

Comparison between different enzymatic inhibition methods in the standardized gastrointestinal model (INFOGEST): a case study of *Pleurotus ostreatus* mushroom biomass

Helena Araújo-Rodrigues^{1,2,*}, Ana Sofia Salsinha¹, Ezequiel R. Coscueta¹,
João Bettencourt Relvas^{2,3}, Freni K. Tavaría¹, Manuela E. Pintado¹

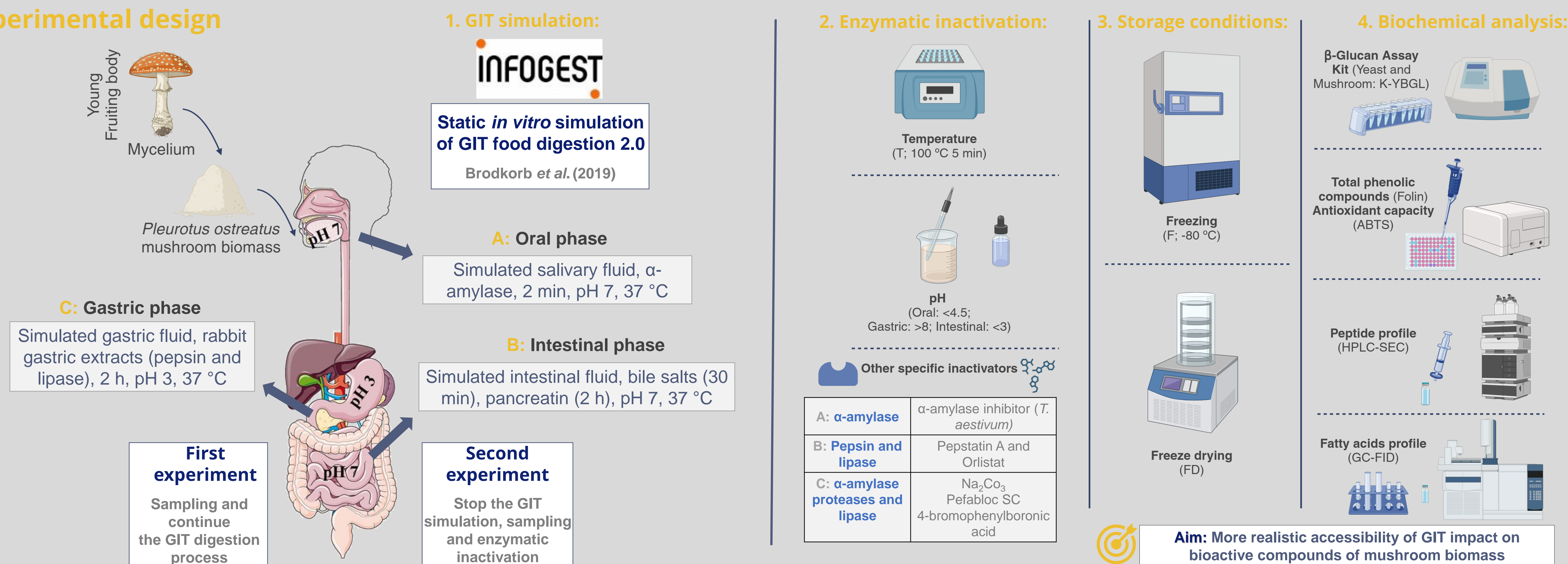
¹ Centro de Biotecnologia e Química Fina- Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa/Porto, Portugal.

² Glial Cell Biology, i3S Instituto de Investigação e Inovação em Saúde, Universidade do Porto (Porto, Portugal). ³ IBMC Instituto de Biologia Molecular e Celular, Universidade do Porto (Porto, Portugal). *Presenting Author: hrodriques@ucp.pt.

