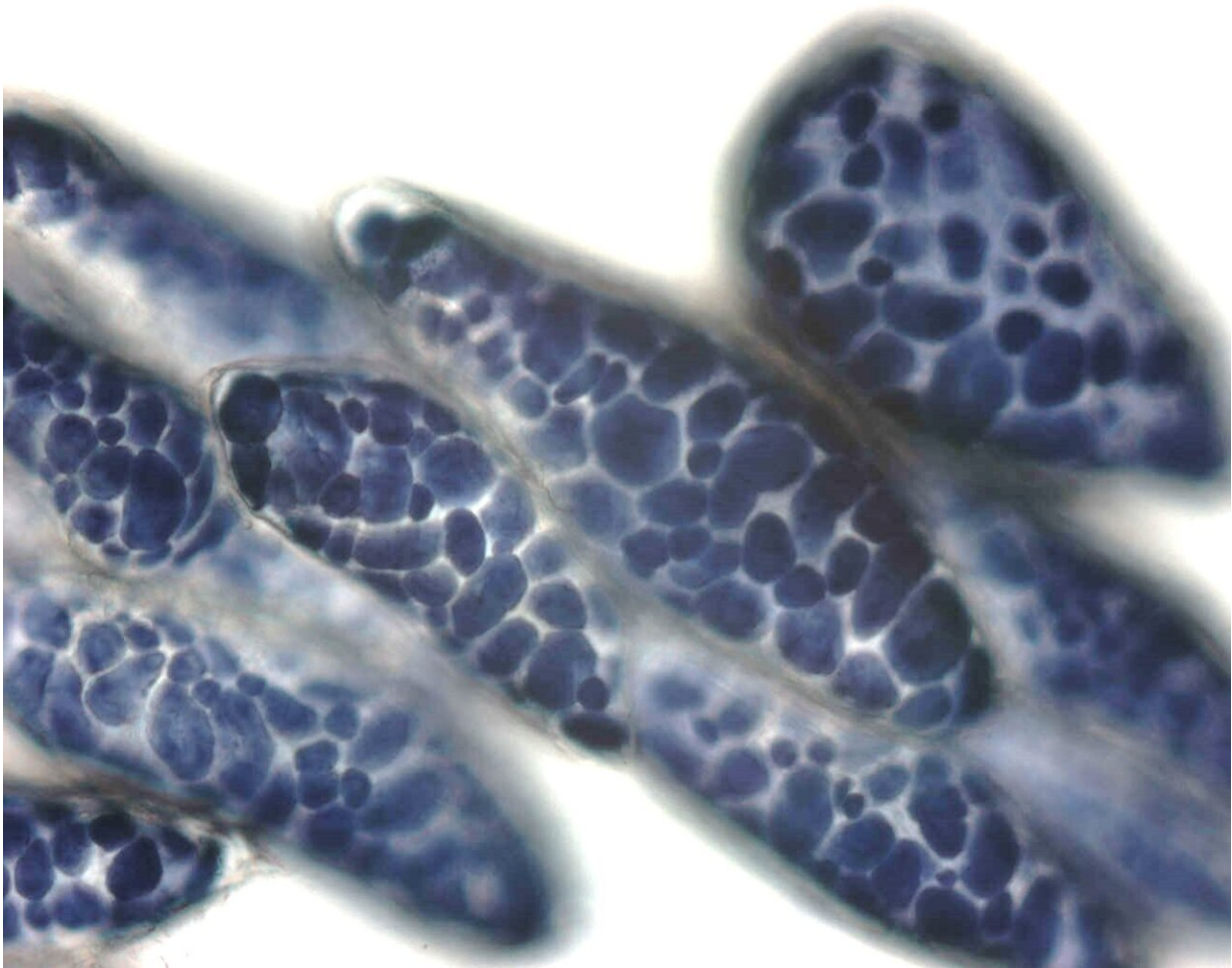


Bread made from a new type of flour keeps you fuller for longer

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Microscopy image of PulseON® flour showing starch, stained blue, inside intact chickpea cells. Credit: Cathrina Edwards, the Quadram Institute

Bread made from a new type of whole cell pulse flour can lower blood glucose (sugar) levels and keep you fuller for longer, new research has found.

