

Stubborn gut bacteria offer insights into yo-yo dieting

Previously obese dieters may struggle to keep weight off because of poor gut bacteria diversity, according to a new study presented today at the European Congress of Endocrinology.

For every cell that makes up the body, there are ten bacteria living on and in it – which means the diversity of bacterial species we have in our system (known as the microbiome) has a huge impact on our health.

Recent studies show that the gut microbiome plays an important role in regulating digestion and energy metabolism, and that obese people have gut bacteria that are better able to extract energy from food. Any surplus energy is converted in the body to fat. As most dieters struggle to keep off the weight they originally lost, manipulating the gut microbiome could be the key to helping stave off obesity and diabetes.

In this study, German researchers from University Hospital Schleswig Holstein in Kiel put eighteen obese adults on a diet of just 800 calories per day for a three month period and tracked how much weight they lost, their sensitivity to insulin, as well as both the activity and diversity of their gut bacteria using stool samples. They then tracked the same factors after putting the dieters on a weight maintenance diet for a further three months. The researchers then compared the results to thirteen obese (control group) and thirteen lean adults who followed their regular diets throughout.

Compared to the control or lean group, they found that the obese dieters had a (beneficially) altered microbiome diversity and metabolism at the end of their three month dieting, but this was not sustained during the three-month weight maintenance phase, despite losing an average of 20kg overall and having improved insulin sensitivity at the end of the six month period.

One of the limitations of the study is that the medications patients may have been taking was not accounted for, which could have an impact on gut bacteria diversity and metabolism.

“Anti-obesity campaigns often recommend low calorie diet programs such as the one we offered here”, said lead author of the study Professor Dr. Matthias Laudes. “However, our work shows that this is not making enough of a long-term change in obese people’s gut bacteria, which may explain why so many of them put weight back on”.

“We want to know why the gut microbiome is resistant to maintaining change after dieting,” he continued. “In the future we will look at the potential of using prebiotics during weight maintenance, or even the potential of faecal transplantation from a healthy gut to that of an obese patient”.

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Abstract

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Dietary and weight loss effects on human gut microbiome diversity and metabolism

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Introduction: Changes in the gut microbiome have been associated with the development of obesity. The aim of the present study was to examine (1) the effect of a formula based very-low-calorie weight loss diet (VLCD) on the gut microbiome of obese humans and (2) whether if potential changes are sustained during weight maintenance.

Patients and methods: The study consisted of 3 months VLCD (approx. 800 kcal/d) followed by 3 months of weight maintenance. 18 obese humans were examined (BMI 42.3 kg/m² (35.2 - 47.7)). A lean and an obese control group were included. Microbiome was characterized by performing high-throughput dual-indexed 16S rDNA amplicon sequencing of stool samples and subsequent analyses.

Results: At baseline, a difference in the Firmicutes/Bacteroidetes ratio was observed ($p=0.047$). The VLCD resulted in alterations in diversity from baseline to 3 months ($p=0.0053$). *Acinetobacter* is an indicator species for the observed effect (IndVal=0.998, $p=0.006$). Metabolic analysis revealed significant alterations of the bacterial riboflavin pathway from baseline to 3 months ($p=0.039$). However, the changes in diversity and bacterial metabolism induced by the VLCD diminished during the weight maintenance phase, despite sustained reductions in body weight and sustained improvements of insulin sensitivity.

Discussion: In obese humans a VLCD is able to beneficially alter both, gut microbiome diversity and metabolism, but these changes are not sustained during weight maintenance. This finding might in part explain the significant weight regain after VLCD- based therapies and might suggest additional measures to target the microbiome, e. g. fecal transplantation.

Notes for Editors

1. For further information about the study please contact:

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2. The study "[Dietary and weight loss effects on human gut microbiome diversity and metabolism](#)" is a poster presentation at the European Congress of Endocrinology at the ICM in Munich, Germany.
3. For other press enquiries please contact the ECE 2016 press office:

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4. The European Congress of Endocrinology is held at the Internationales Congress Center München between 28-31 May 2016.
5. The [European Society of Endocrinology](#) was created to promote research, education and clinical practice in endocrinology by the organisation of conferences, training courses and publications, by raising public awareness, liaison with national and international legislators, and by any other appropriate means.