AUTISM RECOVERY

A MANUAL FOR PARENTS

Treat Autism
BIOMEDICAL TREATMENT CHANGING CHILDREN'S LIVES

CONTENTS

Treating Autism Biomedically: An Introduction

Thank you, thank you, thank you, for getting started with biomedical treatment! When your child has autism and developmental delays, an incredible number of medical concerns need to be assessed and treated. Whether this is your starting point or you are already somewhere along the journey with your child, it is *essential* to know that autism is a *treatable and reversible* sensory motor integration disorder.

I am writing this manual for you and your child. I am writing it because it's unfair that medical problems in autism often remain unaddressed. Your child deserves proper assessment and treatment. I am writing this manual because I am a "swing for the fences" kind of doctor.

Some may read this manual and find it doesn't resonate for them. Some may read this manual and follow the steps religiously. Whatever you ultimately decide, I encourage you to first identify your goal, or goals, in using biomedical treatment for your child. Because the biomedical journey can be long and arduous, being clear about your own goals is essential to carving out the most successful path for your child's treatment. Medical treatment of autism is a *process*. To implement a process, it's vital to understand exactly what you hope to achieve.

What are your goals in treating your child with biomedical intervention?

About This Manual

I am:

- the mother of a recovered child
- the mother of a child with PANS/PANDAS (Pediatric Acute-onset Neuropsychiatric Syndrome/ Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal infections)
- the mother of a neuro-typical daughter whose kindness and strength inspires me
- a naturopathic doctor
- a DAN! (Defeat Autism Now!) doctor
- a MAPS (Medical Academy of Pediatric Special Needs) doctor
- an advocate in the autism community

I want to begin with defining the purpose of this manual. It is to share my experience treating and recovering thousands of children with autism. My goal is to distill the most current medical knowledge about biomedical treatment and share with you, step-by-step, how to treat your child's digestive, sleep, immune and behaviour problems, and help your child develop his or her language, social and cognitive skills to the highest level possible for your child. The goal of this manual is to address medical aspects of autism and open doors that might otherwise remain closed for your child.

Children with medical issues need and deserve treatment. Most children diagnosed with autism suffer digestive and sleep problems. Treating these medical concerns is every child's human right. Treatment will improve their quality of

life and may open up opportunities for improved communication, social interaction and learning. Treatment may reduce "autistic" behaviour. Treatment goals should begin with improved quality of life.

I am indebted to brilliant doctors and researchers like Claudia Morris, Suzanne Goh, Jill James, Richard Frye, Dan Rossignol, Derrick MacFabe, Julie Buckley, James Neubrander, Wendy Edwards, Anju Usman, Laurette Janak, Elizabeth Mumper, Cindy Schneider, Scott Clack, Stuart Freedenfeld, Richard Deth, Martha Herbert and Mary Megson—and so many more. I am in awe of traditionally trained medical doctors who continue to buck mainstream concepts about autism and are recovering thousands and thousands of children in their own practices, all over the world. This manual expresses *my* opinions and experiences, and is robustly backed by the latest research and what I have learned from these heroes and giants in the autism field along the way.

> **NOTE:** *This manual is **not** a replacement for a trained autism doctor. Nor is this a book that covers all the research into biomedical treatment, so if you're looking for something to convince you that it will change your child's life, there are better places to look. For the primary research, head to PubMed and start learning about the human microbiome project, the human genome project , the gut-brain axis, immunoexcitotoxicity, glutathione deficiency, excess glutamate, lipid peroxidation, SNPs like MTHFR, CBS and COMT, mitochondrial impairment, cell danger response, environmental toxicity, etc. If you would like a summary of some of the research, see our parent resource section and read some incredible books by leading researchers and doctors in this field.*
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> *The goal of this manual is to give you information on how to treat medical issues in autism and recover children diagnosed with autism, by treating the physiological and biochemical weaknesses in each child. This manual will include the steps to take, the aggravations, or troublesome effects, that sometimes occur with treatment (and why they occur), and how to continue your journey until your child's brain and body are functioning at their ultimate capacity.*

CHAPTER 1: Where to Begin

Reaching the Summit: Steps to Conquering Everest

One of the main reasons I decided to write this manual was that I had begun to recognize that coaching parents through the process of biomedical treatment was much like climbing Mount Everest together—except infinitely more important, because it's about changing the trajectory of children's lives.

Climbing Mount Everest is no easy task. It takes knowledge, planning, experience, determination, persistence, grit and implementation. Merely reading about climbing Mount Everest and buying the necessary equipment doesn't get you to the top. Simply talking to someone who has climbed Mount Everest is not going to give you the skills and endurance you'll need to climb the mountain.

It's the same with recovering children to their highest potential.

Sherpas are experienced native climbers who help newcomers to Mount Everest get to the top. They know the terrain. They have favoured routes and tools. They have climbed that mountain over and over again. They keep people safe. They help climbers go as high as they are capable of climbing.

This manual summarizes my experience as a seasoned biomedical Sherpa. I cannot tell you how important it is to find someone who can help you climb the mountain of recovery. You cannot simply read about how to recover your child, or hear it from someone else. You need a guide. You need a process: a methodical approach to treatment, repairing all affected systems with varied approaches, simultaneously.

This manual has evolved out of my experience treating thousands and thousands of children. The truth is that, for the most part, there *is* a reliable formula for optimizing brain development.

It's much like the trek up Mount Everest. You start at base camp. Base camp for biomedical treatment ***must*** be changes in diet that optimize your child's microbiome—the trillions of bacteria, viruses and fungi that live in our bodies and play a critical role in regulating brain function. Dietary intervention sets the stage for optimizing brain function. Then you begin your ascent. You follow your Sherpa. No matter how clear another path may look from a distance, a seasoned Sherpa will direct you to the safest, quickest route to the summit.

I hesitated to share my clinical experience in this way for many years, but as I've grown older the number of children diagnosed with autism has continued to skyrocket. I felt compelled to help prevent parents from going down treatment "rabbit holes." So in this book I want to share with you what I've found to be the fastest and most comprehensive path to recovery.

I'm certainly aware, as you probably are, of treatments like diflucan, flagyl, stem cell, Hyperbaric Oxygen Therapy (HBOT), intravenous immunoglobulin (IVIG) etc. But there's no such thing as a magic bullet or a miracle drug. I'm not saying these treatments and others aren't helpful, but there can be serious drawbacks. Short-term gains can lead to long-term slowdown. It's a bit like using your credit card to pay bills; sooner or later, you'll pay the price.

They also fall into two categories: some that in the long run may not be as helpful as they first appear, and others that may be helpful as an adjunct treatment, but aren't sufficient in themselves.

Using diflucan to kill "bad" yeast species, for example, breeds stronger yeast and creates biofilm. A biofilm is formed when microrganisms like bacteria

come in contact with a surface where they can make a home. The bacteria "sticks" to the surface by secreting a gooey substance called an extracellular polymeric substance (EPS). The EPS is a web of sugars, proteins and nucleic acids (like DNA). The EPS allows the bacteria and other microorganisms in the biofilm to stick together. The biofilm can grow and the microorganisms within can share genetic information, allowing them to diversify and evade being killed by drugs like antibiotics. Chronic infections are very difficult to treat because the biofilm allows microorganisms to hide and become stronger.

Every time you try to kill bacteria, yeast or viruses, they have the opportunity to become stronger, with the help of biofilms. Each antimicrobial your child takes will also impair gut function for up to two years. Children who have been on antifungals, antibiotics and antivirals for many years often have severely compromised gut function. HBOT, on the other hand, is a wonderful adjunctive treatment, but I have not once seen a child recover with HBOT alone, and our local clinics report that children doing it alongside biomedical treatment have much higher success rates.

What is Recovery?

Why do we use the term "recovery" in autism? Some doctors use the analogy (warning–I love analogies!) of being hit by a bus. If I were hit by a bus, medical treatment would help me recover. My specific injuries would be unique to my case, and my treatment would be tailored to the particular site and severity of the inflammation, damage and weaknesses I was experiencing. Even the most exceptional medical intervention wouldn't be able to get my body to recover overnight. I would require long-term treatment, including medication, physiotherapy and potentially surgery. It would take time to recover my body to its previous state, and, depending on how hard I was hit, my body might not be capable of recovering completely. On the other hand, through diligent

intervention—say, lots of therapy, good nutrition and exercise—I might even surpass my previous capabilities. *Recovery* requires an ongoing commitment to treatment over a significant period of time. *Recovery* requires a process.

Regression in autism is a lot like being hit by a bus. *Recovery* will take time and diligent intervention. If your child is benefitting from biomedical intervention, he or she will continue to benefit until the brain and body are functioning at their absolute optimum. This process takes time and regular adjustment to address the shifting physiological and biochemical state of each child.

A Note of Caution: Begin with Acceptance

The only way to truly recover your child is to begin treatment from a place of acceptance. Of course, that brings up some paradoxical feelings for parents. Recovery *isn't* about your child being "fine" or "normal." Recovering optimal brain function is about improving quality of life.

Over the years, I have heard the term *recovery* become deeply interconnected with biomedical treatment. It's used perhaps too broadly, in my opinion. In the biomedical world, *recovery* has come to mean such a wide variety of things that the term almost loses its meaning. In our clinic we attempt to define recovery very clearly: as achieving age-level skills. Like climbing Everest, this is a gruelling journey, because recovery is a process, not a destination. Along the way, you may decide to pause or even stop. If you do, you will still consider your child "recovered" from some aspects of autism. I would encourage you to continue recovering your child for as long as you are able to do so. If you keep climbing the mountain, you will get much closer to the top. The focus needs to be on optimal functioning of your child's brain and body. Optimal function does not come in days or weeks, or even months. It takes years to comprehensively repair and optimize brain function.

Severely affected people on the spectrum (note that I don't like the term "severely autistic," because so much of autism involves untreated medical concerns) will still report the same issues, even while experiencing recovery. For example: "it doesn't take a lot of energy to learn; it takes energy to control my body and coordinate the words to communicate." (To understand these issues better, there are wonderful resources available to parents to learn about how your child's brain functions.)

I often explain to parents that skills like pointing, talking and visual processing are "bridges" that, in children on the spectrum, have been damaged or washed away. What if your child understands everything perfectly but can't control her body so as to point, communicate or follow directions? What if, in essence, your child is trapped in a body that won't always listen to his brain? Biomedical treatment helps to build and repair damaged bridges, so that your child's brain can function better, improving her ability to control her own body. This translates into predictable gains in language, social, cognitive, behavioural and motor skills.

Recovery cannot be about making your child "normal." Focusing on that as a goal can tear you apart—and your family, too. Like recovery, acceptance is a journey. If you haven't taken your first steps on the journey of acceptance, I encourage you do to so today … *now*, if you can. Acceptance frees us from the bonds of guilt and despair. Acceptance allows your child's recovery process to proceed with fewer burdens.

I have had the privilege of helping to recover thousands of children. In every case—yes, *every* case—children have eventually reported that they had always understood what was being said or what was happening around them. They simply couldn't show that they understood, because their "bridges" to the world were weak or damaged. Acceptance is crucial for both you and your

child. Children know if you are trying to "treat away" their autism to make them "normal." Your child knows when his behaviours and inability to control his body upset you or embarrass you in public. Not accepting your child slows the process and mires it down in stress and uncertainty. When you embark on this journey with a commitment to comprehensive recovery and with acceptance in your heart, it is a beautiful process. I learned this on the front lines, and I hope that my years of despair and terror over what the future would hold will spare you a little worry on your own journey.

As the number of children diagnosed with autism increases, so does the number of doctors working in this field. I had the privilege of training with some of the best autism doctors and researchers in the world. I have also had the privilege of training some of the best autism doctors in the world. In this manual, I'm suggesting protocols based on the most current research and my 15 years of experience working with thousands of families. One goal is to help you avoid biomedical pitfalls that slow down the recovery process and reduce the likelihood of long-term success.

For example, the number one pitfall, or "rabbit hole," parents fall into is also the one most important to avoid: the attempt to kill microbes in the gut. You can't kill microbes like yeast, clostridia and/or strep with pharmaceutical drugs without breeding stronger microbes and increasing biofilm. This results in a longer and less successful recovery process. The more biofilm that develops, the longer the recovery process and the higher the likelihood of layering on other concerns like PANDAS/PAN/chronic Lyme disease. Repairing the metabolism created by healthy gut flora is the fastest and most successful road to recovery.

The "gut-brain axis," the vital connection between what happens in your digestive system and in your brain, has been extensively researched and provides the basis for many of our biomedical interventions. (You can learn more about it in books by

neurologist Dr. David Perlmutter, *Brain Maker* and *Grain Brain*.) Once damaged, the gut-brain axis is repairable only when you embark on biomedical treatment, which includes the steps laid out in this manual.

Trying to kill microbes in the body is a bit like waging war, in its ultimate futility. Nobody wins when bombs are dropped. You can't live in a city that has been shelled by artillery. Children can't go to school when their town has burnt to the ground. There has to be a better way to "win." If you want to maximize your child's chances of recovery and a more healthy gut, follow the science in this manual and you will discover that your child's body already has what it takes to support its own recovery.

A Window into Your Child's Future: Presume Competence

By the time I'd worked with just a handful of children diagnosed with autism, I knew it was what I wanted to do for the rest of my life. There was something intangibly beautiful about families looking "outside the box" of mainstream medicine to address overt medical symptoms that were constantly dismissed as just "part of autism." Imagine having ongoing digestive issues or sleep problems. Now imagine not being able to communicate these to anyone, so they go untreated. Autism is widely considered a "mental health" concern. Why, then, would chronic diarrhea or insomnia be lumped in with the diagnosis?

I saw quickly that treating digestive pain and sleep disorders for children in my practice dramatically changed their quality of life and that of their caregivers. Repairing children's ability to control their motor systems resulted in staggering improvements in language and social capabilities. Improving sensory integration reduced negative behaviours, from self-injury to stereotypical/repetitive stims (self-stimulation behaviours) that seemed to keep children off somewhere in their own world, trying vainly to manage the brain's scrambled sensory signals.

I sought out continuing education in the world of autism and trained with the Autism Research Institute and later the Medical Academy of Pediatric Special Needs. I reached out to researchers like Dr. Claudia Morris and Dr. Derrick MacFabe, who generously shared their time, expertise and astounding level of knowledge to improve my understanding of gut flora and motor planning. I spent time with top doctors in the field, including Dr. Julie Buckley and Dr. Elizabeth Mumper.

My husband used to say, in the early years of my focus on biomedical treatment, that I was obsessed with two things: my children, and the treatment of autism. Little did we know that those two obsessions were on a collision course that would dramatically alter all of our lives.

I am so profoundly grateful to the researchers and autism advocates who are supporting the message of "presumed competence." This concept was first introduced by psychologist Dr. Anne Donnellan and proposes that the least harmful choice, when working with children who have different needs, is to presume they are competent. Presuming that a child with limited verbal communication understands everything doesn't hurt that child. The opposite presumption—presuming the child has a mental deficit—can create harm. A child "locked" in her own body can't show you she understands by speaking or pointing.

My husband always said he believed our son, Magnus, was listening and understanding everything, but there was a "block" so that he couldn't communicate. Magnus later proved his dad was right, by repeating things we had said—and some words that we shouldn't really have been saying around him!

Magnus's Story - A Tale of Regression and Recovery

I feel it is vitally important that our clinical practices reflect the feedback coming from the autism community. Virtually all of the patients I have treated and who have recovered enough to communicate tell us the same things:

- *I have always understood everything.*
- *I have trouble controlling my body.*
- *I find it difficult or impossible to organize words in my brain.*
- *I don't know how "normal" people move their mouth or control their body.*
- *Hyper-focusing on objects makes me feel calm because I can block out the world.*

The even more difficult comments to hear include:

- *I am in pain.*
- *My brain feels like it is squeezing itself.*
- *I drone or make noise to block out the noise of the world.*
- *I hit my head because it relieves the pain I feel all of the time, if only for a short period.*
- *I don't want to be obsessed with _____, but I can't stop myself. It is like my brain is on a loop.*
- *It hurts to eat.*
- *The world looks like pixels.*

Thank you, thank you, thank you for reading this guide and considering, or continuing, intervention for your child. Physical, medical and neurological symptoms of autism are treatable, and biomedical treatment has the ability to change lives.

CHAPTER 2: What is going on inside your child?

Many doctors and researchers have dismissed the idea that disruption of sensory and motor integration is the underlying problem in autism. But, having had the privilege of working with so many families over the years, I can tell you that without a doubt, autism is a sensory motor planning disorder … a disorder of praxis. So, what is *praxis*? Praxis means "doing" or "acting." It is a combination of the brain's ability to create a "motor plan" and its ability to execute that plan properly. Motor planning refers to how your brain breaks down any desired action into small steps, which the brain and body then execute in the proper order. It's an intricate process that involves instructing the brain to fire particular brain chemicals and stimulate neurons in a complicated sequence.

Whenever I think about praxis, I envision a fireworks display. People diagnosed with autism have the fireworks, but they don't have enough "help" to set off the fireworks in a swift and organized fashion, like a really impressive show on a national holiday. Sometimes all of the fireworks get set off at once, and sometimes none will go off at all. There is a lack of energy to coordinate their brain and body, because their neurotransmission (brain function) is unique. It's one thing to light up a "burning schoolhouse" firework in your backyard, and yet another to create timed fireworks accompanied by a coordinated symphony performance, as seen in some of the world's most best fireworks shows. Our brains are all capable of this. But in autism, genetic weaknesses, environmental toxins, harmful microbes in the gut, nutrient deficiencies and carbohydrate addiction all decrease the brain's capacity to fire coordinated and complicated communications to muscle groups in order to support praxis.

Speech pathologists and occupational therapists often use the term *motor planning* to simplify the therapy they are using to support language, sensory integration or motor skills. These therapies are anything but simple. Breaking

skills down into steps is very difficult and takes both training and experience. Praxis is an extremely complicated and neurologically taxing process. It's a process that requires adequate energy production to:

- come up with an idea
- plan the motor steps needed to execute it
- check with the memory banks to see if this plan has a previous history
- check in with the sensory system to identify any sensory information needed to execute the coordinated motor movements
- execute the movements, and finally
- collect data or feedback on any changes that need to be made to improve the speed or effectiveness of coordinated movements in future.

Difficulty with *praxis* is why your child isn't responding to her name. She knows her name (I promise you, she knows her name and many other things that it is your job to dig out with all the tools at your disposal). Praxis is why your child "can't" follow a single, simple request. No requests are simple when praxis is so complicated. The simplest request will require dozens of steps in a motor plan, a plan that can be executed only once the sensory system accepts it and there is enough energy to coordinate all the steps. For most of us, praxis happens swiftly, with little awareness on our part. For people diagnosed with autism, praxis can involve a mild or severe impairment, with a significant impact on ability to function.

Neuroscientist Daniel Wolpert's Ted Talk simplified this concept for me many years ago. He explained that we have a brain for only one reason: movement.

The sensory system and the motor system are a connected track in the brain, requiring cooperation to support movement.

Let's say I want to stand up from a seated position. Which muscles do I need to use? Which order do they fire in so that I can smoothly stand up? What sensory considerations does my brain have to assess: Am I standing up on ice? Or is there a banana peel that would require me to stabilize a different set of muscles to prevent falling? Does my heart have to pump faster to compensate for change in position? Am I holding an infant in one arm? Infinite variables go into a simple movement like getting up out of your chair.

What we understand now from people with autism is that, when asked to perform "simple" tasks, they are not able to coordinate the sensory processing and motor planning required to execute the task and thereby show they understand the request. A motor plan is like a rough draft; the sensory system needs to review and edit that draft, making the proper choices to help the body accomplish the desired movement. (The eyes are scanning for patches of ice on the sidewalk, for example, and providing information to the brain that will affect how I'll position my muscles to avoid a fall. Nerves in my limbs are relaying information about the shifting weight of the baby in my arms, so that my plan to stand up will be revised to account for changes in my center of gravity.) If the sensory system is required for motor planning, and 90% of children diagnosed with autism have sensory issues, that means we have tens of millions of people on the planet locked in a brain that simply won't do what it's told. This is information that should be spreading like wildfire!

The process of motor planning is supported and improved by repetition and feedback. Deficiencies or damage to motor planning prompt lots of repetition, in an attempt to strengthen or heal the process. Since I'm Canadian, I'll use a hockey analogy: Think of the difference between a 4-year-old who's up on

skates for the first time and a professional hockey player who not only navigates with great speed on the ice (forwards and backwards) but does so pushing a puck! The pro has fine-tuned his or her *praxis*. The 4-year-old will fall down thousands of times before he or she will have the ability to win Olympic gold.

After medical complications, motor planning and sensory integration also require repetition to heal or improve. Let's go back to the "being hit by a bus" analogy. During physiotherapy, I would be required to do exercises targeted at repairing my praxis/sensory motor planning (example: walking back and forth, over and over, to regain mobility). Repetitive exercises help to strengthen and stabilize muscles.

What if your child with autism can't get his body to do what he is asking it to? What will he do to try to get it working?

An example: visual motor planning

Visual motor planning is one of the best examples, in my opinion, of compromised sensory and motor praxis in autism. Some observations:

- How many children stim in front of their eyes, or watch shows or parts of shows, or even credits in the shows, over and over?
- How many children look out of the sides of their eyes, line up toys, or lie down and look closely at toys and objects?
- Why is it when someone with autism looks at something, she always looks at the most densely pixelated part?

Integration of visual information has been identified as a particular problem in autism. Impaired visual motor planning may be the main reason. Researcher Dr. Pawan Sinha, who has shown this, discusses it in an easy-to-understand

TedTalk called *How Brains Learn to See*. He points out that neuro-typical children can take cues from movement to predict where an object is going, allowing them to process dynamic information. Children with autism, on the other hand, have a significantly diminished ability to track visual information. Tracking dynamic visual information allows the brain to create patterns and then to generalize information. But visual integration is not possible if visual motor planning is impaired. A full 40% of the brain is required to process visual information. I believe that many children with autism experience a visual disorder and that "visual stimming" is an attempt to repair or heal this part of the brain. Remember that repetition is the hallmark of therapies designed to improve praxis.

In the first steps of biomedical treatment, most children experience improved eye contact and social skills. In fact, most parents report improved awareness within weeks of beginning treatment. This is because the brain is getting much-needed "fuel" for visual integration. Integrating visual information from looking at human faces is very taxing, in part due to the micro-movements that are part of facial expressions and non-verbal communication. Facial movements are never exactly the same and differ from person to person.

Another astounding finding made by Dr. Sinha is that when dynamic visual processing slows down, so does the rest of the brain. Children with autism probably cannot make sense of some or much of their visual input. Stimming of this nature is always treatable and often completely reversible.

The 'other brain'

The brain is made up of 15% neurons and 85% immune cells. It was long believed that the neurons were in charge. Little did we know that the "other brain," as it is termed by Doug Fields in his book, *The Other Brain,* is responsible for virtually every aspect of brain function. The immune cells, which make

up the bulk of the 1.5 kilograms of tissue in our brains, differ from neurons in that they don't transmit signals electrically.

To explain the differences between neurons and immune cells, a comparison I use is that of a landline phone (the kind wired into a system) vs. a cellphone (which sends and receives signals wirelessly). Neurons are essentially an electrical system like your old-school telephone, with "wiring" that sends brain chemicals to other receptors in serial fashion. The brain's immune cells (collectively called *glia*) are more like your cellphone: they transmit information by broadcasting chemicals throughout the brain without a "line." The immune cells are crucial to support brain development. Broadcasting brain chemicals takes a lot of energy. Because the immune cells, or glia, make up 85% of the brain, any reduction in the energy available to fuel this system will slow brain function down.

Research is beginning to explain more and more of the symptoms and behaviours typically associated with autism, and it appears that altered glial function could be behind some of these symptoms. One way glial function is altered is when immune cells are turned on, or "primed," in response to microbes or toxins.

Did you know that every time you get the flu you suffer brain damage? It's true! The glia turn on and stimulate various brain chemicals to help fight off the flu virus. A battle is waged, resulting in nausea, aching head and muscles, and the discharge of yucky secretions. When you win the battle against the bug, your glia "turn off," and it's cleanup time. No harm, no foul. In autism, something very similar to this is happening, but it can't be stopped until you treat your child biomedically.

Dr. Russell Blaylock has proposed that the central mechanism of autism is "immunoexcitotoxicity." This basically means that, when "primed," or turned on,

the immune cells in the brain start to transmit a brain chemical (glutamate) that causes excitation. Excitation changes the way the brain functions. Too much excitation can cause severe disruption, resulting in neurodevelopmental and neurogenerative disorders such as autism and Alzheimer's.

Reflected in the term itself is the process that causes the ongoing and detrimental changes to the brain:

immuno: immune cells turn on

excito: too much glutamate, causing excitation in the brain

toxicity: damage caused by a cascade of activity induced by excess glutamate

Glutamate isn't a bad thing; it's needed for the brain to function and helps to make neurons. But if there's *too much* glutamate present, it changes signalling in the brain, and results in neurons that don't function properly. Decreasing the amount of glutamate has been shown in clinical trials to reduce autism symptoms.

Imagine a beautiful garden. Now imagine what happens if that garden isn't properly tended. It becomes overrun with weeds and opportunistic plants that take over. That's your brain on too much glutamate.

When there is damage to the brain, glia migrate toward where the damage is occurring to help repair it. Since we believe glia are needed to transmit brain chemicals crucial to language, social, cognitive and motor/sensory integration, it makes sense that brain function will change if glial function has to be redirected to manage the damaging effects of toxicants. Recent research has drawn a link between the huge increase in autism and environmental toxins.

Toxins like lead, mercury, aluminum, pesticides, fire retardants, and so on—up to 100,000 potential culprits—may cause a slowdown in the brain's "wi-fi" system, curtailing the ability of the glia to broadcast the crucial brain chemicals required to support development.

