Critical Care Nutrition – Feline Hepatic Lipidosis

Daniel L. Chan, DVM, MRCVS, DACVECC, DACVN

Definition

Critical illnesses can have a significant impact on nutritional status in cats. In ***hepatic lipidosis,*** a syndrome resulting from excessive and pathologic accumulation of lipid within the liver, critical care nutritional support is an important part of medical therapy and reversal of this condition.

Key Diagnostic Tools and Measures

Physical examination findings (e.g., dehydration, icterus, mental depression, neurologic signs) may indicate a more severe degree of lipidosis. Nutritional assessment should be performed to guide the nutritional plan, and this usually requires obtaining a biochemical profile. Alkaline phosphatase (ALP) activity, alanine aminotransferase (ALT) activity, aspartate aminotransferase (AST) activity, and total bilirubin concentrations are significantly elevated in this condition and are supportive of the diagnosis. Biopsy or fine-needle aspirates of the liver can confirm the diagnosis.

Pathophysiology

The exact mechanism responsible for triggering hepatic lipidosis in cats is unclear; however, anorexia is a common feature of the disease and is believed to be a major contributing factor. Protein and calorie malnutrition is believed to overstimulate lipolysis resulting in mobilization of free fatty acids that overwhelms the liver's capacity to process the influx of triglycerides. Excessive lipid accumulation within hepatocytes disrupts cellular function and may result in overt liver failure.

Signalment

Middle-aged to older cats are most commonly affected. Male cats have been suggested to be over-represented but there is no significant increased risk associated with gender. Obesity is perhaps the most important major predisposing factor.

Key Nutrient Modifications

A negative energy balance is a major component of this disease and nutritional support is paramount for effective reversal of the condition. Protein should be of good quality and highly digestible. Protein levels should not be restricted unless there is a clear contraindication, such as signs of hepatic encephalopathy which includes neurologic impairment, excessive salivation, and seizure activity. Although this condition features a limited capacity by the liver to process fatty acids, some authors advocate fat restriction; however, as the provision of adequate calories is so critical for recovery, diets high in fat are commonly used without complications. Supplements such as S-adenosylmethionine (SAMe), taurine, and carnitine have been advocated for the management of hepatic lipidosis; however, the benefit of these supplements in this condition has not been evaluated

Recommended Ranges of Key Nutrients

Nutrient	% DM	g/100 kcal	% DM	g/100 kcal
	Recommended dietary level		Minimum dietary requirement*	
Protein	40–60	8–13	26	6.5
Fat	15–35	4–6	9	2.3

Modified intake of these nutrients may help address metabolic alterations induced by disease states. The recommended dietary composition is shown as percent of dietary dry matter (DM) and as g or mg per 100 kcal metabolizable energy. All other essential nutrients should meet normal requirements adjusted for life stage, lifestyle, and energy intake.
*Nutrient requirement for adult animals as determined by the Association of American Feed Control Officials

Therapeutic Feeding Principles

Ensuring adequate nutritional intake is the most important therapeutic feeding principle for this condition. The vast majority of cats with hepatic lipidosis require placement of a feeding tube (e.g., esophagostomy, gastrostomy feeding tube). With the exception of nasoesophageal feeding tubes, placement of feeding tubes require general anesthesia, which carries a high risk of complications in hemodynamically unstable patients. Cats that are deemed unstable for anesthesia may benefit from placement of a nasoesophageal tube or may be candidates for parenteral nutrition. Parenteral nutrition is usually reserved for patients that cannot tolerate enteral feeding (e.g., vomiting, severe diarrhea).

Initiation of feeding should commence once dehydration and electrolyte and acid–base imbalances have been addressed. Feedings should aim to meet resting energy requirements (RER):

$$RER = 70 \times (\text{Body weight in kg})^{0.75}$$

Initial feedings should begin at 33% to 50% RER for the first day, and gradually increase to meet RER over next 48 hours. If the patient tolerates feedings (i.e., is not vomiting), feeding targets could be increased by 10% to 20% RER to achieve a stable body weight during hospitalization. Tube feeding is usually required for several weeks and the decision to discontinue tube feedings is made once the cat is eating adequate amounts of food voluntarily.

■ **Treats –** For critically ill animals, the use of treats is usually ineffective at meeting energy and nutrient requirements and only delays more appropriate nutritional support. Animals receiving tube feedings may be offered treats to assess return of appetite.

■ **Tips for Increasing Palatability –** The use of appetite stimulants in critically ill animals is not recommended as they are ineffective at restoring adequate nutritional intake. Techniques such as hand feeding or warming the food may be attempted but are also typically ineffective at achieving adequate nutritional support. Appetite stimulants such as ciproheptadine or mirtazapine may have a role in cats that have recovered from their underlying disease process and are being transitioned to oral feedings.

■ **Diet Recommendations** – Diets typically used to treat cats with hepatic lipidosis are energy dense and high in protein and fat. Diets intended for critical care patients are used most commonly. Most diets, however, will need to be modified (adding water, blenderized) in order to be used effectively with feeding tubes. With small-gauge tubes, typically used for nasoesophageal access, complete liquid diets are the only acceptable diets.

Client Education Points

- As many recovering patients can be discharged from the hospital with the feeding tube in place (e.g., esophagostomy, gastrostomy tubes), clients need to be instructed how to use and care for feeding tubes.
- Clients need to be made aware of possible complications and how to detect them.
- Clients should be provided with detailed and specific instructions for how to use feeding tubes – this should include instructions on how to prepare the diet and how to administer the feedings.

Common Comorbidities

Comorbidities in cats requiring critical care nutrition for hepatic lipidosis include pancreatitis, cholangiohepatitis, and inflammatory bowel disease.

Interacting Medical Management Strategies

Caution must be exercised if nutritional supplements (e.g., taurine, carnitine, S-adenosylmethionine) are administered via the feeding tube; these may occlude the feeding tube and necessitate tube replacement.

Monitoring

All critically ill patients receiving nutritional support should be closely monitored for possible complications related to nutritional support. Patients with feeding tubes should be inspected for infection/inflammation at the surgical exit site. Biochemical and hematologic tests may also be helpful in identifying metabolic complications. Although body weight and body condition scores are essential in patients receiving nutritional support, weight gain per se during hospitalization is not necessary.

Algorithm – Nutritional Support of Critically Ill Feline Patients with Hepatic Lipidosis