



## Early Organ and Metabolic Abnormalities Associated with Obesity

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### INTRODUCTION

The aim of our investigation was to identify novel indicators associated with increased body fat and its early consequences. We did this by determining the serum levels of FGF-19 and FGF-21 in obese rats, whose functions in the pathophysiology of obesity are yet unknown. Additionally, a total reflection X-ray fluorescence technique was used to analyse the elemental chemistry of some tissues linked to obesity. The newly discovered biochemical and molecular characteristics were then contrasted with established markers of metabolic abnormalities linked to obesity. The characteristics of our obese rats were increased calorie consumption, body obesity, hypercholesterolemia, raised liver enzymes, and FGF-21, while FGF-19 levels decreased.

There was discovered to be a robust relationship between new hormones and well-known metabolic markers. Additionally, we showed that obesity had the biggest effect on the elemental makeup of the liver and adipose tissue and that rubidium (Rb) was the most important factor in dividing the groups of animals used in the study. Both well-established and recently discovered indices of obesity showed a substantial connection with tissue Rb. Finally, we confirmed serum FGF-19 and FGF-21 as valuable new markers of obesity-related metabolic alterations and strongly advise Rb as a novel signal of excessive body adiposity and its early effects. However, additional research is encouraged to address this clinical concern.

Obesity is a chronic disease and a growing economic, health, and social problem in the world. It is associated with an excessive build-up of adipose tissue, which in turn raises the risk of a variety of modern illnesses, including malignant growth, type 2 diabetes, gout, non-alcoholic fatty liver disease, chronic kidney disease, and cardiovascular (such as hypertension, stroke, and coronary artery disease) messes. Environmental elements like a lifestyle that promotes a positive energy balance and an im-

balance between energy supply and expenditure are the most frequent causes of excessive body obesity. The main contributors to today's energy imbalance are the widespread access to transportation and electronic devices, as well as the rise in high-calorie food options brought on by changes in civilization. The increasing prevalence of overweight/obesity and its complications has led to a search for new indicators of early metabolic alterations typical of excessive body adiposity in an effort to prevent the occurrence of obesity-related abnormalities and to identify them as early as possible in their development. There are several variables today that are connected to obesity-related complications. When the disease is progressed and the changes are considerable or irreversible, the majority of these criteria become visible.

Given the increased incidence of obesity, any early indicators of adult body adiposity can aid doctors in preventing severe and permanent health implications as well as in further study into the causes of obesity. The abundance or lack of bio-metals, which are essential for element metabolism in living organisms, can have a significant impact on organ and system function. This has led to the development of novel techniques like Total Reflection X-ray Spectrometry, which are used to identify these micronutrients in tissues and explain how they affect the development of disease. On the basis of the results of our investigation, we strongly proposed Rb and validated FGF-19 and FGF-21 as new markers of excessive body obesity and related metabolic alterations. New strategies must be created in order to treat this clinical problem and look into the possibility of gender-related variances.

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### CONFLICT OF INTEREST

The author declares there is no conflict of interest in publishing this article has been read and approved by all named authors.

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