We know without a doubt that microbes such as clostridia, metals like aluminum, and certain chemicals such as pesticides will prime the glial cells and trigger the release of glutamate. Imagine an infant who is hungry, wet and tired all at once, wailing because he's overwhelmed with sensations and needs he can't cope with. That's how scrambled the brain becomes when the glia are overly "primed" and produce too much glutamate. Immune cells in a brain engorged with toxins, chemical messengers and inflammation probably don't broadcast the same amount of brain chemicals (like serotonin, dopamine and GABA) as those that aren't so preoccupied with holding back a flood of toxins. In clinical practice, repairing the body's ability to remove harmful microbes and toxins gives the brain a much-needed break, which it desperately needs to clean up excess glutamate. Stopping the cascade of Immunoexcitotoxicity (pretty much my favourite word) is how autism doctors help a child gain control over her sensory motor system—and therefore her body.

Integration of this system is only possible when the brain can broadcast and receive signals in a balanced way. We do need glutamate (and, by the way, this is why your kid is crazy smart), but too much shuts the system down like an airport full of planes with their jet turbines spinning that can't take off. What follows in this manual is a step-by-step guide to maximize the chance of your child gaining freedom from sensory overload, allowing him to gain better control over his eyes, mouth and body.

Please remember your goals, and the goals that I encourage you to incorporate. Untreated medical issues in autism are a human rights tragedy. Spreading

this message far and wide is right up there in my own list of life goals, along with being a good mom and the best autism doctor I can be.

Mitochondrial impairment: your child's damaged 'factory'

Whole-body treatment is the path to true recovery, a fact that is becoming clearer and clearer as we better understand not just autism but many other conditions.

Naturopathic Doctors are trained in a systems approach, and the tools in their tool box are diverse and abundant. We are trained to use acupuncture, traditional botanical medicines from around the world, and hundreds of vitamins and minerals. Although I am thrilled that medical doctors are pursuing training in functional medicine, which is a more individualized approach to medical treatment, it is very rare for traditionally trained doctors to use a systemic approach to recovery. Rare, because traditional medicine has "chopped" up the body into specialties. Eye problem? See your ophthalmologist. Neurological problem? See the neurologist.

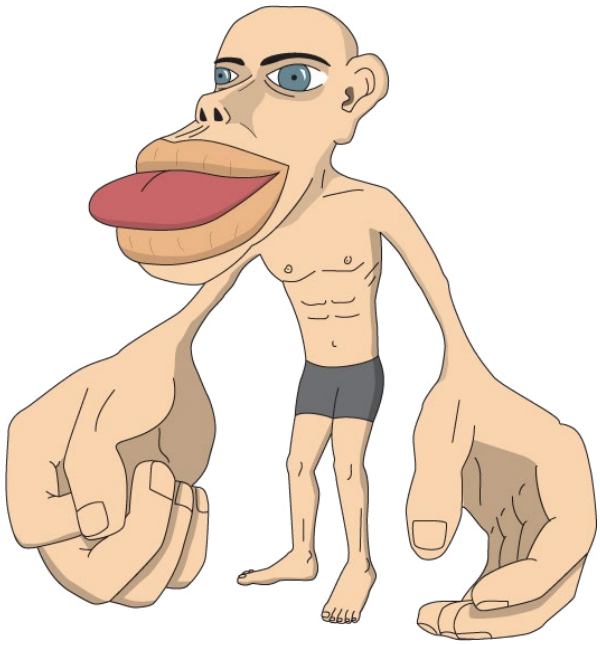
What do we do in an era where research into the gut-brain axis is beginning to explain everything from autism to depression to ALS to dementia? What do we do when dermatologists are using anti-inflammatories to treat eczema when it is microbes in the gut that are responsible? I am thankful for the physicians in my life who are experts in their specialities, because we absolutely need to have experts in urology and cardiology. Surgery and medications are lifesaving … but there is a cost to not looking at the body as a complete system. Antibiotics have a negative impact on the gut for up to two years. Seizure medications create deficiencies like lower carnitine levels, which can slow development.

So, what the heck is this section about? It's about health at the broadest and most basic level: what's going on in the body's cells. Opening up opportunities for sensory integration and coordinated motor planning requires medical treatment of the *mitochondria* and cessation of the *cell danger response*.

Mitochondria and their role in autism symptoms

Mitochondria are the energy production factories in our cells. Mitochondria produce ATP, or adenosine triphosphate, a high-energy molecule in each cell that stores the energy we need to do just about everything. Think of it as the body's fuel, or energy "currency."

Imagine your income is cut by 50%. To survive on that, you'll potentially need to budget carefully and decide which bills you're able to pay. The largest bill, your mortgage perhaps, would be the one most in jeopardy of not getting paid. The body's energy currency works the same way. Look closely at the picture below. It is, as you may know, a sensory homunculus—a visual representation of where the body allocates energy. You'll notice: eyes, mouth, hands.



Decreased energy production in the body will result in the biggest areas of energy consumption slowing down. And where do most children with autism struggle? Eye contact, verbal communication and often fine motor coordination. See the connection? Improving mitochondrial function has been shown to improve language, social and cognitive skills for children with autism. It has also been shown to reduce unwanted behaviours (stimming, for example). Everything we do in biomedical treatment is focused on protecting the mitochondria and improving mitochondrial function.

Many things can negatively affect mitochondrial function, including the presence of toxins, harmful microbes like Lyme, clostridia and yeast overgrowth, and nutrient deficiencies. Even stress can cause mitochondrial impairment. Dr. Robert Naviaux's landmark paper on *cell danger response* also goes a long way toward explaining what is happening in autism. Damaged cell membranes result in a panic signal from the mitochondria, which in turn results in disrupted cell function. Stopping the panic signal will reduce autism symptoms.

I'll use the analogy here of a battery factory. One day, there's an explosion in the factory, and the building suffers structural damage and flooding, followed by rust and mold.

Think of the mitochondria as the factory, busy day after day producing batteries (energy in the form of ATP) to keep the body running. The damage and flooding are what happens when toxicants and microbes interfere with the mitochondria workers, keeping them from doing their job because conditions in the factory are unsafe.

There is one particular drug treatment for this currently being touted as a miracle drug. But it may turn out to be more like a quick fix at the battery factory—say, mopping up the water so the workers can put in a few hours. Soon, they'll have to stop working again because the machinery is rusting up

and stops operating, mold is growing and they have trouble breathing, it rains and the leaky roof lets more water in. Without a comprehensive plan to clean up the damage, repair the factory and machines, and ensure workers remain healthy and safe, the mitochondria factory won't be able to carry on long-term. Recovery takes more than a quick fix once a week. It takes an organized, long-term program to keep the mitochondrial factory humming along.

It is possible this is a miracle drug, but there are very few "magic bullets" in the world; everything valuable takes hard work and persistence. Yet I have watched families become obsessed with what I call "lottery ticket" treatments. Looking for magic bullets may draw you away from a very reliable and safe approach to improved communication, social interaction and cognitive balance. Instead, develop the mindset of being gritty, tough and never giving up. You just have to DO IT.

As a Naturopathic Doctor I can see the process of recovery at work, and the direction a child is progressing. I suffer sleepless nights thinking about recoverable kids whose loving parents fell down a "rabbit hole" going after a "lottery ticket" kind of treatment. Kids on their way to optimal functioning and age-level skills have been taken off biomedical treatments to pursue alternative treatments like stem cells, HBOT, the next big probiotic, fecal transplant … the list goes on and on, and continues to grow. A single treatment or intervention will *not* recover your child. In combination, however, a systematic approach to repair will change your child's life and the lives of the people who love **him**.

Repairing your child's mitochondria factory

So where does it start? With fat.

Mitochondria are fueled by fat. In autism, the mitochondria function optimally when a child is on a modified ketogenic diet. This is typically called a "paleo" or "caveman" diet, but I like to call it living like a "cavekid." Plenty of exercise, clean water, clean air, and lots of protein, fats and vegetables. If we evolved from primates, this is the food we humans have been eating for 15 million years. If we were gifted this beautiful planet by a higher power, this is the food that the higher power gave to humans to thrive. Meat, vegetables, fruits, nuts, seeds and eggs. Not grains and dairy.

One way mitochondria are damaged is through harmful microbes that feed on complex carbohydrates. The shuttles that deliver fats to the mitochondria are also damaged when the number of these microbes increases. Dr. Derrick MacFabe, at the Killee Patchell-Evans Group, has shown that, in the lab, autistic behaviours induced by clostridia can be reversed by removing complex carboydrates from the diet. I will go into more detail later about how important Dr. MacFabe's research is in the medical treatment of autism, but the point is that diet is the most effective way to support mitochondrial function. There are many therapies that help to support mitochondrial function, but recovery is only possible when mitochondria are receiving the proper fuel.

CHAPTER 3: The biomedical steps

Overview

Each of the steps listed in this chapter includes the following:

1. **Biomedical Recommendation:** information on this step, including supplements to add

2. **Rationale:** a summary of why this step is included

3. **FAQs:** the most frequently asked questions and concerns from parents, with both a short answer and a more expansive one

4. **Common Aggravations:** why unwanted effects may occur and the most effective way to manage them

5. **Resources:** further reading to help you learn more about the research on the biomedical recommendations

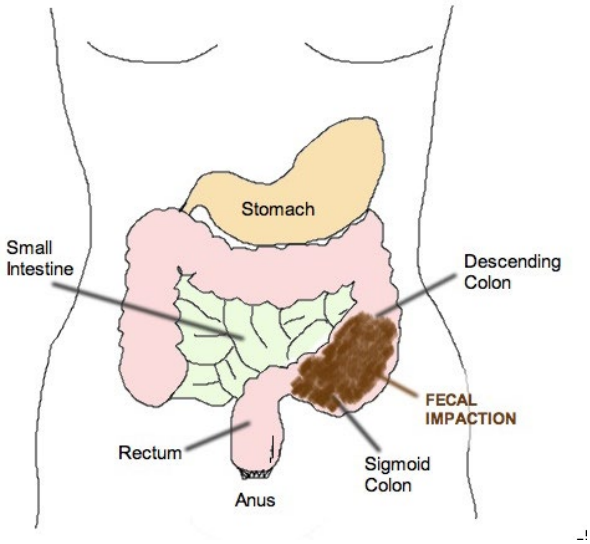
This is a "choose your own information" manual. If following the biomedical recommendations without an explanation works for you, there is no need to read the rationale. If you want to know more about the recommendations, consider reading some of the material listed in the resource section. If those materials don't convince you, move on to the research cited at the end of many of the wonderful books and websites listed for you, in order to expand your knowledge about biomedical intervention.

It is really important to get your information from experts in the field of biomedical treatment of autism. Much of the information found on the Internet or

being shared in parent support groups is based on out-of-date research. For example, many parents who visit my office have transitioned to a gluten-free, dairy-free diet, but the most current medical literature on the gut-brain axis is clear that children require a *grain*-free, dairy-free diet to optimize brain function. Don't believe me? Check out the books in the resource section in Step 1!

Recovery, I repeat, is a process. Adding a treatment like dimethylglycine (DMG) may be helpful for many children, but it is the systematic, step-by-step process that allows your child to recover. It's like building a house: before you put up the frame you need to grade the land and pour the concrete foundation. If you leap ahead and install a beautiful chandelier before you paint the walls, you're haven't finished; you're still in process. Improving the way the brain functions requires putting an individualized, orderly system into place, not taking shortcuts and expecting to get there early. This is why I always say your child's best chance at a high level of recovery is to follow guidance from someone who has the ability to create a systematic approach to the recovery process. There are steps that you need to take to transform a plot of land into a home. So, behold … my process.

STEP 1 – Assess transit time and bowel health



BIOMEDICAL RECOMMENDATION

- Get a bowel X-ray (no contrast dye) to rule out fecal impaction
- If a bowel X-ray is not accessible for any reason, follow the directions for the beet transit time test to identify a slower transit time, which strongly indicates fecal impaction

RATIONALE

Starting treatment with proper assessment of gut function and motility is critical to faster results and overall success. Some will consider skipping this step. **Please do not.** Your child's transit time—the time between eating a food and pooping that food out—should be less than 18 hours. Slow transit time is one of the most common medical contributors to autistic symptoms and behaviours.

If there is one thing that every parent who has a child diagnosed with autism should consider doing, it's getting a bowel X-ray. Many physicians are reluctant to requisition a bowel X-ray in a child who is having daily bowel movements.

But after working with thousands of children, I am continually shocked at how often a child has moderate to severe fecal loading (meaning the bowel is filled with old poop). If your child's MD will not requisition a bowel X-ray, you can use the beet transit time test to give you an approximation of retained stool. Directions can be found in the appendix.

Think of the state of your kitchen after you've prepared a holiday feast, dirtying every single dish, pot and pan. Now, imagine trying to immediately prepare another feast. If your kitchen is filled with dirty dishes, pots and pans, it is not functional. You can no longer cook meals until you clean up. Your child's bowel functions the same way. It must be emptied regularly in order to function properly. Retained fecal matter reduces absorption of nutrients and encourages overgrowth of "bad" microbes, which we will discuss more in Step 2.

FAQS

What if my child won't eat beets or sit still for a bowel X-ray?

SHORT ANSWER: This is just the beginning of transitioning your thinking to biomedical being a lifesaving treatment. Would your child eat beets if it could change the rest of her life?

LONG ANSWER: The most common medical concern in autism is constipation. This is the most important step in your child's biomedical journey. Try to think of these steps as lifesaving, but if your child truly cannot eat beets and you do not have access to a bowel X-ray, consider following the "bowel clear out" steps, which will result in a few days of liquid stool. It is better to start biomedical treatment knowing the bowel is not impacted than to begin and experience aggravations. At the first sign of aggravation, you will need to ensure your child doesn't have an impacted bowel. In my opinion, it is better to start knowing this answer and/or clearing out the bowel to increase likelihood of successful treatment.

Why is normal digestion so important in autism?

SHORT ANSWER: Gut health is 100% important for brain function.

LONG ANSWER: What if I told you that I have a miracle drug? And that this miracle drug could:

- Support healthy sleep
- Increase energy
- Prevent infections
- Decrease inflammation
- Regulate mood
- Support healthy immune function and decreasing autoimmunity
- Make brain chemicals
- Increase levels of vitamins and minerals
- Improve essential fatty acid status
- Regulate hormones and cholesterol levels
- Detoxify harmful substances such as lead and pesticides
- Prevent and treat chronic diseases
- Build and maintain all cell membranes
- Produce protective sheaths on nerves

Sounds a little bit like a miracle drug, doesn't it? But better gut health really can do all this. I hope this is a perspective-shifting moment for you, if your child is not yet on a diet that can leverage the "miracle drug" he has inside his own

body. Many parents are searching for a magic bullet or miracle drug to recover their child. They'll invest all they have in what I call "lottery ticket" treatments, in the vain hope that they will give their child the ability to speak, learn and socialize at age level. In my 15 years of treating children, I have *never* had a child fully recovered without dietary intervention. The more we learn about the microbes that live in our gut, the more this makes sense. Your child's miracle drug is the hundreds of trillions of good microbes in their body. Feed the right microbes, change the brain. Change the brain, change your child's life.

Again, the principle of presumed competence is important here. If your child has physical pain she simply can't express, it may show up in aggression, self-injury or repetitive behaviour. It's vital to have an appropriate medical assessment before assuming that your child's headbanging, for example, is a "behaviour" issue rather than a response to, say, a migraine. I always recommend explaining to your child why you are changing his diet. It is important that you try to include him in the process and talk to him about why the food he craves could be contributing to pain or making it difficult for him to control his body.

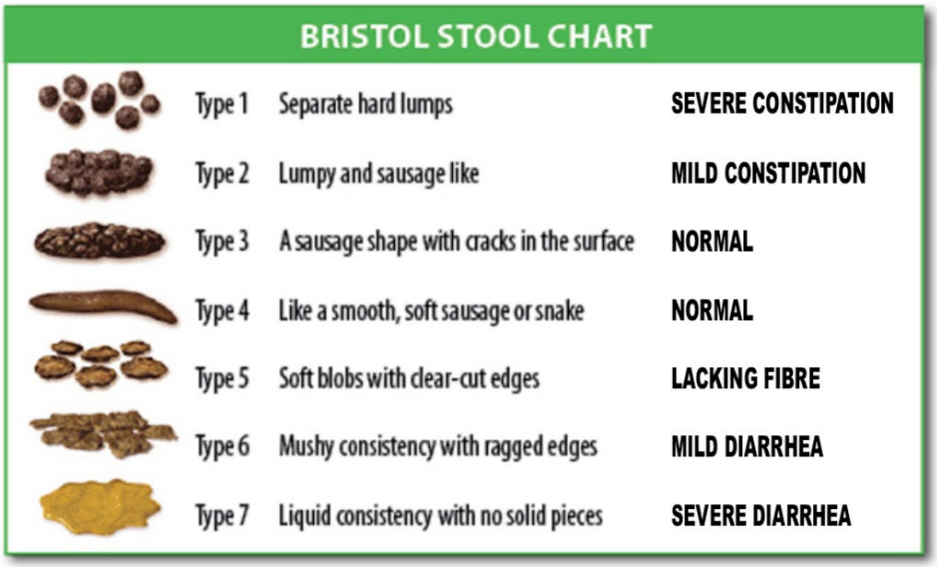
What does my child's poop say about his gut health?

I know it doesn't make us seem appealing, but Naturopathic Doctors talk about poop *a lot*! We talk about frequency, shape, smell, size, texture, you name it. We are tenacious investigators of digestive health, because we see again and again that when digestive function is optimized, overall quality of life improves.

Human beings should have a bowel movement (yes, I'm talking about "poop" again) three times a day. Yes, I said *three times a day!* The width should be the size of your child's "O" when he makes the "OK" sign.

The total length of your child's bowel movement should measure from your child's wrist to her elbow crease.

Many of you reading this will not fall into the "normal" category of digestion. This may be affecting your own health and well-being. Below is a Bristol stool chart, a fantastic tool to help you figure out if someone you support needs to be worked up for digestive problems. Each poop should be somewhere between III and IV on the Bristol stool chart.



Credit - Cabot Health, Bristol Stool Chart - http://cdn.intechopen.com/pdfs-wm/46082.pdf, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=41761316

Let's talk about frequency a little more. Many parents I work with are not aware digestion is an issue because their child has stool that looks like number III or IV. Keep in mind that shape *and* frequency are important to gut function, including supporting mood. Having a bowel movement only once a week is a huge problem. Even skipping two to three days is enough to cause behaviours in people diagnosed with autism.

What does the shape of stool tell us about our health?

Hard stools, like number I and II on a Bristol stool chart, are considered constipation. In my 15 years of practice, constipation has consistently been the number one cause of behavioural issues in autism. When parents come to see me and their child is aggressive, irritable, and/or anxious, has significant self-stimulatory and/or stereotypical behaviours or scripting or self-injury … it is almost always in part due to significantly compromised digestive function. Stimming that includes hitting or pressing on the chin is a common flag for bowel pain, as are certain postures, like lying on the floor, pressing the abdomen against furniture, or leaning at the waist with arms stimming behind.

Loose stools, like number VI or VII on a Bristol stool chart, are considered diarrhea. Diarrhea is often linked to elevated levels of clostridium (a family of bacteria) but can also be seen with yeast overgrowth, food sensitivities, impaired digestive enzyme function, lactose intolerance, gluten intolerance or celiac disease. Chronic diarrhea is when loose stools persist for more than three months. Diarrhea can also be a red flag for severe constipation, because the "newer" stool is passing over and under the old, hard stool, leading to chronic loose stools.

Here's how impaired digestion and digestive disorders have an impact. Up to 85% of people diagnosed with autism experience:

- Constipation—leading to mitochondria weakness, nervous innervation, swelling, and clogged toilets
- Diarrhea—leading to difficulty gaining weight, frequent illness, nutrient deficiencies (B12, iron, vitamin D, zinc)
- Reflux—causing sleep disturbance and pain after eating
- Bloating
- Pain—prompting posturing, aggression, self-injury
- Celiac—causing pain, impaired absorption, increased risk of chronic disease
- Esophageal eosinophilia (an inflammatory condition of the esophagus)
- Picky eating
- Appetite changes, including restricted eating and carbohydrate cravings (often to the point of addiction)

COMMON AGGRAVATIONS

Children using magnesium or another laxative to clear out or empty the bowel may be irritable, nauseous, or have decreased appetite, trouble sleeping and behavioural concerns. Follow the directions in the appendix and ensure your child does not have diarrhea for longer than three days.

RESOURCES

Grain Brain, Dr. David Perlmutter
Gut and Psychology Syndrome, Dr. Natasha Campbell-McBride

STEP 2 – Stabilize the microbiome with diet and add methylation

BIOMEDICAL RECOMMENDATION

- Begin Biomedical Dietary Intervention (BDI) with a grain-free, dairy-free diet that has less than 6 tsp (24 grams) of added sugar daily
- Introduce methylation support, ideally using methyl B12 injections. Children without access to that can use DMG (dimethylglycine), TMG (trimethylglycine), which are similar to vitamin B6 or magnesium, or SAMe (S-Adenosyl-L-methionine), a dietary supplement found naturally in the body. The Aggravations section below reviews steps to take if your child reacts to a methyl supplement.
- Cod liver oil—½ tsp to 2 Tbsp
- Melatonin if needed: follow the guide in the aggravation section on how to support optimal sleep

RATIONALE

Stabilizing the ecosystem that lives in the gut (the microbiome) opens up a developmental super-highway to recovery. Without that stability, the process of recovery is slower and more fraught with aggravations. It may seem daunting at first, but if you read through this section carefully, I believe you'll feel more prepared and empowered to take this crucial step in your child's recovery.

If you were sitting in my office, I would explain how the process works by drawing on a board. **Here's a video.**

Confused?

Let's start at the beginning, with the gut—the digestive system—where nutrients like essential fats, required for optimal gene function, are processed for delivery to the rest of the body, and harmful substances are detoxified.

Living in your gut is a whole unseen world consisting of hundreds of trillions of bacteria from thousands of bacterial species. We call this internal ecosystem the *microbiome*, which encompasses the microbes and their genes. When our microbiome is healthy, we have the support of all those helpful bacteria from thousands of different families, which make up an astounding two to six pounds of our total body weight. The surface area of a healthy adult gut, if stretched out, would be the size of a tennis court! Your child has a mini tennis court filled with tissues and beneficial flora designed not only to absorb the nutrients vital to every organ in the body, but also to run the metabolic factories needed to produce energy for every cell to function.

These bacteria and bacterial genes perform incredibly important metabolic tasks that support brain function, manage inflammation, regulate immune function and help to detoxify harmful chemicals and metals.

Besides bacteria, the gut harbors viruses, which are estimated to outnumber the bacteria a hundredfold, and parasites. Some research suggests that a lack of parasites in this ecosystem, thanks to the cleanliness of modern life, is altering our physiology and increasing the risk of autoimmune disorders. Some leading doctors and researchers are using parasites like non-pathogenic hookworm to treat autoimmunity in autism and other autoimmune diseases where the body is, essentially, attacking itself.

This ecosystem in the gut is directly responsible for how the brain functions. Reduced numbers of helpful microbes, from bacteria to parasites, negatively affect how the brain is functioning. A growth in the number of unhelpful,

harmful and opportunistic microbes, on the other hand, will also change the way the brain is functioning.

Mounting research verifies how critical a role the gut plays in supporting healthy brain function. One study, for example, found that unhelpful bacteria can essentially "eat" GABA (gamma-aminobutyric acid), a brain chemical that is needed for optimal functioning and which helps to calm the brain and nervous system by balancing the effects of glutamate on the brain.

There are some wonderful books on the research being done into this connection, but it basically boils down to this: "Whoever is in charge of the gut is in charge of the brain."

In the words of Dr. Julie Buckley, author of *Healing our Autistic Children*, "Your child's gut will make more decisions in one day than you will in a lifetime." That's why the best, and in my opinion only, starting point for biomedical treatment is to heal the gut and optimize the good flora that reside there.

The Pink Wheel

Now, let's go back to the video, starting with the "pink wheel." This is the *folate cycle*. It's a process whereby one of the B vitamins—synthetic folic acid, or folate from the food your child eats—is converted to methyl folate, what I call "gold for the brain." Methyl folate is a crucial component in more than 200 biochemical and enzymatic processes in the body important for development, including how the cell membranes function—an important factor in autism.

Human genomics is at the forefront of medical assessment and intervention. The Human Genome Project identified that we have 35,000 genes. Researchers around the globe are now studying individual genes and groups of genes to discover how they impact human health. The folate cycle has been the

subject of investigation by a number of autism researchers and is much slower in many children diagnosed with autism because of differences in the genes (SNPs like MTHFR or MTR/MTRR), the presence of environmental toxins like lead and mercury, and the harmful by-products of microbes in the gut. For example, children who have a different form of the MTHFR SNP have trouble converting synthetic folic acid to methyl folate, which helps to regulate brain chemicals. The "pink wheel" in my diagram functions best when synthetic folic acid is removed and vitamins like methyl B12 are added to help the cycle function optimally.

A grain-free, dairy-free diet with less than 6 teaspoons (24 grams) of added sugar daily allows your child's internal "miracle drug"—a healthy gut-brain axis—to be at its highest dose. Not following the diet may mean that your child's overload of harmful microbes slows methylation (to be explained shortly) and contributes to environmental toxins being retained in the body. Sticking to this diet is perhaps the most vital thing you can do for your child's recovery. That's because two types of particularly unhelpful and opportunistic groups of microbes typically feed on grains and sugars: *yeasts* and *clostridia*.

Yeasts change the way the brain functions if they get the opportunity to increase in numbers. I just used the words *opportunity* and *opportunistic* because yeast will only become a problem under certain conditions, including constipation, diarrhea, frequent use of antibiotics, and nutrient deficiency. Yeast creates acetyl-aldehydes, substances that are chemically similar to alcohol. Yes, alcohol. If your child has yeast overgrowth in her gut, the yeast creates an alcohol-like substance that reduces how well her brain works and can even cause damage to the brain. This substance and many others produced by gut flora slow down the methylation cycle and decrease the body's ability to detoxify harmful metals and chemicals.

