**Formulating cellulose nanocrystal Pickering emulsions and their impact on lipid digestion**

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Background: Understanding the process of lipid digestion and absorption and using effective ways to control it is paramount for the development of food formulation strategies to address the obesity crisis.

Objectives: To develop and characterise Pickering emulsions stabilised by cellulose nanocrystals (CNCs) or combined with other polysaccharides, including methyl cellulose (MC) and chitosan (CS), to regulate lipid digestion, using simulated *in vitro* digestion.

Methods: CNCs alone, or in combination with MC or CS were used to generate Pickering emulsions. CNCs were characterised by atomic force microscopy (AFM), dynamic light scattering (DLS), and emulsions by laser diffraction and fluorescence microscopy. The pH-stat method was used to measure free fatty acids (FFA) release.

Results: CNCs were rod-like (length = ﻿81.9±0.3 nm) and a negative ζ-potential (-53 mV). All formulations generated stable emulsions, however emulsions utilising CNCs alone demonstrated significant instability in the simulated intestinal environment. The combination of CNC with MC or CS resulted in greater stability and reduced FFA release *in vitro*.

Conclusions: CNCs can be used to stabilise Pickering emulsions alone. Utilising CNCs, in combination with polysaccharides with different physico-chemical properties, has potential to generate novel food emulsion systems for improved regulation of lipid digestion.