

How I Feed: The Underweight Senior Cat with Multiple Problems

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Abstract

Considerations affecting feeding an underweight senior cat include appetite level and concurrent diseases. The nutritional approach is dependent on the patient's problem list and prioritization of problems if multiple diseases are present. Goals for general nutritional management of underweight senior cats include estimating energy requirements, managing health conditions and finding a palatable diet to help improve body condition. The problem list of the cat described in this report included lymphoma with hepatic involvement, hyporexia, and an underweight body condition with weight loss and loss of muscle condition despite a feeding tube.

Case Presentation: History, Diet History, Physical Examination, and Problem List

A 9-year-old spayed domestic shorthair female cat was referred by the oncology service for hyporexia, failure to gain weight despite placement of an esophagostomy tube, and granular lymphoma affecting the liver and mesenteric lymph nodes. She had previously had hypoalbuminemia and icterus, but these problems had resolved. The patient had stable anemia. She did not have signs of hepatic encephalopathy (HE). She was receiving prednisolone and lomustine by mouth, and an esophagostomy tube had been placed by the primary veterinarian due to continued hyporexia and weight loss. The owner reported that the cat had become less active than usual.

Glossary of Abbreviations

AAFCO: Association of American Feed Control Officials
BW: Body Weight
HE: Hepatic Encephalopathy
MER: Maintenance Energy Requirement
NRC: National Research Council
RER: Resting Energy Requirement

At the time of presentation, the cat was receiving a canned recovery diet^a mixed with water with approximately 60 mL given through the tube four times daily providing 288 kcal/day. The owner, in addition to the primary complaints, was having difficulty feeding the cat four times daily and requested a reduction in feeding frequency, if possible.

The cat was not consuming a significant amount of food orally at the time of presentation.

The cat weighed 4.45 kg (9.8 pounds) at the time of presentation, and her body condition score was 3-4/9. She had a mild decrease in muscle condition. Physical examination did not reveal additional abnormalities. The cat's problem list included lymphoma with hepatic involvement, hyporexia, and an underweight body condition with weight loss and loss of muscle condition despite a feeding tube.

Case Presentation: Feeding Recommendations and Guidelines for Feeding Management

The patient's ideal weight was estimated to be approximately 5.45 kg (12 pounds) based on discussion with the owner and the cat's historical weight. In order to achieve ideal body condition, a two-part diet change was recommended for the patient. First, a new feeding tube blend was recommended along with a seven-day transition schedule to the new blend (Table 1). Second, guidelines for oral feeding were revised and given to the owner to encourage the cat to consume food orally.

Table 1. Recommended Feeding Schedule

Day	Total Volume Per Day	Total Kcal Per Day	Volume Per Feeding	Feeding Frequency
1-2 (25% new*)	Old: 180 ml New: 52 ml	290 kcal/day	45 old + 13 new = 58 ml	QID (q 6 hours)
3-4 (50% new)	Old: 133 ml New: 111 ml	319 kcal/day	44 old + 37 new = 81 ml	TID (q 8 hours)
5-6 (75% new)	Old: 66 ml New: 167 ml	321 kcal/day	22 old + 56 new = 78 ml	TID (q 8 hours)
7+ (100% new)	New: 222 ml	320 kcal/day	New only: 74 ml	TID (q 8 hours)

*Old = Diet A; New = Diet B/C blend as described

The new feeding tube blend consisted of a canned recovery diet^b and a canned liquid diet.^c The diet was mixed in a ratio of one 6-ounce can of the recovery diet (159 mL) to one 237 mL can of the liquid diet, and it was recommended that the client blend the diets in a kitchen blender. The custom feeding tube blend contained 1.44 kcal/mL, representing a 20% increase in calories per mL. The transition to the new diet involved increasing the new blend by approximately 25% of total kcal every two days and decreasing the previous blend by approximately 25% simultaneously, with a full transition to the new blend on the seventh day. In addition to changing the diet, the cat's caloric intake was increased by 11% during this transition. Feeding frequency was decreased to three times daily.

In addition to the new feeding tube blend, it was recommended that the client offer food for oral intake prior to tube feeding to encourage the patient to consume food on her own. Options for oral intake included the feeding tube blend itself (Diet B/C = 1.44 kcal/mL), the canned recovery diet used in the new feeding tube blend (Diet B = 2.1 kcal/mL), the previous canned recovery diet (Diet A = 1.2 kcal/mL), and an energy-dense dry food^d (Diet D = 592 kcal/237 mL or 8 fluid ounce cup).

Management Issues and Diet Selection Rationale

Issues involved in management of this patient include cachexia, feeding cats with liver disease, refeeding patients and preventing refeeding syndrome, cancer diets in cats, and prioritizing the patient's problem list.

Cachexia

At the time of presentation, the cat was consuming resting energy requirements (RER) x 1.35, assuming RER is calculated using the formula $RER = 70 \times (BW)^{0.75}$ which is above what the author typically uses for inactive and altered cats (RER x 1.0-1.2). The cat was also consuming slightly above the National Research Council (NRC) recommendations for maintenance energy requirements (MER) for lean cats ($MER = 100 \times BW^{0.67}$)¹ at $106 \times BW^{0.67}$ but continued to lose weight at this intake despite inactivity.

