

Researchers develop new diet for the study of obesity in animal models

The work, which also compared the effects of different types of diet on the body, highlighted the impacts of over processed foods on the intestinal microbiota.

News report by Camila Raposo

Obesity is a public health problem of increasing dimensions. In 2015, according to a [study in the New England Journal of Medicinry of Health](#), one in five people is overweight and the prevalence of obesity has increased from 11.8% in 2006 to 18.9% in 2016. The growth of obesity may also have contributed to the increase in the prevalence of diabetes and hypertension, among other diseases that are directly related to being overweight.e, the condition reached more than 603 million adults and 107 million children worldwide. The same study reveals that the percentage of obese people has doubled in 73 countries since 1980. In Brazil, according to data from the Minist

Given the relevance of the issue, it is essential that scientists have reliable models for studying the mechanisms and effects of obesity in the body. For research that requires the use of animals – such as rats and mice, for example – it is quite common to feed them with specific diets that induce weight gain, allowing the researchers to observe, in the controlled environment of the laboratory, the discrete variables related to obesity.

Currently, the two most used diets in these cases are the Hyperlipid Diet, based on a high-fat diet, and the Cafeteria Diet – in which different kinds of processed foods, such as chocolates, biscuits, snacks, cheeses, etc., are present. Both, however, are subject to much dispute, regarding their effectiveness and lack of standardization, which may influence the results obtained by each research group. In the case of the Hyperlipid Diet, the fat content of food can range from 20% to 60%. The Cafeteria Diet does not have standardization, besides being subject to variations in relation to the foods available in each country, even at the regional level. As [Rafael Bortolin](#) (graduate student pursuing a doctorate in Biochemistry at the Federal University of Rio Grande do Sul - UFRGS) notes, even within the University, different groups of researchers use very different protocols.

It was with the intention of eliminating the disadvantages of these obesogenic diets that Bortolin dedicated to developing a new diet for the induction of obesity in animals, called the Western Diet. Based on US adult consumption parameters – a country where 70.7% of people over 20 years of age are obese or overweight, according to the National Center for Health Statistics in the United States – the diet had its effectiveness tested in comparison to the Hyperlipidic and the Cafeteria diets. The results of the study, which is part of the Bortolin doctoral research, were published in the [International Journal of Obesity](#).

The Western Diet contains high sugar, fat and salt content and low fiber content. In terms of macronutrients, it is similar to the Cafeteria Diet. However, the diet developed by Bortolin is not made up of industrialized foods; it is like a hand-made ration formulation. In addition, the Cafeteria Diet involves over processed foods with many preservatives and chemical additives and poor in vitamins, minerals and proteins – which is not the case with the Western Diet.

To test the effectiveness of his diet, Bortolin and his group of nine researchers divided 48 rats into four groups and fed each group on a different diet – Hyperlipidemic, Cafeteria, Western and a control diet – for a period of 18 weeks. In fact, the Western diet was the most effective for inducing obesity, as it was predicted by the initial hypothesis. The animals fed with it were the ones that gained the most weight and accumulated fat, despite the fact that the calorie intake was higher among those who ate the cafeteria diet (probably due to the



The research has also investigated the influence of sugar, salt and fiber on the development of overweight - Photo: Michael Stern / Flickr - CC BY-SA 2

palatability of the diet, considered the most appetizing by the rats).

It was also observed that the diet rich in fats was the one that less interfered in the evaluated parameters, not inducing neither the obesity nor the other dysfunctions associated with being overweight. The low palatability of this diet played an important role in this question – among the three diets, this was the one the rats were less likely to eat. But more than that, as Bortolin points out, the results indicate that high sugar content and low fiber may play a more important role in the development of obesity than fat itself.

Over processed food and intestinal microbiota

The effects of the Cafeteria Diet on the intestinal microbiota, the ecosystem of microorganisms that live in the digestive tract of all animals (including humans), was also observed. The study showed that the high consumption of over processed food causes an imbalance in the intestinal microbiota more severe than that observed with the other two diets, and the diversity of microorganisms fell by half in the rats fed with the Cafeteria Diet. This is probably due to the large amount of preservatives and the lack of important nutrients in industrialized food.

This change in the microbiota, called dysbiosis, has been linked to several diseases, including diabetes, obesity, and nervous system-related diseases. "I imagine that a lot of the effects we see in this group that we called the Cafeteria Diet happens because of this change in the microbiota. For example, it is known that there is a relationship between the microbiota and the liver, and you can see that the livers of these animals are very much altered. Maybe even more than those of the diet we've developed," says Bortolin.

As the researcher points out, the Cafeteria Diet proved adequate for studying the effects of over processed foods on the body, not obesity itself. "The point is: This diet is not standardized. So, when I develop it here, animals eat different foods from animals from other regions of the world, because the foods they have in those regions are different. Thus, our animals from the Cafeteria group may not have developed obesity, but animals from other regions may have. And perhaps researchers who obtained obese animals with this diet conclude that the effects observed in animals are due to obesity. But we concluded that they cannot say this, because the effects can occur due to the high amount of food additives present in this diet, not obesity," he emphasizes.

Other studies have compared the effects of the Cafeteria and Hyperlipidic diets on several parameters – some with different results than those obtained by Bortolin, due to the different protocols adopted. This was, however, the first to compare the effects of diets on the intestinal microbiota. Thus, the doctoral student emphasizes the importance of selecting the diet according to what is intended to be studied, and the Western Diet would provide a more reliable model for the study of obesity. Now researchers at the Center for Studies in Oxidative Stress at UFRGS, of which Bortolin is a member, put into practice the knowledge acquired from this study to develop new research related to obesity, already using the protocol of the Western Diet.

Source:

BORTOLIN, R C et al. [A new animal diet based on human Western diet is a robust diet-induced obesity model: comparison to high-fat and cafeteria diets in terms of metabolic and gut microbiota disruption](#). International Journal Of Obesity, 2017.

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Directions

