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## Parenteral Nutrition for Critically Ill Calves

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Many human lives would have been lost during the last 15 years had it not been for the development of parenteral nutrition for critically ill patients. Intravenous feeding is standard practice in human medicine, and it has been shown that long-term parenteral nutrition is feasible and does not cause major ill effects.

Parenteral feeding of critically ill animals is not standard practice. Now researchers at New Bolton Center have used partial parenteral feeding of neonatal calves and foals with success. It all began Christmas eve, 1982. "That night, seven critically ill, neonatal calves were admitted to the Intensive Care Unit at New Bolton Center," said Dr. Thomas J. Divers. "They had enteritis and were malnourished and required nutritional support in order to survive."

These calves were unable to tolerate adequate amounts of milk or milk replacer and had been fed predominantly an electrolyte solution the previous five days. "We administered a solution of dextrose and amino acids intravenously," Dr. Divers explained. "The calves were kept on this for periods ranging from 3 to 14 days. In addition, they received small amounts of milk to provide additional calories and vital micronutrients such as vitamins and minerals. "We really don't know enough about the micronutritional and vitamin requirements of sick calves. We will therefore continue to feed some milk to these calves until more is known about their requirements and appropriate substitution is made to the parenteral nutrition."

Since that December night, more than 30 calves with enteritis and other life-threatening diseases have been fed parenterally at New Bolton with good success. Enteritis, a common problem in calves, affects about 10 to 20% of the newborn animals. The infection, most frequently caused by *Escheria coli*, Rotavirus, Coronavirus or *Cryptosporidium*, results in diarrhea, dehydration and rapid weight loss. As neonatal calves have very little energy reserves, the enteritis can result in starvation. "Normally the sick calf is fed milk, milk replacer and electrolyte solution," Dr. Divers said. "However, there is a percentage of animals that cannot tolerate normal amounts of milk or milk replacer during a bout with enteritis. The electrolyte solution alone may keep the animal hydrated, but it does not meet the energy requirements of the sick calf. These animals can starve to death despite



having adequate hydration. It is this type of case that is often admitted to our neonatal unit and placed on parenteral nutrition."

To better meet the nutritional requirements of the critically ill, neonatal calves, Dr. Divers and his colleagues, Dr. Thomas O. Hansen, Dr. Raymond Sweeney and Dr. David Galligan, recently added lipids to the intravenous feedings. "Lipids provide greater caloric density and can meet the energy requirements of the calf better," said Dr. Divers. "If only dextrose and amino acids are given, the amino acids might be utilized to meet energy requirements rather than the needs for growth and weight gain. With the addition of lipids to our parenteral nutrition formula, we can now provide adequate amounts of energy and protein to the critically ill calf. These calves usually gain weight in spite of having a life threatening disease and being fed only a small percentage of the daily milk requirements.

Very little information exists about the nutritional requirements of sick calves. "We know the needs of a healthy animal, but we don't really know the metabolic needs of a sick calf. To get a better understanding we are now conducting a study." Blood is drawn daily from calves on parenteral nutrition, and the samples are sent to a supportive company, a manufacturer of intravenous solutions. "Travenol

Laboratories has the sophisticated equipment necessary to analyze these samples, and from these analyses we hope to gain an insight into the nutritional needs of critically ill calves."

While further studies are necessary, the work done so far at New Bolton Center has shown that partial parenteral feeding of critically ill calves is a valuable method of treatment. Greater than 80% of the calves that have received parenteral nutrition have survived. It is also a method which can be used by the veterinarian in the field. "These feeding solutions are readily available as a human product," said Dr. Divers. "A catheter is inserted in the jugular vein, and it can remain there for three days. The fluid containers with the PN can be easily suspended in the stall, and with the use of administration sets, the flow rates can be controlled. All that has to be done is to then change the solution bottles every 12 hours, and the dairyman can do that." He pointed out that the commonly encountered complication of thrombosis, seen in foals which need a long-term intravenous treatment, is not seen in calves. "We don't know why this is so, but calves do not require the deep vein catheterization foals need."

Dr. Divers explained that partial parenteral nutrition is used primarily for valuable calves as the treatment is not inexpensive. The patients at New Bolton Center have been mostly embryo transfer calves, which have a greater value. "These animals, even though they are just a few days old, are valued from \$2,000 up to one half million. Breeders are willing to spend the money to save these animals."

Recently partial parenteral nutrition has been used in foals at the neonatal unit. So far, six foals have been treated and one, a botulism case, was fed intravenously for 20 days. It recovered.

"We hope that the research will yield more detailed information about the nutritional requirements of sick neonatal calves," Dr. Divers said. "Our work has shown that partial parenteral nutrition is a valuable form of treatment for critically ill, neonatal calves and foals."

Dr. Divers is associate professor of medicine at the University of Pennsylvania School of Veterinary Medicine. Currently, he is acting head of the Section of Medicine, New Bolton Center. Dr. Raymond Sweeney is a lecturer in medicine at New Bolton Center, Dr. Hansen is a resident in medicine there, and Dr. Galligan is an instructor in nutrition. *H. W.*

## AKC Funds Canine Genetic Disease Information System

Through the support of the American Kennel Club, a Canine Genetic Disease Information System is being established here at the School by Dr. Donald F. Patterson and his colleagues in the Section of Medical Genetics. "As the number and variety of genetic disorders known or suspected to occur in the dog have continued to increase, it has become apparent that the rapidly expanding body of available information cannot be efficiently organized, kept up to date month-by-month, and made available to breeders, dog breed clubs and veterinarians by any system we now use," said Dr. Donald F. Patterson. "Needed is a computerized system which will enable the user to gain access to all of the currently available information. When



Dr. Donald F. Patterson and Patricia Green, coordinator/bibliographer for the Canine Genetic Disease Information System.

this System is operational it will have a number of important benefits to the dog world. It will create a truly comprehensive source of informa-

tion to help recognize genetic diseases that occur in each of the breeds. It will enable breed clubs to keep track of known and suspected genetic disorders in their breeds. In addition, the System will provide current information regarding diagnostic criteria, modes of inheritance and tests for the recognition of carriers. And, it will assist breeders and veterinarians in developing programs to reduce the frequency of genetic diseases in the purebred dog." It will be three years before the System is fully operational. The task is huge, since the computer program must be developed, a literature search conducted, and the information stored in the computer. The System will eventually contain all published information obtained from veterinary institutions and breed organizations. Once the information base is established, it will be kept current and it will be possible to get up-to-date information on genetic diseases in any breed.