The combination of increased energy requirements (or loss of body weight at average or above-average energy intake) and loss of muscle mass while consuming a high-protein and high-fat recovery diet indicates that this patient likely had cachexia. Cachexia is the loss of lean body mass that occurs in patients with neoplastic disease or other chronic diseases.² Cancer cachexia is common in cats. In one report, 91% of feline patients with cancer had loss of muscle condition at multiple sites.³ The mechanism of cachexia is complex and involves increased energy requirements, decreased nutrient absorption, decreased energy intake, and metabolic alterations.²

Treating patients with cachexia with appropriate nutrition is key, as it can affect morbidity and mortality. Feline cancer patients with a body condition score below ideal (<5/9) have a lower median survival time compared to cats with ideal or above

ideal body condition ($\geq 5/9$).³ Recommendations for treatment of patients with cachexia depend on the underlying cause, the disease process, and the severity of cachexia. Some general recommendations for nutritional management of cachectic patients include treating the underlying cause as best as possible, addressing issues that can decrease food intake, feeding appropriate levels of nutrients in the form of a complete and balanced diet, addressing anorexia or hyporexia, and increasing activity level if possible.²

Feeding Cats with Liver Disease

Nutritional management of liver disease involves treating the clinical signs versus treating the liver disease itself. Liver disease can manifest in different ways, depending on the underlying cause, the severity of the disease, and other factors. Signs of liver disease that require nutritional management include, but are not limited to, hepatic encephalopathy, hypoglycemia or hyperglycemia, and anorexia or hyporexia.

The presence or absence of HE is a major issue in management of feline liver disease. The presence of HE indicates that a relative restriction in dietary protein is necessary due to the production of ammonia and false neurotransmitters as a result of protein metabolism. The absence of HE indicates that protein restriction is not necessary unless there are other diseases present, for example, renal disease, which necessitate protein restriction. Dietary protein restriction can result in the loss of lean body mass and other health concerns. If the patient does not have signs of HE associated with liver disease, protein requirements set by the NRC and/or the Association of American Feed Control Officials (AAFCO) should be met or exceeded.^{1,4}

In addition to controlling levels of dietary protein for small animal patients with liver disease, other macronutrient levels are of concern as well. The presence of persistent hypoglycemia or hyperglycemia in a patient with liver disease indicates a need to control dietary soluble carbohydrates. The patient described had lymphoma with liver involvement but did not have HE or hypoglycemia. The presence of stable blood glucose levels on repeated serum chemistry profiles influenced diet selection as did the presence of severe hyporexia and weight loss that required placement of a feeding tube.

Refeeding Patients and Preventing Refeeding Syndrome

Nutritional support should be implemented sooner rather than later to avoid issues with refeeding. This patient had an esophagostomy tube at the time of presentation to the nutrition service but had continued to lose weight and would not consume food orally. Issues with refeeding, and refeeding syndrome, can occur when a patient receives nutritional support too quickly after initiating feeding. Preventing refeeding syndrome involves providing nutrition slowly and addressing the metabolic shifts that can occur during the refeeding process.

The patient described was receiving above-standard maintenance energy requirements at the time of presentation to the

nutrition service. Therefore, refeeding was not an immediate concern. However, in a diseased animal with anorexia or severe hyporexia, the body shifts to using lipid and protein for energy compared to carbohydrate, which can affect diet selection despite the number of calories fed.^{5,6} Hyperglycemia can occur in patients with anorexia or severe hyporexia that receive nutritional support via enteral or parenteral routes. Other metabolic derangements include alterations in potassium, phosphorus and magnesium. This patient was at high risk for refeeding issues at the time of tube placement due to cancer cachexia in addition to hyporexia. Metabolic shifts also occur in patients with cachexia.²

Cancer Diets in Cats

There currently are no data that indicate that a specific diet or macronutrient profile is ideal for cats with neoplastic disease. There is minimal research in dogs as well, with most data available for dogs with lymphoma. The data that are available indicate that a diet with low dietary carbohydrate, high fat and high protein as well as increased omega-3 fatty acids from fish oil and arginine may be beneficial for dogs with lymphoma.⁷ However, there is a lack of evidence for a similar diet profile in cats with lymphoma or other types of cancer. The author recommends treating other nutritional problems prior to making decisions based on the presence of neoplastic disease. Therefore, the diet profile described for dogs with lymphoma was not a consideration when making a diet selection for this patient.

Prioritizing the Patient's Problem List and Diet Selection Rationale

Senior cats present challenges when developing a nutritional plan due to the presence of one or more health problems that affect nutritional management. When treating patients with multiple problems, the problems often need to be prioritized in terms of severity and the effects on the patient's quality of life. These factors must always be balanced with the patient's appetite level as well. The problem list of the cat described in this report included lymphoma with hepatic involvement, hyporexia and an underweight body condition with loss of weight and muscle condition despite a feeding tube. Had signs of HE been present, diet selection might have been limited to protein-restricted diets. With no signs of HE, we were able to select a diet with higher levels of protein.

