Cow antibodies suspected as a cause of colic

No one relishes the sound of a squalling infant, least of all the child's parents. While most moms and dads can hush their babies with a feeding or a diaper change, one out of every five infants in the United States remains unconsolable, suffering bouts of "excessive" crying due to a baffling disorder called colic.

During the first four months of life, colicky babies often wail for hours on end, says pediatrician Patrick S. Clyne of Washington University School of Medicine in St. Louis. Some parents find it difficult to bond with babies who can't be quieted, and researchers list colic as one of many factors that can trigger child abuse. "It is a very difficult time in the parents' life," Clyne says.

A new study focusing on the cause of colic may offer hope to sleep-deprived parents. In the April PEDIATRICS, Clyne and co-worker Anthony Kulczycki describe results suggesting that certain antibodies produced by cows contribute to colic in susceptible infants.

Kulczycki, an immunologist at Washington University, says the study is the first to pinpoint a specific type of bovine protein associated with colic: antibodies called immunoglobulin-G (IgG).

The finding builds on at least seven previous studies, which indicated that unidentified proteins in cow's milk might cause colic in some infants – even infants fed exclusively human milk. In one such study, breast-feeding mothers with colicky infants ate a milk-free diet for about a week, and colic symptoms disappeared in nearly half the babies during that time, the St. Louis researchers note.

Presumably, nursing mothers somehow incorporate cow proteins from their diet into their breast milk. But past attempts to measure several bovine proteins in human milk turned up only small amounts, leaving scientists unable to explain why breast-fed babies get colic as often as babies fed formulas based on cow milk.

When Clyne and Kulczycki looked for bovine IgG in milk from 59 nursing mothers, they found that the concentrations averaged 31 percent higher in mothers with colicky babies than in those with noncolicky babies. What's more, they discovered that milk from 51 (86 percent) of the women – including many with noncolicky babies – showed bovine IgG concentrations at least 200 times higher than the levels of the other cow proteins measured in earlier studies. Indeed, milk from two of the mothers contained more bovine IgG than did several infant formulas based on cow's milk.

"Most mothers have an incredible amount of cow antibodies in their milk," Kulczycki told SCIENCE NEWS.

The fact that colic did not strike all infants who drank breast milk laced with bovine IgG, he says, supports past findings suggesting that not all infants are susceptible to cow proteins. The St. Louis team plans a detailed follow-up to examine the degree to which adding or removing these antibodies from the diets of colicky infants affects their crying. Clyne theorizes that some babies may have colic-predisposing conditions, such as an underdeveloped digestive system that cannot handle the foreign proteins.

Ronald G. Barr, a child-development researcher at McGill University in Montreal, says he suspects that only about 10 percent of colic cases trace to a single causative agent such as cow antibodies. He favors the idea that colic may involve many contributing factors – especially behavioral ones such as how often parents feed or hold their infants.

"I think it's neat," Barr says of the new study, but he adds: "I don't think it's going to explain all colic."

Kulczycki, on the other hand, maintains the results suggest that cow IgGs are a "major cause" of colic.

Noting that women who give up breast feeding frequently cite colic as the reason, Kulczycki suggests that these mothers first try forgoing dairy products for at least a week – while maintaining their calcium supplies with supplements – to see if the diet makes a difference.

– W. Gibbons

New evidence supports genomic imprinting

In a mid-19th-century monastery garden, Gregor Mendel's experiments with smooth and wrinkled peas revealed the rules by which parents pass on traits to their offspring. But a theory called genomic imprinting is putting a new wrinkle into Mendelian genetics: A gene's expression may depend on which parent contributed it (SN: 5/20/89, p.312).

In the latest finding, Susan Malcolm of the Institute of Child Health in London and her colleagues report in the March 23 LANCET on two children who developed a rare type of mental retardation called Angelman's syndrome. Because of an error during sperm formation, each child inherited two chromosome 15 segments from the father and none from the mother, a rare condition called uniparental paternal disomy. According to Mendelian genetics, neither child should have suffered ill effects because each got a normal and complete set of genetic material, albeit from only one parent.

The British report parallels a finding by Robert D. Nicholls and other researchers at the Children's Hospital in Boston that a double dose of maternal chromosome 15 leads to a clinically different form of mental retardation called Prader-Willi syndrome (SN: 11/18/89, p.324).

The results of these two studies strongly support genomic imprinting in humans, Malcolm says, because they show that the same gene has different effects depending on its parental origin.

"Clearly, for this bit of chromosome 15 [to function properly], you just have to have a contribution from mother and a contribution from father – which Mendel didn't know about," Malcolm told SCIENCE NEWS.

Researchers suspected the influence of genomic imprinting in the two syndromes because each had an odd inheritance pattern. Using DNA probing techniques developed in the 1980s, geneticists had discovered that about half of Angelman's cases were missing genetic material from a portion of the mother's chromosome 15 and about 60 percent of Prader-Willi cases were missing material from the father's chromosome 15. In the rest of the individuals with these syndromes, however, researchers couldn't find chromosomal deletions; this led them to suspect uniparental disomy. The 1989 discovery of a double dose of maternal chromosome 15 in six cases of Prader-Willi syndrome stimulated researchers to search for double paternal chromosomes in Angelman's patients, says Judith G. Hall of University Hospital in Vancouver, British Columbia.

The findings have profound implications for genetic researchers and genetic counselors, Hall says. Researchers should look at other disorders involving chromosomal deletions for further evidence of genomic imprinting effects, she told SCIENCE NEWS.

Scientists don't know how much of the human genome is under the influence of genetic imprinting, says Nicholls, now at the University of Florida College of Medicine at Gainesville. Nor do they know exactly how imprinting operates, or even why it evolved. Ever since the first observation in 1984 of differences in maternal and paternal gene expression in mice, scientists have sought to discover the chemical process by which some genes are imprinted, or silenced.

Regardless of how or why imprinting takes place, these recent discoveries could affect the reproductive decisions of couples with an Angelman's or Prader-Willi child. To properly advise these couples, Malcolm says, genetic counselors must know which genetic mistake caused the syndrome. If a child is mentally retarded because of a uniparental disomy, then neither parent has a defective chromosome. Because uniparental disomy is rare, Malcolm says, these parents can be assured that the syndromes "would be unlikely to recur." *– T. Walker*