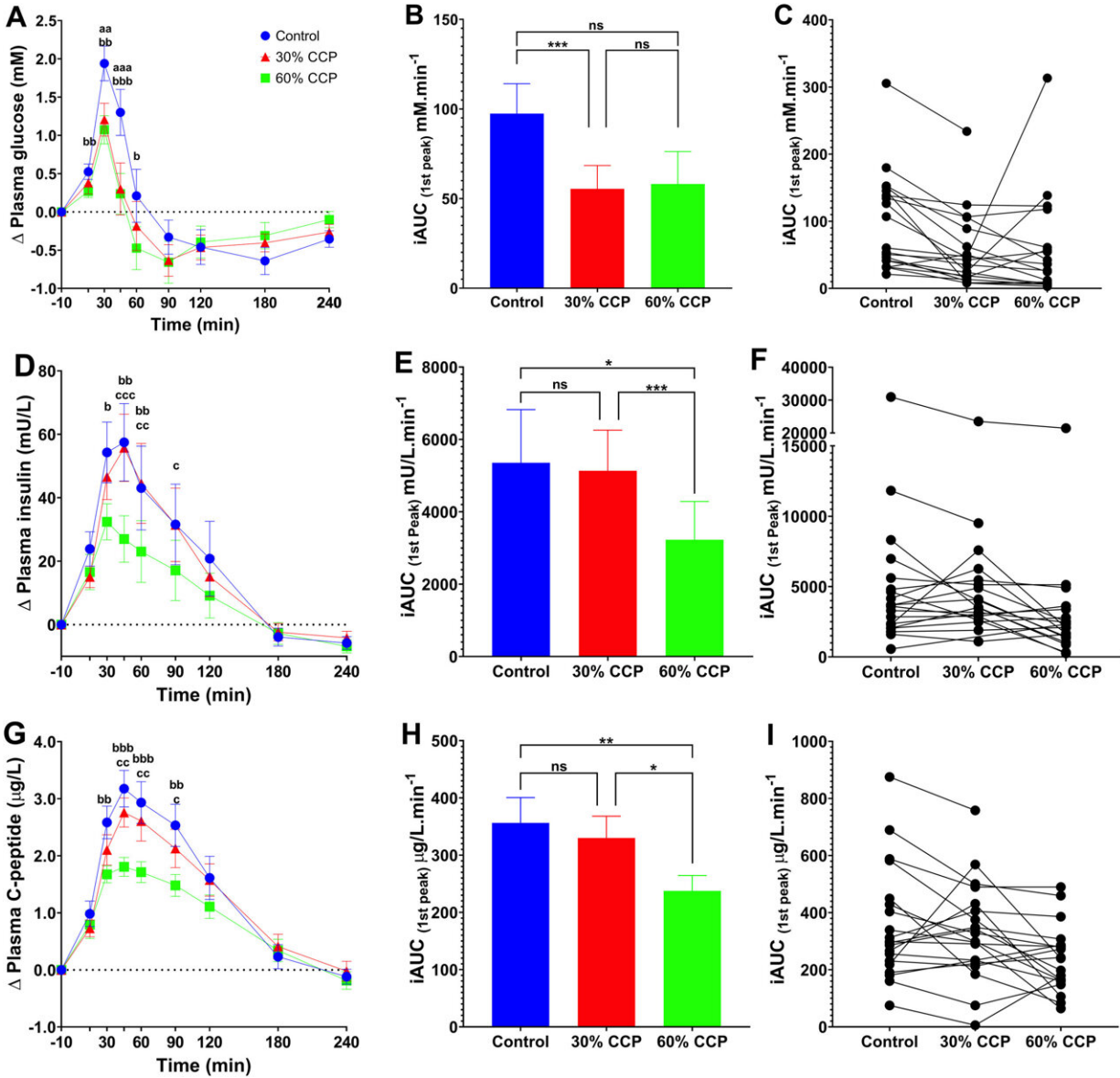
A study published recently in *The American Journal of Clinical Nutrition* by researchers from King's College London and the Quadram Institute looked at the effects of replacing regular wheat [flour](#) with 'cellular chickpea flour' on feelings of fullness, fullness-regulating hormones, insulin and blood sugar levels in people who ate it.

