

## Can “low calorie”-oil enhance the secretion of incretin hormones with beneficial effects on diabetic patients?

When the human body digests dietary fat (triacylglycerol), hormones from the intestine called incretins are released from the small intestine. These hormones stimulate insulin release and inhibit food intake. The mechanism for the fat-induced incretin release involves the generation of 2-monoacylglycerol (2-MAG), which is generated when triacylglycerol is digested into smaller parts. This 2-monoacylglycerol attaches to a receptor protein in the intestine called “G protein-coupled receptor 119 (GPR119)”, and activation of GPR119 causes the intestinal cells to release the incretins.

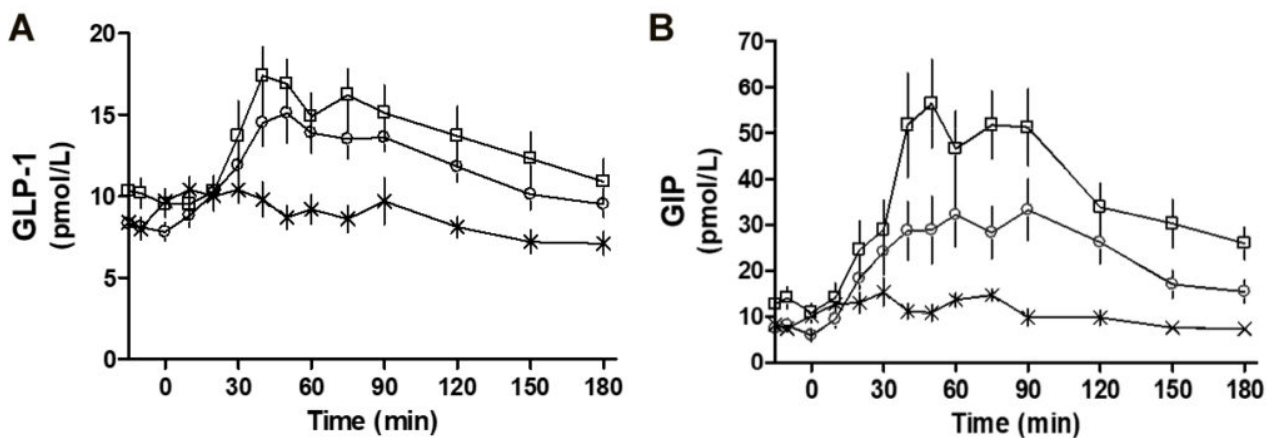


Fig. 1. A. Time courses for plasma GLP-1 following ingestion of olive oil and carrot (squares), C4-dietary oil and carrot (circles) and carrot alone (crosses). The three time points prior to ingestion was used in order to determine baseline and are only included as one point-value. B. Time courses for plasma GIP following ingestion of olive oil and carrot (squares), C4-dietary oil and carrot (circles) and carrot alone (crosses). The three time points prior to ingestion was used in order to determine baseline and are only included as one point-value.

The two incretin hormones are called GLP-1 (Glucagon-like-peptide 1) and GIP (glucose-dependent insulinotropic polypeptide) and they both have the ability to decrease blood sugar levels in a glucose-dependent manner by enhancing the secretion of insulin. Thus, enhanced incretin release has beneficial effects on diabetic patients. However, dietary fat intake may promote weight gain and should therefore be restricted in patients with obesity.

“C4-dietary oil” (with the chemical name 1,3-di-buteryl-2-oleoyl glycerol) was designed by researchers from University of Copenhagen as a 2-MAG-generating fat type, which was expected to be a good stimulator of incretin release in humans while providing less calories than the same

amounts of common triglycerides, e.g. olive oil.

In the study from University of Copenhagen blood hormone levels were measured during 180 minutes after intake of three different light meals: a) 19 g olive oil plus 200 g grated carrot, b) 10.7 g C4 dietary oil (the designed oil mentioned above) plus 200 g grated carrot and c) 200 g grated carrot alone, respectively, in 13 overweight patients diagnosed with type 2 diabetes (T2D). Theoretically, both oil meals, either olive oil or C4-dietary oil, should result in formation of 7.7 g 2-OG during digestion. The carrot meal functioned as a control meal without dietary fat.

After intake, both olive oil and C4-dietary oil resulted in significantly higher blood levels of both glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP) compared to carrot meal. Blood levels for GLP-1 and GIP were statistically similar for C4-dietary oil and olive oil, although olive oil resulted in a higher peak value for GIP than C4-dietary oil.

The conclusion of the study was that the C4-dietary oil enhanced secretion of the incretin hormones (GLP-1 and GIP) to almost the same extent as olive oil, but had a much lower caloric content. Thus, C4-dietary oil is more effective as incretin releaser than olive oil per unit of energy and may be useful as substitution for high energy triglycerides.

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## Publication

[Comparing olive oil and C4-dietary oil, a prodrug for the GPR119 agonist, 2-oleoyl glycerol, less energy intake of the latter is needed to stimulate incretin hormone secretion in overweight subjects with type 2 diabetes.](#)

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