

AUTISM SPECTRUM DISORDERS

The Benefits of Bovine Colostrum

By: Alfred E. Fox, Ph.D.

Autism, better known today as autism spectrum disorders (ASD), is a pervasive development disorder (PDD), all of which are characterized by varying degrees of impairment in communication skills, social interactions, and restricted, repetitive and stereotyped patterns of behavior. Autism spectrum disorders range from a severe form, called autistic disorder, to a milder form, known as Asperger syndrome. If a child has symptoms of either of these disorders, but does not meet the specific criteria for either, the diagnosis is called pervasive developmental disorder not otherwise specified (PPD-NOS). Other rare, but very severe disorders that are included in the autism spectrum disorders are Rett syndrome and childhood disintegrative disorder.

The autism spectrum disorders are more common in the pediatric population than some better-known diseases, like diabetes, spinal bifida or Down syndrome. A recent study in the United States estimated that 3.4 of every 1,000 children 3-10 years of age has autism. Males are four times more likely to have autism than females.

The hallmark feature of autism is impaired social interaction. As early as infancy, a baby with autism may be unresponsive to people or focus intently on one item, to the exclusion of others, for long periods of time. Some affected children appear to develop normally and then withdraw and become indifferent to social engagement. Children with autism also usually fail to respond to their name and often avoid eye contact with other people.

Many children with autism engage in repetitive movements, such as rocking and twirling, or in self-abusive behavior, like biting or head-banging. They also tend to start speaking later than other children and may refer to themselves by name instead of "I" or "me". Some affected children speak in a sing-song voice about a narrow range of favorite topics, with little regard for the interests of the person to whom they are speaking. In addition, they ordinarily do not know how to play interactively with other children.

Children with autism spectrum disorders also have a reduced sensitivity to pain, but are abnormally sensitive to sound, touch or other sensory stimulations. Some sounds – a vacuum cleaner, a ringing telephone or a sudden storm – can cause some of the children to cover their ears and scream. Many of the affected children find the feel of clothes touching their skin to be unbearable. These unusual reactions may contribute to behavioral symptoms, such as resistance to being hugged or cuddled.

The most severe forms of autism spectrum disorders are Rett syndrome and childhood disintegrative disorder. Rett syndrome almost exclusively occurs in females, with the frequency being one per 10,000 to 15,000. After a period of development, usually between 6 and 18 months, the child's mental and social development regress – she no longer responds to her parents and pulls away from any social contact. If she has been talking, she stops; she cannot control her feet; and she wrings her hands.

Fewer than two children per 10,000 with autism spectrum disorders would be classified as having childhood disintegrative disorder. Males are predominately affected and, although symptoms can appear by the age of 2, the average age of onset is between 3 and 4 years. Until this time, the child usually has normal age-appropriate skills in communication and social relationships. The loss of vocabulary, motor, language and social skills is often dramatic and is accompanied by the loss of bowel and bladder control and, frequently, seizures and very low IQ.

In addition to the behavioral and social impairments, children with autism spectrum disorders often have one or more of the following associated complications.

- Mental retardation. Some areas of ability may be normal, while others may be especially weak.
- Seizures. One in four affected children develops seizures, often starting in early childhood or adolescence.
- Fragile X syndrome. A defective segment of the X chromosome is the most common form of inherited mental retardation and affects 2-5% of individuals with autism spectrum disorders.
- Tuberous Sclerosis. 1-5% of individuals with autism spectrum disorders have tuberous sclerosis, a rare genetic disorder that causes benign tumors to grow in the brain and other vital organs.

Recognition of autism as a medical syndrome more than 50 years ago led to a search for causative risk factors. Various research organizations came to the conclusion that mercury poisoning due to the use of thimerosal, a mercury-based preservative, in childhood vaccines was the responsible agent. Thimerosal was never used as a preservative in some childhood vaccines (measles, mumps, polio) and was removed from others (DPT) several years ago. Despite the fact that no childhood vaccines have contained thimerosal for several years, the incidence of autism rose from 0.3 per 1,000 births in 1993, to 1.5 per 1,000 births in 2003; to current estimates of 3.4 per 1,000 births.

It is now believed that genetics and the environment both play a role. Recent studies strongly suggest that some people have a genetic predisposition to autism. In families with one autistic child, the risk of having a second child with the disorder is approximately 5%, which is

greater than the risk for the general population. A number of genes linked to the disorder have been identified. A recent study at the University of Chicago identified a micro-deletion on a particular chromosome in affected families. The micro-deletion represented the loss of about 25 known genes, with 12 of them being part of a single genetic network that includes genes involved in cell-to-cell signaling and interaction. At least three of these genes are primarily expressed in the brain and are thought to influence behavior. Studies at other institutions have identified micro-deletions on other chromosomes with similar consequences in affected families.

Other studies of people with autism spectrum disorders have found irregularities in several regions of the brain. It has also been shown that affected individuals have abnormal levels of certain chemical neurotransmitters, like serotonin and glutathione, in the brain. The combined abnormalities suggest that autism spectrum disorders could result from early disruption of brain development in the fetus caused by defects in genes that control brain growth and that regulate how neurons communicate with each other. It is possible that sudden, rapid head growth may be an early warning signal that will lead to early diagnosis and intervention.