The study is the first of its kind and is based on the design of a new pulse ingredient that is now being commercialized for food industry use as PulseON by Pulseon Foods Ltd.

Eating healthy pulses including chickpeas, lentils and beans is known to help support healthy weight maintenance and decrease the risk of heart disease. A lot of the benefits seen from these foods are due to the fiber structure of the pulses themselves, with normal flour milling generally considered to reduce the beneficial effects of fiber structure.

However, new methods in [food technology](#) developed by the scientists have allowed them to make whole cell flours that preserve the dietary fiber structure of the whole pulses, providing a new way to enrich flour-based food with beneficial nutritional qualities for improved health.

Scientists from the Quadram Institute and King's College London found that adding the whole cell chickpea flour to bread significantly increased the release of satiety signals from the gut to the brain, meaning people felt fuller after eating the enriched bread.



Glycemic and insulinemic responses to control and CCP-enriched test bread. Postprandial responses are based on analysis of blood samples collected following consumption of white bread rolls containing 0% (control, n = 20), 30% (n = 20) or 60% (n = 19) cellular chickpea powder (CCP) and 50 g of available carbohydrate per serving. Time-course data show the change (relative to fasting concentrations) in postprandial plasma; (A) glucose (D) insulin, (G) C-peptide measured for 240 min. Bar charts show the integrated area under the curve (iAUC) calculated for the 1st peak (above baseline) of the time-course data for glucose (B), insulin (E) and C-peptide (H) responses. The scatter plots show the matched iAUC for individual participants for glucose (C), insulin (F) and C-

peptide (I) following the consumption of each of the bread types; data points connected by a line were from the same individual. Significant time x treatment effects were detected for glucose (ABC, P^{aa}P^{aaa}P^bP^{bb}P^{bbb}P^cP^{cc}P 0.05, *P The American Journal of Clinical Nutrition (2022). DOI: 10.1016/j.ajcnut.2022.12.008

The bread that was 30% cellular chickpea flour reduced blood glucose levels by as much as 40% compared to the regular white wheat flour bread. The authors have shown that this effect is due to the slower breakdown of the starch in the cellular flour during digestion.

The results from this study show a simple switch to a cellular chickpea blend in commercial bread recipes can improve feelings of fullness, which in turn may potentially help to avoid overeating. The addition of cellular chickpea flour, which causes a lower spike in blood sugar levels, could also contribute to a lower risk of obesity and type 2 diabetes.

Incorporating cellular chickpea flour into starchy staple foods could bring these beneficial effects to a range of products designed to help prevent or treat diet-related conditions such as type 2 diabetes.

As this study was carried out with healthy people, more research is needed to show whether regularly eating these new foods made with cellular chickpea flour can help in the management of healthy body weight or diabetes, and the researchers now want to set up larger scale trials to test this.

Dr. Cathrina Edwards from the Quadram Institute and senior author of the paper said "We have long known that the structure of food can have a big impact on its nutritional value. This study is a promising example of how new ingredient structures can be used successfully to improve the

metabolic and fullness effects of everyday food products. We hope that our findings will attract interest from food producers looking to improve the health credentials of their products."

First author Dr. Balazs Bajka from King's College London said of the study: "We were impressed with the results we've seen in healthy individuals, and now would like to see how our cellular [chickpea](#) flour bread can help in the management of body weight or diabetes in larger scale dietary intervention trials with people who suffer with these conditions."

Prof. Peter Ellis of King's College London said, "At a time that we are all being encouraged to increase our fiber intake, this study highlights the importance of the physical form of fiber, as intact cell walls, in slowing starch digestion, improving [blood glucose levels](#) and simulating satiety hormones to help us feel full."

More information: Balazs H. Bajka et al, Enhanced secretion of satiety-promoting gut hormones in healthy humans after consumption of white bread enriched with cellular chickpea flour: A randomized crossover study, *The American Journal of Clinical Nutrition* (2022). [DOI: 10.1016/j.ajcnut.2022.12.008](#)

Provided by Quadram Institute

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