Yeast further complicates developmental delays like autism because it depletes vitamin B6, which is needed to support the production of critical brain chemicals like serotonin, dopamine and GABA. B6 is needed to reduce *glutamate*, and to produce *glutathione*. (**http://treatautism.ca/2017/09/20/brain-chemicals-research/**)

Yeast overgrowth also contributes to low cholesterol levels in people with autism—and cholesterol, even though that word has negative connotations, is essential in the right amounts to optimal development.

Children who suffer constipation and diarrhea have predictable changes in their microbiome. Below is a list of symptoms associated with yeast colonies proliferating in the small intestine.

Behaviors:

- Demanding
- Non-compliant
- Aggressive, emotional, rage, crying easily, self-injury
- Stimming
- Hands over ears
- Chewing (on everything and anything) and teeth grinding
- Laughing for no reason, in the middle of the night or spontaneously during the day
- Climbing all the time
- Standing on head or hanging upside down all the time
- Brain fog: giddy, super-silly behaviors
- Loss of energy
- Seeming out of it
- Craving bread, pasta and sweets
- Hyperactivity
- Jumping, rolling excessively
- Night waking
- Night wetting
- Grinding teeth
- Pressing chin with hand or fist
- Off in own world
- Toe walking
- Lying on the ground
- Pressing belly into furniture or other firm things

Clinical Signs:

- Rashes
- Eczema, cradle cap
- Funky-smelling scalp (the "wet dog" smell)
- Itching: perianal, genital and/or generalized
- Redness: perianal, perivaginal
- Abdominal bloating
- Increase in flatulence
- Constipation or diarrhea
- Change in smell of stool (yeasty, bready, foul or sweet)

Now let's look at some tremendous research being done at the University of Western Ontario by Dr. Derrick MacFabe involving *clostridia*, a family of bacteria. Building on previous research by Dr. Sydney Finegold showing elevated numbers of clostridia in the stool of children with autism, Dr. MacFabe and his team were able to create an animal model of ASD (an autism-like condition in rats) by injecting propionic acid from clostridia bacteria into their brains. The "PPA rats" began to exhibit autism-like behaviours such as running repetitive loops around their cages, seizures, reduced interest in social interaction, and even fixation.

In practice, overgrowth of clostridia in children diagnosed with autism shows a correlation with what Dr. MacFabe found and continues to find in his research.

Clostridia species impact in the following way:

- Impaired detoxification through depletion of glutathione
- Glutathione detoxifies heavy metals, pesticides, chemicals, hormones and toxins
- Depletes carnitine
- Carnitine shuttles fats into the cells

- Carnitine deficiency leads to essential fatty acid deficiencies that impact oral motor planning, increasing likelihood of verbal apraxia
- Increases oxidative stress
- Increases microglial activation contributing to immunoexcitotoxicity
- Impairs methylation cycles, leading to an increased need for methyl donors
- Causes mitochondrial impairment, likely through depletion of glutathione and carnitine
- Causes digestive problems in many children

Yeast and clostridia, as I said earlier, feed on grains and sugar. They're always hungry for more. So, the more of these microbes are living in your child's gut, the more your child will crave grains, dairy (which contains sugars) and sugar. Let's note here that "gluten-free" and "grain-free" are not the same thing. While many parents report their children respond better off gluten, others report no difference with a gluten-free or even gluten-free/dairy-free diet. Opportunistic and harmful microbes flourish in an environment that is high in complex carbohydrates. In other words, NO grains (with or without gluten) or sugar.

Yeast and clostridia metabolites result in altered brain function. However, *this problem is treatable and highly reversible.* It's not that different from what happens with an individual who is addicted to drugs or alcohol. If you ingest a harmful substance on a daily basis, your brain's functioning will be altered. But once you stop ingesting that substance, over time the brain begins to function differently. It's possible, with patience and diligence about avoiding grains and sugar, to optimize your child's brain function, resulting in dramatic differences in his ability to process and relay information.

The Green Wheel

The "green wheel" in my video stands for the methylation cycle. Methylation refers to the addition of a "methyl group"—a single carbon atom and three hydrogen atoms—to another molecule. Methyl groups are like little on-off switches in your body that help to control your brain chemistry, how your body makes energy from food, responds to stress and infections, and a host of other functions. If there's a shortage of methyl groups or the methylation cycle is interrupted, those functions are compromised. The fuel for the "green wheel" is methylcobalamin, the form of vitamin B12 that is bound to a methyl group; adding it can help optimize the function of this cycle.

When babies are conceived, they are not methylated. They grow through the process of methylation, which is supported by B12. If the body is damaged in some way, the methylation cycle helps to repair it—especially in the brain. As I said in the video, 90% of children diagnosed with autism have methylation impairments, according to research done at the Arkansas Children's Research Institute by biochemist Jill James, PhD. Impaired methylation leads to various weaknesses down the road, such as low glutathione levels, weak cell membranes, cell danger response, oxidative stress, mitochondrial weakness, and inflammation. In practice, we see that supporting methylation with treatments like methyl B12 injections improves development and behaviour in children diagnosed with autism as well as Down syndrome, speech delay, ADHD and rare genetic disorders.

The Battery: Glutathione

Glutathione, a powerful antioxidant, is the product of the folate cycle and the methylation cycle working together. It's essentially the battery in the brain, protecting cells and mitochondria and aiding in detoxification, among many other active functions. When it runs low, brain development and functioning

slows. Essentially, your child's brain can only develop as far as the available glutathione can take it.

Dr. James found in another study that children diagnosed with autism have up to 80% of their normal glutathione level depleted. This reduces glutathione's ability to "mop up" and regulate glutamate in the brain and leads to glutamate becoming dominant. The resulting excitability in the brain, constant in many children with autism, leads to effects like repetitive behavior, fixation and obsessiveness, and can reach the toxic point, where there is actual damage to the brain.

Glutathione levels can be improved by supplementing with a variety of nutrients, including methyl B12.

Too much of a good thing: Glutamate

Glutamate is the most plentiful brain chemical, or neurotransmitter. (Neurotransmitters are chemical messengers that help transmit the tiny electrical signals that pass information between neurons, a continual process in the brain.) As was explained earlier, glutamate is needed to make neurons. In the first two years of life, glutamate is responsible for building a beautiful garden of neurons in the brain. But too *much* glutamate reduces the brain's ability to "weed" the garden, resulting in longer and more complicated neurons. These are more difficult to "fuel," and that affects neurotransmission and keeps the brain from functioning optimally. If there's not enough fuel available to keep everything running as it should, the brain goes into a "crisis management" mode, and allocates fuel (or energy) to the most critical parts of the brain. In practice, we see that cognitive function is always preserved, but other systems that may not be as essential are compromised. People can survive without language and social interaction, but cognition is a critical system that is almost always protected when energy resources run low.

In virtually all of my patients, the brain starved of fuel chooses a short-term survival strategy of trying to "memorize" the world by storing massive amounts of detailed information. (Which may explain why many a child with autism is able to memorize entire shows and movies, but has trouble saying hello to a friend.) In the long run, shunting resources in the brain towards memorization means there isn't enough fuel left to coordinate information in the parts of the brain that govern spontaneous language and social interaction. For a child with autism, that results in significant delays and reduced quality of life.

For those of us who work closely with the autism community, there are countless examples of this, including young children who understand and can write five or six languages, do four-by-four-digit multiplication, or create astounding works of art. The brain in someone with autism is working differently because of a fueling issue that is medically treatable and reversible. Remove the fuel embargo created by grains and sugar, and your child can show you what she is capable of. In my experience, people diagnosed with autism are some of the most creative, loving, imaginative and intelligent people on the planet.

The brain-gut axis is a two-way system between the nervous system and the digestive system. Serotonin, another brain chemical sometimes called a "feel-good hormone," functions in a key way at both ends of this network. Microbes in the gut can affect production of the amino acid tryptophan, which converts to serotonin, and thereby have a significant impact on brain function and behaviour: While the mechanisms are complicated, imbalanced gut microbiota, stress, nutrient deficiencies and the cell danger response have all been shown to disrupt this process and negatively affect neurotransmission.

The solution to all of this is simple: repair methylation, and improve regulation of glutamate, by putting affected children on the Biomedical Dietary Intervention (BDI) program and methylation supports.

The basics of BDI

Keep in mind that if grains, dairy and sugar are acting like drugs, the most successful approach is to remove them 100% as quickly as possible. Treating addiction to drugs or alcohol in adults is difficult and has low long-term success after the initial cold-turkey phase, because access to the addictive substances is so easy. The good news is that the drugs harmful to your child aren't available to them unless *you* provide them! Here are the basic elements of the diet.

Maximize:

Most of your child's meals (90%) should consist of these foods

- meat
- vegetables (ideally green leafy vegetables)
- eggs
- fruit
- nuts
- seeds

Minimize:

Your child can eat these foods, but they should compose no more than 10% of the diet

- all sources of starch (including tapioca starch, which is used in "paleo" recipes)
- juice
- sweet potato
- lentils
- beans
- buckwheat
- quinoa
- peanuts
- legumes
- Added sugar/cane sugar/ honey/maple syrup should be less than 6 tsp daily (24 grams)
- Xylitol and stevia are good, naturally derived alternatives to sugar

Remove:

- all grains (be aware that your child will likely prefer these foods and continue to crave them)
- all dairy (including milk, yogurt and cheese; your child may crave these foods or choose to completely avoid them)
- white potatoes (too starchy and often have high levels of pesticides)
- remove all artificial sweeteners

Supplement with:

- Cod liver oil

Parents researching this subject will note that there is a wide range of suggested dosing for cod liver oil. So what amount is beneficial but safe? This is something you need an expert to help you with.

I realize that many people reading this manual will not have access to an autism trained doctor. One of the main reasons I decided to publish my "biomedical formula to recovery" is that so many parents who call us from around the world have no local access to biomedical treatment. I need to repeat that this manual is absolutely **not** a replacement for a trained autism doctor. If you don't live near one but can travel, you may want to consider doing so. A trained Naturopathic Doctor can help you use maximum doses for the fastest and most comprehensive recovery your child is capable of.

One of the secrets to a successful outcome for the patients in our clinic is the use of very high doses of essential fatty acids, fat-soluble vitamins and phospholipids, in addition to a modified ketogenic approach that leverages the body's burning of fat as fuel—an approach being used by many other

researchers and doctors to treat chronic diseases like cancer and Alzheimer's. This is the "biomedical formula" we have discovered that creates dramatic improvements in our patients and also speeds up the recovery process.

To ensure your child is taking the highest dose that is safe for him or her, you need to work with a medical professional with adequate training in nutrition and nutritional biochemistry. I have the utmost respect for traditionally trained physicians and work closely with children's family doctors and pediatricians to provide comprehensive care. It is important to understand, however, that most traditionally trained medical doctors have limited training in nutrition and very little if any in nutritional biochemistry. In Canada, physicians receive four hours of training on nutrition. My family has a wonderful medical doctor; the Canadian health-care system literally saved my son's life twice when he had life-threatening croup. I am pro-MDs, but most will not have the training to help you maximize your child's recovery by using high-dose, but safe, cod liver oil.

The best way to recover your child is to first put him on the BDI diet, provide him with methylation support, and help him begin to heal with the help of essential fats like cod liver oil. Our team has discovered that no matter how big the problem, if you can super-saturate the body with healthy fats, dramatic changes can be seen. The more "severe" the autism, the more fats are required. Also—and this makes sense if you think about pre-existing fat deficiency—the children who have the most trouble absorbing, transporting and using fats will be the most susceptible to developmental delays. Repairing the system that absorbs and shuttles fats into the mitochondria depends on BDI and methylation support.

Work on maximizing:

- sleep time

Optimal sleep is required to ensure that your child's recovery is a smooth and fast as possible. My recommendation, as with the bowel X-ray and/or beet challenge, is not to skip this step. Below are optimal sleep windows for children based on age and what time they wake up in the morning. Adequate sleep is a medical recommendation. It's irrelevant if you as parents are night owls or your child's brother or sister also goes to bed late. Your child's brain needs as much sleep as possible to do the hard work of repair. The brain heals while it is sleeping. Every hour of sleep before midnight is worth two after midnight for your child's development. If you will allow me a moment of being bossy, every child should be going to sleep in his or her optimal sleep window.

	WAKE-UP TIME						
	6:00 am	6:15 am	6:30 am	6:45 am	7:00 am	7:15 am	7:30 am
AGE	SLEEPING TIME						
5	6:45 pm	7:00 pm	7:15 pm	7:30 pm	7:30 pm	8:00 pm	8:15 pm
6	7:00 pm	7:15 pm	7:30 pm	7:30 pm	8:00 pm	8:15 pm	8:30 pm
7	7:15 pm	7:15 pm	7:30 pm	8:00 pm	8:15 pm	8:30 pm	8:45 pm
8	7:30 pm	7:30 pm	8:00 pm	8:15 pm	8:30 pm	8:45 pm	9:00 pm
9	7:30 pm	8:00 pm	8:15 pm	8:30 pm	8:45 pm	9:00 pm	9:15 pm
10	8:00 pm	8:15 pm	8:30 pm	8:45 pm	9:00 pm	9:15 pm	9:30 pm
11	8:15 pm	8:30 pm	8:45 pm	9:00 pm	9:15 pm	9:30 pm	9:45 pm
12	8:15 pm	8:30 pm	9:00 pm	9:00 pm	9:15 pm	9:30 pm	9:45 pm

FAQs

Most families dealing with autism are searching high and low for treatments that could help improve their child's quality of life … to improve language, reduce behaviours, help with sleep, and stop aggression or self-harm. I've had the privilege of working with families all over the world and, time and time again, I've found the best intervention is diet. Below are some of the most frequently asked questions that I have encountered from parents.

Does my child need digestive enzymes?

SHORT ANSWER: Maybe, but not right now.

LONG ANSWER: Antibiotics and antifungals breed biofilm in the body. Biofilm, as I've previously described, is a colony of various microbes, minerals and metals. These things glom together and adhere to a surface in a wet environment; a familiar example is the dental plaque that forms on your teeth and is implicated in tooth decay and gum disease. Chronic infections are caused by bacterial biofilms, which are basically multicellular organisms that help microbes that are under attack survive the attack and eventually grow even stronger. It is crucial to avoid breeding biofilm because it makes it harder for children to recover.

Digestive enzymes can chip away at the biofilm, but this may cause unnecessary aggravation early on in treatment. After the first few steps, we often add a digestive enzyme, or need to add one, because we're seeing symptoms that stem from an inadequate breakdown of biofilm. Signs your child needs a digestive enzyme include undigested food in the stool, inability to manage high doses of cod liver oil, or symptoms caused by phenols, including dark circles under the eyes, sleep disturbance, laughing for no reason, behavioural

concerns, red ears, hyperactivity, and reactions to high-phenol foods (for details, check the resource section).

Can't we just kill the "bad" bugs like yeast, clostridia, Lyme, strep, etc.?

SHORT ANSWER: No. Unequivocally, no.

LONG ANSWER: The best research and researchers on the planet are reinforcing our understanding that you cannot simply kill microbes and expect to fix the microbiome. You can only starve the "bad" guys and feed the "good" guys. While targeted killing may have merit in individual cases, the first step is to incorporate foods that will improve balance in the microbiome and then help to run your child's brain metabolism.

The problem with trying to use pharmaceutical drugs to kill microbes is that when they replicate under pressure, they will use the genetic information from other microbes—their buddies in the biofilm—and replicate in different, resistant forms to evade being killed by the drug. Biofilm is much like a college dormitory, with different bugs living closely together and sharing genetic information. That gives microbes access to a kind of super-genome that will provide a survival formula for each microbe being targeted with a drug.

Using antimicrobial drugs to "beat" autism is a bit like bombing your own homeland to win a war. We'll never win the war on microbes, which can adapt faster to what we throw at them than our cells can. We win by feeding the "good" bacteria and starving the rest.

My child is a really picky eater. He won't eat the foods listed on the maximize list of the diet.

SHORT ANSWER: Yes, he will … maybe not all, but some. That will be enough to begin getting better, and it will build from there.

LONG ANSWER: All the reading in the world will not get your child's brain improving. You *must* act! Reading and learning about Mount Everest does not get you to the top of the mountain. That's why I have provided you with a list of resources to learn about the research, but have not focused on that. This is a "how to" manual.

Transitioning your child to this diet should actually be very easy. After all, your child does not have a job. Your child cannot buy food. Your child probably doesn't prepare meals. Putting your child on the diet is as simple as taking these steps:

- For 48–72 hours, feed your child only food that is grain-free and dairy-free
- Ensure your child is getting liquids; ideally water, but juice or non-dairy milk if necessary
- After 72 hours, if your child has not eaten anything, consult a trained autism doctor before continuing
- After 72 hours, if your child is eating only foods from the BDI list, continue to offer her as many different options as possible, ensuring she's getting adequate protein and high amounts of good fats

After three years of trying to help families gradually transition their child to the diet recommended by Dr. Martha Herbert and many others, I finally realized why this can be such a struggle. The reason children were craving sugar, carbohydrates, processed foods and dairy products is that their brains were actually trying to solve a complicated fueling issue. Children diagnosed with autism do not get enough brain fuel from their mitochondria. Their mitochondria may not be as strong as others genetically, or may have been damaged by a microbe or toxin. Whatever the reason, the result is that children with autism feel like their brain is not getting enough energy. So they make a beeline

for the fastest fuel they can find. Sugar feeds the brain quickly, but it doesn't support optimal brain development. The fuel our children so desperately need is *fat*. Burning fat for fuel optimizes brain function.

This is why no other intervention can compare to changes in diet. Your child needs the proper fuel source. A magical thing happens when you transition him away from grains, dairy and sugar: in a few short weeks, his brain function improves—noticeably.

Sugar may come in its simple form (juice, for example), or in its more complex form, such as in bread, rice, cereal, and pasta. Sugar is eight times more addictive than cocaine! What I learned in three hard years is that the best way to put your child on the diet is to do it 100%, as quickly as possible—like the old analogy of ripping off a Band-Aid. Trying to simply cut down on a food that behaves in the body like an addictive drug is as arduous as it is unsuccessful. Putting your child on the diet "cold turkey," the way rehab centres handle a drug addict, is surprisingly easy. You just do it. And when you do it, you transition directly to the food you want your child eating. Transitioning first to gluten-free bread, then no bread, is brutal. Transitioning off grains onto white potatoes in the form of chips and French fries is frustrating and ineffective. The best advice I can give you is to put your child on the diet *completely*, and focus on healthy fats, protein and vegetables. This is short-term pain for a long-term gain.

Does my child need a probiotic?

SHORT ANSWER: Probiotics are valuable adjuncts to treatment but cannot recover a child on their own. Adding a probiotic before beginning the new diet often creates aggravation. "Bad" microbes don't like being pushed out by "good" microbes. Putting your child on a probiotic is part of the next series of steps.

LONG ANSWER: Probiotics are an important part of biomedical treatment, but the only way to heal the microbiome and gut is to *feed* the "good" guys and starve the "bad" guys. Imagine a community that's overrun by looters and thugs (some of whom are "good" kids who've just fallen in with a bad crowd). They're causing chaos, breaking windows, stealing merchandise and setting fires, sending the good honest citizens fleeing elsewhere. You could give more "good" people "danger pay" to go live there, but would that solve the problem? Isn't the best first step to reinforce security systems, make it harder for the criminals to profit from their behaviour, and starve them out?

Think of the "bad" bacteria in the gut, the ones we know can alter brain function, cause damage and create inflammation, as the criminals in this scenario. Is there benefit in adding "good" people into the chaos? Isn't the best first step to remove any reason for the looters to be there, and restrict their access to food and water? Embargo is the only strategy that truly works for "bad" microbes. If you don't want your child's brain being negatively affected or damaged by "bad" microbes, you need to remove them from the ecosystem—and return the opportunistic microbes (the "good" kids gone astray) to being "helpful" members of the community.

The gut contains hundreds of trillions of bacteria. A probiotic could have 5 billion to 450 billion beneficial strains, which means it will take years, if not decades, to repair the gut using probiotics alone. The "bad" and "opportunistic" microbes will never leave if you feed them, and the most current medical literature to date shows that these microbes eat sugar and complex carbohydrates. The "good" bacteria in the gut that help to govern brain function via the gut-brain axis require vitamins, healthy fats and things like inulin. Feed the good guys, starve the bad guys, and your child will experience significant improvements in brain function and quality of life.

Will my child get enough calcium on this diet?

SHORT ANSWER: Yes.

LONG ANSWER: Dairy is a poor source of calcium. Only 33% of calcium in dairy is absorbed. Non-dairy sources of calcium are 100% absorbable.

Doesn't my child need dairy?

SHORT ANSWER: No.

LONG ANSWER: We are the only species that drinks milk from another species. Dairy contains an omega 9 fatty acid. The brain requires omega 3 and omega 6 fatty acids for optimal functioning. Dairy is the cheapest, most available fat. It is not the best source of fat for the brain. Using the BDI and cod liver oil in step 1 will automatically increase the quality of fat needed in your child's diet to help her brain.

How long will my child have to be on the diet?

ANSWER: The answer to this question is based on your goals. My goal for my child was recovery, so he remained on the diet until he was functioning at his optimal level, which included age-level language, social, cognitive and motor skills. If the BDI begins to help, consider doing the diet until your child's brain is functioning optimally. In other words, help your child climb the mountain as high as he can. Biomedical treatment success is 90% persistence.

How do I know my child's brain is functioning optimally?

ANSWER: The answer to this isn't easy, but for the most part, our goal is age-level skills. Not all children are capable of recovering all of their language, social

and/or cognitive skills. I can guarantee only one thing: If you follow the steps in this manual, your child will be happier, be in less pain, and have more communication, awareness, social interaction, and control over her body and brain function. These are life-transforming changes for someone diagnosed with autism.

Is my child allowed juice or sugar?

ANSWER: Ideally, no. Small amounts of juice or sugar can be used to help administer supplements like cod liver oil. Aim for less than 6 tsp of sugar daily (48 grams). Just one teaspoon of sugar alters immune function for up to five hours. The brain is 85% immune function, so sugar is an important toxin to remove. Yes, it is a *toxin*. As I said earlier, it is an astounding *eight* times as addictive as cocaine!

What do we do when we are at a birthday party or a family event/holiday? Or, my daycare or caregiver provides food for my child?

SHORT ANSWER: Keep your child on the diet.

LONG ANSWER: Remember that these foods act like a drug on the brain. These foods alter brain function and cause damage to the brain by slowing methylation, impairing fat absorption, negatively affecting mitochondrial function etc. These foods are not a treat for your child, and others interacting with your child need to understand that clearly. These foods are taking opportunities away from your child. These foods are making your child's brain fuzzy and foggy. They are contributing to pain. Birthdays, family dinners and holidays are celebrations. It is important to reframe your thinking about diet and brain function. You wouldn't celebrate a holiday by getting together and taking a drug like cocaine. Your child has a unique brain. This brain requires unique fuel.

Most of my daily practice is focused on reminding parents that your child may want these foods, but that they are the number one obstacle to recovery.

Is there another way to get B12 methylation other than injections?

SHORT ANSWER: Injections are 100% absorbed and the best support for the methylation cycle.

LONG ANSWER: B12 is among the methylation supports that are essential to biomedical treatment. Oral, spray and transdermal B12 are options, but all have very low absorption. Other methylation supports include:

- Foods like beets, meat, eggs, green leafy vegetables, dark green vegetables and onions
- DMG, TMG
- SAMe
- Methionine
- B complex

My child is afraid of needles; should he still get injections?

SHORT ANSWER: Yes.

LONG ANSWER: It is quite common for children to be afraid of getting their B12 injections. There is really nothing easy about autism. The only good thing about biomedical treatment is the results! Every other aspect is difficult. Some doctors who treat autism use the example of Type I diabetes to explain the necessity of accepting needles: children who are diabetic *need* lifesaving insulin injections. The brain *needs* B12 to function. B12 injections are safe and effective. The injections provide 100% absorbable B12 to the brain and result in improvements in communication, social interaction, learning, and fine and gross motor skills, and reduce "autistic" behaviours by improving sensory integration.

Is it safe to give my child high-dose cod liver oil?

SHORT ANSWER: It is really important to work with a health care provider with training in nutritional biochemistry if you are concerned about supplement safety.

LONG ANSWER: One of the most important clinical "pearls" that we have discovered in our clinic is the value in providing good fats, fat shuttles and fat-soluble vitamins in the treatment and recovery of children diagnosed with autism. The natural form of vitamin A found in cod liver oil is the key to eye contact, reducing visual stimming, social interaction and learning. I have had the privilege to train Naturopathic Doctors, Nutritionists, Dietitians, Traditional Chinese Doctors and Medical Doctors, and one of the most important treatments that I review is the use of high-dose cod liver oil to repair dynamic visual processing.

My child won't take cod liver oil; what should I do?

SHORT ANSWER: This applies to any supplement that I recommend throughout the manual. You *must* get your child to take the supplements. Treat them like lifesaving medicine. Make it non-negotiable. Be firm. Your child understands everything. Tell him it is essential, that you love him and must get those supplements into his body daily. It will be a chore at first, but I can assure you it does get easier relatively quickly. Check out suggestions on how to administer supplements in the Appendix.

LONG ANSWER: Brain functioning in autism is like a hurricane. After a hurricane hits, there is damage, flooding, reduced access to resources, stress, and debris. What does it take to clean up after a hurricane or typhoon? Resources. Fuel. Help. Supplements are the way to fast-track recovery and to heal damage in the system. People with autism may not like this analogy, but remember that in times of crisis, such as a natural disaster, the best qualities of human

beings often rise to the surface: kindness, bravery, courage, persistence, creativity and honesty. The fact that the best parts of humanity are highlighted in our children and in adults with autism doesn't mean medical treatment isn't required. The brave survivor of a natural disaster—even one who saves the life of another—still needs rescuing himself.

I often get criticized by adults with autism who tell me there is nothing wrong with them and they don't need to be "treated"—a term gleaned from my website TREAT AUTISM. I am not autistic, but I disagree with that criticism, after more than a decade advocating for the medical treatment of autism. If a person finds eye contact painful, treating it medically can only improve that person's quality of life. If sounds are so overwhelming to the brain that the choice is to retreat or injure oneself, medical treatment is essential.

