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New evidence points to milk proteins as culprit in autism

Two new studies strongly support earlier reports showing that some cases of autism and schizophrenia stem from an inability to digest milk proteins.

Researchers have been aware for several decades that autism and other psychiatric disorders may occur when psychoactive peptides from improperly digested milk or wheat proteins are released into the bloodstream and enter the brain (see ARRI 10/3, 9/4, 7/1, 6/3, 6/1, 5/4). Studies show that urine, blood, and spinal fluid concentrations of beta-casomorphin-7 (ß-CM7), a peptide produced by digestion of the milk protein casein, are higher in individuals with autism or schizophrenia than in non-disabled subjects. Moreover, a large majority of autistic and schizophrenic subjects exhibit antibodies to milk or wheat peptides, compared to few non-disabled subjects.In addition, milk-free diets and hemodialysis (which removes ß-CM7 and other peptides from blood) often cause significant improvement in individuals with autism or schizophrenia.

Evidence points to two abnormalities that could account for an excess of ß-CM7 in autistic or schizophrenic individuals' blood: deficient or defective digestive enzymes, which could allow excess amounts of ß-CM7 to accumulate (rather than breaking down into amino acids), and abnormally permeable intestines that could allow an excess of these molecules into the bloodstream. Digestive enzyme abnormalities have been reported in schizophrenic subjects, while abnormal intestinal permeability has been documented in autistic individuals (see ARRI 11/3). To date, however, an unsolved question has been: can peptides from milk actually cross the blood-brain barrier, and—if so—what effect do they have? To find out, Zhongjie Sun and colleagues at the University of Florida conducted two experiments.

In the first experiment, the researchers infused human ß-CM7 at different doses into rats. The researchers found that ß-CM7 not only penetrates the blood-brain barrier readily, but also activates brain cells in many areas theorized to be involved in autism and schizophrenia. When the researchers administered the opioid-receptor-blocking drug naloxone to some of the rats, the drug partially blocked the effects of ß-CM7, suggesting that ß-CM7 activates the same brain cell receptors as opium and similar drugs.

> Seven minutes after being infused with ß-CM7, the rats became inactive, "distancing themselves from the other rat in the same cage," and showed no social reaction and very little reaction to sounds. In addition, they exhibited unusual circling behavior and frequently bit or "lipped" their tails.

In a second experiment, Sun and colleagues observed the behavior of rats after the animals received injections of ß-CM7. They report that about a minute after treatment, the rats grew restless and ran violently, exhibiting "explosive" motor behavior. Seven minutes later, they became inactive, distancing themselves from other rats and showing no social reaction and very little reaction to sounds. In addition, they exhibited unusual circling behavior and frequently bit or "lipped" their tails. An hour later, they became extremely defensive and hostile.

"There are a whole number of behaviors that the rat has after beta-CM7 that are basically the same as one sees in the human with autism or schizophrenia," study co-author J. Robert Cade commented. For instance, he said, "If we ring a bell beside a rat's cage, it normally looks up to see where the noise is coming from. But the rats after beta-CM7 didn't do that—they were completely oblivi-

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