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Phenolic extracts of bilberry: they protect lipid from oxidation in in vitro simulated digestion conditions

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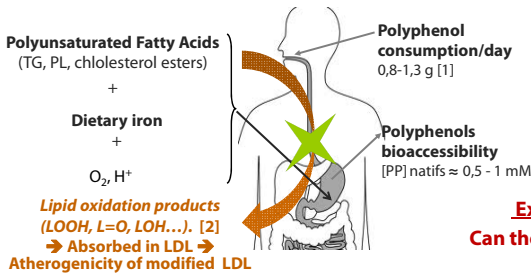


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BACKGROUND



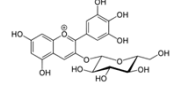
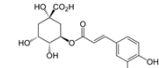
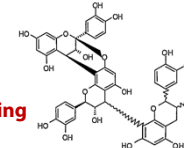
Extracts of bilberry stems, leaves and fruits:
Can they protect dietary lipids from oxidation during digestion in *in vitro* conditions?

Bilberry (BB) (*Vaccinium myrtillus* L.) polyphenols: content and main contributors [3]

Stems
79 mg/g DE
A-type trimer
B-type dimer
5-O-Caffeoylquinic-acid

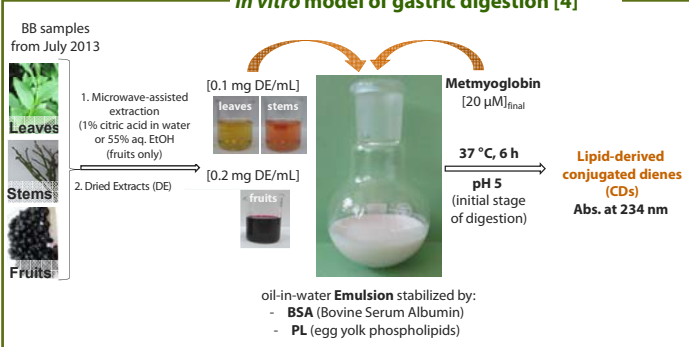
Leaves
125 mg/g DE
5-O-Caffeoylquinic-acid

Fruits
27 (H₂O) mg/g DE
41 (aq. EtOH) mg/g DE
delphinidin-3-O-glucoside



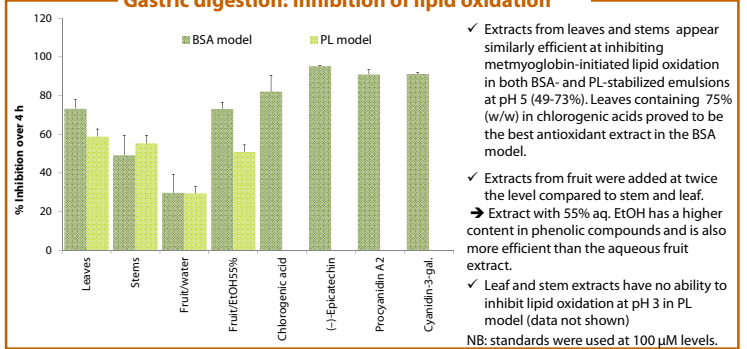
MATERIALS AND METHODS

In vitro model of gastric digestion [4]



RESULTS AND DISCUSSIONS

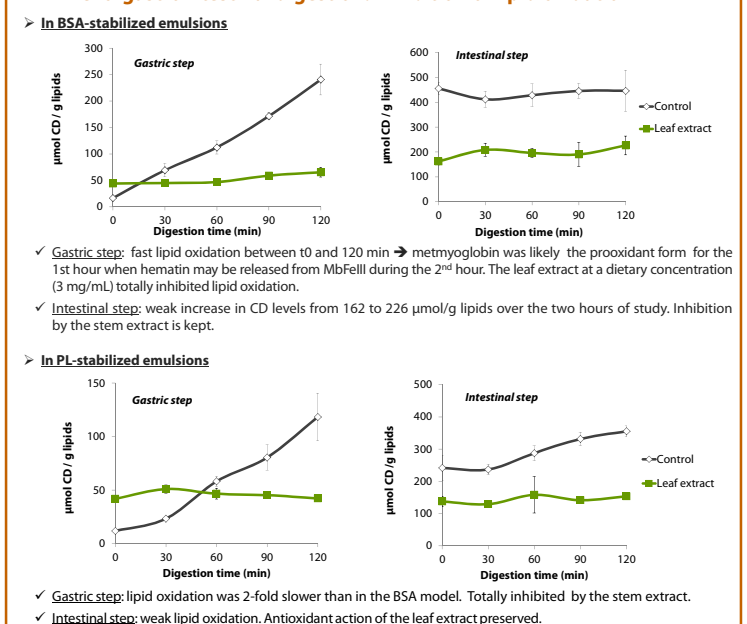
Gastric digestion: Inhibition of lipid oxidation



In vitro model of oro-gastrointestinal digestion [5]

Oral Phase	Gastric Phase	Intestinal Phase
Mix: dietary lipids (BSA or PL emulsions) + Leaf extract (36 mg) + CaCl ₂ (0.75 mM)	Oral phase (1:1 dilution with SGF) + pepsin (2000 U/mL) + MbFe ^{III} (20 µM)	Gastric phase (1:1 dilution with SIF) + pancreatin (100 U/mL) + bile (10 mM) + CaCl ₂ (0.49 mM)
Adjustment pH 7: 1 M NaOH	Adjustment pH 5: 1 M HCl	Adjustment pH 6.5: 1 M NaOH
Incubation: 5 min, 37 °C, 130 rpm	Incubation: → Sampling: 1 h, 37 °C, 280 rpm; 0, 30, 60 min	Incubation: 2 h, 37 °C, 280 rpm
No sampling	Adjustment pH 3: 1 M HCl	Sampling: 0, 30, 60, 90, 120 min
	Incubation: → Sampling: 1 h, 37 °C, 280 rpm; 90, 120 min	
	Determination of CDs	Determination of CDs

Oro-gastrointestinal digestion: Inhibition of lipid oxidation



CONCLUSIONS

Leaf, stem and fruit extracts of bilberry can play a protective role towards oxidation of polyunsaturated dietary lipids during digestion.

The fast lipid oxidation in the gastric step (BSA and PL emulsion systems) and the slower lipid oxidation in the intestinal step (PL system) were totally inhibited by a bilberry leaf extract at the level of 3 mg/mL in the gastric step.

→ the stability of the phenolic compounds should be further evaluated in the gastrointestinal digestion to give an insight into their protective mechanisms.

References:

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