Biomedical treatment changes lives. It doesn't change people. I often hear parents use the term "normal" when outlining their goals. Biomedical treatment will not make your child "normal." And, knowing these children, why would you want them to be "normal"? They have personalities and gifts that make them exceptional people.

Treatment provides the path to age-level skills, but the autistic brain is not something to be treated away. The most beautiful humans I have ever met are autistic. Their honesty, creativity and profound compassion is why we need to treat them medically. We "normal" folk are missing out. The medical aspects of autism are decreasing our ability to know and learn from a group of people that will change our world in a way that is desperately needed.

Does it have to be cod liver oil? Can I just use an omega 3 fish oil?

SHORT ANSWER: Yes, it really should be cod liver oil.

LONG ANSWER: When autism doctors are specific, it is for good reason. The "cis" form of vitamin A in the cod liver oil will help to repair the cell membrane and optimize visual integration. Not all brands of cod liver oil have vitamin A, and some have the vitamin A but it isn't as effective at repairing the G proteins and cell membrane as others. Vitamin A is also needed to support healthy cell function and improve the balance of "good" microbes in the gut. The cis form of vitamin A helps to improve genetic expression in a unique way, helping your child improve more quickly.

Can I add a regular omega 3 fish oil?

SHORT ANSWER: Cod liver oil contains omega 3 fish oil, so extra isn't needed.

LONG ANSWER: I believe autism is a fat-deficient state. Patients often require very high doses of omega 3 and omega 6 fatty acids to optimize communication, motor planning, social skills and learning. In the next sections, we will discuss the addition of more good fats.

We are vegan. Is there a vegetarian option?

ANSWER: Yes, but if you can consider cod live oil a medical treatment, it is the best source of the natural vitamin A required by your child. A vegan source of omegas needs to be converted to EPA, DHA and GLA with the help of B6. A child on a vegan omega source should also be taking B6 and a separate vitamin A supplement derived from cod liver oil.

My child goes to sleep late but sleeps through the night. Is that okay to continue that, or should I try to get her to sleep in her age-appropriate window?

When I tried melatonin, my child woke up in the middle of the night (or really early). What do I do?

ANSWER: Children's brains need to be supported by sleeping during their optimal window. Every hour of sleep that your child gets before midnight is worth two hours after that time in terms of how it supports development. I provide parents who experience a problem with early waking with a step-by-step plan for using melatonin to adjust sleep rhythm (see Chapter 5: Aggravations Index for more detail). It can take time to repair your child's sleep cycle, but doing so is an important step in his biomedical treatment. Children who go to sleep in their age window and sleep through the night improve more quickly.

COMMON AGGRAVATIONS

Aggravations are one of the most important topics in this manual. *Aggravations* are communications from the body about an internal problem that needs to be addressed. Imagine that you fell and broke your arm. You go to the doctor and the doctor carefully presses on various spots, asking, "Where does it hurt?". When the doctor finds the spot where it hurts—that's where the bone is broken! Aggravations seen in biomedical treatment likewise provide important information about the underlying causes of your child's autism symptoms.

Biomedical treatment can often cause aggravations because we are "pressing" in various areas, trying to identify weaknesses, so we can create a treatment plan to help support the parts of your child's body that most need help. Aggravations are crucial to discovering details about how your child's body is functioning and where treatments need to be targeted. This is both positive and negative. *Positive*, because on the biomedical journey getting good information is paramount, and generating accurate data about your child is always a good thing. *Negative*, because riding out the aggravation or waiting for it to subside can be difficult.

Potential aggravations from the BDI come in two forms:

Parent Aggravations

- This diet is hard. ***Yes, but your child is worth pushing through hard stuff.***
- My child wants to eat carbs, sugar and dairy. ***More than you can imagine; we'll discuss carbohydrate addiction later in the manual.***
- My child steals food or cries for the "no" foods on the diet. ***The bugs in the gut that are currently in charge of your child's brain are going to put up a fight!***

- My child eats the same foods and meals all the time. ***That's totally fine.***
- My child isn't going to eat the "maximize" foods. ***He absolutely will if those are the only foods offered.***
- My family and friends feed my child "no" foods. ***Not allowed! It's your child; you are in charge.***

There are probably a hundred and one reasons not to do this diet. There is only one reason for you to put your child on this diet, and that is that it will make your child better! The foods she wants are slowing down, or worse, damaging her brain. Your child, your friends and your family cannot be in charge of what your child eats. Every day, you have the choice to feed your child's brain or to feed the bugs in the gut that are causing the cravings. This is a little like starving the alien that is taking over your child's brain, reducing his ability to control his body, process sensory information and communicate. Your child is worth it! This diet can dramatically alter the trajectory of your child's life—and yours.

Child Aggravations

- Constipation or diarrhea
- Lethargy or reduced energy
- Fevers
- Headaches
- Irritability and/or aggression
- Sleep disturbances
- Behaviours around getting access to preferred foods

Why is the diet creating these aggravations? Because harmful or opportunistic bacteria feed largely on complex carbohydrates and sugar. When you remove their food sources, changes in the gut are common.

Some ways to manage aggravations:

- Ensure your child is having regular bowel movements
- Consider a bowel X-ray to rule out retained fecal matter, fecal loading or severe constipation.
- If you cannot get a bowel X-ray, follow the directions for the "beet transit time test" to identify if slow transit time (motility constipation) is the reason for the aggravation.
- If you have already had a bowel X-ray, do a beet transit time test to confirm your child has not become constipated. Remember, the gut is an exit route for toxins. The BDI improves detoxification of harmful toxicants, which could result in constipation that needs to be treated to reduce aggravations.
- Activated charcoal can be used to "bind" toxins dumped by microbes. It is taken two hours away from all other supplements to avoid binding the "good" stuff you are supplementing.

Cod liver oil aggravations

- child may smell "fishy"
- "oily" poops
- more hyper or more self-stimulating behaviour
- nose bleeds
- vomiting
- decreased appetite
- changes in visual processing, increasing or changing visual self-stimulating behaviours (lensing, side glancing, looking closely at people or things, change in toy play, etc.)

Why is the body responding in this negative way to something that should be good for it? It's part of the autism paradox. A child with autism is typically hooked on sugar or other carbs, and/or dairy. This diet reduces the good fats your child is eating and reduces absorption of nutrients as well as good fats, by feeding opportunistic microbes in the gut. Autism is a *fat*-deficient state. Treating autism requires repair of the *fat* system, from the absorption stage to the way the body burns fat as fuel. Adding a fat like cod liver oil, while it will be helpful in the long run, puts pressure on a weak system. The response to cod liver oil is a great test of your child's *fat* system.

What do in the event of aggravation:

- Stop cod liver oil for one week and then reintroduce it, starting with ½ tsp per day
- Work up slowly to the highest tolerated dose (note that you can't use long-term high dosing without medical supervision)
- Maintain the highest tolerated dose until the next step
- If your child can't handle any cod liver oil, there is a high likelihood he has elevated levels of toxic heavy metals that are affecting his ability to absorb fats via the carnitine shuttle. If this is the case, start giving a digestive enzyme that contains lipase for two weeks, then start cod liver oil again at ½ tsp and move up slowly. Stop increasing the dose at the first sign of aggravation, and slightly decrease. Maintain this dose.

RESOURCES

The Autism Revolution, Dr. Martha Herbert, MD

Fall Down 7 Times Get up 8, Naoki Higashida

YouTube: *How the brain learns to see, The Other Brain, The Real Reason For Brains*

I Contain Multitudes: The Microbes Within Us and a Grander View of Life, Ed Yong

Brain Maker, Dr. David Perlmutter and Kristin Loberg

Dr. Derrick MacFabe, Kilee Patchell-Evans Group

Jill James, PhD, Arkansas Children's Research Institute

STEP 3 – Add vitamins to stabilize SNPs and detoxify

After many years of seeing aggravations caused by adding supplements, I developed this step-by-step formula to reduce adverse effects and maximize recovery time. It is and will continue to be a work in progress. Every time I hear of a new treatment or potential support for autism, I try it out and figure out how it will fit into this formula. There are a number of supplements that I don't use because having your child on a grain-free, dairy-free diet negates the need for them.

BIOMEDICAL RECOMMENDATION

- Add a high-potency multivitamin designed to support autism and other developmental disorders

RATIONALE

High-dose vitamin therapy can help to stabilize genetic expression and support optimal detoxification and methylation. Bear with me here as I try to explain.

The Human Genome Project (HGP), completed in 2003, gave us the ability to read nature's complete genetic blueprint for building a human being. It identified that our genome is made up of approximately 35,000 genes. DNA contains all of our genes and is made up of four chemical bases that pair up to make the "rungs" of the DNA molecule.

SNPs, *single nucleotide polymorphisms,* are variations in a single base pair in the genome. Individuals may have different forms of a particular gene, which will affect how their cells interact with their environment.

When the genome is copying to make a new cell, a single base pair can be substituted. Genes provide possible "recipes" for physiological functioning. For example, if you get a cut on your arm, under optimal physiological conditions the body will heal the cut quickly and without excessive scarring. Changes in the cellular environment result in different "recipes" being used. A different variation of a gene (an SNP) will affect which recipe is provided, perhaps leading to a less-effective response to stressors. For example, a child with a different form of the gene needed to support glutathione production may have lower glutathione than is typical, putting him at higher risk for damage caused by exposure to lead.

High-dose vitamins, minerals, antioxidants and amino acids help support optimal production of neurotransmitters such as serotonin, dopamine, norepinephrine and GABA. B12 in particular "cranks" the methylation wheel to aid in producing and regulating these brain chemicals. Supplementation with B12 can help compensate for the presence of variant SNPs that increase the likelihood for intracellular toxins, overgrowth of harmful microbes and/or excess glutamate. In other words, nutritional "bridges" can counterbalance the weakness caused by variant forms of genes that happen to be more sensitive to environmental stressors.

FAQs

Is high-dose vitamin therapy safe?

SHORT ANSWER: Yes.

LONG ANSWER: I have been using high-dose vitamin therapy for 15 years. Other than the positive/negative aggravations that will be discussed below, I have never had a child experience a side effect or toxic response. Many

other autism doctors use a similar approach, because a child who is experiencing delays in language, social and cognitive function, who has repetitive behaviours and sensory issues in addition to digestive concerns and sleep disturbance, requires *a lot* of support. This support is built on the scaffolding of the biomedical dietary intervention. Our diet includes lots of vitamins, minerals, antioxidants, healthy fats, prebiotics and amino acids. But for a child who is delayed, if the goal is to help him improve as quickly as possible, a high-dose vitamin is the best option, even if it tastes "yucky." Other children, remember, continue to progress on a typical developmental track. If your goal is recovery to age-level skills, you need to hyper-load your child's body with nutrients to maximize energy production.

High-dose vitamins taste bad and my child won't take them. What should I do?

SHORT ANSWER: It's vital to treat supplements like lifesaving medicines, which means taste has to be a secondary consideration.

LONG ANSWER: See the cod liver oil section for more information on the importance of administering supplements. You may also refer to the "How to Give Supplements" handout.

Is there an alternative that doesn't taste so gross?

ANSWER: Yes, but it is not as effective.

COMMON AGGRAVATIONS

Aggravations related to high-dose vitamins occur in two categories.

The first is when a child is benefiting from the vitamin supplement but also showing sensory and/or behavioural aggravations. The cause of this type of aggravation is usually that it contains the active form of B6, called P5P. Some SNPs that help to make glutathione or metabolize phenols are more likely to cause aggravations when we supplement with this form of B6. Versions of high-dose multivitamins without P5P are available for children who have the first type of reaction.

The second type of aggravation from high-dose vitamins is purely negative. There are two reasons for this, which are potentially interconnected.

The first reason is constipation. Due to the extreme "fat-deficient" state some kids experience, chronic constipation is unbelievably common. The stool becomes very dry or sticky. It is also very difficult for kids to coordinate the muscles needed to push the stool out because mitochondrial impairment affects all motor systems. Our digestive tract is a 20-foot tube that requires energy (ATP) from the mitochondria to function properly. A compromised ability to absorb, break down and transport fats, combined with an increased need for essential fats to bind harmful toxicants, is a major contributor to digestive issues and developmental delays in autism.

The second reason is an elevated level of heavy metals. It's recommended that you test for heavy metals and, if they are elevated, use a smaller amount of vitamins to support B12 safety, SNPs, methylation and detoxification, without causing aggravations.

RESOURCES

The Human Genome Project - **https://www.genome.gov**

STEP 4 – Add probiotics

RATIONALE

Hundreds of trillions of bacteria inhabit our intestines. Adding "good" or "helpful" strains improves digestive health and supports optimal brain function. Gut-brain axis research, as I've said before, has shown that the microbiota living in our body play a regulatory role in brain health. The BDI dietary approach allows good bacteria to flourish. The addition of a probiotic, based on symptoms and/or testing, allows children to recover more quickly.

The human microbiome governs inflammation, detoxification, production of nutrients, absorption of fats and immune function in the body. Individual strains of microbes support unique physiological functions.

Comprehensive Organic Acid Testing can identify dozens of strains of yeasts and clostridium species that can have a negative impact on gut function. Research is clearly showing there's a benefit to adding certain individual or small combinations of microbiota. But choosing the right probiotic combination for each child is as much a matter of experience as it is science. In my practice, we have used a combination of Saccharomyces boulardii, Lactobacillus rhamnosus and Bifidobacterium infantis with excellent success in addressing clostridia, yeast, and strep (PANS, PANDAS), and reducing biofilm proliferation.

I believe very strongly in long-term use of probiotics to reduce colonies of potentially harmful microbes. Remember that dietary intervention is an essential building block to a healthy microbiome. Taking probiotics to help reduce bowel symptoms or mitigate reactions to gluten and/or dairy can improve quality of life, but the goal of this manual is to set the stage for recovery. There is no gut recovery without removing grains and dairy and reducing sugars.

Adding fermented foods is also a fantastic addition to biomedical treatment during Step 4:

- Kimchi
- Sauerkraut
- Coconut water kefir
- Coconut, almond or cashew yogurt
- Miso (GMO, organic)
- Kombucha–it is important this is homemade and not purchased, to ensure the sugar content is low
- Pickled, lacto-fermented vegetables

COMMON AGGRAVATIONS

Aggravations resulting from probiotics are quite common and generally transient. If the aggravation is really intense, check for constipation with a bowel X-ray (not ultrasound) or use the beet transit time test to identify fecal impaction (a backed-up bowel). Aggravations including bloating, constipation, diarrhea, rashes, fever, lethargy, changes in sleep, and increased "behaviours" are common. Using activated charcoal can mitigate aggravations from probiotics. We recommend giving activated charcoal (two hours away from other supplements, to avoid binding up the good stuff!) to bind the "bad" stuff that is being pushed out by the good bacterial strains. It is really important to have your child on the BDI and ensure regular bowel movements before adding probiotics.

FAQs

I have heard my child should be on a probiotic with 50 billion or more good bacteria and multiple strains. Is that correct?

ANSWER: It is important to address the harmful and/or opportunistic microbes first. These microbes feed on complex carbohydrates. Removing their "food" is the first and most important step. Fifty billion may sound like a lot, but it is a drop in the bucket when compared to the hundreds of trillions of microbes that make up your child's microbiome. Probiotics are an important treatment strategy, but the most important gut support comes from a diet rich in nutrients that will support the "good" microbes that govern the gut-brain axis.

RESOURCES

Dr. Derrick MacFabe – Killee Patchell-Evans Resource Group - **http://kpearg.com**

STEP 5 – Add fats that heal

BIOMEDICAL RECOMMENDATIONS

- High-dose vitamin E (including all forms, called mixed tocopherols)
- Vitamin K
- GLA
- After four weeks on the above supplements, add acetyl-L-carnitine and carnitine tartrate

RATIONALE

The concept that good fats can help to heal and transform the body and brain is becoming more mainstream, especially for weight loss, metabolic syndrome, and diabetes. Healthy fats and fat-soluble vitamins are required for a healthy metabolism. The brain and nervous system have high metabolic activity, requiring large amounts of fuel. Changing the type of fuel the brain is using helps to improve glutathione status, serves to optimize brain function, and reduces the negative impact of oxidative stress, inflammation and excess glutamate. Given our typical diets that are rich in carbs and sugars, most brains function primarily using glucose as fuel, rather than fat, creating oxidative stress. The brain cannot use fat for energy without shifting the physiological state through diet. This approach, which relies 100% on diet, can dramatically transform the brain's ability to function. The fat healing approach will only succeed if a child is on a diet that consists, at least 90% to 95%, of meat, vegetables, fruit, nuts, seeds and eggs. (The other 5%–10% can be made up of lentils, beans, sweet potato, tapioca, quinoa, buckwheat, etc.) It's important to aim for less than 6 teaspoons of sugar daily (less than 24 grams).

The BDI shifts your child's body towards a modified ketogenic diet that will burn ketones for fuel. The liver makes ketones from fatty acids in your diet (including cod liver oil and GLA) and releases them via the bloodstream to the brain and other organs. They are then shuttled into the mitochondria, where ATP (the cell fuel) is produced. Ketones are a more efficient fuel than glucose, resulting in significant shifts in communication, awareness, motor skills, social interaction, learning, digestion and sleep. Most "autistic behaviours" come from digestive pain, sensory issues and lack of energy production. Fats will help to improve all three of these major contributors to repetitive, self-injurious, aggressive and stereotypical behaviours.

To repeat what I said earlier, the overall goal of the intervention steps in our biomedical recovery plan is to repair cell membranes and mitochondrial function. Healthy fats, fat-soluble vitamins and shuttling as many fats as possible into the body is how you can achieve recovery for your child. In a fat-deficient state, toxins trigger the cell danger response, leading to "shredding" of the cell membrane. Healthy fats "mop" up both toxins and the body's response to toxins, breaking the vicious cycle of inflammation, oxidative stress and glutamate dominance in the brain.

FAQs

I have heard/read that omega 6 (GLA) is pro-inflammatory. Is that true?

ANSWER: In the presence of B6, omega 6 and omega 3 fatty acids combine to make a molecule called DGLA which is highly *anti*-inflammatory. DGLA is also a component of cell membranes.

My child has seizures. Is it safe to take GLA?

ANSWER: The most current medical literature indicates that GLA does not cause seizures and is, in fact, protective against seizures. If your child is taking seizure medication, it is essential she is on the modified ketogenic diet and high-dose vitamin therapy before proceeding to other steps in treatment. Seizures are like a boiling pot of water in the brain; anything added to the pot could cause water to overflow. The key is improving seizure thresholds to reduce the frequency and intensity of seizures. Seizure medications deplete many nutrients, including B vitamins and carnitine.

COMMON AGGRAVATIONS

When high-dose fat-soluble vitamins and omega 6 are used to support repair of the cell membranes and improve mitochondrial function, results should be obvious within six weeks. If your child experiences aggravations from this step, it's a strong indication of the presence of elevated heavy metals. If your child experiences aggravation, stop all new supplements, and then re-start them one at a time, waiting two weeks before introducing the next one. It may be that your child is reacting to an individual supplement, not the entire group. If you can identify which supplement is causing the aggravation, stop that one and continue the others. The two forms of carnitine are added four weeks after the other supplements for this reason, to help differentiate between them if an aggravation occurs.

> ***Note****: Long-term high-dose vitamin E requires the addition of vitamin K for safety. High doses need to be supervised by a trained medical professional with knowledge of nutritional biochemistry.*

If your child is reacting poorly to all of the supplements, stop all supplements for two weeks and re-start very slowly, with low doses given every three days.

Try to figure out if your child can manage a smaller amount if possible. If a child cannot tolerate any of the above supplements, the strategy will have to shift toward detoxification of heavy metals.

RESOURCES

What's Eating Your Child – Kelly Dorfman, MS, LND

The Best Dypraxis Program Ever

Claudia Morris, MD – Autism Canada

CHAPTER 4: Next steps in biomedical treatment

The next steps in treatment can be highly individualized, requiring support from a Naturopathic Doctor or trained autism doctor. They include:

Heavy Metal Detoxification

One of several reasons I decided to write this manual, and a significant motivation, was realizing that so many parents were pursuing heavy metal detoxification, including chelation with DMSA or ALA, on their own. While I understand the rationale, the reality is that before you set the stage for heavy metal detoxification, you are just doing harm. You are shuttling metals around the body with a high likelihood of redistribution. Many parents and parent groups follow a low-dose chelation therapy under the false belief that it is safer.

The safest way to remove heavy metals is to follow the steps in this chapter and then do testing. Testing will guide you to the right treatment, depending on the metal profile. Without testing, you won't be able to ascertain if your child is capable of absorbing supplements like DMSA. If your child isn't able to absorb it, using DMSA will actually damage the gut and prolong the recovery process. Heavy metal detoxification without methylation support like methyl B12 is simply *not safe*. Chelation, in particular, must be pursued with the support of a trained doctor and only implemented once the gut is strong enough, the cell danger response is dampened, and mitochondria function has improved.

Treatment for attention deficit symptoms (executive functioning)

As children recover, they often struggle with symptoms of ADHD. This is positive, because as the autism symptoms diminish, the focus can shift towards supporting executive function, which includes focus, attention, short-term memory, starting and finishing tasks, and organizing information. A child requiring extra support in this area may be hyper, impulsive, forgetful and disorganized. Helpful treatments include phosphatidylserine, pycnogenol, curcumin, bacopa moniera, methyl B12 injections and B vitamins, high-dose methyltetrahydrafolate and/or folinic acid.

Expressive language

Expressive language can be difficult to improve to age-level for some children. Continued high-dose mixed tocopherols, vitamin K, omega 3 and omega 6 fatty acids are important until a child is communicating as well as she is capable of, based on her age. Other important additional supports for children who need extra language support include phosphatidylcholine, folinic acid and Hyperbaric Oxygen Treatment.

Social skills

One of the hard things about social delays is that learning social skills takes time. Once you have improved your child's brain function, their interest in interacting with family members, peers and other people should increase. While there are other supplements like folinic acid, TMG and SAMe that can fast-track acquisition of social skills, often what is needed is targeted play therapy. Children need to learn to play from other children if possible. If you have other children, it is a really good idea to ask for their help in optimizing their sibling's play skills.

Remember that even if your child diagnosed with autism is 9, his play skills could be that of a 1-year-old. Play therapy needs to start at the age your child is presenting socially … exploration of toys, playing catch, kicking a ball, cause-and-effect toys. Try to ascertain your child's play stage and spend as much time as possible playing with the child to help her acquire missed social skills.

In my practice, there comes a time when I strongly encourage parents to stop therapies like IBI, ABA, speech therapy and occupational therapy. My recommendation is to incorporate all you have learned from those professionals in a play-based strategy at home, school, parties with friends and family, play dates, playing sports, learning a musical instrument, playing at the park, etc. Recovery of social skills will require immersion in the world. Therapies cannot provide what turning off the TV and playing a board game can accomplish for your child. The good news, for your child diagnosed with autism, is that many children around the world struggle with acquiring optimal play skills. This is something you can hasten with a commitment to a comprehensive social strategy.

One of the reasons that our son's play skills are so strong is because we encouraged our older children to take on the responsibility of helping our son catch up socially. The other important social strategy for parents is to treat your child like any other child their age. Try not to do things for your child that she should be doing for herself. This is very difficult and can feel terrifying, but "sink or swim" and "survival of the fittest" strategies should be considered once your child starts recovering. Children succeed and excel when they are capable and given the chance. They need to be medically treated first, and then exposed (carefully) to as many opportunities for learning as possible. In terms of scaffolding social skills, asking a friend to play and succeeding is equally important as learning how to manage feelings after being rejected and then trying again.

Over the years, I have watched thousands of children recover. I cannot stress how important it is to set age-appropriate expectations whenever possible. If children are overly indulged, their behavioural issues may reduce social opportunities. In our own home, in the beginning I allowed my son to get whatever he wanted. My older children complained a little about this, but we all felt that he had been through enough. If he wanted to watch *Wreck it Ralph* every day, we could handle it. Watching the same movie over and over was calming for our son. But as he recovered, there was a behavioural component to getting what he wanted. I spoiled him! Thankfully, having watched this happen in my practice over the last fifteen years, we were able to right the behavioural ship before it got too far off-track.

I now call this "sink or swim" therapy. Children need to be consciously exposed to situations that provide an opportunity to enhance play skills—an opportunity that will surface only when a child is challenged. Sometimes they will fail, but when they succeed, they are able to learn and accomplish more than they can in any adult-supported therapy. One of the best examples of this in Canada is sending your child to a public junior kindergarten program. Many parents worry their children will get bullied or won't get the support they need. While these are important concerns, if your child is close to ready, putting him in a "sink or swim" situation like JK may enhance his development, because he'll be *motivated* to dress himself like the other kids, sit down at circle time, make friends, try new things, advocate for himself. There are countless ways this approach can be transformative.

As a parent, I can tell you that finding and enduring the right "sink or swim" opportunities was tough. Actually, it was brutal! It felt awful to watch our son cry because I wouldn't carry him on hikes through the forest, feed him, or dress him. I cried as he lay on the ice eating snow instead of participating in his skating class and cringed when he threw himself into the soccer net instead

of kicking the ball. Thankfully, my husband was able to be a little tougher and demand appropriate behaviour and appropriate participation. Our son struggled, but with our firm support he began to reach the milestones he had missed, including learning to write his name, skate, ride a bike, play soccer and have a friend group. The terror I felt when he entered junior kindergarten, senior kindergarten and Grade 1 was mostly because I was afraid he would be socially rejected. But behavioural issues that result from not pushing your child to her limit will hold her back.

I coached soccer; we found a quieter skating class; and we had playdates with kids aged 4, 5 and 6 whenever possible. We recruited our children's friends to help when they were visiting, at the arena, at the park and at school. We were blessed with amazing grandmas who could patiently play Go Fish, Tic-Tac-Toe and Snakes and Ladders for hours. It actually does take a village to support a child with autism. If you don't have a village, make one.

