# INVESTIGATIONS INTO THE FEASABILITY OF THE INTRAPERITONEAL ROUTE FOR PROVISION OF NUTRITIONAL SUPPORT TO COMPANION ANIMALS

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# ABSTRACT

Poor nutrition is associated with alterations in metabolism and intracellular enzyme activities, defects in the function of multiple body systems and impaired wound healing. Enteral nutrition is preferred over parenteral nutrition in most circumstances. A proportion of patients, however, are not suitable to receive nutrition via the enteral route and require parenteral nutritional support. Unfortunately, the use of intravenous parenteral nutrition is largely confined to referral institutions because of expense, potential complications and lack of 24-hour care facilities. A number of reports in the scientific literature suggest conventional parenteral nutrition solutions are well absorbed after delivery into the peritoneal cavity. This route of nutritional support may provide an alternative to currently available intravenous parenteral nutrition.

The peritoneum is composed of a single layer of mesothelial cells built upon a basal lamina and underlying connective tissue. Within the connective tissue layer is a complex network of lymphatics and blood vessels. Mesothelial cells are biologically active, playing roles in local immune response, host defence and locally regulating inflammation and vascular tone. The large surface area of the peritoneum has huge absorptive potential. Water and solutes are able to traverse the mesothelial cell layer, travel through the interstitium and into the semi-permeable capillary network or lymphatics. Macromolecules are absorbed through dilated mesothelial intercellular spaces or 'stomata' and enter underlying lymphatic channels. These transport properties of the peritoneum have been exploited for many years in the technique of peritoneal dialysis and are the basis of intraperitoneal nutrition.

Amino acids, glucose and lipid solutions have been demonstrated to be absorbed after intraperitoneal administration in rats, rabbits, dogs and people. Experimentally, intraperitoneally delivered nutrient solutions have been used to provide nutritional support for dogs and rabbits for periods up to 30 days. Side effects of intraperitoneal nutrition include fluid shifts into the peritoneal cavity and septic peritonitis. Careful control of

volume and osmolality of the fluid infused and implementation of sterile technique should limit the occurrence of these problems. Current literature would suggest intraperitoneal nutrition is a practical and effective means by which to provide nutritional support.

Originally used as a tool to detect intra-abdominal haemorrhage, diagnostic peritoneal lavage (DPL) is now used as an aid in the diagnosis of a wide variety of medical and surgical conditions of the abdomen. Diagnostic peritoneal lavage is reported to be highly sensitive in the detection of septic peritonitis. The technique of DPL would be easily combined with intraperitoneal nutrient instillation and may provide a useful means of monitoring the peritoneal cavity for potential sepsis during intraperitoneal nutrition.

Two original studies are reported in this work. The first describes the suitability of glucose, amino acid and lipid solutions for instillation into the peritoneal cavity of the cat. Two cats, one who received intraperitoneal amino acids and the other intraperitoneal glucose, developed clinical signs attributable to hypovolaemic shock. Another two cats received two doses of intraperitoneal lipids 24 hours apart and developed clinical signs consistent with peritonitis: abdominal pain, pyrexia and vomiting. Diagnostic peritoneal lavage performed two days after the second intraperitoneal lipid infusion in these cats returned fluid with elevated total nucleated cells counts, an increased proportion of neutrophils and no evidence of infectious organisms. Aerobic and anaerobic culture of DPL fluid grew no bacteria. These findings suggest that the lipid solution used in this study incited a clinically apparent, sterile peritonitis in these two cats.

The second study was undertaken to investigate the effects, in a different species, of intraperitoneal administration of the same lipid solution used in the feline pilot study. Five rats received three doses of intraperitoneal lipid 24 hours apart and another five rats intraperitoneal saline infusions. Diagnostic peritoneal lavage, post mortem and histological examination of peritoneum and selected intra-abdominal organs was performed. No clinical signs of peritonitis were detected in any rat. Lipid treated rats, however, displayed cytological and histological evidence of peritoneal inflammation.

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