal chaos (abdominal symptoms) begins.

The intestinal environment in ASD

The intestinal bacterial environment of children on the autism spectrum is different from that of neurotypical children. A number of parents date the onset of the regressive form of the disease to the administration of an antibiotic(s) prescribed in early childhood for reasons thought to be good at the time, with this being followed by chronic diarrhea. Shortly thereafter, there was a gradual evolution of autistic symptoms. Many authors have suggested that the administration of the antibiotics created the side-effect of a toxic environment in the intestines. Various broad-spectrum antibiotics do not discriminate between killing off bad bacteria and good bacteria.

Conversely, why is it that, per a US study, some children with late-onset autism have improved function when they take a poorly-absorbed antibiotic, vancomycin? If it’s poorly absorbed, that means it is primarily effective only in the intestines. In another study, it was shown that 8 of 10 children with regressive autism demonstrated noticeable short-term improvements with vancomycin. If they take this antibiotic, a significant percentage of the children – 80 percent – seem to improve. Why would one antibiotic seem to contribute to an autism diagnosis and the other seem to relieve symptoms associated with autism? An attempt to help these children by treatment with vancomycin was based on the following hypothesis: the first antimicrobial treatment led to the colonization of the intestines with a higher incidence of the neurotoxin-producing
Clostridium histolyticum group (Clostridium clusters I and II) of bacteria that was responsible for triggering a descent into autism; hence, improvement could be expected by treating this with an antibiotic effective against this Clostridium group.4,5

Bad bacteria in the guts of children on the autism spectrum can cause "tsunamis" in the body. Byproducts of toxin-producing bacteria – lipopolysaccharides – leak out of the gut due to intestinal permeability into the bloodstream and can affect the brain. This may be why some of these children feel better in the short-term when an antibiotic that addresses the pathogenic bacteria in the intestinal milieu (vancomycin) is used. The better option is to create an environment in the intestines of children with autism that is stronger and more resistant to the bad bacteria. Kids cannot take antibiotics indefinitely as there are too many long-term side effects. This underscores the importance of the intestinal milieu and the need to bolster the probiotics in both type and concentration. As with all interventions, responses vary, but multitudes of children have been reported to improve dramatically when healing the gut has been addressed by both removing offensive foods and re-establishing a healthy intestinal milieu. Very commonly, addressing probiotics in the gastrointestinal (GI) tract is rational to include in your strategy and an essential part of the program.

Probiotics

As mentioned in the last issue of The Autism File Global, the 19th century naturopath Louis Kühne proposed that an inappropriate diet led to intestinal toxicity, with increased growth of bacteria in the bowel causing disease. And 20th century Nobel laureate Elie Metchnikoff believed that “death begins in the colon”; he held that many diseases were related to the action of gut bacteria and that consuming beneficial lactic acid-producing bacteria (in fermented milk or yogurt) prevented growth of the unfriendly (putrefactive) bacteria. This beneficial microflora found in the GI tract was termed "probiotics.” Probiotics, literally meaning “for life,” are microorganisms proven to exert health-promoting influences in humans and animals.7 They are so important that the World Health Organization (WHO) deemed probiotics to be the next-most important immune defense system when commonly prescribed antibiotics are rendered useless by antibiotic resistance.8 The WHO went on to define probiotics as "live microorganisms which when administered in adequate amounts confer a health benefit on the host."9

Let’s look at the environment of the intestines and how to create internal “good weather,” preventing the thunderstorms and tsunami’s that contribute to so many different diseases. Creating a safe harbor begins with probiotics, the good guys in the GI tract. How important are they? Consider these facts:

- The number of cells that compose the good bacteria of the intestinal milieu is 10 times higher than all of the other cells in the body combined.
- By young adulthood, both humans and other mammals support one of the most complex microbial ecosystems on the planet, with over 100 trillion bacteria in the distal gut.10
- The composition of the intestinal bacteria can shape a healthy immune response or predispose to disease.
• All food contains bacteria and perhaps a little mold or fungus. There is no such thing as sterile food (unless it’s been microwaved). About five percent of the good bacteria in the intestines binds to the food coming through to help digest it and protect us from any “bad guys.” They not only help with digesting the food, they also produce bacteriocidins that attack unfriendlies (the bad bacteria). On top of that, they send out messages for reinforcements from the immune system, if necessary.
• Gene expression is influenced by what we eat. Probiotic foods and supplements have a big part in determining this. Scientists are now saying that the total information in the human genome for responding to our environment is not sufficient to carry out all functions that are required to maintain health and that the action of the intestinal milieu, the probiotics in our intestines, are crucial for protection from various diseases.