I was shocked how many parents we reached out to were sending their child over for their first play date. Or how many other children experienced anxiety and refused to go to swimming lessons. Or had parents who worked long hours, or who were divorced. We became a support for other families as we super-saturated our son's world with opportunities to acquire social skills.

I recently I had my third visit with a two-year-old patient. On the first visit, he lined up everything he could find, including my magnets. When the magnets stuck together, he would get really upset and have a meltdown. I gave him a dozen or so dry-erase markers of various colours and took away the magnets. The boy happily lined them up as I spoke to his mom about the dietary intervention, cod liver oil and B12 injections that would begin to transform his ability to process the world. At the second visit, the boy again pulled the toys out, but this time began to group them together by colour. Mom was discouraged that

his play skills were still repetitive, but I was thrilled. This young boy's brain was beginning to heal. What I have observed over the years is that, once you begin to repair the brain, developmental gains begin where they slowed down.

On the third visit, six months into treatment, the boy was playing functionally with the magnets and stacking colourful rings. No lining up and no grouping. Another very interesting thing happened in the appointment. The boy kept climbing up on the toy bins, and then would look at his mom and say "down." If she repeated "down," he would throw his pacifier to the ground and look for her reaction. Mom was puzzled and a little frustrated that he kept doing the same thing over and over—something she felt he needed to be gently disciplined for. Again, over years and years I have had the opportunity to witness similar situations. I spoke to the mom about what I thought might be going on.

I told her I believed that he was trying to initiate play, but didn't know how. He knew how to get her attention but not how to make that idea blossom into a more functional social initiation. One time, the boy climbed on a stool and reached for the paper towel roll. Before Mom could tell him not to touch it, I looked at the boy with a big smile and said, "Mine. That paper towel is mine." I laughingly told him to "get down," and he looked at me, a little puzzled, and scrambled over to see his mom. The next time he climbed on the bins, I smiled and laughed, as if surprised, and said, "You aren't going to climb on those bins, are you?" I told him to get down, and he looked at me and threw his pacifier on the ground. During the rest of the visit he played with toys and would climb up on the stool or bins and repeat this process, but the difference was that he was engaging me and smiling. At one point, I got up from my chair (which is low to the ground and spins) and he climbed up. I asked him if he wanted to spin. He didn't respond verbally but held on tight, and I spun him around for a few minutes.

The interesting thing about repetitive types of play or mischievous behaviour at certain developmental stages is that kids are collecting data on how people react. Mom told the boy to stay off the bins, but she could never provide the data he was trying to collect because he was trying to memorize her responses. Each time he climbed on the bins was slightly different. Each time she reacted, it was slightly different. There are infinite variables for social reactions and interactions. As humans, the micro-muscles in our faces are never the same. Reactions can be similar but not exact. Children diagnosed with autism have a difficult time generalizing these reactions and can therefore be very repetitive in their attempts to collect information.

Our son used to drop markers off the table over and over, because the first time he did it, we laughed. He was attempting to get the same response, again and again. We had to help his attempts to initiate "play" to blossom. To do this, we needed to help him come up with new ideas. If your child is doing something that is repetitive, in particular something "bad" or "naughty," it may fall under this category of learning and recovering play and social skills. One thing I would caution about is that if you focus on disciplining these behaviours, you will, first off, probably not be very successful, and, most importantly, you may be missing extraordinary opportunities to help your child gain socially appropriate play skills.

This causes confusion on the part of many parents, teachers and therapists. Children are on a spectrum not just of autism but of the way they collect information. Anger and irritation aren't identical emotions, but they're on the same spectrum. Parents, teachers and therapists often try to get children to identify a static picture of anger vs. irritation.

It's said the Inuit have more than 50 words for "snow," describing minute variations in its look and texture. Asking a child diagnosed with autism to generalize

a facial expression with one word, like "happy," is like asking an Inuit child to describe snow with one word. The autistic brain is an incredible one that collects information in a unique and comprehensive way. The result is that the brains of autistic kids will come up with ideas and conclusions that neuro-typical brains cannot do as easily, or at all.

Your child isn't cognitively *deficient*. She is cognitively *different*. Medical treatment allows your child and you to explore, enjoy, and frankly, to be awed by the power of the autistic brain.

Biofilm treatment – PANDAS, PANS, Pitands, Lyme

If your child has received antifungals, antibiotics or antivirals in the past, it is very likely he will have formed biofilms that will slow down recovery. A biofilm, as discussed earlier, is a community of microbes held together in part by minerals and metals. Most children who have frequent aggravations are struggling with biofilm. Many people categorize the troublesome microbes individually and label them something like PANDAS or Lyme. I have found it more helpful to think about treating these microbes as a community. Again, dietary intervention will be at the forefront of managing biofilms. I maintain that the answers to most health concerns lie within the plants and food on the planet. Blueberries, avocados, cilantro, curcumin, licorice and citrus all contain phytochemicals that help to reduce and prevent biofilm.

Cognitive enhancing supplements

The recovery process is unique for each child, and all children learn differently. Some children need extra support for things like executive functioning, working memory, focus and attention, reading, math, etc. A comprehensive assessment of your child's strengths and weaknesses can be really valuable if aspects of learning start being more difficult.

Botanical medicines like gingko and bacopa can support optimal cognitive function. If for some reason your child is not on a grain-free, dairy-free diet, it is important to implement one. The brain thrives on fat and protein. Remember that babies are fed breastmilk (under ideal circumstances), and breastmilk is full of fat and protein. Fueling the brain optimally leads to optimal cognitive function. Phospholipids like phosphatidylserine and phosphatidylcholine are a fantastic and safe support for focus and attention. They can improve mental endurance and academic performance.

Unique learning styles may also have to be addressed. Auditory learners, for example, often have to read out loud to better understand something. *The Gift of Dyslexia* is a wonderful book written by Ron Davis, who taught himself to read by creating a way to "turn off" disorientation from auditory or visual information that confused his ability to keep letters "orientated." When he made letters with mud, the sensory system in the brain was able to process them properly. On paper, the letters moved around so that they alternately looked as if they were upside-down, sideways and right-side up, making it impossible for him to read. Some children also struggle with numbers, which affects their ability to succeed at math. Our son had a lot of difficulty with letters staying oriented and would write many letters backwards and upside-down. Although this can be typical, and most kids eventually learn to orient the letters without the sensory disruptions, children diagnosed with autism have

impaired sensory integration on a larger scale, which may require targeted therapies.

Fine and gross motor adjunctive treatments

I find the homunculus to be the best visual representation of how the energy deficiency in autism affects overall function. Fine and gross motor skills rely heavily on motor planning, which is supported by the ATP produced by the mitochondria. Gross motor skills almost always improve in the first few steps of biomedical treatment. Pronounced gross motor delay is related to extremely elevated intracellular toxicants, including microbes and metals. Significant weakness in terms of walking, running, jumping and swimming requires mitochondrial treatment and often treatment for PANS triggered by strep, yeast, Lyme or Lyme co-infections. Mitochondrial supports, such as vitamin E, phosphatidylcholine, carnitine, alpha lipoic acid, B vitamins, vitamin C and omega 3 and 6 fatty acids, are important to fully recover fine and gross motor skills to age level.

Hyperbaric Oxygen Treatment (HBOT)

I am not going to go into detail about the physiological and biochemical benefits of HBOT, but wanted to link this important therapy to improving mitochondrial function. On its own, HBOT may be helpful for language, social, cognitive and motor skills. As an adjunct to treatment once you have moved through the above steps, it can help most children improve more quickly by improving mitochondrial function and genetic expression. We have around 35,000 genes, and they all can express in different ways depending on the environment. Our particular genetic expression can protect us when faced with a stressor like mercury. Altered genes, on the other hand, can increase the damage caused by an environmental toxin because their genetic expression is not as protective. Genes may be expressing in a way that contributes to inflammation

because of nutrient deficiencies. The situation can be altered if those nutrients are provided, which changes the expression of the gene towards creating anti-inflammatory compounds.

HBOT is a safe and effective way to improve mitochondrial function, heal damage and improve mitochondrial genetic expression. HBOT has been shown to heal wounds and improve tissue damaged by trauma, which means it may help in healing damage to the brain, which has been linked by researchers to autism spectrum disorder.

More work to do on the way up the mountain

This manual is a guide to the first steps in biomedical treatment. It is not the end of the work you need to do to recover your child. I have seen countless families who have tried one or all of the treatments listed in our biomedical program but at the wrong time, in the wrong combination, and/or at the wrong dose. I felt that it was really important to share these steps with anyone supporting a loved one diagnosed with autism, so you can work with a medical professional to safely climb the mountain using this as a guide. Remember the analogy of Mount Everest: With the right preparation, anyone can climb the mountain. You need to start at the bottom, with the right tools and a guide to help you find the right path. You will need different tools for different parts of the mountain, but as long as you keep climbing, you can reach great heights. Recovery is a *journey*. Getting stuck on the idea of recovery as a *destination* is heart-wrenching. I am in year five of my own journey as a parent, and it is amazing to enjoy seeing my son's gains and know that all the work we have done together as a family has allowed him to be happy and successful. Finish the marathon; continue to climb. Remember thant recovery depends on perseverance.

It is essential that your child's recovery be a shared family goal. One parent doing all the work of recovering a child can tear a family apart. Parents of children diagnosed with autism have higher rates of stress and divorce. Biomedical treatment helps in countless ways, but perhaps the biggest impact is on the whole family, with success making life easier for everyone. Note, though, that doing just part of the diet is torture. Doing the diet 100% is difficult for a very short period of time, after which a child begins to improve in ways that aren't open to an untreated child. In the words of the great Dr. Martha Herbert, autism is a *whole body* medical disorder.

Imagine having a migraine every day of your life. Treating the migraine would change your life *forever!* Living with a child who is in pain all the time—and is unable to communicate or show you what they know—is so difficult, there really are no words to fully explain it. I have watched hundreds of untreated children come into my practice. Parents may be doing minimal treatment, or trying to treat their child themselves using information gleaned from the Internet or parent groups. I have worked with families for ten years who still haven't tried the "paleo" diet or B12 injections, and at virtually every visit, I will attempt to get them motivated to start with the basics needed to climb the mountain. The way to recover children the fastest is to follow each of the steps with support from someone with medical training.

I often ask parents: "Who fixes your engine if your car breaks down?" Of course, the answer is that they take it to a mechanic. And then I say: "If you would get an expert to fix your engine, why would you try to 'fix' your child without experience or expertise?" This manual is not intended as a means for parents treat their own children. Even if the doctor you choose is not an autism expert, the steps above, combined with that person's knowledge of physiology and biochemistry, will provide a proper balance with your expertise and intuition about your own child.

My intention is to provide information that will help support you through a difficult but incredible journey of health and healing for your whole family. I wish you all the best on that journey, in hopes that it will follow a smooth path, with endless gains—a journey opposite to what many parents currently experience. Whether you try to implement a step-by-step biomedical approach or continue on another path, you as a parent of a child with autism will experience the depths of humanity—profound kindness, endless patience and unbelievable tenacity—and joy and pride in each gain that fills your heart to the brim. The smooth road is just easier on families, who are so often broken to pieces by the stress of supporting someone who is medically untreated.

Untreated medical concerns in autism make for a rocky journey. It is your job to remove obstacles from your child's life to set him up for success. If autism is medical, it is treatable. If it is treatable, it is reversible.

Treat Autism
BIOMEDICAL TREATMENT CHANGING CHILDREN'S LIVES

CHAPTER 5: Aggravation Index, A-Z

One of the most difficult aspects of biomedical treatment is aggravation from treatment. What I have learned over the past fifteen years is that aggravations are clues, breadcrumbs, to follow to discover an underlying contributor to autism symptoms. This is an index of some common aggravations and potential causes. If the aggravations are manageable, especially with the support detailed below, continuing biomedical treatment is recommended. Severe aggravations should be managed by stopping the supplements that were just initiated. If you have not done Step 1 of the biomedical program described earlier in this book, severe aggravations may require a bowel X-ray or beet challenge to rule out fecal impaction (significantly backed-up stool).

Appetite

Changes in appetite tend to be positive after the first few steps of the biomedical program. Some children have reduced appetite, which needs to be addressed by always checking bowel health (you are going to notice a trend) and doing a bowel X-ray or beet challenge. Biomedical treatment is successful because it is a safe process to remove harmful microbes and toxicants from the body. Removing harmful substances requires extra support, which is why a high-dose multivitamin is an essential part of long-term treatment safety and success. Zinc is a very important mineral needed to support a healthy appetite. After checking the bowel, checking zinc status is a good idea. I suggest a one-month trial of a higher dose of zinc to see if your child's appetite improves. Speak with your medical partner on your journey for the correct dosing.

Fatigue

Removing harmful toxicants from the body requires the support of lots of vitamins and minerals. Harmful metals are detoxified via the liver and excreted by the stool and urine. High levels of metals can lead to iron deficiency during biomedical treatment because, as metals such as lead are removed, the iron level decreases. This is another reason why working with a medical professional is so important. Fatigue that begins after biomedical treatment should prompt a blood test for iron and ferritin. The other possible cause of fatigue after starting biomedical treatment is that the child has chronic Lyme. Chronic Lyme is difficult to accurately test for, but co-infections like EBV, bartonella, babesia, cocksackie, etc., can help identify if fatigue is being caused by a microbe.

Hyperactivity

Mild to severe hyperactivity can result from biomedical treatment. The intensity of it depends on a child's genetics (SNPs) and/or the child's toxicant load. Children carrying higher levels of metals like mercury will often react more to methyl B12, in particular. Any supplement can create hyperactivity, but the typical culprits are those with a methyl donor, such as methyl B12, DMG, TMG, methyl folate, and SAMe. Hyperactivity is a positive thing in these children, but it often has to be managed. The first step is to check for constipation, using the beet transit time test or a bowel X-ray. Please do not skip this step. The second step is to add B6 and magnesium. This is in the formula for a number of autism-focused multivitamins. You may have to use a supplement that does not contain P5P, because it creates behaviours for some children, including hyperactivity.

Immune symptoms: rashes, fever, illnesses

Immune cells make up a large percentage of the brain and gut tissue. Immune irregularities are found in the majority of children diagnosed with autism. Biomedical treatment will help to stabilize and repair changes in the immune system that are creating symptoms of autism and slowing development. Some 85% of the brain is made up of immune cells, called glia, which, when overstimulated or "primed," broadcast a lot of glutamate. This is not ideal for optimal brain function. Glutamate needs to be balanced with other brain chemicals like GABA to support age-level language, social and cognitive skills, while reducing the repetitive behaviours that are a hallmark of autism.

So, if your child was rarely sick before biomedical treatment, it is possible that more frequent illnesses will occur. This is actually positive. The immune system needs to iron out the kinks to create a new balanced state. Immune symptoms such as fever, rashes, diarrhea, colds, cold sores, a skin infection called molluscum contagiosum, warts, etc., can be signs of a normal adjustment for the immune system.

If your child has immune changes, there should be an "acute" immune protocol to support her through these symptoms. Immune issues can be reducing by testing for vitamin D and supplementing if it is low. Increasing the amount of zinc and/or vitamins and using herbs like echinacea, licorice, St. John's wort or homeopathic remedies can help address specific concerns. This is where the help of trained Naturopathic Doctor can be very valuable, and this doctor does not have to be an expert in autism to help you with immune issues.

Regression, Aggression and Self-injury

The most common cause of such symptoms is constipation. The second most common cause is seasonal. Yes, seasonal. Half of kids regress in spring and/or fall. Sometimes they experience aggravations through the summer. Others, children who need large amounts of immune support, can do so all winter. Your child can experience regression, aggression and/or self-injury with no changes at all other than to the weather. Before you start to worry too much, check the calendar. The bigger the seasonal weather change, the more pronounced the symptoms may be. A child who has never had aggravations on a seasonal basis may start to do so with biomedical treatment because their bodies are, essentially, under renovation.

"Bad" microbes and metals are being shuttled away from the brain and body, and this creates a different type of reactivity to triggers like seasonal allergies and produces a need for more immune supports in the winter. Zinc is needed to support appetite, detoxification of heavy metals, and immune health. This is the reason a high-dose multivitamin is crucial to success. The analogy I use is that of a race car. In the "race" to help your child catch up to other kids developmentally, increased resources are needed—just the way a race car requires special fuel, more frequent tire changes and plenty of crew support.

One reason that getting a bowel X-ray or doing a beet challenge is so important at the beginning of biomedical treatment is that it dramatically reduces the risk of regression. Biomedical treatment should never prompt regression, aggression or self-injury. If any of these occur and you have not done a bowel X-ray or beet challenge, it is important to do so. If I sound like a broken record on this subject, it's because ensuring that bowel impaction doesn't happen is central to your child's safety and success.

Sometimes B12 can cause these symptoms when a child has very high levels of mercury and lead.

Probiotics, when first started, can create what's called a *herxheimer reaction,* which can look like a loss of skills as yeast dies off. Dying yeast will dump all their brain toxins, which may cause short-term aggression and potentially self-injury. This is why the bowel needs to be moving regularly, to poop out the dead yeast. Other microbes, such as strep or Lyme, if released suddenly from the biofilm, can cause similar aggravations. This is why I do not recommend using digestive enzymes right away, because some chip away at the biofilm, releasing microbes before the body is ready.

If you do experience persistent regression, aggression and/or self-injury with your child—and you've ruled out constipation and transient seasonal changes as the cause—stop all supplements, put your child back on a regular doctor and go to an experienced autism doctor to help you figure this out. These reactions are very rare and usually indicate that your child has high levels of metals and/or microbes. The good news is that the more *medical* the concern, the more *treatable*. The bad news is that you may not be able to recover your child without the help of someone who has already recovered many children, and can guide you through a more difficult start to this journey.

Activated charcoal—in the form of one to two capsules given two hours apart from all supplements—can bind up the microbial debris of toxins that are contributing to the regression, aggression and or self-injury. Note, you should use this no longer than three months.

REPETITIVE BEHAVIOURS

As we help to increase the amount of "fuel," or energy, your child is producing, increased behaviours may occur. Increases in fixation, tantrums, obsessive and/

or compulsive activities, rigidity, flapping, jumping, pacing … anything repetitive or "stuck." The "gears" of development can be rusty for some children. Once we start cranking those gears, repetitive or "sticky" behaviours can increase for a time. Regular bowel movements, a high-dose multivitamin and essential fatty acids like cod liver oil all help to reduce the likelihood of behaviours increasing.

Some behaviours are also positive, but present as negative. A child who used to not care if a sibling took a toy may seem "aggressive" when he/she fights back. Increased stimming, or self-stimulatory behaviour, is almost always positive, but needs to be assessed to identify if it is interfering with quality of life or social and learning opportunities. Again, activated charcoal can help if repetitive behaviours increase.

SLEEP DISTURBANCE

I often describe what we are achieving with biomedical treatment as making more neurotransmitters, packaging them better and delivering them more effectively. Serotonin is a brain chemical that helps to regulate sleep. Increasing serotonin is positive, but while doing biomedical treatment, the rate of production of serotonin compared to the rate of conversion to melatonin (the hormone that tells our body it is time to sleep) is sometimes imbalanced. We want both serotonin and melatonin production and regulation to optimized, but it is a little like renovating a house. While we're in the process, we may need to make changes in accommodations, like sleeping in another room or using the other bathroom. Sleep disturbances are a positive sign that treatment is going in the right direction. It may take weeks or months of melatonin therapy to regulate sleep, but it is a very important treatment goal. Your child may wake at 4 a.m. for a few weeks, which is a sign she needs more magnesium. Children are not born knowing how to sleep; it's a skill that is supported by healthy levels of melatonin.

Note: Melatonin therapy must be supervised by a medical professional like a Naturopathic Doctor, Medical Doctor, Chiropractor or Nurse Practitioner. Children with a history of seizures need to consult with their physician before using melatonin.

1. Give melatonin one hour before the time he is *currently* going to sleep on day ONE. Start with a small amount, and work up slowly. Melatonin should help your child go to sleep within 30 to 60 minutes, and the right dose will not make him groggy in the morning
2. On day TWO, give melatonin five minutes earlier than you gave on day ONE.
3. On day THREE, give melatonin five minutes earlier than day TWO.
4. Continue moving the timing of melatonin back by five minutes a day, until your child is going to sleep within her age window.
5. If your child wakes before 3 a.m., give another dose of melatonin. If he is groggy in the morning, give less the next time he wakes up before 3 a.m.
6. If your child wakes in the morning and is very groggy, decrease the dose of melatonin

Melatonin can cause nightmares or disturbed sleep, which is often a sign of magnesium deficiency. Melatonin safety studies have been done on children with developmental delays, and long-term therapy is considered very safe if melatonin dose is less than 10 mg. Most children do not need more than 5 mg of melatonin, in my experience.

Note: The first days to weeks of melatonin use will usually result in your child going to sleep quickly. Over time, it is more typical for your child to take 30 to 60 minutes to fall asleep.

APPENDIX

Treat Autism
BIOMEDICAL TREATMENT CHANGING CHILDREN'S LIVES

90%–95% of diet:

Vegetables	Meat	Coconut Oil (4 Tbsp. daily ideally)
Nuts	Seeds	
Eggs	Fruit	

5%–10% of diet: **These foods can be hard to digest for people who have impaired digestive systems or yeast overgrowth. Please be aware of reaction to these foods and omit 100% if necessary.*

Quinoa	Lentils	Arrowroot
Beans	Peanuts	Cassava Root
Buckwheat	Tapioca	Konjak Root
Sweet Potato	Beets	Chickpeas

Good Sources of Fat:

Olive Oil	Avocado Oil
Coconut Oil	Sunflower Oil

Good Sources of Inulin:

Onions	Bananas and Plantains
Garlic	Fresh Herbs
Asparagus	Yams

Remove all grains from diet:

Corn	Oats	Millet
Rice (wild, arborio, etc.)	Teff	Sugar
Sorghum	Couscous	Barley
Cornstarch	Kamut	Spelt
Amaranth	Arrowroot	Titricale
Rye	Bulgur	Wheat

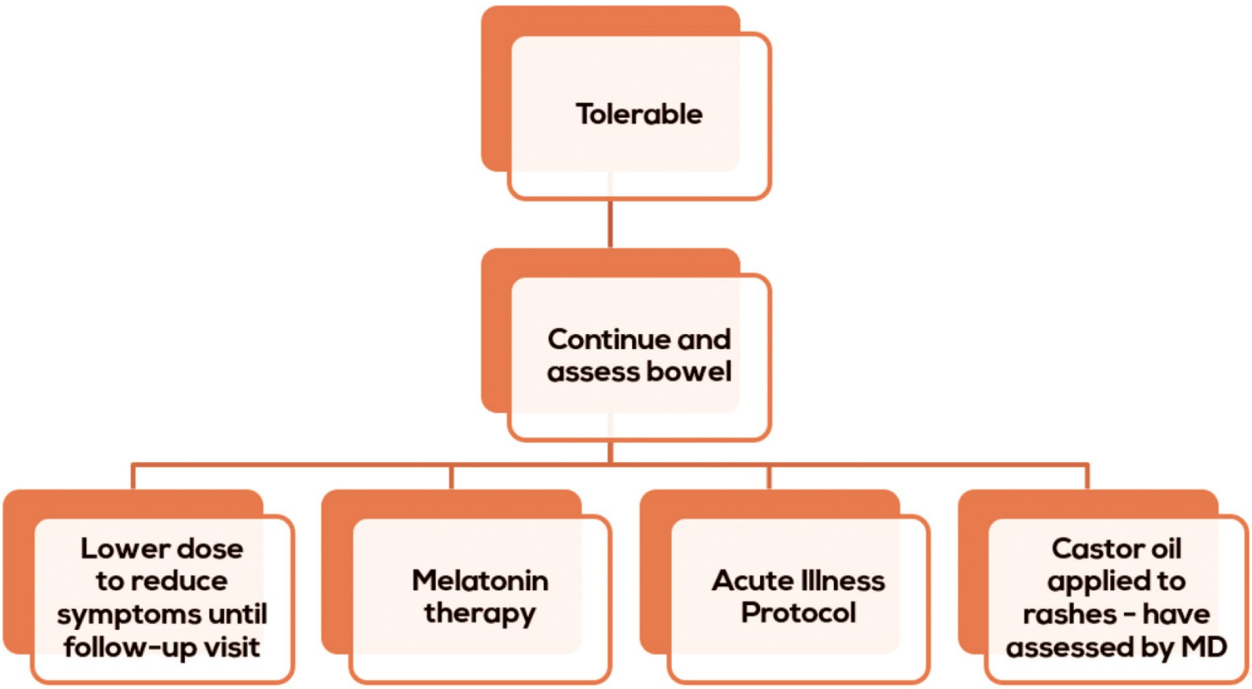
Sugar – less than 24 g or 6 tsp. daily. (1 tsp. = 4 g)

NO GRAINS, NO DAIRY, NO WHITE POTATO

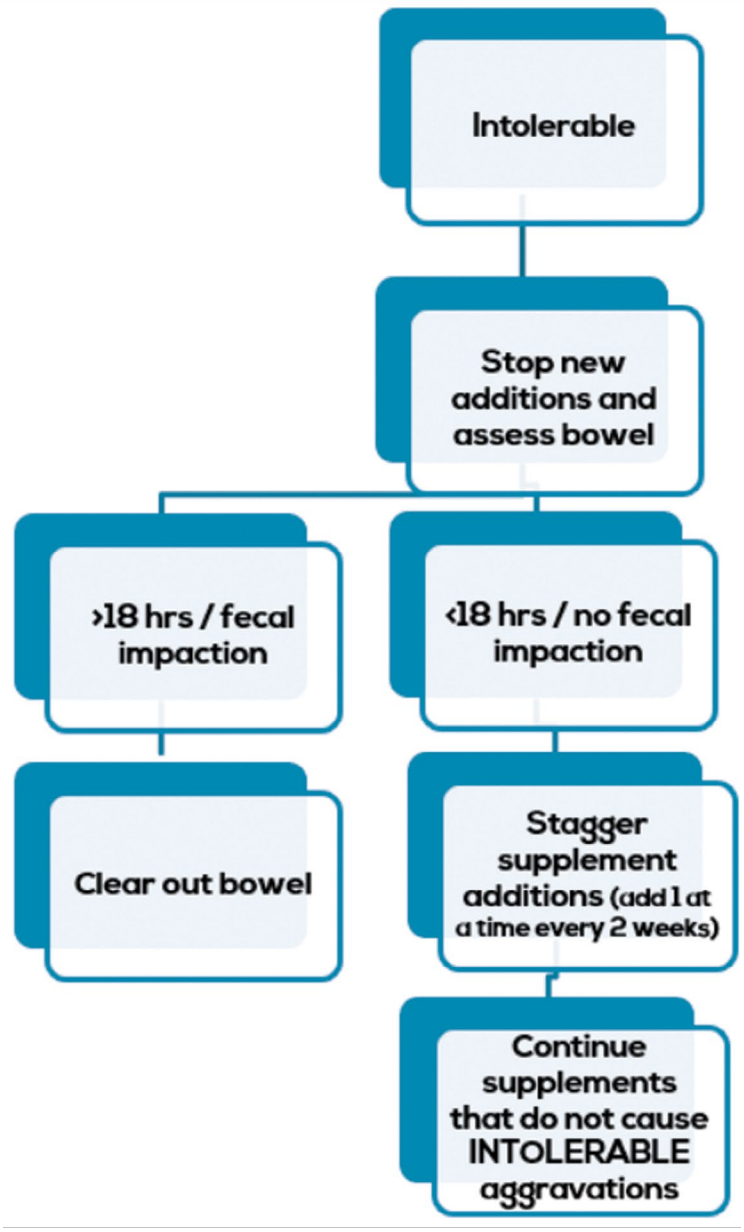
BIOMEDICAL TREATMENT FLOW CHARTS

One of the most difficult aspects of biomedical treatment is that is it a dynamic process. Children diagnosed with autism have layers of medical abnormalities that need to be addressed, one step at a time. Like the climb up the mountain, you must start at Step 1 (base camp) and climb up. Each stage will require reassessment of treatments required, based on the response to the first step. I have developed a few flow charts to explain this process. The index will give a more detailed explanation of each flow chart.

