

This Week's Citation Classic

Barlow B, Santulli T V, Heird W C, Pitt J, Blanc W A & Schullinger J N.

An experimental study of acute neonatal enterocolitis—the importance of breast milk. *J. Pediat. Surg.* 9:587-95, 1974. [Depts. Surg., Pediat., and Pathol., Coll. Physicians & Surgeons, Columbia Univ., and Surg. Serv., Babies Hosp., Children's Med. and Surg. Ctr., Columbia-Presbyterian Med. Ctr., New York, NY]

An animal model demonstrated that formula feeding in conjunction with hypoxia produced enterocolitis in newborn rats. Breast-feeding under the same circumstances was completely protective. Enteric overgrowth of potentially pathogenic bacteria in only the formula-fed rats indicated that the gut flora played an important role in the pathogenesis of enterocolitis. [The SC//® indicates that this paper has been cited over 125 times since 1974.]

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"Necrotizing enterocolitis of the newborn with its high mortality and morbidity has been a topic of great clinical and research interest since the 1960s. In addition, research in enteric immunity and in breast milk components was increasing during this period. As the number of neonatal units multiplied and more sick premature infants were kept alive, the number of infants developing necrotizing enterocolitis also increased. In this milieu, this study of necrotizing enterocolitis and breast milk protection was received with great interest.

"Research training at Vassar College and in the department of experimental psychology at Columbia University Graduate School made me a great friend of the laboratory rat. The career change to medicine and then long surgical training had kept me from research for many years, so when TV. Santulli and J.N Schullinger offered me the time, laboratory space, and financial support during my pediatric surgical residency I eagerly embarked on this study of enterocolitis and breast-feeding.

"W.C. Heird developed an artificial formula

suitable for the newborn rat and J. Pitt suggested isolation of the cellular component of the rat milk which later proved to be the most protective factor in the model.¹ W.A. Blanc, an expert in the pathology of human enterocolitis, reviewed the pathologic material from the study.

"Although the laboratory rat was an old friend, I found that tame female rats accustomed to human handling were needed in order to obtain rat breast milk without anesthetizing the rat. I raised female rats at home and then returned them to the laboratory to be impregnated for milk production. The New York telephone company believed that I had a dog who chewed telephone wires because I was too embarrassed to tell them that I was raising female rats in my apartment who liked to run free and enjoyed eating telephone wires.

"Translating findings from animal models to human disease is always difficult. In fact, at our hospital, feeding breast milk to premature infants was considered an experimental feeding practice which needed the approval of the human experimentation committee. Breast milk banks have disappeared from hospitals in this country and expensive reorganization is required to change newborn feeding practices. Breast milk trials in this country have been hampered by bacterial contamination of the milk during collection or storage. The protection offered by any biologic system can be over-whelmed, in this case by heavy bacterial contamination of the milk or the infant. Many European neonatal centers use only breast milk feeding or predominately breast milk feeding for their premature units and rarely see necrotizing enterocolitis. If breast milk banks were reestablished in this country for feeding of neonates I am convinced that necrotizing enterocolitis would rarely occur and then only in the most severely stressed infants or in infants inappropriately fed enterally when significant bowel injury had already occurred.

"An excellent collective review was published by A. Kosloske in *Surgery, Gynecology and Obstetrics*.²

1. Pitt J, Barlow B & Heird W C. Protection against experimental enterocolitis by maternal milk. Role of milk leukocytes. *Pediat. Res.* 11:906-9, 1977.
2. Kosloske A. Necrotizing enterocolitis in the neonate. *Surg. Gynecol. Obstet.* 148:259-69, 1979.