There is more, but the point is that there is an extremely sophisticated world in our intestines, and it was put there for a purpose. What are some of the functions that scientists have found for this vast protective army – probiotics?
• Competition with potential “bad guys” for space and resources (e.g., probiotics will crowd out undesirable bacteria)
• Digestion of vegetable fibers (polysaccharides) that otherwise would not be available to us
• Promotion of vegetable nutrient absorption (monosaccharides) and storage
• Synthesis of vitamins (B-12, K, biotin, folic acid, pantothenate)
• Control of the intestinal “gates” that allow nutrients into the bloodstream (tight junctions)
• Production of the primary fuel (N-butyrate) for the fastest growing cells in the body (the epithelial lining of the intestines). Butyrate is produced by the action of the probiotics on vegetable fiber. Inadequate butyrate in the intestines puts one at higher risk for developing cancer cells.

There is a great diversity of friendly, protective bacteria in the GI tract. From the mouth to the anus, bacteria play a critical role in protecting us. The bacteria in different regions have different jobs to do (bacteria in the mouth have a very different role from bacteria in the large intestine). So, when your clinician recommends probiotics to you, you may not have heard of the particular strains before. There are different strains and species of probiotics – even different strains within the same species. A probiotic is defined by its genus (Lactobacillus), by its species (e.g. Lactobacillus acidophilus), and by its strain designation (often a combination of letters or numbers). The concept of a bacterial “strain” is similar to the breed of a dog – although all dogs are the same genus and species, different breeds of dogs have different attributes, and different breeds are good for different tasks. Some probiotics are as powerful as morphine to reduce pain in the intestines. Some are very strong antibacterials that protect you from spoiled food. Some have powerful anti-yeast properties to reduce the risk of chronic yeast infections. Some focus on rebuilding the damaged intestinal world (intestinal permeability). There are over 500 known probiotics in the human GI tract. Your healthcare practitioner will be able to help determine which probiotic strain or combination is best for you. Don’t be afraid to ask “How is this particular strain of probiotics going to help my child’s specific imbalance?”
IN CONCLUSION

This "weather pattern" in the intestines that I referred to begins in infancy with the colonization of the gut by a variety of microbes, continues throughout the rest of life, and is directly associated with health and disease. The weather can either be turbulent or tranquil. The good news is that you can create a calm environment in the gut with a knowledgeable healthcare practitioner and a little work.

What will a knowledgeable clinician do for you regarding your child's intestinal environment?

- Identify what is disrupting normal GI function.
- Understand how those disruptions play out in the GI tract.
- Understand how those disruptions play out throughout the entire body (a "leak" in one area will eventually affect other bodily systems. It may be the intestines where the problem begins, but this can easily spread and contribute to problems in the brain (autism, ADHD, depression), or skin (psoriasis, eczema, infections), or joints (arthritis, limited motion).
- Develop a plan to address the resulting dysfunction and disease.
In the next edition, we'll talk about healing the damage called intestinal permeability.

**Figure 1 – Common Bacteria in the Gastrointestinal Tract**

<table>
<thead>
<tr>
<th>GI Tract Site of Bacteria</th>
<th>Density of Bacteria</th>
<th>Common Bacterial Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagus</td>
<td></td>
<td>Lactobacilli</td>
</tr>
<tr>
<td>Stomach</td>
<td>$[10^3 - 10^5]/g$</td>
<td></td>
</tr>
<tr>
<td>Small intestine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duodenum</td>
<td>$[10^3 - 10^5]/g$</td>
<td>Lactobacilli</td>
</tr>
<tr>
<td>Jejunum</td>
<td>$[10^5 - 10^9]/g$</td>
<td>Streptococci, Enterobacteria</td>
</tr>
<tr>
<td>Ileum</td>
<td>$[10^3 - 10^{12}]/g$</td>
<td>Bacteroides spp.</td>
</tr>
<tr>
<td>Large intestine</td>
<td>$[10^{10} - 10^{12}]/g$</td>
<td>Bacteroides spp., Fusobacterium spp., E. Faecalis, Lactobacilli, Staph. Aureis, Clostridium sp.</td>
</tr>
<tr>
<td>Feces</td>
<td>$[10^9 - 10^{11}]/g$</td>
<td>Bacteroides spp., Bifidobacteria, Eubacteria</td>
</tr>
</tbody>
</table>

Figure 7.4 Common bacteria in the gastrointestinal tract