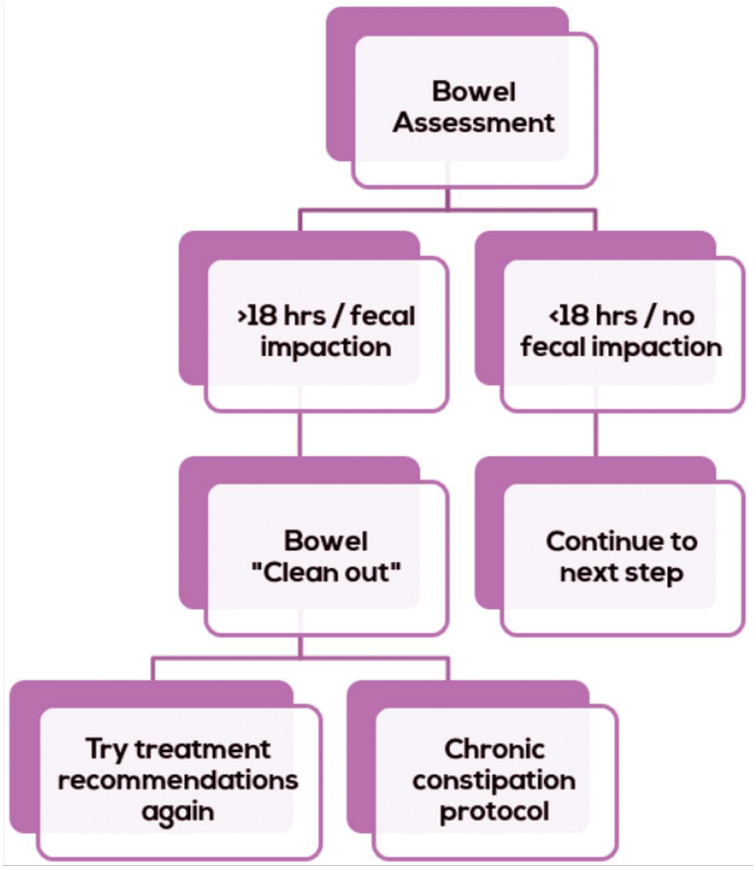
Tolerable changes



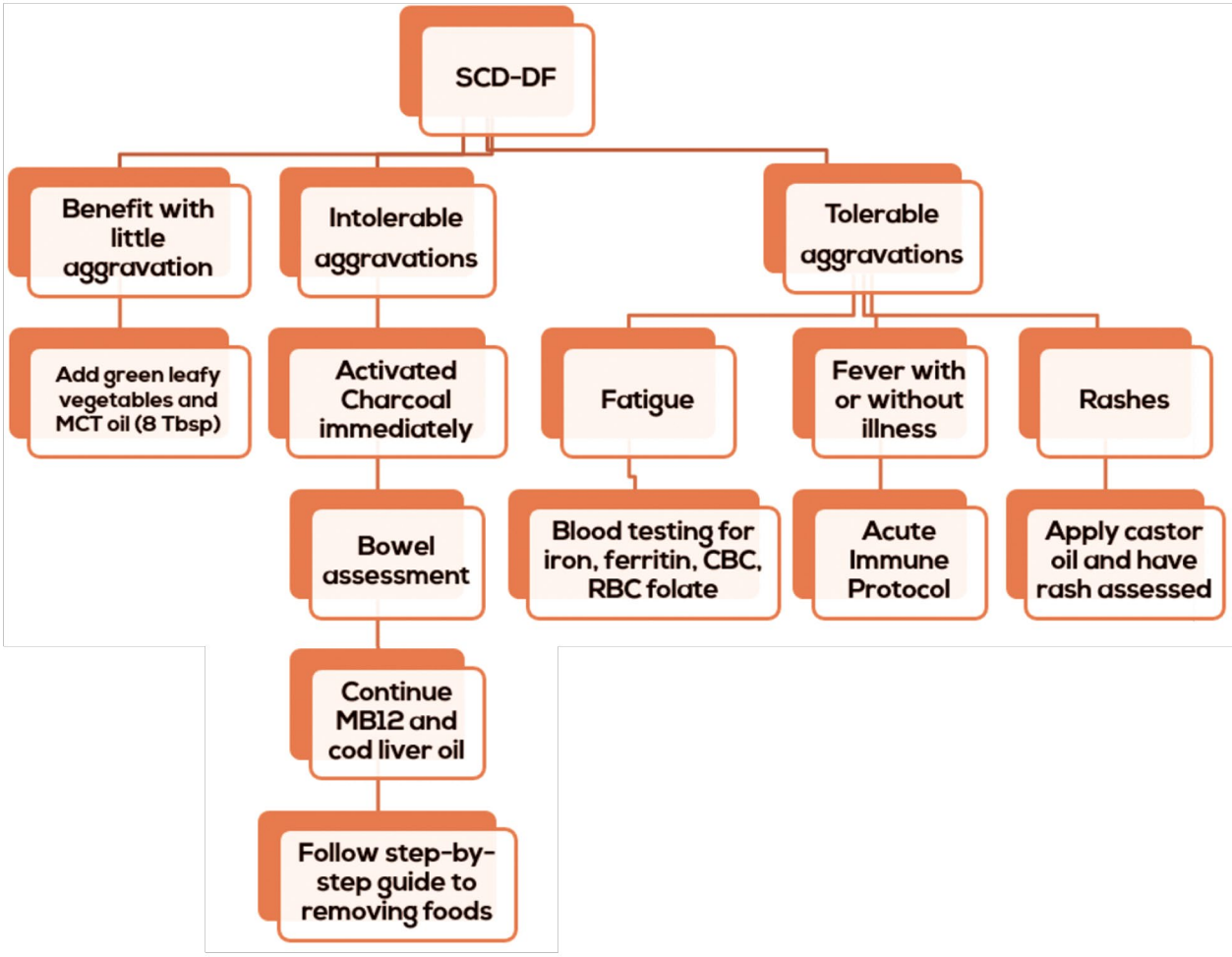
Intolerable changes



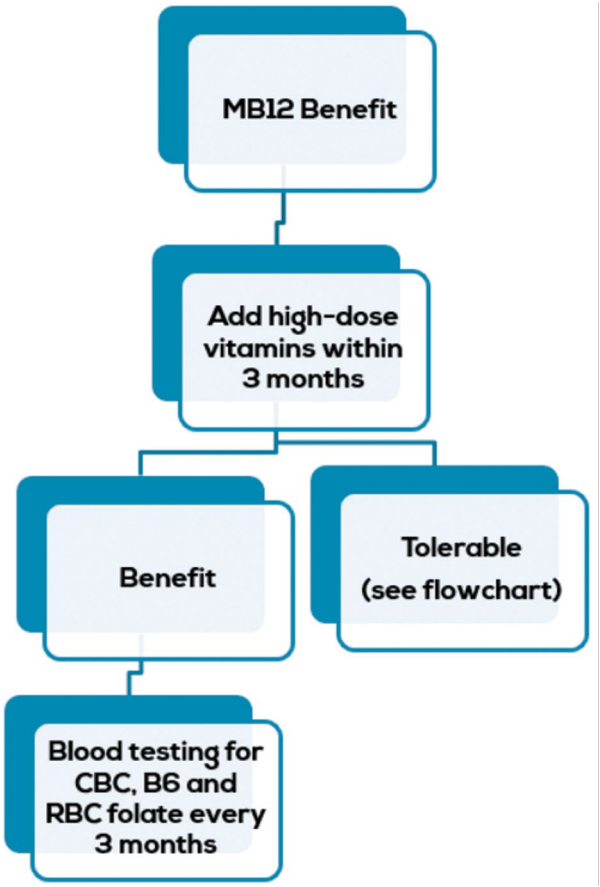
Bowel assessment



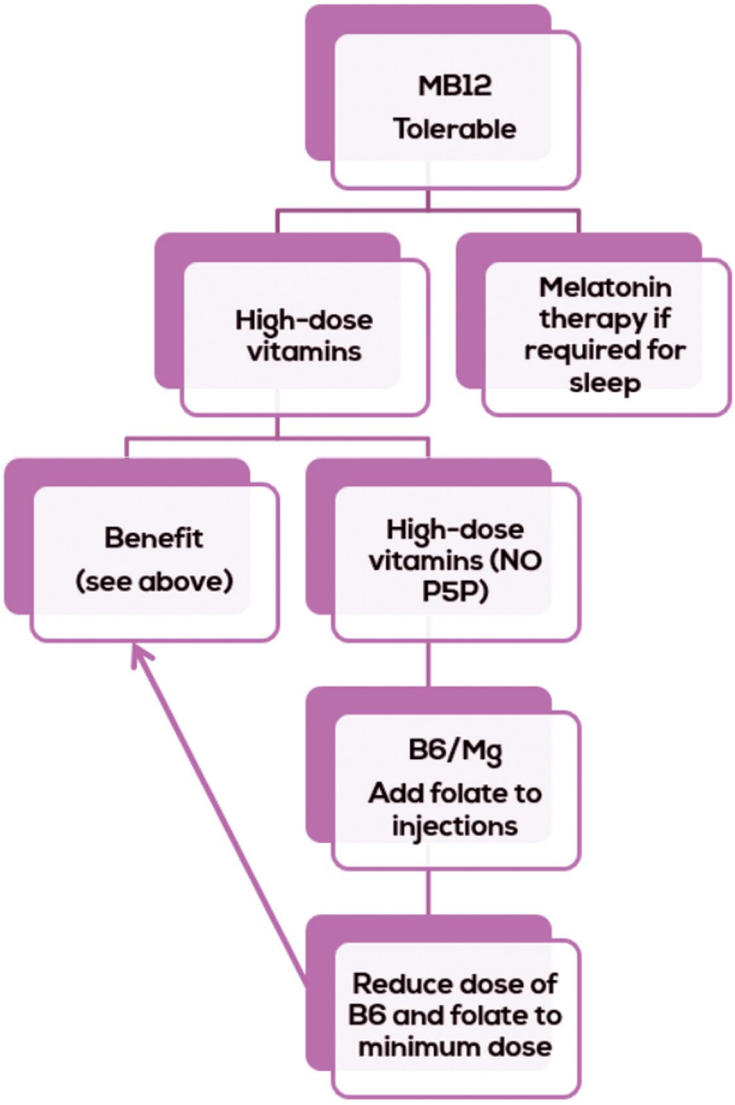
Biomedical Dietary Intervention (BDI) – also known as SCD-DF, modified ketogenic



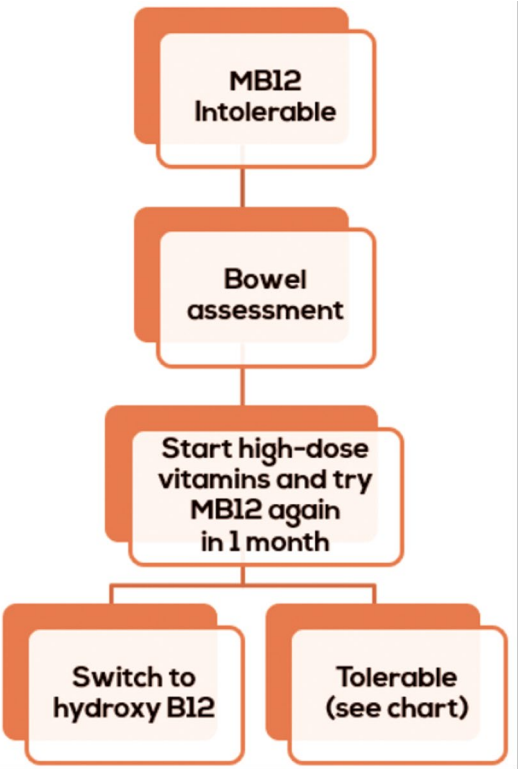
Methyl B12 injections – Benefit with little aggravations



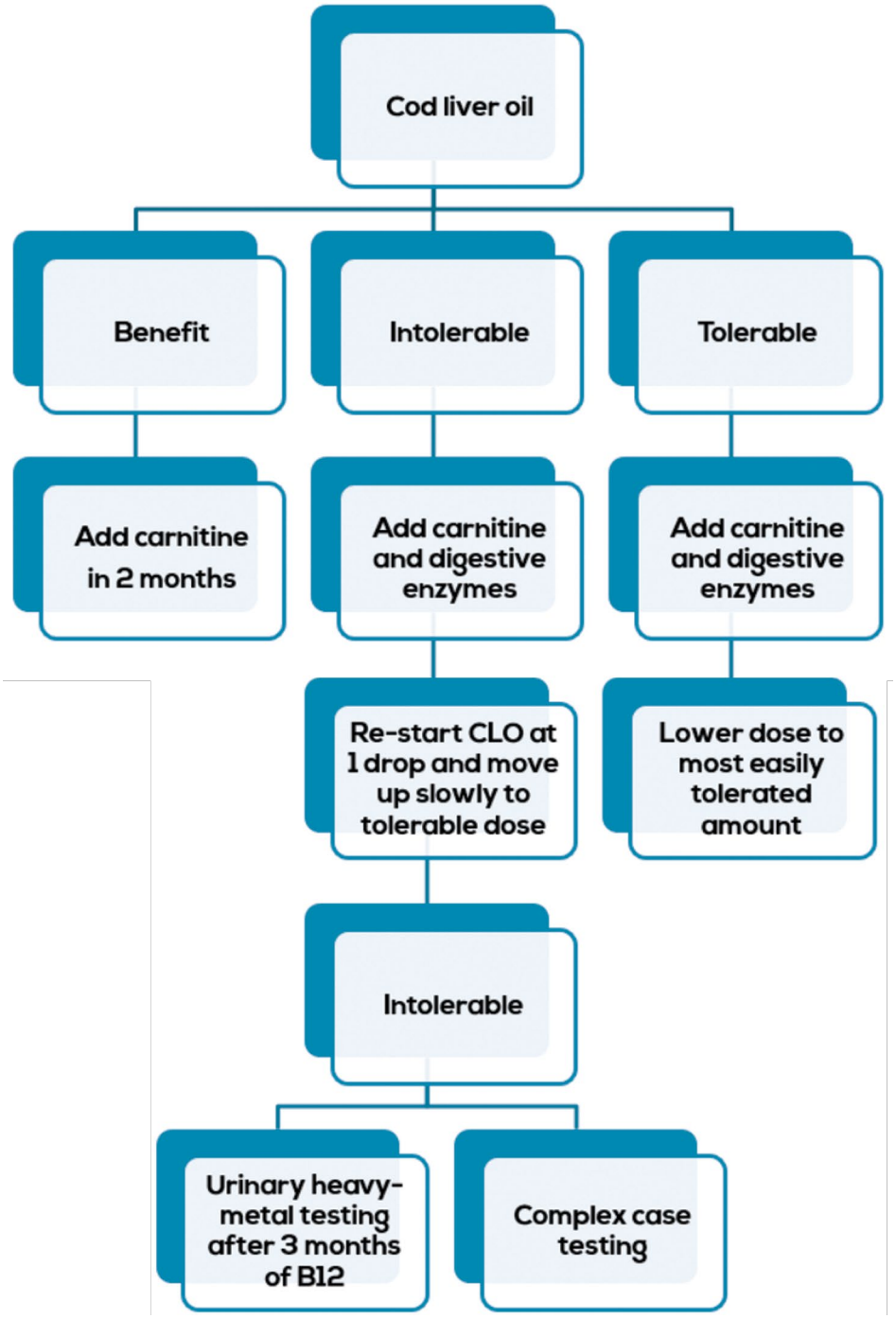
Methyl B12 injections with tolerable changes



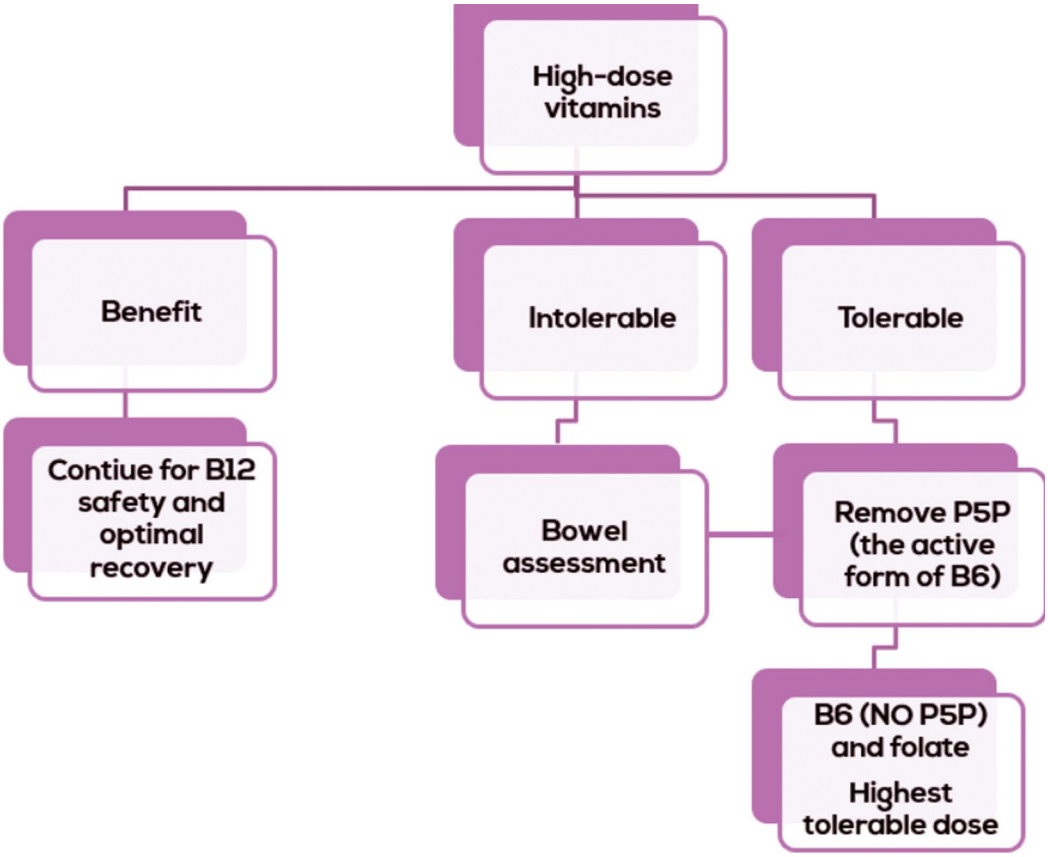
Methyl B12 injections with intolerable changes