The primary goal for all patients is to provide an adequate number of calories in the form of a complete and balanced diet. In hyporexic patients with no need for protein or fat restriction, calories are best provided in the form of a complete and balanced energy-dense diet. These diets, which can include recovery diets as well as other types of therapeutic or over-the-counter diets, are often higher in protein and fat than maintenance diets. For this patient, issues with refeeding, loss of weight and muscle condition, and cachexia made an energy-dense, high-protein, high-fat diet an ideal selection. A customized energy-dense feeding tube blend

was created to meet these goals as well as to reduce feeding frequency for the owner. In addition, to encourage oral intake, multiple diet options including canned and dry food that met the same nutritional goals were offered for oral consumption.

Fish oil omega-3 fatty acids have been found to be useful in some patients with cachexia, mainly dogs with congestive heart failure,⁸ and might have been useful in this patient as well. Supplementation of EPA and DHA was not included in this patient's nutritional plan initially because of potential palatability issues associated with fish oil supplements and the primary goal was getting the patient to consume enough calories to achieve ideal body condition. However, the esophagostomy tube could have been used for administering a fish oil product.

Case Outcome

The cat did very well with the new feeding plan. The feeding schedule, shown in Table 1, was designed to gradually increase calories to the estimated daily energy requirements for weight gain (current intake + 10%) and also to reduce the feeding frequency for owner convenience. The cat had historically preferred dry food and almost immediately started eating the dry food offered (Diet D). The owner began to use the feeding tube less. Within two months, the cat had gained weight to 5.3 kg (11.65 pounds) and was consuming ½ cup of Diet D per day (296 kcal/day). At this weight, the patient had a body condition score of 5/9 with mild loss of muscle condition. The cat was more active and began to play more, and the feeding tube was removed. It was not replaced due to good oral intake, and intake was decreased to seven tablespoons per day (259 kcal/day) due to rapid weight gain and the fact that the cat was approaching estimated ideal body weight. This represented decreased caloric intake from the initial presentation to the nutrition service and was presumed to be due to metabolic shifts and decreased energy requirements, potentially due to chemotherapy treatment. Six months after initial presentation, the cat continued to have issues with maintaining ideal weight without the feeding tube but was maintaining between 4.77 and 5.0 kg (10.5-11 pounds). The owner reported issues with the cat consuming its housemate's food, which is less energy-dense than Diet D, and reported that the cat continued to have a good appetite.

General Nutritional Recommendations for Underweight Senior Cats

A significant portion of cats over the age of 12 years are under ideal body condition.⁹ Underweight senior cats, regardless of the presence of medical problems, have different nutritional needs compared to younger or middle-aged cats. A complete physical examination and nutritional assessment including body condition, muscle condition and dietary history should be performed to rule out underlying causes for weight loss. A thorough dietary history will help determine if the cat is consuming an appropriate number of calories for weight maintenance or if intake has

decreased. If intake is appropriate for the cat's body weight and activity level, it is possible that the energy requirements have changed with time. Although the effects of aging on daily energy requirements in senior cats are controversial, some studies suggest that daily energy requirements are increased in senior cats.¹⁰

Protein requirements may be altered in older cats as well. In the absence of disease, lean body mass may decline with aging. This condition, called sarcopenia, must be differentiated from cachexia, which occurs in the presence of disease.² In order to prevent sarcopenia and the morbidities associated with loss of lean body mass (which include compromised immune function), an increase in dietary protein may be necessary for apparently healthy senior cats.¹¹

The NRC does not set specific nutrient requirements for older cats.¹ However, the requirements for specific nutrients are modified by the diseases that affect the senior cat. The requirements for vitamins such as cobalamin, minerals including phosphorus and potassium, and other nutrients can vary among senior cats. For example, a cat that has clinical or subclinical gastrointestinal disease may require cobalamin supplementation, though a cat with renal disease requires dietary phosphorus restriction. For underweight senior cats, it is important to consider all nutrients of concern and prioritize the need for supplementation and restriction of specific nutrients. In addition, steps to enhance palatability of food (for example, offering different types of food or warming the food) should be taken to enhance intake in hyporexic senior cats.

Conclusions

This case outlines using a customized nutritional plan to approach ideal body weight in a senior cat with lymphoma with liver involvement, hyporexia and a feeding tube. Many senior cats have multiple health problems that make diet selection difficult. Management of these cases includes the primary goals of the cat consuming food regularly and the cat achieving or maintaining ideal body condition. Feeding adequate levels of nutrients, keeping refeeding issues in mind with hyporexic animals, and feeding appropriate levels of nutrients to manage diseases also are important factors in management of these patients.

Footnotes

- A. Hill's® Prescription Diet® a/d®
- B. Maximum-Calorie™ Plus, Iams Veterinary Formula™
- C. Clinicare® Canine-Feline Liquid Diet, Abbott Animal Health
- D. Purina Veterinary Diets® Dietetic Management® DM

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