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HOW HYPERBARIC OXYGEN THERAPY HELPED MY DAUGHTER WITH DOWN SYNDROME

BY JANE WINANS, MA,
WITH CONTRIBUTIONS BY NORM SCHWARTZ, MD

I believe that Down syndrome is treatable, just like autism. For Down syndrome parents who share this belief, this can mean working with heavy metal chelation, vitamin supplements, methylation, oxidative stress, leaky gut, neurofeedback, and hyperbaric oxygen therapy (HBOT). (Your issues, my issues.) It might also mean Amy Yasko, S. Jill James, and doctors belonging to the network formerly known as Defeat Autism Now! (DAN!). (Your experts, my experts.) Again, Down syndrome is treatable.

My daughter Lydia is 9 and has Down syndrome. The medical name for her condition is trisomy 21 (T21). Dr. Norm Schwartz, Lydia's integrative medicine physician, describes the implications of T21 in this way:

Chromosome 21 is one of 23 human chromosomes. Normally, there are two copies of each chromosome: one from each parent. The addition of a third copy of the 21st chromosome, from either the mom or dad, is the usual cause of Down syndrome. In 2000, it was determined that chromosome 21 contains 1.5% of a cell's DNA, making it the chromosome with the smallest amount of DNA.[1] Of interest, this diminutive chromosome contains genes that code for enzymes and proteins with critical roles in cell physiology, including amyloid-beta precursor protein, cystathione beta-synthase, and superoxide dismutase that contribute to the pathophysiology of T21.

Exactly how the extra chromosome causes Down syndrome is still being researched. Possibilities include direct or indirect gene dysregulation or overexpression of genes on chromosome 21. And despite intensive medical research, how the complexity and variability of the genotype in T21 is involved in the phenotypic expression of Down syndrome is not fully understood.[2-8] *However, although generally not currently well appreciated, it is crucial that we increasingly begin to recognize the degree to which medical problems seen in T21 are the consequences of metabolic dysfunction* from genetic alterations.[9-17]

In any case, understanding how the *metabolic disruption in T21 creates multiple downstream consequences* that adversely affect cellular networks is the first step to treatment. Documented biochemical and physiological abnormalities in T21 include reduced energy production,[18-20] decreased glutathione,[21,22] compromised mitochondrial function,[23-27] increased oxidative stress,[28-32] neurotransmitter imbalances,[15,33-35] altered redox regulation,[4,36-39] abnormalities in the critical one-carbon methylation pathway,[21] and faulty DNA repair.[17,40] Knowledge of these biochemical and physiological abnormalities points the way to a rational, physiology-based treatment regimen to mitigate the adverse consequences of T21.

Down syndrome is treatable.

The enormity of that extra chromosome can still bring me to tears, even today when Lydia is in the third grade, reading Junie B. Jones books independently (these are beginning chapter books appropriate for up to third graders), going to basketball and dance class with her peers, calling friends on the phone to finagle sleepovers, and arguing her bedtime with me. How incredibly blessed we are. We have been able to get to this point because Lydia has consistently done well with targeted interventions. Her most dramatic improvements occurred in August 2011 after she began HBOT. To understand her progress with HBOT, however, it may help to first explain the other therapies that Lydia has used along the way.

LYDIA'S PATH TO HEALING

Lydia has been cared for with various therapies and interventions almost from birth. Throughout her first year, Lydia took omega-3 supplements and a multivitamin specific to people with T21. In addition, after being identified as hypothyroid at 2 months, Lydia began thyroid replacement that continues to the present day. Lydia also began receiving craniosacral therapy (CST) at a very young age to address cranial facial abnormalities that can otherwise inhibit brain function, respiration, and sleep. She continues to receive CST a number of times a year. At 5 months, Lydia had heart surgery for an atrial septal defect (congenital heart defect).

