

High fat diet linked to unfavourable changes in gut bacteria and inflammatory triggers

May sow seeds for metabolic disorders and cardiovascular disease over longer term

A high fat diet is linked to unfavourable changes in the type and numbers of gut bacteria—collectively known as the microbiome—as well as a rise in inflammatory triggers in the body, finds the first study of its kind, published online in the journal **Gut**.

These effects may sow the seeds for the development of metabolic disorders, such as diabetes, and heart disease and stroke over the longer term, warn the researchers.

The findings may be particularly important for countries where dietary habits are becoming more ‘Westernised’ in tandem with increasing levels of population wealth, they add.

Previous experimental research suggests that a high fat diet creates an imbalance in gut bacteria and makes the gut ‘leaky’, while observational studies suggest that diet is strongly linked to the volume and type of bacteria in the gut.

The researchers wanted to see if different levels of dietary fat might alter gut bacteria in healthy young adults from China, where dietary habits are moving from a traditional low fat, high carb diet, to one relatively high in fat and low in carbs.

The researchers split 217 healthy 18 to 35-year olds of normal weight into three dietary groups by altering the ratio of carbs—white rice and wheat flour—and fat—mostly soybean oil—but otherwise, keeping fibre and protein content the same.

The three diets were: low fat, equivalent to 20 per cent of energy intake; moderate fat, equal to 30 per cent of energy intake; and high fat, accounting for 40 per cent of energy intake.

Each participant stuck to their particular diet for six months, and its impact on their gut bacteria and inflammatory triggers was assessed in blood and faecal samples taken at the start and end of the six months.

After six months participants in all three groups had lost weight, with those on the low fat diet losing the most. But certain changes, with potential implications for long term health, were evident in the samples from the high fat diet group.

Although there were no major changes in the overall volume of gut bacteria among the three groups, the numbers of beneficial bacteria that produce short chain fatty acids, including butyrate, had increased in the low fat diet group.

Butyrate is a key energy source for bowel cells and has anti-inflammatory properties.

By contrast, the numbers of these beneficial bacteria had fallen in the high fat diet group, while numbers of 'unhelpful' bacteria that have been found in the guts of people with type 2 diabetes, for example, had increased.

Certain bacteria, such as *Blautia* species, which were associated with lower cholesterol levels, were abundant among those on the low fat diet. *Bacteroides* species, which were associated with higher cholesterol levels, were more common among those on the high fat diet.

What's more, the higher fat diet was associated with significant and potentially detrimental changes in long chain fatty acid metabolism, resulting in higher levels of chemicals that are thought to trigger inflammation. The opposite was true for the low fat diet.

The researchers emphasise that sampling was only done at the start and finish of the trial, and a more complete picture of microbial changes would have emerged with more frequent sampling.

And as all three groups lost weight, it's not entirely clear whether the weight loss prompted the changes seen, or vice versa, and as the study participants were all young, healthy, and of normal weight, the findings might not be more widely applicable, they add.

But the findings do seem to illustrate the need to curb dietary fat intake, they suggest.

"Compared with a lower fat diet, long-term consumption of a higher fat diet appears to be undesirable...for young healthy adults whose diet is in transition from the traditionally consumed lower fat, higher carbohydrate diet to one characterised by an appreciably higher fat content," the researchers conclude.

But their findings might also have implications for other countries, they suggest. "These findings might also have relevance in developed countries in which fat intake is already high," they add.