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OBESITY AND WEIGHT MANAGEMENT

GENERAL INFORMATION ON OBESITY



The term “overweight” refers to increase in body weight over normal due to an accumulation of body fat. The term “obese” refers to an accumulation of excess body fat to the extent that it negatively impacts the animal’s health.

Overweight is considered to be 10% - 20% above ideal body weight. Obese is considered to be greater than 20% above ideal body weight. Body weight in veterinary medicine is commonly measured using a Body Condition Score (BCS) on a scale of 1 -5 (3 being ideal body weight) or a scale of 1 – 9 (5 being ideal body weight). 25% to 50% of dogs and cats in the United States are overweight. 5% to 15% of dogs and cats in the United States are obese. In simple terms, excess weight accumulation occurs because energy intake is higher than energy expenditure. The most common source of

increased energy intake is overfeeding. Reduced energy expenditure comes from reduced activity and/or reduced metabolism. Fat cells or adipocytes are life-long cells. Overweight and obese animals increase the size and number of their adipocytes. However weight loss only results in a decrease in the size of adipocytes but not a reduction in the overall number.



OBESITY RISK FACTORS

- Overeating + inadequate exercise – The most common risk factor for obesity.
- The following breeds are at predisposed to obesity which may suggest a genetic component – Labrador Retriever, Golden Retriever, Cairn Terrier, Cavalier King Charles Spaniel, Scottish Terrier, Cocker Spaniel, Miniature Schnauzers, Dachshunds, Shetland Sheepdog, Beagles and Basset Hounds. The incidence of obesity in descending order by breed: Beagles, followed by Cocker Spaniels, Golden Retrievers and Labrador Retrievers.
- Spaying/Neutering – Mainly due to reduced activity secondary to a decrease in the need to roam and mate.
- Gender – Females are twice as likely to be obese compared to males.
- Owner Factors – Over-humanizing of the pet, owner obesity and owner time spend observing the pet eat.
- Socioeconomic Factors – Obese pets tend to come from less educated and lower income environments.
- Disease – Hypothyroidism (not as prevalent as commonly thought) and Cushing’s Disease.
- Drugs – Insulin, steroids (increased appetite) and Phenobarbital.
- Age – Metabolic rate decreases with age as lean muscle mass decreases and fat mass increases.

ADIPOSE (FAT) TISSUE AS AN ENDOCRINE (HORMONE) PRODUCING ORGAN

There are two main types of fat tissue – brown adipose tissue (brown fat) that is found in hibernating animals and neonates and white adipose tissue (white fat) that is the form that accumulates with obesity. Historically white adipose tissue or WAT has only been considered a storage organ. However new research has determined that WAT is in fact an endocrine organ that secretes high levels of chemical mediators called adipokines that affect metabolic and endocrine function and thus normal physiology of the entire body. These adipokines include inflammatory mediators, hormones and metabolically active proteins and exert their effects especially on muscles and organs such as the liver and the brain. Adipocytes and their adipokines drive appetite, activity and metabolism. As adipocytes acculate to the point of obesity, the normal function of WAT is lost and becomes unregulated. Important mediators and hormones secreted WAT and their function and role in obesity are:

ADIPONECTIN, TUMOR NECROSIS FACTOR- α (TNF- α): Anti-inflammatory effects and regulates insulin control.

↓ with weight gain = increases inflammation and causes insulin resistance promoting weight gain.

LEPTIN: Controls appetite regulation and energy balance.

↑ with weight gain = leptin resistance develops causing increased appetite and decreased energy expenditure.

INTERLEUKINS (IL-1 β , IL-6, 1L-10), TRANSFORMING GROWTH FACTOR- β (TGF- β), PROSTAGLANDINS, MACROPHAGE INHIBITORY FACTOR (MIF), PLASMINOGEN ACTIVATOR INHIBITOR-1(PAI-1), ADPSIN, COMPLEMENT: Pro-inflammatory adipokines.

↑ with weight gain = chronic inflammation in the body including muscles, joints and ligament/tendons.

INTERLEUKIN (IL)-8, MONOCYTE CHEMOTACTIC PROTEIN (MCP-1): Pro-inflammatory chemokines.

↑ with weight gain = activate macrophages (white blood cells) causing a chronic inflammatory state in the body.

- ✓ **WHITE ADIPOSE TISSUE (WAT) IN OVERWEIGHT AND OBESE ANIMALS PROMOTES INCREASED APPETITE DESPITE THE NEED FOR LOWER CALORIC INTAKE AND MAKES WEIGHT LOSS AND MANAGEMENT AN ENORMOUS CHALLENGE.**
- ✓ **OVERWEIGHT AND OBESE ANIMALS ARE IN A CONSTANT INFLAMMATORY STATE THAT IS DAMAGING TO THE ENTIRE BODY AND MAKES THEM HIGHLY SUSCEPTIBLE TO SIGNIFICANT NON-REVERSIBLE METABOLIC AND ORTHOPEDIC DISEASE.**