At 15 months, after a friend told me that children with autism and children with Down syndrome share some metabolic similarities, Lydia had her first appointment with a doctor from what was formerly known as the DAN! network. Based on research and metabolic testing specific to Lydia, which revealed that her metabolic analysis profile was very dysfunctional, we began to systematically address her metabolic dysfunction. First, we implemented a gluten-free/casein-free (GF/CF) diet as well as more healthful food choices. We watched her carbohydrate and sugar intake to improve her digestive function. Many parent support networks have reported the benefits of this approach. A diet that decreases hard-to-digest and potentially allergenic and reactive foods can help with digestion, vitamin and mineral absorption, gut integrity, and balanced intestinal flora, all of which can benefit an individual with T21. In addition, gluten and casein, if not completely broken down, can have a negative effect on brain function. In T21, there is also an increased incidence of celiac disease, so eliminating gluten is an important proactive strategy since celiac disease often does not have intestinal symptoms and/or can be present for an extended period of time before it is diagnosed. Lydia began eating a high-protein, low-carbohydrate diet containing as much organic food as we could afford and nothing artificial. Lydia's doctor also recommended NAET (Nambudripad's Allergy Elimination Techniques) to eliminate Lydia's food and environmental sensitivities.

Lydia's testing pointed to vitamin insufficiency coupled with heavy metal overload, which affected almost every metabolic cycle and interrelationships among cycles. We addressed her high levels of lead, mercury, and aluminum with both chelation and supplementation, devoting many appointments to determining what supplements to push and what metals to pull to allow her metabolic cycles to rotate as designed. Lydia's test results showed steady metabolic improvement as we adopted this healing strategy. Whenever Lydia failed to reach her therapy milestones, we focused on the metabolic function behind the targeted abilities. For example, low tone plagued Lydia for many years. "Snap practice" was arduous because the tone in her fingers simply wasn't strong enough to allow her to snap. One day, months after we had stopped snap practice and had begun to biomedically address building better muscle tone, Lydia got up, pulled on her jeans, and snapped without effort. This was one of many reminders that we have had along the way that T21 is treatable.

At just under 2 years of age, Lydia started a targeted neurodevelopment program (National Association for Child Development) which continued until she entered kindergarten.

ATTENTION AND COGNITIVE FUNCTION

In kindergarten, Lydia was able to read, do simple math, and learn fairly well alongside her peers. First grade was a different story, however, as Lydia's attention issues became glaringly apparent. Because Lydia did not qualify for learning disability (LD) or cognitive disability (CD) services, we heard that Lydia might not receive additional academic services. I pored over biomedical research and Lydia's lab results to try to qualify her for services under "Other Health Impairments." As I read research specific to T21 as well as descriptions of "precocious development of Alzheimer's disease" and "increased susceptibility to neuron apoptosis" (cellular suicide), often with tears streaming down my face and a breaking heart, I nevertheless refused to accept that others might be right–that I was simply in denial of all that Down syndrome implies. Although the extra chromosome will always exist, I became convinced that T21 is a treatable medical condition, and it is possible to increase functionality in many biochemical pathways to achieve improved cognition. Therefore, our concerted push to improve Lydia's attention and cognitive function began.

Research out of Stanford University has identified excessive GABA (gamma-aminobutyric acid) in people with

T21. GABA is the principal inhibitory neurotransmitter in the central nervous system. Our osteopath (DO), who was trained in Eastern medicine, prescribed Chinese memory herbs that included gingko, a GABA inhibitor. These helped tremendously. In addition, Lydia started taking other research-supported supplements specific to T21 abnormalities and brain function. These T21-specific interventions improved Lydia's memory, which was most clearly evidenced by her improved recall of math facts and dreams.

She also underwent auriculotherapy (stimulation of the auricle of the external ear) to enhance brain wave function and neurotransmitter levels and to achieve more fluid language production.[41,42]

In October 2010, when Lydia was 8, we began neurofeedback to address her attention-deficit disorder (ADD) issues. Neurofeedback improved Lydia's language and focus somewhat, but daily charting of focus and attention by her teachers continued to show inconsistencies and deficits throughout second grade. As Lydia finished her second grade year, her timed math fact achievement was 10-17 per minute, and her words-read-per-minute score was low. However, it was clear to all concerned that focus rather than knowledge was the issue. With third grade looming, it became more urgent to find ways to improve both focus and cognition.