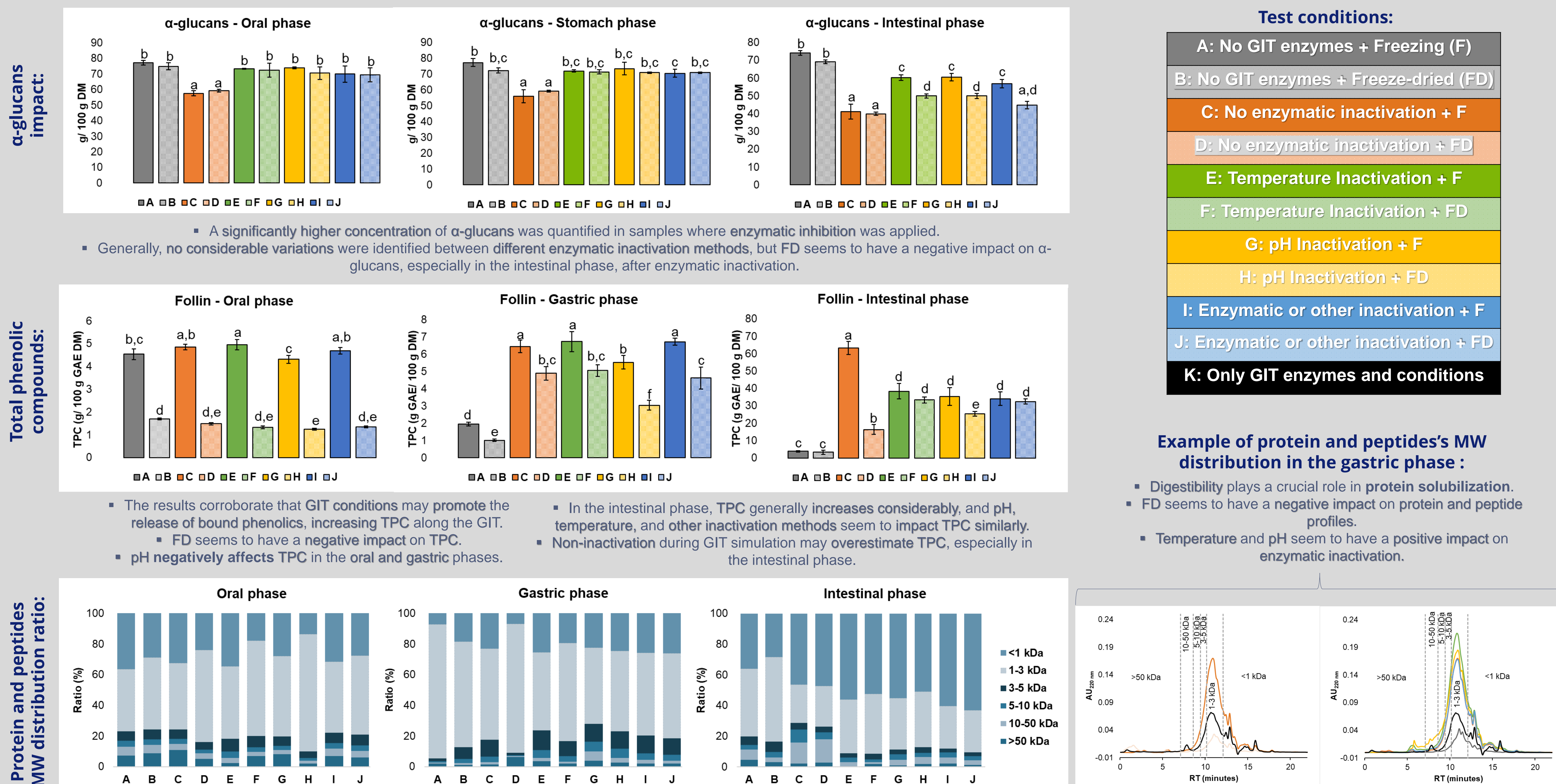
Resume

- Pleurotus ostreatus* (PO) is one of the most cultivated and consumed mushrooms worldwide, playing crucial roles in human health (e.g., prebiotic and immunomodulatory). Mushroom biomass (MB) combines the mycelium and young fruiting bodies. Both parts possess numerous bioactive compounds such as α - and β -glucans. A possible synergetic effect between their distinct macromolecules has been proposed (Araújo-Rodrigues *et al.*, 2024). Accordingly, the authors characterized the PO biomass composition for the first time. The results suggested an interesting nutritional profile, where the main differences between PO biomass and fruiting body are the higher α -glucans content (77.49% on dry weight - DW) and lower concentration of β -glucans (2.96% DW), free sugars (0.34% DW), protein (4.62% DW) and ashes (1.36% DW). However, it is imperative to assess the influence of the gastrointestinal tract (GIT) on their bioactive compounds, especially α -glucans. Accordingly, the standardized GIT model (INFOGEST) was used (Brodkorb *et al.*, 2019).
- Samples were taken from oral, gastric, and intestinal phases to better assess the impact of different GIT phases. The results indicated a loss of approximately 19 and 44% of α -glucans in the oral and intestinal phases. However, the authors identified some issues, mainly linked to the difficulty in collecting homogenous samples (high variability and time-demanding) and non-enzymatic inactivation. During the INFOGEST protocol, enzymatic inactivation may overestimate the enzymatic activity, playing a key role in the bioactive compound quantification.
- The authors tested different enzymatic inhibition approaches to select the method that allows more realistic accessibility of GIT impact on bioactive compounds of MB. The influence of the freezing (F) or freeze-drying (FD) process was also evaluated. α -glucans content, protein and peptide profiles, antioxidant capacity (ABTS), total phenolic compounds (Folin) and fatty acids were determined.

Experimental design



Main results and discussion



Main conclusions

- The present study corroborates the relevance of enzymatic inhibition in the INFOGEST standardized protocol for assessment of the gastrointestinal tract impact on mushroom biomass. It suggests a notable influence on α -glucans, total phenolic compounds (TPC), antioxidant capacity (ABTS) and fatty acids quantification (data not shown), as well as on protein and peptide profile.
 - In general, freeze drying seems to have a detrimental effect on mushroom biomass sample storage, affecting all bioactive groups analyzed.
 - Temperature may be the most favorable condition. The findings indicate that temperature does not impact the main bioactive compounds and corresponds to a cost-effective alternative to other inhibition methods such as, enzymatic inhibitors and chemical reagents.
- In future research, the GIT impact of other mushroom biomasses will be investigated using temperature as enzymatic inactivation method and freezing as sample storage. This will allow deciphering their nutritional value and biological properties.

References

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- Brodkorb, André, *et al.* "INFOGEST static *in vitro* simulation of gastrointestinal food digestion." *Nature protocols* 14.4 (2019): 991-1014.

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