Nutritional Management of Liver Disease

The liver performs more than 1500 functions and is considered one of the most important organs of the body. These functions are sustainable even in the face of moderate damage; only 10-20% of liver function is necessary to maintain homeostasis. When symptoms of liver dysfunction develop, a tailored and multifaceted treatment approach is warranted which includes the use of appropriate dietary management. This Nutrition Brief will address the therapeutic advantage that proper nutrition can play in hepatic disease management.

Dietary Considerations in Liver Disease Management

When choosing a diet for dogs and cats with liver dysfunction, many factors need to be considered, including the cause of the disease, the severity of the disease, and the clinical signs that are present. It is also important to provide a palatable diet that the pet will eat, and, in some cases, a diet that is formulated to help minimize ammonia production.2

Importance of Dietary Protein Maintenance in Liver Disease

A negative nitrogen balance can be detrimental. It was once thought that protein should be restricted in all forms of hepatic disease to decrease the liver's workload and the production of nitrogenous waste products. Current evidence, however, indicates that dietary protein restriction may result in a negative nitrogen balance, enhancing disease signs and progression.3,4

Protein catabolism is increased in hepatic disease.5 and that dietary protein restriction can lead to increased catabolism of functional proteins, as well as decreased lean body mass. Lean body mass, especially skeletal muscle, plays an important role in controlling blood ammonia levels in patients with liver disease. Catabolism of functional proteins will result in a negative nitrogen balance, and can lead to

- increased ammonia production
- loss of skeletal mass with decreased capacity for detoxification of ammonia
- increased potential for hepatic encephalopathy.

Many serum proteins produced by the liver are decreased in hepatic disease.
The liver is responsible for the synthesis of multiple serum proteins which include fibrinogen, clotting factors, albumin, and many others. In hepatic disease, this production may be decreased, and inadequate dietary protein intake can decrease the production further.6

Dietary Protein Recommendations in Liver Disease Management

Clinically, dietary protein should only be restricted in liver disease if patients have evidence of protein intolerance, for example in hepatic encephalopathy.7 As a general recommendation, dogs with chronic hepatic disease should be fed diets containing at least 22% protein (dry matter basis), and cats at least 34%.8

Other Nutritional Considerations

For the nutritional management of chronic liver diseases

- Carbohydrates – In cases of advanced liver disease, adequate carbohydrate intake is important to maintain glucose concentrations.
- Fat – This nutrient helps to improve the palatability of food and provides energy density to the diet.4

KEY POINTS:

• Nutrition plays a role in the management of patients with liver disease, but not all liver conditions require the same dietary approach.
• Most dogs and cats with liver disease need normal to increased levels of high-quality dietary protein to meet daily protein requirements.
• Restricting dietary protein inappropriately can lead to a negative nitrogen balance which enhances disease signs and progression.
Digestion of fat may be reduced in some patients with liver disease. A lower fat diet may be of value if the patient shows signs of diarrhea or fat intolerance. If there is a need for fat restriction in the diet, a portion of the long-chain triglycerides may be substituted with medium-chain triglycerides; fats that can be readily absorbed despite a lack of bile acids.\(^9\)

- **Zinc** - Has been shown to provide hepatoprotective effects, and it is useful in decreasing and preventing hepatic copper accumulation in breeds at risk for copper hepatotoxicity.
- **Vitamins** - The liver is the major organ for vitamin storage and metabolism. In liver disease, the fat-soluble vitamins A, D, E and K are prone to be deficient because they require bile salts to aid in their absorption, so supplementation of these vitamins is often warranted. Vitamin C is synthesized by the liver and is also commonly supplemented in liver disease.

**For the nutritional management of hepatic encephalopathy** feed a nutritionally balanced diet with restricted but high-quality protein to help decrease the production of nitrogenous waste products. Vegetable and dairy protein sources are less ammoniagenic and provide a good choice for dietary maintenance of these patients.\(^10\) There is some evidence that dietary fiber, prebiotics and/or probiotics can be helpful in managing hepatic encephalopathy. This may be due to acidification of the lumen of the colon, which reduces ammonia absorption. Feeding multiple, small meals per day may help reduce encephalopathic episodes.

**For the nutritional management of hepatic lipidosis** it is important to
- Supply adequate calories and high levels of high-quality protein, usually via tube feeding.
- Provide fluid and electrolyte replacement.
- Treat any underlying diseases.

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### CONDITION | NUTRIENT RECOMMENDATIONS | DIET CHOICES
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Liver disease w/o encephalopathy | **Protein:** at least 22% for dogs, dry matter at least 34% for cats, dry matter Medium-chain triglycerides if fat restriction is indicated (dogs) Fat soluble vitamins A, D, E, & K Zinc – hepatoprotective effects | EN Gastroenteric®

Feline Hepatic Lipidosis | High protein, high energy diet for tube-feeding Palatable, energy-dense diet for convalescent patients | DM Dietetic Management®

Liver disease with encephalopathy | Restricted but high-quality protein to help decrease the production of nitrogenous waste products | NF Kidney Function®

HA Hypoallergenic®

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Nutrition Brief Liver Disease References