Feline models for human obesity: Insights from cat gut microbiota studies.

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Introduction

In recent years, there has been an increasing interest in understanding the parallels between human and feline obesity, particularly through the study of gut microbiota. This interest is grounded in the recognition that obesity is a complex condition influenced by a multitude of factors, including genetics, diet, and the gut microbiome. By examining the gut microbiota of cats, researchers hope to uncover insights that could be applicable to understanding and treating human obesity [1].

Cats, like humans, can develop obesity, which is associated with various health problems such as diabetes, cardiovascular diseases, and musculoskeletal disorders. The gut microbiota, a diverse community of microorganisms residing in the gastrointestinal tract, plays a significant role in regulating metabolism, immune function, and overall health. Alterations in the composition and function of gut microbiota have been linked to obesity and related metabolic disorders in both humans and animals [2].

Research on feline gut microbiota has shown that obese cats exhibit distinct microbial profiles compared to their lean counterparts. These differences in microbial composition are believed to influence the host's energy balance, fat storage, and inflammatory responses, which are critical factors in the development of obesity [3]. For example, studies have found that obese cats tend to have a higher abundance of Firmicutes and a lower abundance of Bacteroidetes, a microbial signature also observed in obese humans. This shift in microbial populations is thought to promote increased energy extraction from the diet and fat deposition [4].

One of the key insights gained from studying feline gut microbiota is the role of short-chain fatty acids (SCFAs), which are metabolic byproducts of microbial fermentation of dietary fibers. SCFAs, such as acetate, propionate, and butyrate, are known to influence various metabolic processes, including appetite regulation, lipid metabolism, and insulin sensitivity. In both humans and cats, obese individuals tend to have altered SCFA profiles, which may contribute to metabolic dysregulation. For instance, butyrate has been shown to improve gut barrier function and reduce inflammation, while propionate can influence gluconeogenesis and lipid metabolism [5].

Another important aspect of gut microbiota research in feline models is the impact of diet on microbial composition and function. Diet is a major determinant of gut microbiota, and changes in dietary habits can rapidly alter the microbial community structure. Studies in cats have demonstrated that high-fat diets lead to significant changes in gut microbiota, promoting the growth of bacteria associated with inflammation and obesity. Conversely, diets rich in fiber can enhance the growth of beneficial microbes that produce SCFAs and other metabolites that support metabolic health [6].

The use of prebiotics and probiotics as therapeutic interventions for obesity has also been explored in feline models. Prebiotics are non-digestible food ingredients that selectively stimulate the growth and activity of beneficial gut bacteria, while probiotics are live microorganisms that confer health benefits to the host when consumed in adequate amounts. In cats, prebiotic supplementation has been shown to modulate gut microbiota composition, increase SCFA production, and improve metabolic parameters. Similarly, probiotic treatments have demonstrated potential in reducing inflammation and improving gut health, although more research is needed to fully understand their efficacy and mechanisms of action [7].

One promising area of research is the investigation of fecal microbiota transplantation (FMT) as a treatment for obesity. FMT involves the transfer of gut microbiota from a healthy donor to an obese recipient, with the aim of restoring a balanced microbial community. In feline models, FMT has shown potential in altering gut microbiota composition and improving metabolic health. While the application of FMT in humans is still in its early stages, findings from feline studies provide valuable insights into its potential as a therapeutic strategy for obesity [8].

Moreover, the study of feline gut microbiota offers insights into the genetic and environmental factors that contribute to obesity. By comparing the gut microbiota of domestic cats with different genetic backgrounds and lifestyles, researchers can identify microbial signatures associated with obesity susceptibility and resistance. This knowledge can inform the development of personalized interventions tailored to an individual's genetic and microbial profile, ultimately leading to more effective obesity management strategies [9].

The parallels between feline and human gut microbiota underscore the relevance of feline models in obesity research. The similarities in microbial composition and function between

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the two species suggest that findings from feline studies can be translated to humans, providing a valuable framework for understanding the complex interactions between diet, microbiota, and metabolism. Furthermore, the use of feline models allows for controlled experimental conditions and longitudinal studies, which are often challenging to conduct in human populations [10].

Conclusion

The study of feline gut microbiota has yielded important insights into the mechanisms underlying obesity and its metabolic consequences. The parallels between feline and human obesity highlight the potential of using feline models to investigate the role of gut microbiota in obesity and to develop novel therapeutic strategies. By exploring the interactions between diet, gut microbiota, and metabolic health in cats, researchers can gain a deeper understanding of the factors contributing to obesity and pave the way for innovative approaches to prevent and treat this global health issue. The ongoing research in this field holds promise for advancing our knowledge of obesity and improving the health and well-being of both humans and companion animals.

References

1. Ji Y, Yang Y, Wu Z. Programming of metabolic and autoimmune diseases in canine and feline: linkage to the gut microbiome. Microb Pathog. 2023;185:106436.
2. Pallotto MR, De Godoy MR, Holscher HD, et al. Effects of weight loss with a moderate-protein, high-fiber diet on body composition, voluntary physical activity, and fecal microbiota of obese cats. Am J Vet Res. 2018;79(2):181-90.
3. Barry KA, Middelbos IS, Vester Boler BM, et al. Effects of dietary fiber on the feline gastrointestinal metagenome. J Proteome Res. 2012;11(12):5924-33.
4. Pathak A, Asediya V, Anjaria P, et al. Nutritional and metabolic diseases of dogs and cats. IDDMD. 2024:429-457.
5. Rollins AW, Shepherd M. Pathophysiology of obesity: Metabolic effects and inflammation mediators. BCS. 2019: 17-37.
6. D'Hooghe SM, Bosch G, Sun M, et al. How important is food structure when cats eat mice?. Br J Nutr. 2024;131(3):369-83.
7. Whittemore JC, Stokes JE, Laia NL, et al. Short and long-term effects of a synbiotic on clinical signs, the fecal microbiome, and metabolomic profiles in healthy research cats receiving clindamycin: a randomized, controlled trial. PeerJ. 2018;6:5130.
8. Li Y, Rahman SU, Huang Y, et al. Green tea polyphenols decrease weight gain, ameliorate alteration of gut microbiota, and mitigate intestinal inflammation in canines with high-fat-diet-induced obesity. The J Nutr Biochem. 2020;78:108324.
9. Delgado GT, Tamashiro WM. Role of prebiotics in regulation of microbiota and prevention of obesity. Food Res Int. 2018;113:183-8.
10. Villaverde C, Fascetti AJ. Macronutrients in feline health. Vet Clin North Am Small Anim Pract. 2014;44(4):699-717.

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