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Diabetes, Obesity, and Diet

The Kitty Carb Connection: Obesity, diabetes, and high protein/low-carb diets

Obesity is a major nutritional problem in companion animals in the United States. Studies have estimated the incidence of overweight and obese cats to range between 19 and 40%. Obese cats are at higher risk for health problems compared to cat that maintain ideal weight. Obese cats are more prone to diabetes, liver disease, skin problems, urinary tract problems, and arthritis. As a veterinarian specializing in cats, I find it more difficult to provide proper medical care to overweight cats. During a physical examination, it's harder to feel the abdominal organs, more difficult to insert an intravenous catheter or to obtain urine via cystocentesis (inserting a needle into the bladder), and more challenging to obtain a good quality x-ray in overweight cats. Routine surgical or anesthetic procedures become more difficult, or even hazardous, when cats are overweight.

Diabetes is one of the most common glandular disorders in cats. Cats, like humans, can develop two types of diabetes. In type-1 diabetes, the pancreas in incapable of producing adequate amounts of insulin. In type-2 diabetes, the pancreas produces insulin, but the body does not recognize or respond properly to the insulin.

The link between obesity and type-2 diabetes in well documented in both humans and cats. An obese woman is nearly 13 times more likely to develop diabetes than women within healthy weight ranges. In the U.S, the incidence of type-2 diabetes rose an incredible 33% from 1990 to 1998. Overweight cats are twice as likely as normal cats to develop diabetes. Obese cats? *Four* times more likely.

Treatment of diabetes typically involves giving insulin injections once or twice daily, for the rest of the cat's life. Type-1 diabetics do not produce enough insulin, and therefore are dependent on insulin injections to regulate their blood sugar. Type-2 diabetics, however, are capable of making their own insulin and may not necessarily require insulin injections. Overweight type-2 diabetics often respond to oral medications designed to lower the blood sugar, and some may respond simply to a change in diet. In many instances, a combination of oral medication *and* diet change is needed. Unfortunately, there is no simple method of determining which type of diabetes – type 1 or type-2 – is afflicting a particular cat. Most type-1 diabetic cats have the classic clinical signs: excessive thirst, excessive urination, ravenous appetite, and weight loss, and tend to be thin or underweight. Most type-2 diabetic cats have excessive thirst, urination, and appetite, but the signs are not as severe as that seen in type-1 cats, and many type-2 cats are overweight. If a cat presents with mild clinical signs of diabetes and is overweight, veterinarians should discuss

with the client the possibility that their cat is a type-2 diabetic, and that their cat may respond simply to a change in diet, namely, a diet designed to promote weight loss. Clients need to be informed of the risks involved: delaying insulin therapy in a cat that is truly insulin-deficient may lead to a condition called diabetic ketoacidosis (DKA), a potentially life-threatening complication of diabetes.

For years, diabetic cats were prescribed a diet high in fiber and low in fat. Fiber is a complex carbohydrate. It is metabolized very slowly, minimizing fluctuations in blood sugar, allowing for tighter regulation of the diabetes. Overweight cats do respond to these low fat/high fiber diets, losing weight in a fairly predictable fashion. Recent studies in feline nutrition and diabetes, however, have led to a change in thinking regarding the best diets for overweight and diabetic cats. It seems even our cats are about to get caught up in the low-carbohydrate craze that has swept the nation. For cats, though, it makes perfect sense: cats are pure carnivores.

Cats have been fed a wide variety of diets since becoming domesticated, apparently with little regard to what they, as carnivores, would encounter in nature. Cats in the wild eat mice, and if you look at the nutritional content of a mouse, what do you find? Mice are 3% carbohydrate, 40% protein, and 50% fat. Yes, mice are low-carb snacks.

Dietary carbohydrates are not required by normal healthy cats. Carbohydrates are physiologically essential – most cells in the body normally utilize carbohydrates, in the form of glucose, as their main energy source. But carbohydrates are not an essential *dietary* nutrient. If carbohydrates are not provided in sufficient quantities in the diet, dietary protein is utilized as the main source for glucose synthesis. Cats, being strict carnivores, are well-adapted to metabolizing protein, and they can convert protein to glucose for energy pretty efficiently. Cats, however, are not very efficient at processing carbohydrates. For glucose to be used by a cell, it must enter the cell and undergo a process called phosphorylation. In most animals, this requires the enzyme glucokinase. Cats lack this enzyme, and must use another enzyme, called hexokinase. This enzyme is not very efficient in cats.

Obesity occurs if a cat takes in more calories than it uses. Carbohydrates consumed in excess of energy needs will be converted for storage. How are these carbs stored in the cat? You guessed it: fat.

Recent studies suggest that cats fed diets that are high in protein, high in fat, and low in carbohydrates are ideal for strict carnivores like the feline. Diets like these help keep cats slim, and prevent diabetes from developing. For cats with diabetes that are already receiving insulin injections, and for newly diagnosed diabetics, especially those that are overweight, a high protein/low carb diet may be an essential component of diabetes therapy.

Feeding a high protein/low carb diet has become very easy, thanks to The Purina Company and the Hill's Company. Purina manufactures a prescription diet called DM (for "diabetes management") that is high-protein/low-carbohydrate. More recently, the Hill's company has developed a similar diet called Hill's m/d. Studies have shown that the use of these diets can reduce blood sugar levels, enhance glucose control, increase sensitivity to insulin, and lower the insulin requirements of most diabetic cats. The most significant study was described in the Summer 2001 issue of *Veterinary Therapeutics*. Nine adult, client-owned cats with diabetes of at least four-months duration were initially fed a high-fiber, moderate-fat canned diet for 1 to 2

months, to establish a standardization period. All cats were then transitioned onto a high-protein, low-carbohydrate canned diet for the three-month treatment period. A complete blood count, chemistry panel, and several other blood, urine, and behavioral parameters were assessed at the start, the midpoint, and the end of the study. Cats were monitored closely during the treatment period, and insulin dosages were adjusted as necessary. Cat owners were asked to maintain a diary to record food intake, changes in their cat's activity, drinking habits, excretory habits, and any other significant observations.

The clients' recorded perceptions of appetite, activity, urination, and health showed a slight improvement, and all cats did well during the treatment period. Body weight remained stable throughout the study. The most significant findings were related to the insulin requirements. The total dose of insulin required to regulate the diabetes decreased significantly during the treatment period. The daily dose of insulin decreased in 8 of the 9 cats. Remarkably, 3 cats no longer required any insulin at all to control their disease! The response to dietary change occurred quickly, during the first half of the treatment period

Because it is impossible to say for sure which cats will respond to a high protein diet, and to what degree the insulin dose can be reduced, diabetic cats that are being transitioned to these new diets need to be monitored closely during the first few months, to ensure that hypoglycemia (low blood sugar) doesn't occur.

High protein/low carb diets are not suitable for all cats. Cats with kidney disease should not be fed these diets, as high-protein diets have been implicated in more rapid progression of kidney failure.

Obesity is a health risk for all indoor cats. Providing your cat with a stimulating environment and plenty of play, as well as feeding a healthy diet, is essential for keeping your cat's weight in the ideal range. Evidence now suggests that high protein/low carbohydrate diets may be just the ticket for our carnivorous companions.