



What's New In Autism!

Keeping up with the new findings.

by Pamela J. Compart, M.D.

Our scientific understanding of the underlying dysfunctional biochemistry seen in individuals with autism is growing daily. Here is a brief summary of what I feel are the most important and exciting newer findings.

1. Oxidative stress

Oxidative stress is the body's response to invaders such as bacteria or other microbes. When confronted with this threat, the body makes molecules called free radicals which function like bullets to kill off the invaders. This is an appropriate response. However, problems can occur when there are too many bullets or not enough anti-oxidant nutrients to scoop up the free radicals/bullets. In this situation, "innocent bystander" damage can occur from these excess bullets. Targets of damage can include cell walls, DNA, and glial cells (important brain cells).

Much of our attention to the brain has been focused on the neurons, the cells which release transmitters such as dopamine and serotonin. Until recently, not much focus was given to other important cells known as glial cells. Glia literally means "glue," and it was initially thought that the main purpose of these cells was to hold the neurons in place. However, we now know that these cells are very metabolically active and serve very important roles in the health and functioning of the brain. They provide nutrients to the neurons and clear up the toxic byproducts, the "garbage" generated from brain metabolism. When glial cells are negatively affected by oxidative stress, they cannot perform these functions well and brain function is negatively affected. This can result in language delays, sensory processing symptoms, and other problems.

Oxidative stress can be treated by decreasing the triggers of the stress and by providing anti-oxidant nutrients. Other supplements can be given to balance or counteract the toxic "garbage" which builds up in the brain under these conditions.

2. Neuroinflammation

Chronic low-grade inflammation of the brain has been a known issue in a subset of children with autism since autopsy studies done by Johns Hopkins University in 2005. Inflammation can also adversely affect brain function. Treatments involve identifying and eliminating/decreasing the sources of inflammation as well as

providing anti-inflammatory nutrients.

3. Mitochondrial dysfunction

Mitochondria are the energy-generating machinery found in cells. Research in recent years has increasingly documented that a subset of children with autism have poorly functioning mitochondria. This can result in the equivalent of a “brown out of electricity” in cells, with negative consequences on cell functioning throughout the body. Diagnostic tests are available to document the degree and types of mitochondrial dysfunction. This can guide provision of appropriate supplements to support good mitochondrial function.

4. Signal-to-noise ratio

This is a concept very familiar to engineers and recently has been proposed as a way to conceptualize what may be happening in the brain of individuals with autism. “Signals” need to be brighter or louder than “background noise” in order for messages to be transmitted. Consider the situation of attending a lecture in a large auditorium. If the speaker did not use a microphone, the voice signal would be too low to be heard. If audience members were talking or rustling papers, the background noise would also be high. In this situation, no one in the audience would receive the speaker’s information. Similarly, in the brain, if mitochondrial function is poor, the brain’s “signals” are not loud enough. If oxidative stress and/or inflammation is present, “background noise” is high. In this situation, the brain messages cannot be heard. Improving mitochondrial function and lowering oxidative stress and inflammation could then theoretically improve brain signaling and overall brain function.

5. Oxytocin

Oxytocin is commonly known as the “bonding hormone” and is found in breast milk. Research in recent years is suggesting that oxytocin is also important for social awareness throughout life. More recent studies suggest that oxytocin may also be involved in the signal-to-noise paradigm described above, and may help with lowering the background noise. A number of studies have been done with adolescents and young adults with autism using oxytocin as a nasal spray. Reported improvements include improved eye contact, better turn-taking, better recognition of emotions, and decreased social anxiety.

The field of autism research is moving forward very rapidly. Other exciting developments include the role of the methylation pathway in turning genes on and off and the provision of nutrients and other biomedical supports to mothers prior to conception and during pregnancy to hopefully decrease the incidence of autism. Stay tuned for more updates.

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