An effective treatment program requires early intervention that focuses on behavioral management to reinforce desirable behaviors and reduce undesirable ones. The most effective programs have strong parental involvement and build on the child's interests, offering a predictable schedule, teach tasks as a series of simple steps, actively engage the child's attention in highly structured activities and provide regular reinforcement of behavior.

The life of an individual with an autism spectrum disorder can often be further complicated by allergic reactions to various foods. At one time, it was believed that such allergic reactions, particularly to gluten and certain proteins found in dairy products, were the cause of the disorders. As a consequence, specialized diets were developed and falsely touted as "cures" for the disorders. A further complication can be frequent occurrences of gastrointestinal infections with organisms that are part of the natural flora, particularly yeast (*Candida* species). These issues appear to indicate that the immune system may also be compromised in some, if not all, individuals with autism spectrum disorders.

The Benefits of Bovine Colostrum

Colostrum is an amazing material that, like many other things in nature, reflects the evolutionary development of a unique composition that will serve the needs of the offspring for which it is intended. The most unique of the colostrums from mammalian species occurs in bovines, where transfer of biological substances across the placenta to the developing fetus does not occur and everything required for the development of a healthy, productive offspring is provided in the

colostrum. As such, bovine colostrum provides a specialized resource that offers the broadest possible spectrum of biologically active substances that can promote the development of a sound body mass, assure effective and efficient metabolism and support the activation and maintenance of a fully functional immune system capable of combating potential insults from microorganisms and other deleterious sources. Bovine colostrum is also compatible with almost any species and can readily convey its full benefits to humans by routine dietary supplementation without any significant adverse effects.

The active substances found in high quality first milking bovine colostrum may afford significant benefits to individuals with autism spectrum disorders.

Glutathione Deficiency

In addition to its role as a neurotransmitter, glutathione is the most significant antioxidant produced by a cell. It participates directly in the neutralization of free radicals and reactive oxygen compounds and maintains other antioxidants, such as vitamins C and E, in their active forms. In addition, glutathione can interact with many organic and inorganic substances and assist the body in detoxifying them.

When glutathione is ingested by mouth, absorption into the body is negligible and, thus, it must be manufactured inside of the cell. It is a tripeptide made up of three amino acids, cysteine, glycine and glutamic acid. Both glycine and glutamic acid are readily available in the diet of most individuals, but cysteine is not, making it the rate-limiting substance for glutathione formation within a cell. As the free amino acid, cysteine is potentially toxic and is broken down in the gastrointestinal tract and the blood. The most stable form of this amino acid is as cystine, which is two cysteine molecules linked together by a disulfide bond. Cystine is not broken down by stomach acid or proteolytic enzymes and is readily absorbed. It is rapidly reduced to two cysteine molecules when it enters a cell. In addition, cystine can cross the blood/brain barrier.

The proteins albumin, lactoferrin and lactalbumin found in substantial amounts in first milking bovine colostrum are excellent resources for cystine. The amount of albumin is highest in first milking colostrum and diminishes with time after birth. Transitional milk, obtained at 96 hours (4 days) after birth of the calf, contains only about 20% of the albumin found in first milking bovine colostrum taken within 6 hours after birth. Thus, first milking bovine colostrum, obtained within 6 hours after the birth of a calf, contains approximately 5x more albumin than milk and, therefore, contributes at least 5x more cystine from albumin than milk.

Gastrointestinal Infections

The immunoglobulins IgG, IgM and IgA are complex proteins, better known as antibodies that make up a significant portion of the proteins

found in complete first milking bovine colostrum. These antibodies were produced by the mother's immune system in response to her exposure to many different microorganisms during her lifetime and then transferred into the colostrum prior to birth of the calf. There is no evidence that any of these antibodies are found intact in the blood of individuals who ingest colostrum by mouth. However, many of these antibodies are reactive against bacteria, viruses and fungi, including *Candida* species, that infect the gastrointestinal tract of humans and there is scientific evidence that they can survive passage through the digestive system.

Immune System Deficiency

Very early in life, the foundation of the immune system is established within a small gland-like structure in the upper chest, the thymus. It is within this structure that cells mature that will determine the appropriate type of response that the immune system should mount after an insult, whether from an invading microorganism or via an allergen. Cells from the thymus will also regulate the quality and intensity of that response.

Scientific studies have shown that insulin-like growth factor (IGF-1), a major component of high quality bovine colostrum, and the IGF superfamily of proteins can restore and maintain a fully functional thymus, even in adults. In addition, colostrum contains the alpha and beta chains of the hormone thymosin that act independently and in concert to regulate the functions of the thymus and, therefore, are responsible for the activation, development and maintenance of the immune system. Further, the proline-rich peptide (PRP), also known as thymulin, in bovine colostrum is known to down-regulate the immune system and keep the response to a foreign substance under control. Other studies have shown that including only small amounts of colostrum in the daily diet of adult animals significantly enhances the ability of their white blood cells to respond to infection and destroy invading bacteria.

Colostrum is an amazing resource of substances necessary to strengthen and support the immune system, potentiate the development and repair of cells and tissues; and assure the effective and efficient metabolism of nutrients. However, it is very important to recognize that all colostrum products are not the same and, despite the claims made by their manufacturers, they do not all contain every beneficial component at an optimum concentration. In many cases, they have been manipulated and may be missing some of the essential components. When choosing a colostrum product, one needs to be certain that it is made from only first milking bovine colostrum collected within 6 hours after birth of the calf and that the colostrum is "complete" and that none of the components have been removed, including the fat.

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