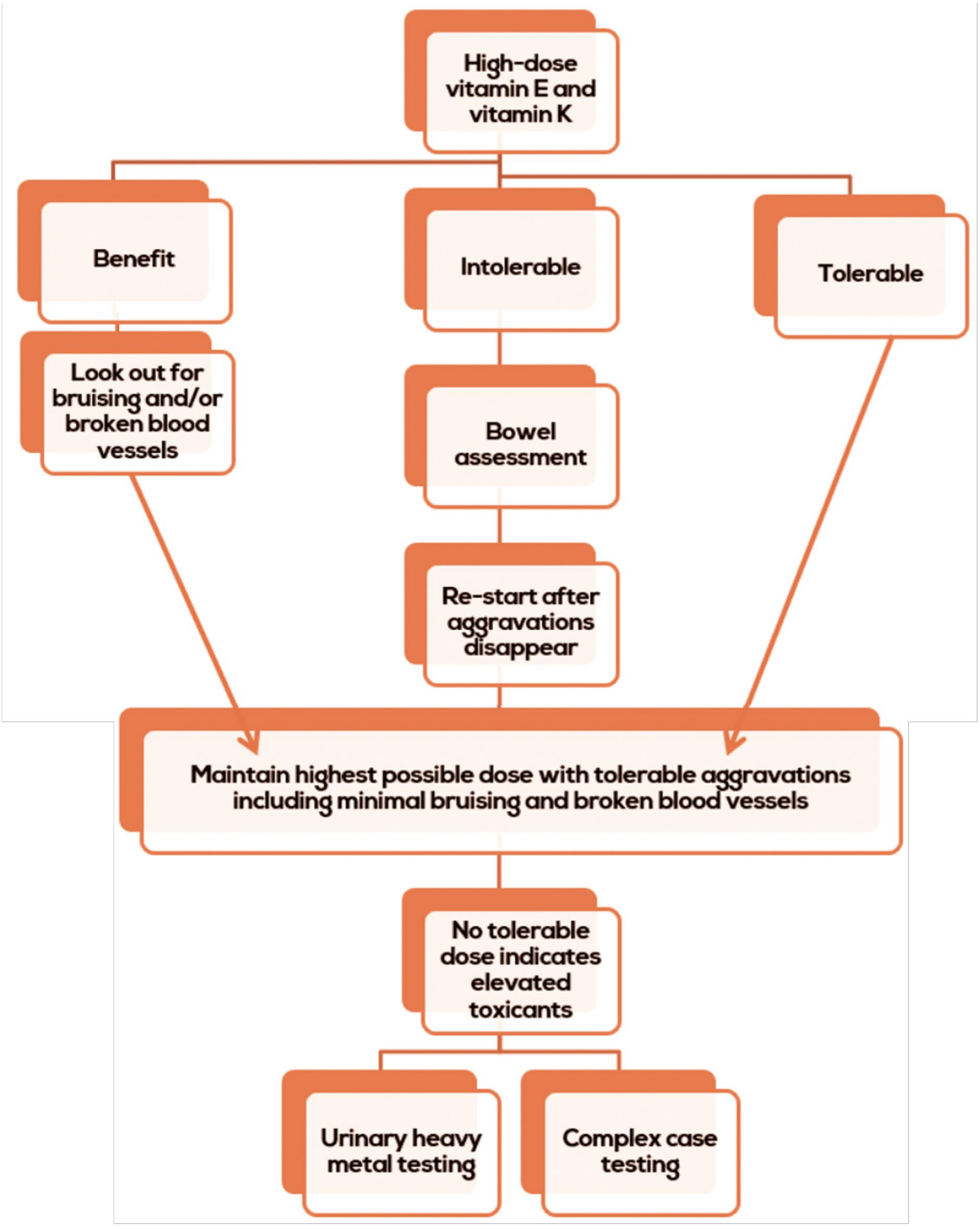
Cod liver oil



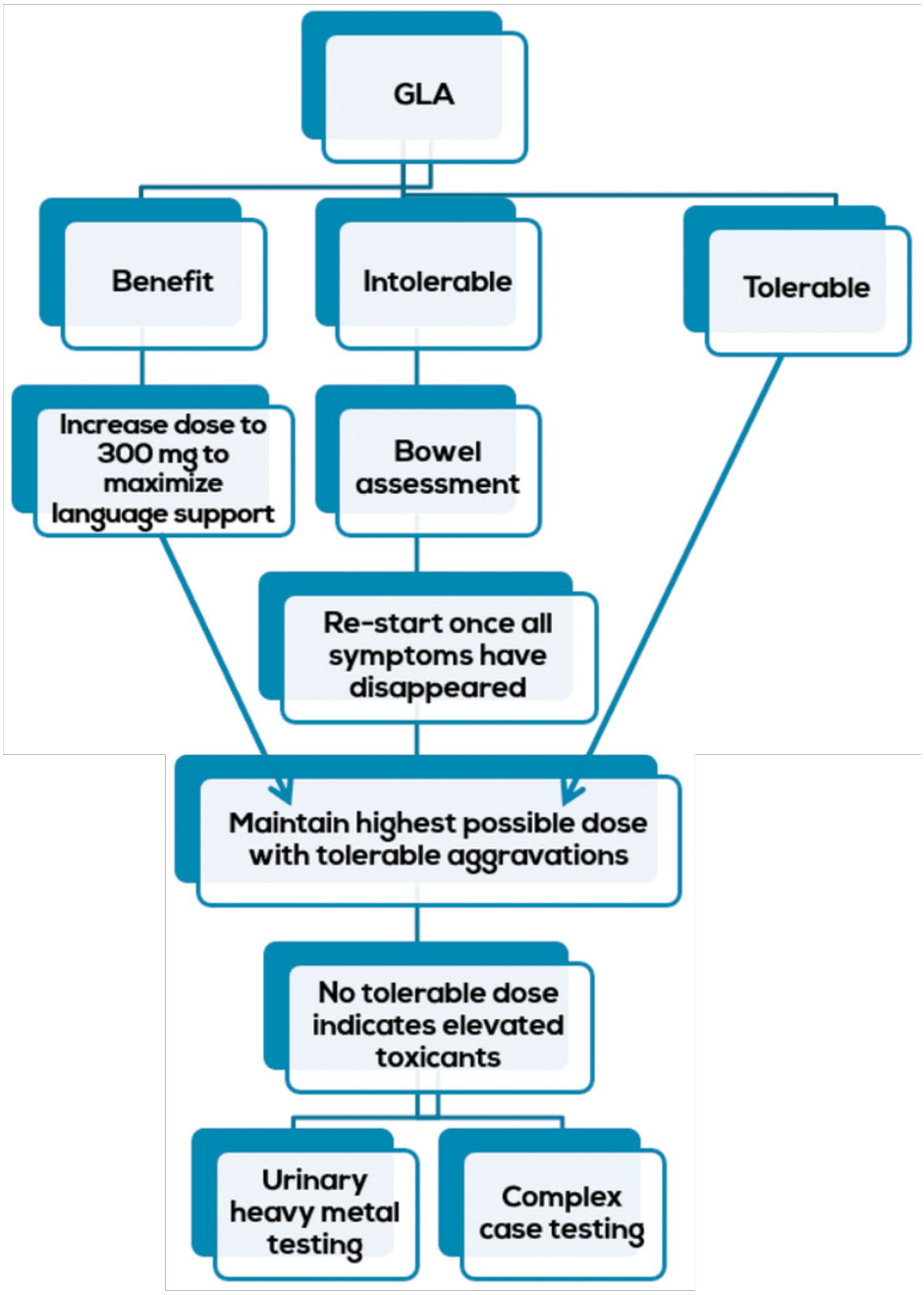
High-dose multivitamin therapy



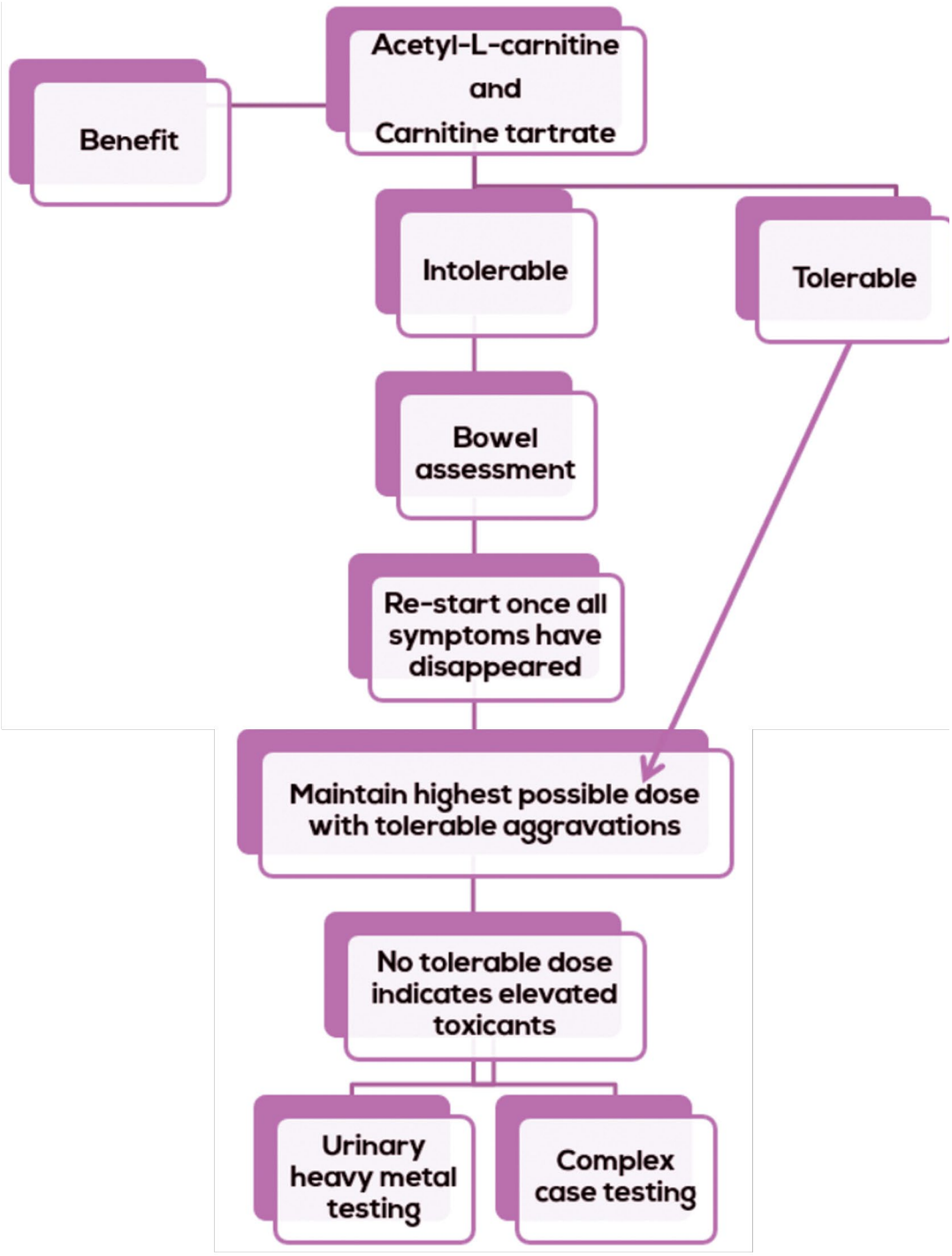
High dose vitamin E



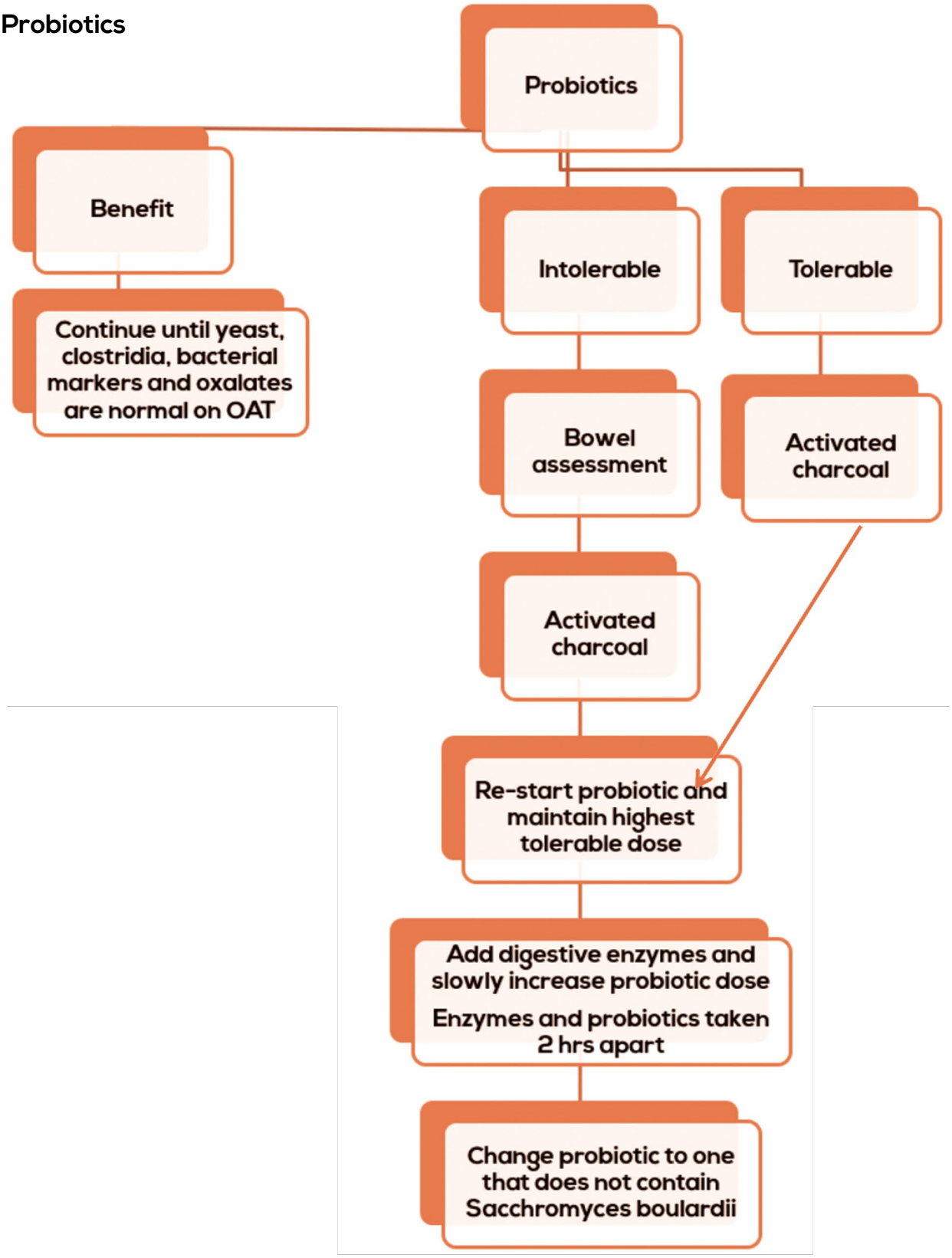
GLA – omega 6 fatty acids



Carnitine



Probiotics



BOWEL X-RAY RATIONALE

Research from THE HUMAN MICROBIOME PROJECT is showing that gut health directly impacts brain health, development and mood. Constipation, digestive pain, diarrhea and reflux can be the root of irritability and aggression, in addition to anxiety and sensory issues} OUT OF THESE CONSTIPATION IS THE MOST COMMON. Optimal gut function is required to support development.

A bowel x-ray is the most effective way to identify constipation, fecal impaction and/or megacolon. A high percentage of our patients have a bowel movement every day but still have mild to severe fecal loading that impacts gut function. Most clients/patients living with developmental delays (DDs) have abnormal serotonin and dopamine levels, impacting everything from mood to sleep to sensory overload. 90% of serotonin is made in the GUT and serotonin governs dopamine levels.

Most patients with DDs have a pathway upregulated in the brain that causes CARBOHYDRATE ADDICTION (IDO). Carbs very quickly deliver serotonin and dopamine to the brain, but then these levels decrease very quickly, leading to out-of-control blood sugar. Not only does this increase the risk of diabetes, obesity and heart disease, but in the short term it causes irritability, aggression and erratic blood sugar. A diet high in carbohydrates contributes to digestive dysfunction, including constipation.

Addressing gut issues and improving the balance of serotonin and dopamine improves quality of life by reducing irritability and aggression and improving mood, sleep and immune function.

SEROTONIN

Learning
Appetite
Language development
Mood and noise sensitivity
Sleep
Behaviour
Sensory perception
Memory

DOPAMINE

Sensitivity and processing of information
Perception of change
Relaying information
Fundamental brain function – cognition
Motivation
Emotional responses
Attention and focus
Transitions

BRAIN CHEMICALS

Serotonin

Serotonin is a key brain chemical that is been identified in the physiological abnormalities in ASD. Serotonin is made from tryptophan with the help of co-factors including vitamin C, folate, iron, calcium, magnesium and B6. Tryptophan is an amino acid, which is a building block that makes up protein protein. Children with developmental disorders often show amino acid deficiency including tryptophan. They also have an inability to effectively convert B6 to its active form P5P. Digestive problems in autism reduce the levels of necessary components needed in the production of brain chemicals, like serotonin and eighty to ninety percent of serotonin resides in the gut cells where it helps to regulate intestinal movements (see constipation and picky eating for more information). Abnormal levels of serotonin have been found in autism and serotonin receptors in different areas of the brain may explain some autistic behaviours and delays.

Serotonin is responsible for regulating:

- Learning
- Memory
- Sensory Perception
- Noise sensitivity
- Mood
- Behaviour
- Sleep
- Appetite

Dopamine

Dopamine is needed for fundamental brain function. Dopamine receptors have abnormal form in children with developmental delays. The methylation cycle provides the primary fuel for dopamine receptors in the brain. Children with autism and ADHD often have dysregulation in their dopamine system. Low dopamine levels impair attention and focus. High dopamine levels cause the mind to race and increase sensory perception which causes an overload on the brain's ability to process. Dopamine is produced from the amino acid tyrosine with the help of iron, vitamin C, folate, vitamin B6 and tetrahydrobiopterin (which requires dihydrafolate from green leafy vegetables). Mothers who have a different form of the gene COMT are seven times more likely to have a child diagnosed with autism. COMT converts dopamine to norepinephrine and mutations in the COMT enzyme result in dopamine creating oxidative stress in the brain. The COMT enzyme is extremely sensitive to lead and benefits from reducing body burden of lead and other harmful toxins. COMT V158M decreases the activity of the enzyme by 300 percent and children with this SNP benefit from supplementation with magnesium, curcumin and inositol. In practice, we see a correlation between COMT SNPs and PANDAS and tic disorders like Tourette syndrome.

Dopamine is responsible for regulating:

- Sensitivity and processing of information
- Perception of change
- Relaying information
- Fundamental brain function – cognition
- Motivation
- Emotional Responses
- Attention and Focus

GABA and Glutamate

GABA is a calming neurotransmitter that impacts up to 40% of brain synapses. It is created from glutamate (via the Kreb's cycle from alpha-keto-glutarate) with the help of B6 in its activated form P5P, zinc, n-acetyl-cysteine and taurine. Research into the autistic brain has identified an imbalance in glutamate to GABA receptors. Deficient levels of GABA or problems with GABA receptors are thought to play a role in the excitatory elements of autism, ADHD and seizures. Identifying and addressing problems with neurotransmitter systems is a key component to biomedical treatment of autism and other developmental delays.

There are a lot of brain chemicals or neurotransmitters that are needed to regulate brain function. Glutamate is the most abundant neurotransmitter in the brain. It is essential for the development and function of the brain. It is also strictly regulate because in high amounts, it can change the way to brain functions and even cause damage. Glutamate is stimulated by the glia (the immune cells in the brain) in response to threat like chemicals, metals or microbes. The glia work to control the threat and repair damage to the brain. The brain requires adequate levels of glutathione to manage glutamate.

Glutathione is the master antioxidant in the body and brain. It helps to protect cells from damage and is needed to "mop" up excess glutamate. Glutathione is the rate limiting step in development. Developmental speed depends on glutathione produced by the methylation cycle. Glutathione helps to detoxify many harmful toxicants including metals and chemicals. Depletion of glutathione, results in higher levels of glutamate in the brain triggering a cascade of events that cause disruption of typical brain function and damage. This cascade is a proposed central mechanism of autism described by renowned neurologist, Dr. Russell Blaylock, MD, who coined the term immunoexcitotoxicity.

DEFINITELY DAIRY INGREDIENTS

- Acidophilus Milk
- Ammonium Caseinate
- Butter
- Butter Fat
- Butter Oil
- Butter Solids
- Buttermilk
- Buttermilk Powder
- Calcium Caseinate
- Caramel
- Casein
- Caseinate (in general)
- Cheese (All animal-based)
- Condensed Milk
- Cottage Cheese
- Cream
- Curds
- Custard
- Delactosed Whey
- Demineralized Whey
- Dry Milk Powder
- Dry Milk Solids
- Evaporated Milk
- Ghee
- Goat Milk
- Half & Half
- Hydrolyzed Casein
- Hydrolyzed Milk Protein
- Iron Caseinate
- Lactalbumin
- Lactoferrin
- Lactoglobulin
- Lactose
- Lactulose
- Low-Fat Milk
- Magnesium Caseinate
- Malted Milk
- Milk
- Milk Derivative
- Milk Fat
- Milk Powder
- Milk Protein
- Milk Solids
- Natural Butter Flavor
- Nonfat Milk
- Nougat
- Paneer
- Potassium Caseinate
- Pudding
- Recaldent
- Rennet Casein
- Skim Milk
- Sodium Caseinate
- Sour Cream
- Sour Milk Solids
- Sweetened Condensed Milk
- Sweet Whey
- Whey
- Whey Powder
- Whey Protein Concentrate
- Whey Protein Hydrolysate
- Whipped Cream
- Whipped Topping
- Whole Milk
- Yogurt
- Zinc Caseinate

DAIRY ALTERNATIVES

Milk, Ice Cream and Yogurt: Hemp, coconut, sunflower, almond, cashew and soy are a few non-dairy based foods used in our favourite products. *So Delicious, Silk, Almond Breeze, Coconut Breeze* and *Coconut Bliss* are a few of our favourite brands.

Butter: *Earth Balance* makes a variety of butters made from soy or coconut.

Cheese: *Daiya* cheese comes in shreds and slices and is readily available at most grocery stores. If you are making a sauce, or are looking for parmesan sprinkles you can use nutritional yeast which gives food a cheesy taste.

Chocolate: Cacao nibs or powder are a great alternative to chocolate. *Enjoy Life* chocolate chips are delicious to use in baking, or just on their own when you have a bit of a sweet tooth.

DIARRHEA PROTOCOL

Bentonite, Activated Charcoal, or Diatomaceous Earth:

Bentonite: 1/2 Tbsp.–2 Tbsp. given two hours from any other supplement.

Activated Charcoal: 1–2 capsules given two hours from any other supplement.

Diatomaceous Earth: ¼–1 tsp. in water given two hours from any other supplement.

Saccromyces Boulardi: 5–10 billion daily (away from bentonite, charcoal, or DE)

FOOD SUGGESTIONS

PASTA

- Sweet potato
- Bean thread vermicelli
- Kelp
- Chickpea (BANZA brand)
- Red lentil

FLOURS

- Almond
- Coconut
- Tapioca
- Chickpea
- Lentil
- Quinoa

DRINKS

- Use 100% juice, NOT FROM CONCENTRATE, which equals more sugar
- Aim for 3-6 tsp. of sugar daily (=12–24 grams) } 1 tsp. of sugar equals 4 grams
- Xyla pop is an option as well
- Unsweetened chocolate almond, coconut or hemp milk (in the beginning you can use sweetened and unsweetened to transition slowly)

COOKIES

- Sweet Earth Flourless Cashew Cookies

CHIPS

- Potato chips are okay in small amounts
- Beet, bean, sweet potato, parsnip and carrot chips
- Banana chips

YOGURT

- Almond, cashew or coconut

FOODS FREE OF GLUTEN:

- Rice – all types
- Tef
- Buckwheat
- Corn
- Beans
- Lentils
- Mochi rice bread
- Rice pasta
- Flax
- Corn meal
- Maise, masa
- Quinoa
- Sago
- Soy, soybean
- Water chestnut
- Amaranth
- Millet
- Kasha
- Wild rice
- Legumes
- Millet
- Tapioca bread
- Rice noodles
- Rice cakes
- Rice crackers
- Job's Tears
- Hominy
- Milo
- Kudzu
- Saffron
- Sesame
- Sunflower seed
- Hemp
- Oats
- Amaranth flakes cereal
- Corn & flax cereals
- Cream of brown rice cereal
- Corn tortilla/taco shells
- Soba buckwheat noodles
- Wheat-free tamari or Bragg's

FLOURS:

- Acorn
- Almond
- Amaranth
- Artichoke
- Brown rice
- Bean flour
- Cassava
- Buckwheat
- Corn
- Cornstarch
- Cottonseed
- Dasheen (Eddo)
- Oat
- Quinoa
- Potato
- Soy
- Pinto bean
- Tapioca
- Rice
- Taro

Always double-check your label to make sure the food you are eating is indeed gluten-free.

FOODS CONTAINING GLUTEN:

- Wheat
- Rye
- Barley
- Spelt
- Triticale
- Kamut
- Noodles
- Pasta
- Crackers
- Breads: rye, sourdough etc.
- Hot dogs with wheat filler
- Sausages with wheat filler
- Baking mixes
- Batter-fried foods
- Salad dressings
- Soy sauce
- Gravies and cream sauces
- Beer
- Gin
- Whiskey
- Liverwurst
- Ovaltine
- Inka
- Barley Malt
- Gum
- Icing sugar
- Modified starch
- Textured vegetable protein

May be found in the following:

- Soups
- Vitamin E
- Matzos
- Candy
- Rye flakes
- Yeasts
- Hamburger
- Granola
- Ice cream (thickening agents)
- Pepper (synthetic)

May be listed on food labels as:

Flour
Wheat flour
Vegetable Starch
Vegetable gum
Wheat germ
Wheat bran
Wheat starch
Graham
Modified food starch

GRAIN-FREE NOT GLUTEN-FREE: A-Z GUIDE

acorn [Quercus spp.] Sweet edible nut used whole or ground into flour. Flour adds flavor and fiber, but does not bind well.

almond [Prunus amygdalus] Sweet edible nut used whole or ground into flour. This flour, alone or in combination with other flours, is used in breads, cakes and pastries.

amaranth [Amaranthaceae] Many varieties; related to spinach, beets and pigweed. Tiny seeds are commercially available whole, or ground into a light brown flour with a nutty taste. Highly nutritious. Edible leaves.

arborio rice Short-grain white rice of Northern Italy used for risotto. Cooks up creamy. Similar to the California-grown short-grain variety, pearl.

aromatic rice Brown or white rice with a natural aroma and flavor similar to roasted nuts or popcorn.

arrowroot [Maranta arundinacea] Herbaceous tropical perennial. The starch, extracted from the rhizomes, is used as a thickener and blends well with gluten-free flours. Interchangeable with cornstarch.

artichoke [Cynara scolymus] Flower head of a thistle-like plant. Used cooked as a vegetable, or dried and ground into flour. Combine flour with rice, potato, and/or tapioca flour for breads and other baked goods.

basmati rice Very slender, long-grain, highly aromatic rice grown in India and Pakistan. High in flavor; available in brown and white forms.

beans Seeds of leguminous plants. Used whole as a cooked vegetable; pureed as a thickener, or dried and ground into flour. Many commercial gluten-free bean flours are available. (See legumes.)

besan (gram, chickpea flour) Pale yellow flour made from ground, dried chick-peas; very nutritious, high in protein. Used in doughs, dumplings, and noo-dles; as a thickener for sauces; and as a batter for deep fried food.

black and red rice Rare Asian rice grains with black and red husks and bran coverings. (Also cultivated in California.)

boil-in-bag rice Rice that is pre-measured, cooked, and packaged in a colan-der-style plastic bag for quick, convenient cooking.

brewer's rice Tiny particles of rice or rice chips, primarily used as an ingredi-ent in brewing beer or in animal feed.

brown rice Kernels of rice from which only the hull has been removed. Cooked brown rice has a slightly chewy texture and a nut-like flavor.

brown rice flour Ground form of brown rice with a nutty taste.

buckwheat [Fagopyrum esculentum] Herb with triangular-shaped seed and black shell, used whole, cracked or ground into flour.

calrose A type of medium-grain rice grown in California.

canola [Brassica napus] Hybrid rapeseed developed in Canada, most commonly found as cooking oil.

Carolina gold rice Distinctive rice grown in the South Carolina low country, known for its golden outer hull.

cassava [Manihot esculenta] (tapioca, manioc, yuca) Starch, extracted from the root, is ground into flour, which is used as a thickener for soups, fruit fillings and glazes, much like cornstarch.

channa Type of chickpea grown in the Indian subcontinent. Used whole or ground into flour.

chestnut [Castanea dentata] Smooth-shelled, sweet, edible nut. Usually roasted, then used whole or ground into flour. (Flour does not bind well.)

chickpea (garbanzo) Seed of leguminous plant of the pea family, used whole, pureed or ground into flour. (See besan.)

converted® Registered trademark used to describe parboiled rice.

corn [Zea mays] Maize, cereal plant native to the Americas. Kernels are largest of cereal seeds. Six major types are dent, flint, flour, sweet, pop and pod corn. Used whole or processed into a multitude of products including sweeteners, flours and oils.

corn flour Finely-milled flour from the entire kernel of corn. Can be blended with cornmeal and small amounts of other flours for making cornbread and cornmeal mush. Found in white, yellow and blue varieties.

corn gluten Nutrient supplement.

corn malt Flavoring agent.

cornmeal Coarse grade of milled corn flour. (Not a substitute for cornstarch or corn flour.) Found in white, yellow and blue varieties.

cornstarch Thickener derived from corn.

cottonseed [Gossypium hirsutum] Used as a seed or ground into flour; seeds typically pressed and used as an oil for margarine or cooking oil.

dal (dhal) Split peas or beans from India; used whole, pureed, or ground as flour.

dasheen flour (eddo flour) Variation of taro flour, used as a thickener. (See taro flour.)

della rice Cross of long-grain rice and basmati rice, developed in the United States.

enriched rice White rice with some of the nutrients, mainly the B vitamins, iron, niacin and folic acid, restored after the milling process.

fava bean (faba) Legume. Used whole, cooked as a vegetable or ground into flour. Unrelated to celiac disease, favism is an allergic reaction to fava beans that can be life-threatening. Favism is most common in those of Mediterranean descent.

flaxseed [Linum usitatissimum] Seed of ancient medicinal herb, with a nutty flavor. Used whole, toasted or sprouted; ground into meal; or pressed into oil. High in fiber.

garbanzo (chickpea) Seed of leguminous plant of the pea family. Used whole, pureed or ground into flour. (See besan.)

glutinous rice The term glutinous refers to its sticky texture when cooked. White, brown, or black rice characterized by broad, short grains that stick together during cooking; mainly used in Asian sweet snacks; also known as sweet rice, sticky rice, or waxy rice.

glutinous rice flour (sweet, mochiko) Works well as a thickener in sauces and soups. Sauces thickened with sweet rice flour will not separate when frozen and thawed.

gram flour (besan) Made from chickpeas.

hominy White or yellow corn kernels from which the hull and germ have been removed. Used canned as a side dish or in casseroles.

hominy grits Side dish of coarsely ground dried hominy.

hulls Outer inedible covering or husk layer that encloses any grain kernel. Industrial uses.

instant rice Rice that has been precooked and dehydrated.

japonica rice Specialty rice, typically used for rice stuffing and side dishes.

jasmine rice Variety of aromatic rice.

