

Obesity and associated metabolic disorders in companion animals

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Obesity is a pathological condition characterized by excessive fat deposition leading to harmful consequences for health. Canine obesity is associated with the development of insulin resistance (**IR**), dyslipidaemia, and mild hypertension (**HT**). Feline obesity is associated with insulin resistance and a high risk of developing diabetes mellitus.

Obesity is now considered as a disease by itself; obesity increases the risk for several chronic diseases; and above all obesity is a life-shortening factor that strongly penalizes the quality of life. These deleterious consequences arise from two mechanisms: metabolic and physical-mechanical. Metabolic changes are associated with excess fat and are linked to production of metabolic products, hormones and adipokines, with local, peripheral and central effects.

Obesity and low-grade inflammation

More than 50 adipokines have been identified and extensively reviewed. Many of them have been studied in the obese dog: ie, TNF- α , Interleukin 6 (IL-6), leptin, adiponectin or plasma C-reactive protein (CRP).

Dog adipose tissue expresses a wide range of adipokine genes, similar to rodents and humans. It has also been shown, at a transcriptional and plasma levels, that genes involved in canine insulin resistance/sensitivity are influenced by IR in the same way as in man.

Obesity, insulin resistance and type 2 diabetes mellitus

Obesity leads to profound and proportional changes in the metabolism of glucose and the secretion of insulin. When obesity is induced by a high-fat diet, IR gradually develops in relation to an increase in adiposity and an increase in the production of adipocyte cytokines.

Recent studies will be discussed.

Obesity, insulin resistance, dyslipidemia, coronary heart disease

Obesity, mainly with central fat, is associated with a dyslipidemia. However dog obesity is not associated with high risk for developing coronary artery disease because of their low-atherogenic reverse cholesterol transport (mainly driven by HDL).

In dogs the frequency of cardiovascular disease increases with obesity. Especially cardiac and vascular hypertrophy have been observed in obese dogs.

Blood pressure is higher in overweight dogs, but there are conflicting data and opinions about the origin and the mechanisms of HT in obese IR dogs, especially regarding the links between HT, hyperinsulinemia, cytokines, and the sympathetic nervous system.

Conclusions

Metabolic disorders associated to obesity are extensively studied in dogs, but less in cats. Due to the high differences in protocols and methods, some results appear contradictory. Nevertheless, it is established that chronic obesity in dogs induces both metabolic and physical disorders, many of them being reversible with weight loss.