HYPERBARIC OXYGEN THERAPY

If neuron apoptosis was a feature of Down syndrome, I reasoned, then I wanted to find a way for Lydia to acquire more brain cells as well as new and healthier brain cells. In short, I wanted to find something that would stimulate neurogenesis. After I again turned to our experts, the consensus seemed to be that we should look into HBOT for Lydia.

Research has identified many ways that HBOT may benefit individuals with T21,[43] which are listed in Table 1. Knowing that Lydia had always responded well to mitochondrial support, our doctors saw good reason to believe that HBOT might produce comparable benefits for our daughter.

In the summer of 2011, we rented a hyperbaric chamber for a month to determine whether Lydia was a "responder" to HBOT. We used a soft chamber with a pressure of 1.3 atmospheres. Based on the recommendations of clinicians with extensive HBOT experience, we gradually increased the time Lydia was in the chamber to an hour and a half twice a day. For this month-long trial, we implemented a doable schedule that involved putting Lydia to sleep in the chamber and transferring her to her bed after one and a half hours. At 6:00 a.m., we carried her back to the chamber, where she again slept for one and a half hours.

The results of the month-long trial were amazing, with dramatic increases in Lydia's focus, attention, executive function, and language. There is no question that HBOT resulted in increased brain function. For example, there was a noticeable increase in Lydia's voice clarity on the phone, and she also began to use more sophisticated speech patterns. When retelling a story, Lydia now is able to describe the transitions characters in a book make from school to bus to home, whereas previously she related what happened without context. Lydia's math teacher, the same as last year, is awed by Lydia's improvement. Lydia's newfound focus is something her teachers could only dream of in second grade. Lydia now works independently and moves much more quickly through her work. The number of timed math facts that Lydia can complete in a minute has increased by over half, and her words-read-per-minute also has increased significantly. For the first time, Lydia can remember and spell words consistently.

Best of all, Lydia now gets herself ready for school, getting up, getting dressed, and making her own lunch and snack in a very age-appropriate time frame. In other words, what we would expect a child of 9 to accomplish in 30 minutes actually takes 30 minutes, not 90. This has completely changed our lives. No more crabby mornings! Lydia is really excited about her newfound independence and responsibilities.

Table 1. Benefits of hyperbaric oxygen therapy for T21

Benefits of HBOT
1. Increases brain blood flow[44,45]
2. Increases oxygen delivery to cells[46]
3. Is anti-inflammatory[47,48]
4. Reduces oxidative stress[49]
5. Supports mitochondrial function[44]
6. Mobilizes stem cells from bone marrow for self-healing[50]
7. Promotes gastrointestinal healing[51]
8. Decreases neuroinflammation[52-54]

LOOKING AHEAD

As parents, none of us can afford to wait 10 or 15 years until the newest research enters into widespread medical practice. We must be advocates for our children here and now, seeking the best. As Lydia's advocate, what I have learned over the years is that, at least for my daughter, T21 is not a static condition. Clearly, the interventions we pursued for her were beneficial. As I gained greater understanding of T21 over time, I learned that the potential for treating T21 depends on understanding the metabolic consequences of chromosome 21 overexpression. Many practitioners have helped me shed light on Lydia's biochemical train wreck and have guided us through numerous interventions, some simple and easy, others more challenging and difficult.

During our month-long summer trial of HBOT, we made no changes to Lydia's neurofeedback regimen or supplements, other than a slight increase in vitamin C and coenzyme Q10 (CoQ10). Whereas in summers past we played school, read, wrote, and did math and unit studies, during our HBOT summer, I had a new job that meant we were lucky if we read a book every other day. The amount of television watched by Lydia over the summer definitely exceeded the suggested limit, as well. In short, the only meaningful change we made during that month was to add the hyperbaric oxygen therapy. Through HBOT, neurogenesis was achieved, confirming that Down syndrome is treatable. We love our happy mornings!

The results of the month-long trial were amazing, with dramatic increases in Lydia's focus, attention, executive function, and language. There is no question that HBOT resulted in increased brain function.

You can view Lydia reading at http://www.youtube.com/user/jdwinans?ob=5#p/u/0/rnT-tKp7JMg and hamming it up with diet talk and 3-digit math at http://www.youtube.com/watch?v=UuWrqXvVlG8

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