Bioaccessibility of Lipids from a Plant Sterol-enriched Wholemeal Rye Bread: Effect of Gastric Lipase and Cholesterol Esterase

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The bioaccessibility (BA) of plant sterols (PS) can be assessed by *in vitro* digestion models as a screening tool to predict potential biological effects[1]. The addition of lipid-related enzymes during simulated digestion can affect lipid absorption[2]. This study aimed to investigate the influence of gastric lipase (GL) and cholesterol esterase (CE) on BA of PS and lipolysis from a PS-enriched wholemeal rye bread (1.6 g PS/100 g). Different digestion methods were employed: adult control (AC, INFOGEST method), adult 1 (A1, INFOGEST 2.0 with GL), and adult 2 (A2, INFOGEST 2.0 with CE)[2]. Gas chromatography (GC)-mass spectrometry was used to analyse PS content in bread and bioaccessible fractions samples for BA calculation[3]. The main lipid classes were determined by GC-flame ionization detection[4]. Under AC, the BA of total PS was 25.3%, with sitostanol showing the highest BA (32.8%) and Δ^7-avenasterol displaying the lowest one (15.2%). Under A1 and A2 conditions, a significant reduction of BA of total PS was observed, reaching values of 18.6% and 14.13%, respectively. The PS solubility profile changed, being -sitosterol the most BA sterol (18.1% and 13.9%) and Δ^7-avenasterol the lowest (14.4% and 7.9%). Moreover, a significant increase in free fatty acids and a decrease in monoacylglycerols were observed in both A1 and A2 (*vs*. AC), while a significant increase in esterified sterols and triacylglycerols was only noted in A1. Our study demonstrates that the inclusion of specific lipid digestion enzymes significantly reduces BA of PS. Moreover, a reduction in lipolysis was observed in presence of GL, but this effect was reversed when CE was added. These findings highlight the importance of specific digestive enzymes in modulating PS solubility and the potential implications for lipid metabolism and their biological effects. **Authors thank** the financial support from project PID2019-104167RB-I00/AEI/10.13039/501100011033. V. Blanco-Morales holds a grant for the requalification of the Spanish university system from the Ministry of Universities of the Government of Spain (European Union, NextGenerationEU). References: [1]Faubel et al., 2022; [2] Makran et al., 2022; [3]Cuevas-Tena et al., 2017; [4]Tappi et al., 2020.