PLEASE TURN OVER

OBESITY RELATED RISKS, DISORDERS AND DISEASE

Pulmonary Disease	Cardiovascular Disease	Exercise and Heat Intolerance due to decreased lung expansion and hypoxia
Pancreatitis	Immune System Compromise	Diabetes Mellitus – Hyperinsulinemia and glucose intolerance
Hepatic (Liver) Disease	Pregnancy Dystocia	Exacerbation of hypertension
Decreased Life Span	Degenerative Joint Disease	Increased risk of cancer by > 50%
Increased anesthetic risk	Increased surgical morbidity	Exacerbates collapsing trachea
Asthma	Urinary Tract Infection (UTI)	Anal Sac Disease
Increased risk of Cushing's Disease	Increased dermatosis (skin disease)	Increased risk of metabolic bone disease
Chronic Inflammation – Cruciate Ligament Injury, Osteoarthritis, herniated intervertebral disks, muscle inflammation		
Exacerbation of constipation, flatulence (gas), gastric ulceration, Irritable Bowel Syndrome (IBS), Inflammatory Bowel Disease (IBD)		

GASTRIC ENDOCRINOLOGY AND ITS ROLE IN OBESITY

The gastric role is an important and vital aspect in relation to obesity. The gastric system secretes hormones that affect the body's orexigenic (increasing appetite) and anorexigenic (satiety or decreasing appetite) state. Important gastric hormones and their role in obesity are:

GHRELIN: Serves an orexigenic role increasing appetite.

↑ with weight gain = may cause appetite increase in animals, will decrease metabolism and promote weight gain.

PEPTIDE YY (PYY), PANCREATIC POLYPEPTIDE, GLUCAGON-LIKE PEPTIDE-1 (GLP-1), CHOLECYSTOKININ: Serves an anorexigenic role to decrease appetite and increase metabolism. Obese individuals retain full sensitivity to PYY, have lower concentrations of PYY and must consume more calories to increase PYY.

↓ with weight gain = decreases satiety effect when eating (increases appetite) and decrease metabolism (increase weight gain).

WEIGHT LOSS

Weight reduction is achieved by the reduction of energy intake and an increase in energy expenditure. There currently two methods to reduce caloric intake and achieve weight loss in animals – dietary manipulation or pharmacological (drug) manipulation. Reducing food volume, removal of treats and “people” food and over the counter (OTC) weight reduction diets may work in borderline overweight cases but are poor choices in the treatment of significantly overweight and truly obese animals.

DIETARY MANIPULATION:

For truly overweight and obese animals, a prescription weight reduction diet is required. It is estimated that diet reduction as a sole method of weight loss and weight maintenance at normal body weight on a long term basis has a success rate of only 8%. Diet manipulation must also have a physical activity component when possible otherwise weight reduction may be very slow or may not occur at all. Increased physical activity may be difficult to accomplish for a variety of reasons including owner factors, environment, severe obesity, degenerate diseases, etc. Even with caloric restriction and exercise, some animals will not lose weight or may lose weight initially and then stabilize at a lower weight that is still overweight or obese.

HIGH FIBER DIETS:

- Increasing fiber in the diet while maintain minimum fat and protein requirements will reduce caloric intake and promote weight loss.
- Diets high in fiber can contain >15% fiber for dogs and >10% fiber for cats.
- Common prescription high fiber diets are Hill's Science Diet R/D, Eukanuba Weight Loss, Iams Weight Loss, Royal Canin Caloric Control High Fiber



HIGH PROTEIN DIETS:

- It has been recognized that in some animals a high fiber diet does not result in a weight loss. In these animals a diet high in protein but normalized for fiber and carbohydrates may increase energy rate, decrease food intake and result in weight loss.
- Diets high in protein can contain >30% protein in dogs and >45% protein in cats.
- Common prescription high protein diets are Hill's Science Diet M/D, Royal Canin Caloric Control High Protein, Eukanuba Weight Loss.

SLENTROL (DIRLOTAPIDE):

- Slentrol was introduced in the United States in 2007 by Pfizer and works by decreasing appetite and reducing food intake. Slentrol had been used in Europe for 5 years prior to its United States introduction.
- Slentrol works by preventing a partial amount of consumed lipids (fat) from being packaged for absorption. As a result digested lipids accumulate in the intestinal tract and enterocytes (gastric cells). The increased presence of accumulated digested lipids triggers the release of satiety hormones, especially Peptide YY (PYY) which acts as a satiety signal on the hypothalamus, makes the animal feel full and reduces appetite.
- Enterocytes are sloughed off each day and are excreted in the animal's feces without changing the consistency of the stool.
- Slentrol is dosed by body volume and is designed to reduce weight between 3% to 5% every 30 days.
- Slentrol treatment has three phases – weight loss, weight management and post-treatment.
- Slentrol is not for use in cats as it may cause Hepatic Lipidosis and is not for use in dogs that are on long-term corticosteroid therapy, Phenobarbital or that have liver disease. Slentrol should never be used in humans.



THE BENEFIT OF PROPER WEIGHT CONTROL

Increased life span by an average of 1.8 years	Delayed onset of chronic disease by 2.1 years	Lower liver enzymes
Delayed late-life lean body mass loss by 2 years	Delayed loss of age related mental acuity	Lower glucose response
Increased physical activity and animal happiness	Promotion of good heart and lung function	Lower heat distress
Delayed physical signs of age such as hair graying, impaired gait and reduced activity		Lower insulin response