Job's tears [Coix lachryma-jobi] Seed of ancient annual grass, resembling large barley. Used as a substitute for pearl barley.

kasha Roasted buckwheat groats, with a toasty, nutty flavor. Russian kasha may also contain millet and oats.

koshihikari Variety of Japanese rice, now being cultivated in the United States.

kudzu Leguminous Asian plant whose roots yield a starchy powdered extract, used as a thickener. Leaves and stems are also edible.

legumes, leguminous Plants with seeds in pods. There are more than a hundred legumes, including peanuts, lentils, peas, soya, beans, channa, garbanzo (chickpea, gram). Versatile served as vegetables, dried and ground into flour, or pureed. May be processed into oils or butters.

lentils Tiny lens-shaped seeds of a leguminous plant. The three main varieties are: French/European lentil, Egyptian/red lentil, and yellow lentil.

long-grain rice Brown or white rice kernels, averaging five times as long as they are wide.

maize, maiz, masa, harina Other names for corn or corn flour.

manioc [Manihot esculenta] (cassava, tapioca, yuca) Starch, extracted from the root, is ground into flour, which is used as a thickener for soups, fruit fillings and glazes, much like cornstarch.

millet [Panicum miliaceum] Drought-tolerant grasses with small seeds, which can be substituted for sorghum in most recipes.

milo Versatile grain used whole, cracked or as a flour. (See sorghum)

modified corn starch Corn starch chemically modified to improve properties for commercial uses.

modified tapioca starch Tapioca modified to improve consistency, stability and flavor.

nuts Tree nuts and peanuts (a legume) do not contain gluten. Used whole or processed into butters or oils.

peanut [Arachis hypogaea] Seed of a leguminous plant. Used whole, ground into flour, or processed into an oil or butter.

pearl rice California short-grain; white kernels very plump and almost round.

polished rice Regular milled white rice. The outer husk is removed, and the layers of bran are milled until the grain is white.

popcorn Variety of corn suitable for popping. Unpopped kernels may be milled into a light corn flour. Popped corn may be pulverized and added to ready-to-eat breakfast cereals, or used as soup/salad toppers.

popcorn rice Grown in Louisiana, this long-grain rice is a cross between basmati and regular rice. (Tastes like buttered popcorn, but the scent is stronger than the flavor.)

potato flour Commercially ground from the whole potato, used as a thickener. Retains potato flavor.

potato starch flour, potato starch Commercially prepared from cooked potatoes that are washed of all fiber until only the starch remains.

precooked rice White or brown rice that has been completely cooked and dehydrated after milling.

quinoa [Chenopodiacum quinoa Willd.] Seed of ancient cereal grain of Peru, related to amaranth. Mild nutty flavor. Versatile; can be substituted for any grain. Used whole; as a hot cereal; ground into flour. Adds moisture to baked goods.

red rice Type of rice grown in South Carolina. (Also refers to a dish consisting of tomatoes and rice.)

rice [Oryza sativa] ("Races" called Indica, Javonica, and Sinica) Semi-aquatic member of the grass family. Rice is gluten-free and non-allergenic. Categorized as short, medium and long, the edible seed is the staple grain for over half the world's population.

rice bran Outer layer of brown rice; an excellent source of thiamin, niacin, vitamin B-6, iron, phosphorus, magnesium, potassium and fiber.

rice bran oil Mild-flavored oil extracted from rice bran; has a very high smoking point that makes it suitable for frying.

rice couscous Cracked rice resembling a cracked wheat product called couscous.

rice flour, white rice flour Ground form of rice that is gluten-free and non-allergenic.

rice hulls Outer inedible covering protecting the rice kernel—industrial uses.

risotto Creamy Italian rice dish in which rice is sautéed and cooked in broth.

rosematta Parboiled rice from South India. The bran gives an attractive rose color.

rough rice Rice, as it comes from the field, also known as paddy rice. Rough rice kernels are encased in an inedible, protective hull.

saffron [Crocus sativus] Derived from the dried stigmas of a purple-flowered crocus. Used to color and flavor foods.

sago Starch extracted from tropical palms and processed into flour, meal, or pearl sago (similar to tapioca.) Used as a thickener.

sesame White, brown or black seeds. Used whole, ground as flour, or pressed into oil.

short-grain rice Brown or white rice kernels that are much thicker than long-grain varieties. Grains are soft and stick together when cooked.

sorghum, milo [Sorghum bicolor L. Moench] Drought-tolerant cereal grain used primarily as a flour or sweet syrup. Third most prevalent food crop worldwide. Certified food grade white sorghum has been specially developed for the food industry.

soy, soybean [Glycine max L. Merr] (soya, kinako, edamame) High- protein, high-fat legume, which is processed into a variety of food products. Oil is used in cooking and salad dressings. Flour has strong, distinctive nut flavor. Most recipes are designed to use low-fat soy flours; soy milks and tofu use high-fat soy flours.

starch Reserve poly-saccharide in plants. Starches from many sources are used commercially as thickeners and gelling agents. In the U.S., when the single word "starch" appears on a food label, the source must be corn. CFR Title 21, Section 578.100 October 1, 1980. (This does not apply to starch in pharmaceuticals.)

sunflower seed Can be dried or roasted and eaten as a snack; used in salads or sandwiches; or added to a variety of cooked dishes and baked goods. Oil is used in cooking and salad dressings. The seed may be finely ground and added to flour combinations for a dark color and nutty taste.

sweet potato [Ipomoea batatas] Tropical American vine of the morning glory family, cultivated for its fleshy, tuberous, orange-colored root. Used cooked as a vegetable, or dried and ground into a flour.

sweet rice flour Glutinous waxy rice, containing more starch than the brown and white rice flours. Excellent thickener; binds and reduces separation in sauces that are to be frozen and then reheated. (Cannot substitute for brown or white rice flours.)

tapioca Starchy substance extracted from the root of the cassava plant, used mainly in puddings. Tapioca flour is used as a thickener, especially in fruit dishes because it produces a clear gel. Adds "tooth" to gluten-free breads. (See cassava and manioc)

taro flour Commercially processed from a starchy tropical root. Used as a thickener, similar to tapioca.

tef [Eragrostis tef] (tef grass or teff) Very small black ancient grain of the millet family. Principal grain in Ethiopian bread (Injera), which is described as a soft, porous, thin pancake.

texmati A variety of aromatic rice.

urd Variety of green gram or bean cultivated in India.

Valencia rice A short-grain rice.

water chestnut Edible tuber of a water plant. Used fresh, canned or dried. Dried water chestnuts may be ground to a flour or powder and used as a thickener, or for coating foods prior to frying.

waxy rice flour See glutinous rice and sweet rice flour.

wehani rice California-grown rice, a hybrid that includes Indian basmati.

wild rice [Zizania aquatica] Seed of plume-topped wild aquatic grass found mainly in the United States and Canada. Can be used whole or milled into a dark flour.

wild pecan rice Aromatic long-grain rice grown in Louisiana. Named for the strong aroma and milder, but distinct nutty taste.

A GUIDE TO THE BEET TRANSIT TIME TEST

Digestive Health

Many Canadians suffer from constipation. From the time you eat it should take 12–24 hours for your digestive tract to break down your food and eliminate the waste in a bowel movement.

The Beet Transit Time Test

Transit time refers to the length of time that passes between ingesting food and having a bowel movement. This information can provide valuable insight into your overall health.

How the Beet Transit Time Test Works

Eat some beets (either raw or baked) and write down the exact time you eat them. Don't be alarmed at seeing red in your stool and urine. Pay attention to your bowel movements starting from the time you ingest the beets. If you are not seeing red within 24 hours, your system is taking too long to move waste through your body. Please record the time at which you LAST see red in the stool. Email us this number.

Suggestions for Improving Your Transit Time

- Keep hydrated and drink water. Adding lemon to your water may also help with your digestion.
- Eat more fruits and vegetables. Apples, avocados, broccoli, Brussels sprouts, cabbage, sweet potatoes, celery, chia seeds, kale, pears and watermelon are some foods that are fibre-rich, nutrient-dense and hydrate your body.
- De-stress! Your gut will either speed up or slow down your transit time when you are stressed.

- Eliminate any food intolerances from your diet.
- Increase your intake of fermented foods and introduce a probiotic to your supplement regime.
- Keep an active lifestyle and exercise on a regular basis.

How do you prefer your beets?

Raw beets can be shredded with a cheese grater and put on top of a salad.

Baked beets can be enjoyed by chopping the beets and placing them in a covered baking dish. Drizzle a bit of oil on them and sprinkle with sea salt and pepper. Heat your oven to 350 degrees Fahrenheit and bake for 45-60 minutes.

THE IMPORTANCE OF REACTIONS AND AGGRAVATIONS IN BIOMEDICAL TREATMENT

Biomedical treatment is one of the most effective ways to improve your child's development. Most developmental concerns are made worse by inflammation, toxins, microbial overgrowth in the bowel and/or heavy metals. The process of removing these harmful substances from the body can sometimes include aggravation. Aggravation occurs when inflammation moves out of the brain into the body and eventually exits the body through the digestive system. This is the objective of biomedical treatment, and often symptoms, reactions and aggravations can present themselves.

Here are some things to consider when trying to identifying why your child is aggravating:

- Believe it or not, there are seasonal changes in behaviour and mood for many children.
- 53% of children can have aggravation in the spring and fall.
- Children with impaired immune function can aggravate in the winter.
- Many children aggravate when they are fighting an illness. Sometimes someone else in the home is sick or children at school or daycare are fighting something, but your child aggravates with mood, behaviour, sleep or development, while others get more typical immune system symptoms.
- We recommend that all children under treatment are on a special diet. Food exposures to gluten, grains, dairy and/or sugar are a very common cause of aggravation.
- Your child's bowel is his powerhouse for development. Changes in the bowel are often a good place to look when assessing why your child is aggravating.

- Sleep is very important to help your child feel well and have consistent mood and behaviours. Sleep changes can cause aggravation.

TRACKING REACTIONS AND AGGRAVATIONS

Tracking these reactions and the symptoms that precede and follow aggravations can be incredibly helpful to your Naturopathic Doctor. Including a diet diary in your reaction and aggravation tracking will provide even more information to your Naturopath for future treatment plans.

Reactions and/or Aggravations Notes

List briefly any reactions and/or aggravations you notice in your child. Considering reasons that children often aggravate as listed on the previous page, are there any contributing factors that you can help us identify?

Week One _____

_____

_____

Week Two _____

_____

_____

Week Three _____

_____

_____

Week Four _____

_____

_____

INDEX

Benefit
Gains with little to no aggravation

Tolerable aggravations:

- Hyperactivity
- Sleep disturbance–follow melatonin therapy guidelines
- Waking up early
- Irritability
- Rashes
- Fevers with or without illness
- Heightened sensory concerns
- Repetitive behaviours–fixation, OCD, scripting, echolalia
- Tantrums
- Nosebleeds
- "Oily stool"
- Constipation–follow constipation protocol
- Diarrhea–use activated charcoal

Intolerable aggravations:

- Could be any of the above, depending on severity and impact on quality of life for the child or child's parents
- STOP added supplement or supplements and assess bowel function whenever an intolerable aggravation occurs
- Self-injurious behaviour
- Aggression
- Sensory meltdowns

High-dose vitamins

Staggering supplements start one at a time with 2 weeks in between

Step-by-step guide to removing foods

Reduce dairy

Remove dairy

Reduce grains

Remove grains

Reduce juice

Remove juice

Reduce potatoes and potato chips

Remove potatoes and potato chips

Reduce lentils and beans

Remove lentils and beans

Reduce sweet potato, quinoa, tapioca starch, buckwheat, starchy vegetables and high-glycemic fruits like banana and grapes

- Minimum B6 and folate dose: B6 = 25 mg, folate = 1 mg

PICO SALAX CLEAROUT PROTOCOL

Please stop all supplements during this time.

FOOD IS NOT RESTRICTED (please continue on the diet recommended by your Naturopathic Doctor).

PLEASE DRINK LOTS OF WATER ALONG WITH OTHER LIQUIDS (coconut water, juice, homemade broth).

*For many of our patients experiencing chronic constipation, it can take several days or rounds of using PicoSalax in order to empty the bowel completely. Once you have achieved clear liquid stools for one whole day, stop PicoSalax.

ADULT PROTOCOL:

Empty the tube:

9 a.m. mix one packet of PicoSalax in 8 oz. or one glass of water

11 a.m. mix one packet of PicoSalax in 8 oz. or one glass of water

At 4-6 p.m., if stool doesn't run clear (watery diarrhea with no brown colour), then do the protocol the next day. Repeat the above protocol for 5–6 days, or until empty or stool is clear and watery.

Maintain the tube:

Make sure transit time is 8–18 hours. Use corn or beets, and record the time period from initial ingestion until you see the LAST remnants of the food in the bowel movement—NOT the first time it appears in stool. Note

that beets will not be seen after 2–3 days, as the colour disappears in the bowel and is digested.

You can use any of the following to support maintenance:

5000–10,000 mg of Vitamin C

1,000–45,000 mg of Magnesium

20 cups RestoraLAX in 64 oz. of juice over 2 days

CHILD DOSE

Empty the tube:

9am mix 1/2 packet of PicoSalax in 8oz or one glass of water

11am mix 1/2 packet of PicoSalax in 8oz or one glass of water

At 4-6pm, if stool doesn't run clear (watery diarrhea with no brown colour), then do the protocol the next day. Repeat the above protocol for 5-6 days, or until empty or stool is clear and watery

Maintain the tube:

Make sure transit time is 8-18 hours. Use corn or beets, and record the time period from initial ingestion until you see the LAST remnants of the food in the bowel movement - NOT the first time it appears in stool. Note that beets will not be seen after 2-3 days as the colour disappears in the bowel and is digested.

You can use either of the following to support maintenance(the goal is stool the consistency of soft serve ice cream):

1000-5000 mg of Vitamin C

400 – 2000mg of Magnesium

Please let the clinic know if you have any other questions or concerns.

GLOSSARY

Aggravations

Aggravation is the term we use to describe the positive/negatives that occur throughout biomedical treatment. Aggravations appear to be "negative" symptoms that affect digestion, immune function, skin, sleep and/or behaviour. They are transient symptoms that arise from medical treatments designed to create change, such as detoxification of harmful substances or removal of harmful microbes from the body. Aggravations can be thought of as positive, as they teach us about how a child's body is functioning and repairing.

ATP, adenosine triphosphate

ATP is produced by mitochondria in our cells. ATP is the energy molecule that supports all cellular function, affecting both tissue and organ function.

BDI

Biomedical Dietary Intervention is the term we use to describe a grain-free, dairy-free diet. The BDI is similar to other dietary interventions, such as the Specific Carbohydrate Diet (SCD), Gut and Psychology Syndrome Diet (GAPS), Body Ecology, and the "paleo" diet. All of these dietary approaches remove complex carbohydrates and reduce starches in the diet.

Biofilm

A biofilm is made up of a group of microbes that stick to each other with the help of an extracellular matrix. Biofilms contribute to chronic infection. One example of a common biofilm that affects human health is the plaque that grows on people's teeth.

Carnitine

Carnitine is derived from the amino acids (protein building blocks) lysine and methionine. Carnitine helps to shuttle fats into the cells to create energy. Carnitine is present in every cell in the body, and supplementation has been shown to improve social, language, and cognitive development.

Cell danger response

Cell danger response (CDR) is the evolutionarily conserved metabolic response that protects cells and hosts from harm. It is triggered by chemical, physical or biological threats that exceed the cells' ability to maintain balance. **https://www.sciencedirect.com/science/article/pii/S1567724913002390**

Clostridia

Clostridia is a family of bacteria that have been studied by Dr. Derrick MacFabe in relation to the medical aspects of autism spectrum disorder.

Digestive enzyme

Digestive enzymes are needed to help break down our food into smaller components. Children diagnosed with autism often have impaired digestive function, and supplementation with digestive enzymes can help their digestive tract absorb more nutrients. Inadequate breakdown of food can lead to symptoms seen in autism.

DMG, dimethylglycine

Dimethylglycine (DMG) is a derivative of the amino acid, glycine. DMG is an antioxidant and a methyl donor and is the result of choline metabolism.

Folate cycle

The folate cycle converts folate and folic acid from our diet or supplements into active forms of folate needed for synthesis, repair and methylation of DNA. The folate cycle also supports production of neurotransmitters, including serotonin and dopamine.

GABA, gamma-aminobutyric acid

GABA is a calming neurotransmitter. It is converted from glutamate with the help vitamin B6.

GLA

GLA is made from omega 6 fatty acids with the help of vitamin B6. GLA combines with EPA (derived from omega 3 fatty acids) to create a molecule called DGLA. DGLA helps to regulate inflammation and immune function.

Glia

Glia, or neuroglia, are the immune cells in the brain. Glia is an umbrella term for all types of brain immune cells, including microglia, oligodendrocytes, Schwann cells, astrocytes, ependymal and satellite cells.

Glutamate

Glutamate is the brain's most plentiful neurotransmitter. It helps to form neurons and is excitatory. Imbalances in glutamate are at the root of many neurological disorders including autism.

Glutathione

Glutathione is the body's master antioxidant. It is produced by the methylation cycle with the help of vitamin B6 and methyl B12. Glutathione is made up of three amino acids

(glycine, glutamate, cysteine). Glutathione is needed to help detoxify harmful substances like chemicals and heavy metals. Glutathione is needed to support glutamate balance in the brain and has been found to be deficient in children diagnosed with autism.

Gut-brain axis

The gut-brain axis (GBA) refers to back-and-forth communication between the digestive tract and the brain. The GBA links the emotional and cognitive centers of the brain with peripheral intestinal cells and the way they function. Recent advances in research have described the importance of gut microbiota in influencing these interactions. This interaction between microbiota and GBA appears to flow in both directions, namely through signaling from the gut-microbiota to the brain, and from the brain to gut-microbiota, by means of neural, endocrine, immune, and humoral links. **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4367209/**

Herxheimer reaction

The herxheimer reaction is caused by toxins released from microbes when they are dying. A herxheimer reaction can be caused by a pharmaceutical or botanical anti-microbial, a probiotic, and/or dietary changes. Symptoms include fever, rashes, digestive changes, itching, headache, nausea, fatigue, chills, malaise and muscle pain.

HBOT

HBOT is the acronym for Hyperbaric Oxygen Treatment. HBOT therapy has been shown to improve language, social and cognitive function in children diagnosed with autism.

Immunoexcitotoxicity

Immunoexcitotoxicity is a term coined by Dr. Russell Blaylock. Immunoexcitotoxicity describes the changes that occur in the brain's immune system that contribute to changes in neurological function. Immuno refers to the brain's immune system, also called the glia or neuroglia. Excito refers to the higher levels of glutamate that result from the immune cells in the brain being triggered. Lastly, toxicity refers to the toxic impact of too much glutamate on the cells in the brain. Immunoexcitotoxicity is the proposed central mechanism for autism, Alzheimer's and chronic traumatic encephalopathy (commonly known as chronic concussions suffered by athletes, most notably NFL players).

Melatonin

Melatonin is a hormone produced by the methylation cycle. The neurotransmitter serotonin is converted to melatonin with the help of vitamin D and SAMe (also produced by the methylation cycle). Melatonin helps to govern natural sleep cycles and is often deficient in children and adults diagnosed with autism. Melatonin also acts as an antioxidant to protect the brain from oxidative stress.

Methylation

Methylation is the process by which methyl groups are added to DNA. The methylation cycle helps to support 200 other biochemical cycles. Methylation is responsible for producing neurotransmitters, cell membranes, carnitine, glutathione, phosphatidylcholine and creatine. Research has shown that 90% of children diagnosed with autism have impairment in their methylation cycle.

Microbiome

Microbiome is the term used to describe the collection of microbes that live in our bodies, including bacteria, yeast, fungi and viruses, termed microbiota. The microbiome plays a crucial role in regulating inflammation, immunity, neurotransmission and detoxification. The Human Microbiome Project is a National Institutes of Health–funded research endeavor that is investigating the role the microbiota play in human health.

Mitochondria

Mitochondria are organelles that are in every cell in our body. Mitochondria are the only organelles that have their own DNA, passed on maternally. Mitochondria produce energy in the form of ATP that supports all cellular function in the body, affecting tissue and organ function. Mitochondrial impairment has been implicated in the medical aspects of autism spectrum disorder.

Modified ketogenic diet

This is a diet high in fats and low in carbohydrates. The goal of the modified ketogenic diet is to shift the body's fuel over to ketones, decreasing the inflammation and oxidative stress that are created when the body uses glucose as the primary fuel for cellular function. The modified ketogenic diet has been shown to improve mitochondrial functioning.

Motor planning

Motor planning is the conception, planning and execution of a motor movement by sequencing the muscles needed to fire from the beginning to the end of a movement. Motor planning requires sensory input, as well as a consecutive firing of motor neurons, to create coordinated movements.

Omega 3 and 6 fatty acids

Omega 3 and 6 fatty acids are essential fatty acids that need to be acquired through diet or dietary supplementation. Omega 3 fatty acids convert into EPA and DHA, while omega 6 fatty acids convert into GLA.

Probiotic

Probiotics are good bacteria and yeasts that can be supplemented to help improve the health of the human microbiome. Probiotics have been shown to help improve digestion,

mood, sleep, skin, and immune function, and to alleviate autism symptoms. There are thousands of good bacteria that live in our bodies. Probiotic supplements contain some of these strains of good bacteria that research has found can improve human health.

SAMe, S-Adenosyl-L-methionine

SAMe is a methyl donor that helps to deliver methyl to approximately 200 biochemical cycles in the body. SAMe is produced by the methylation cycle. SAMe has been shown to improve symptoms of autism, reduce inflammation and enhance mood.

Serotonin

Serotonin is a neurotransmitter that is responsible for supporting mood, appetite, sleep, language, noise sensitivity and memory. The majority of the body's serotonin is made in the digestive tract, with the help of the methylation cycle.

SNPs

Single Nucleotide Polymorphisms (SNPs) is the term used to describe the genetic variations that occur in the human population. The Human Genome Project identified that humans have approximately 35,000 genes. SNPs describe some of the most common variants of genes, and research is now beginning to explain how SNPs impact human health. Some of the most common SNPs discussed and researched in the autism population are MTHFR, COMT, CBS, GST, MTR/MTRR and PEMT.

Spectrum Solutions

Spectrum Solutions is a high-dose vitamin therapy used to support language, social and cognitive function for people diagnosed with developmental delays or chronic health concerns.

TMG, trimethylglycine

Trimethylglycine is the active metabolite of choline in the body. It supports methylation and is often referred to as betaine. TMG donates methyl to SAMe, which then helps to support methylation in approximately 200 other biochemical cycles in the body.

Tocopherals

Tocopherols are forms of vitamin E. Tocopherols are powerful antioxidants and help to slow lipid peroxidation of the cell membrane (destruction of the membrane that surrounds all of our cells). In autism treatment, mixed tocopherols are used to support praxis (motor planning).

ABOUT THE AUTHOR
Dr. Sonya Doherty, N.D., FMAPS (Cand.)

Dr. Sonya Doherty is a Naturopathic Doctor focused on biomedical treatment of neurodevelopmental disorders including:

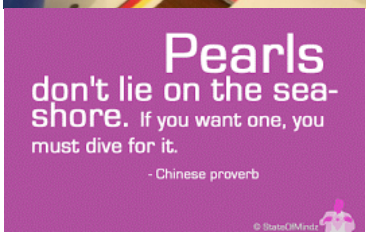
- Autism Spectrum Disorder
- Down Syndrome
- Cerebral Palsy
- Global Developmental Delay
- AD/HD
- Tourette Syndrome
- Pediatric OCD
- Speech delay
- PANDAS, PANS, Pitands
- Dyspraxia, Apraxia
- Rare genetic disorders
- Oppositional Defiant Disorder – ODD
- Pediatric anxiety and depression

She has been practicing as a Naturopath since 2003, after completing her pre-medical studies at the University of Western Ontario and her post graduate naturopathic training at the **Canadian College of Naturopathic Medicine.** Dr. Sonya is a board certified Naturopathic doctor and member of the **Canadian Association of Naturopathic Doctors**.

Dr. Sonya has completed **The Autism Research Institute**'s Level I and II Defeat Autism Now! training, providing her with the research and expertise necessary to help every child reach their developmental potential. DAN doctors are trained to help treat children with autism as well as other neurodevelopmental disorders.

Biomedical treatment is extremely important to Dr. Sonya, both as a mother and as a professional. She is committed to staying current on research and

treatments that can benefit children with developmental concerns. After becoming a DAN doctor, she began her training with the Medical Academy of Pediatric Special Needs. The FMAPS education is a comprehensive training program for physicians at the forefront of medical treatment of neurodevelopmental disorders. The level of mastery that MAPS fellows (FMAPS) achieve in the field of complex pediatric conditions makes them among the best-prepared practitioners in this field.



Dr. Sonya is extremely passionate about biomedical treatment. She has been practicing for over 15 years and has treated thousands of children diagnosed with neurodevelopmental disorders. As the mother of 3 young children, she is dedicated to bringing the most current research and advanced treatments to her multi-disciplinary wellness clinic located in Burlington, Ontario, Canada.

Dr. Doherty is an international speaker and lectures extensively on biomedical treatment and the prevention of autism and other developmental. As a member of the Treat Autism faculty, she trains other health care professionals in biomedical treatment.

"We were told so many things about our son that weren't true. That he would be severely delayed in writing, swimming, biking and skating. That he wasn't very smart. We chose a different path and because we did, his level of skills and future are much different than they would have been. Biomedical treatment may be the hardest thing you ever do but it will create opportunities for your child that will defy all odds."

~ Dr. Sonya