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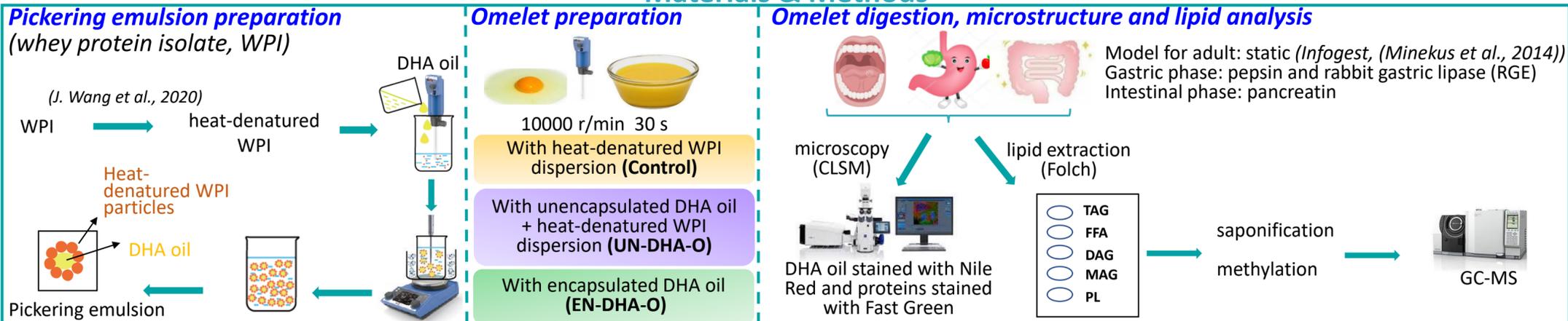
Does encapsulation of DHA with heat-denatured whey proteins in Pickering emulsions improve its bioaccessibility?

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Background

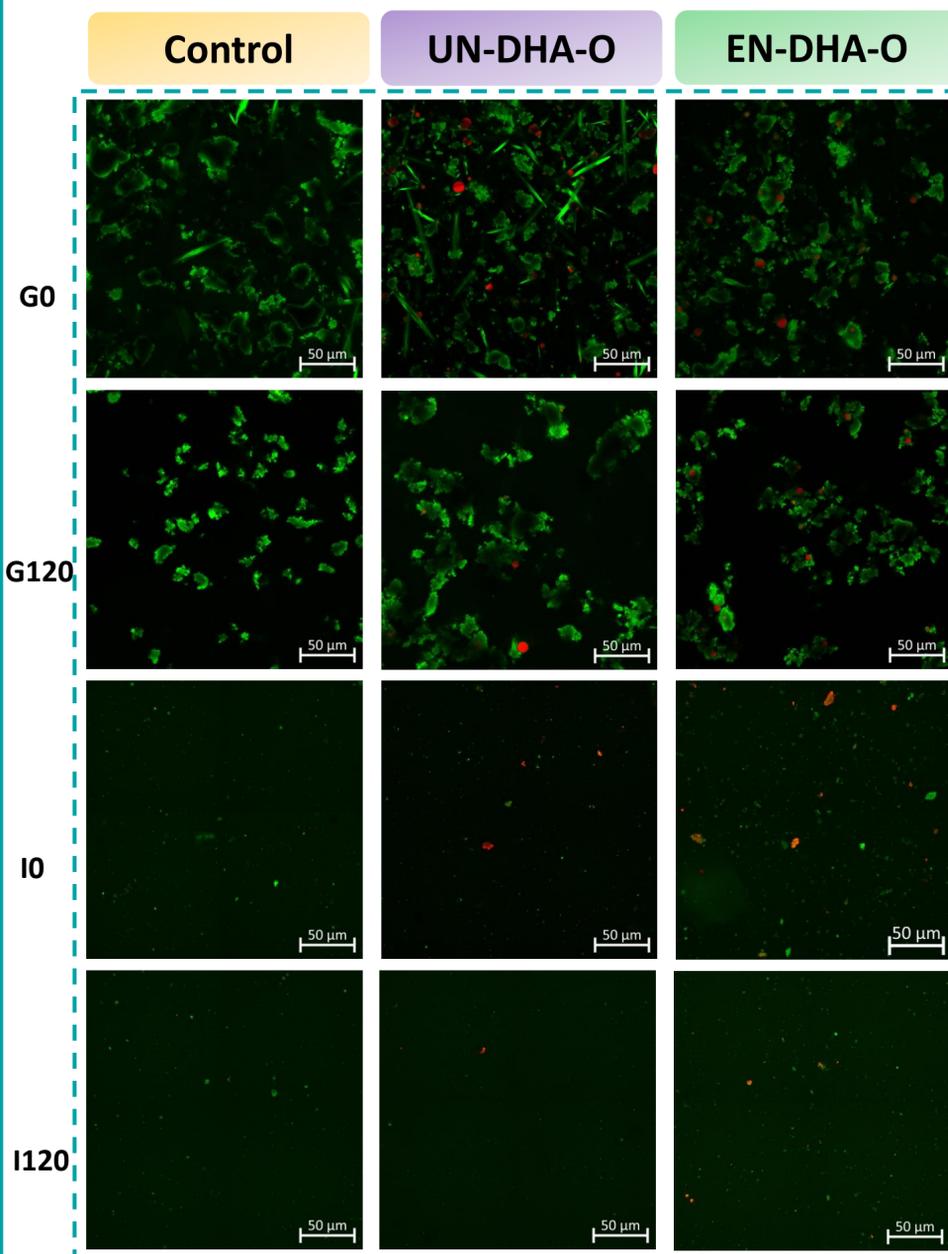
- DHA is the most important n-3 polyunsaturated fatty acids (PUFAs), mainly known for its health benefits on cognitive development and cardiovascular function. The **current intake** of DHA and EPA in the Western diet averages **150 mg** per day, less than the **recommended** daily consumption from The French Food Safety Authority for adults, which is **500 mg**.
- Oxidation** limits the enrichment of n-3 PUFAs in foods. **Encapsulation** is an effective strategy to strengthen food with n-3 PUFAs, and can also improve the oxidative status. **Pickering emulsion** has garnered exponentially increasing interest in recent years due to its excellent stability.
- Omelets** have the **highest DHA bioavailability** in various forms of DHA-rich foods (omelet, mousse, hard egg) (Pineda-Vadillo et al., 2021).
- In this study, **encapsulated** and **unencapsulated** DHA oil were added to omelets respectively to obtain DHA-rich foods. Then we measured the impact of **encapsulation** of the DHA oil on the digestion of DHA carried on **triacylglycerol (TAG)**. We used an *in vitro* model of **static digestion** for adults (Infogest, (Minekus et al., 2014)).

