

Abstract

# Gastric lipase and cholesterol esterase in the INFOGEST model: evaluation of sterol bioaccessibility in plant sterol-enriched wholemeal rye bread <sup>†</sup>

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**Abstract:** The incorporation of key enzymes of the lipidic metabolism to the INFOGEST digestion method on plant sterol (PS) bioaccessibility is evaluated, for the first time, in a PS-enriched wholemeal ryebread. The assayed conditions were: (i) INFOGEST method; (ii) INFOGEST+gastric lipase (GL) (60 U/mL gastric digesta); and (iii) INFOGEST+GL+cholesterol esterase (CE) (0.075 U/mL intestinal digesta). The contents in PS were determined in the bioaccessible fractions after saponification, derivatization into trimethylsilylethers, and analyzed by gas chromatography-mass spectrometry (for identification purposes) and gas chromatography-flame ionization detection (for quantification). The identified PS were: campesterol, campestanol, stigmasterol, b-sitosterol, sitostanol, D5-avenasterol, D5,24-stigmastadienol, D7-stigmastenol and D7-avenasterol from the PS-ingredient and rye flour. The incorporation of the lipidic enzymes slightly reduced bioaccessibility of total (from 23.2 to 17.6-18.2%) and individual PS (from 22.6-57.7 to 17.3-44%). In addition, no differences in bioaccessibility were detected when GL nor GL+CE were used. Largest bioaccessibility values were shown for D5-avenasterol and D7-avenasterol, regardless of the conditions assayed. In conclusion, the use of GL and CE means a closer approach to in vivo conditions, and we propose their inclusion in the INFOGEST model for the evaluation of the bioaccessibility of sterols and other lipid bioactive compounds.

**Keywords:** enzymes of lipid metabolism; simulated gastrointestinal digestion; plant sterols, solid matrix

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