Materials & Methods



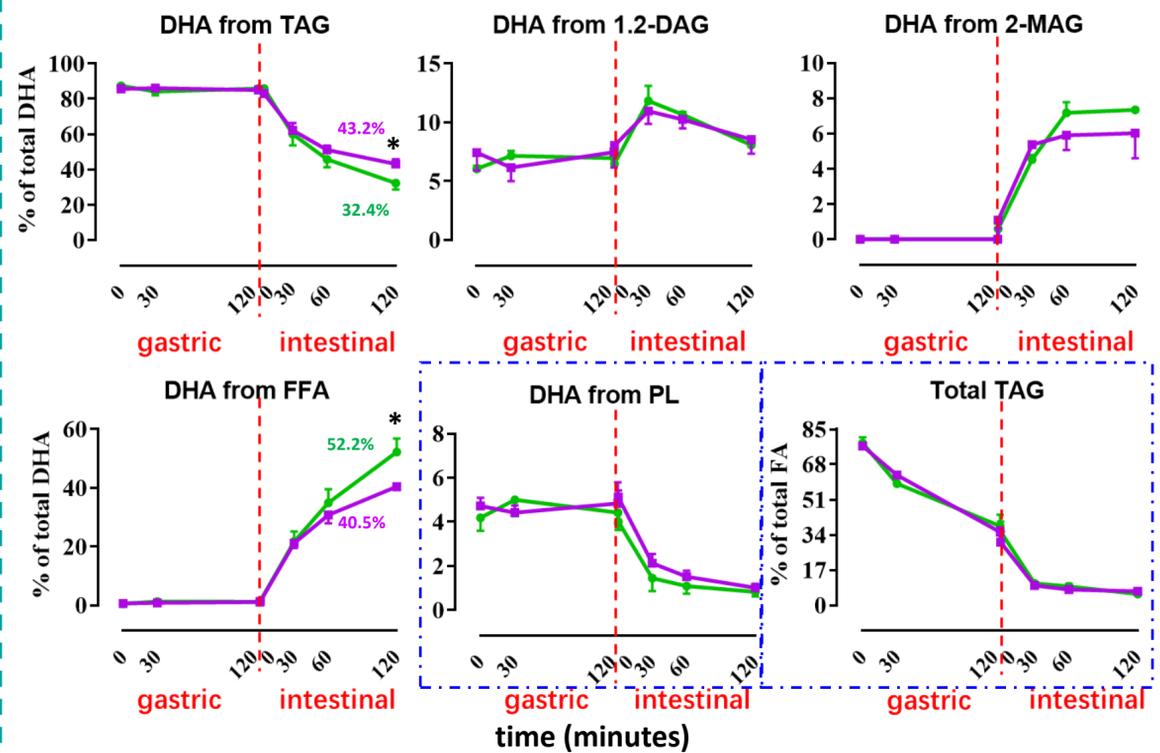
Results & discussion

The distribution of DHA oil in omelets during the digestion



- Droplets of DHA oil were uniformly sized and equally distributed in omelets with EN-DHA-O, contrary to UN-DHA-O.
- Digestion of the DHA oil occurred during the intestinal phase but without discrimination between groups.

The evolution and bioaccessibility of DHA during the digestion



- DHA-TAG was only digested during the intestinal phase, leading to the sequential release of DHA as 1,2-DAG, 2-MAG or Free FA.
- At the final point of digestion, DHA-TAG was more hydrolyzed with EN-DHA-O than with UN-DHA-O. Consequently, DHA was significantly more released as DHA-FFA with EN-DHA-O than UN-DHA-O.
- DHA was also minority present in PL from eggs so the digestion was equally performed during the intestinal phase for both groups.

Conclusions

- Our results showed that DHA-TAG was only digested in the intestinal phase as compared to the other TAG present in omelets.
- Encapsulation of the DHA oil enhanced the lipolysis of DHA-TAG. The lipase activity was probably improved because of a higher oil-water interfacial area due to the smaller droplets observed in the EN-DHA-O group.