The bioaccessibility of iron and zinc from commercial plant-based meat alternatives

Jonas Pospiech[1], Johanita Kruger[1], Jan Frank[1]

[1]Department of Food Biofunctionality (140b), Institute of Nutritional Sciences, University of Hohenheim, Stuttgart, Germany

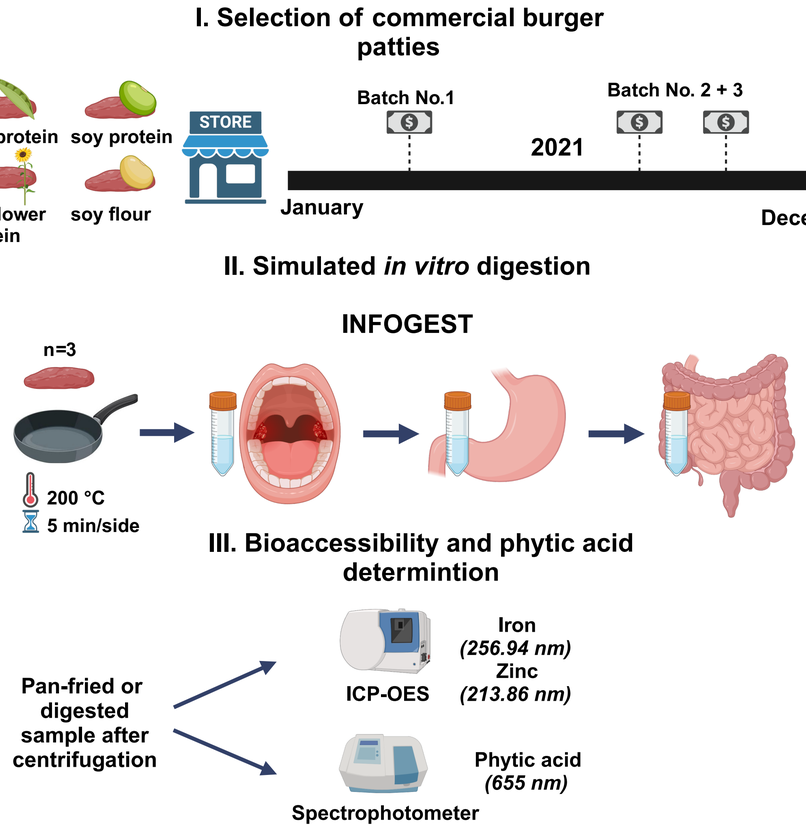
INTRODUCTION

The consumption of plant-based meat alternatives is currently increasing due to animal welfare concerns, environmental aspects, and potentially negative health consequences resulting from meat consumption.

Commercially available meat alternatives are based on different protein-rich plants and may thus significantly diifer in their contents of minerals as well as absorption inhibitors , such as phytic acid, which in turn may lead to differences in the bioaccessibility of the minerals.

Thus, the aim of the present study was to quantify the content of minerals and phytic acid in plant-based burger patties and to determine the bioaccessibility of iron and zinc.

METHODS



RESULTS

Table 1. Concentrations (mean ± standard deviation) of iron, zinc and phytic acid in pan-fried plant-based burger patties (mg/ 100 g fresh weight; n=3). Values within a row not sharing a common letter significantly differ at $p < 0.05$; one-way ANOVA with Tukey's post-hoc test.

	Pea protein	Soy protein	Soy flour	Sunflower protein
Iron	3.38 ± 0.16^{a}	6.02 ± 1.12^{b}	1.71 ± 0.17^{c}	2.74 ± 0.22^{a}
Zinc	2.16 ± 0.07^{a}	0.59 ± 0.04^{b}	0.96 ± 0.09^{c}	2.45 ± 0.04^{d}
Phytic acid	343.89 ± 57.18^{a}	386.56 ± 10.82^{a}	172.46 ± 40.54^{b}	708.92 ± 51.94^{c}

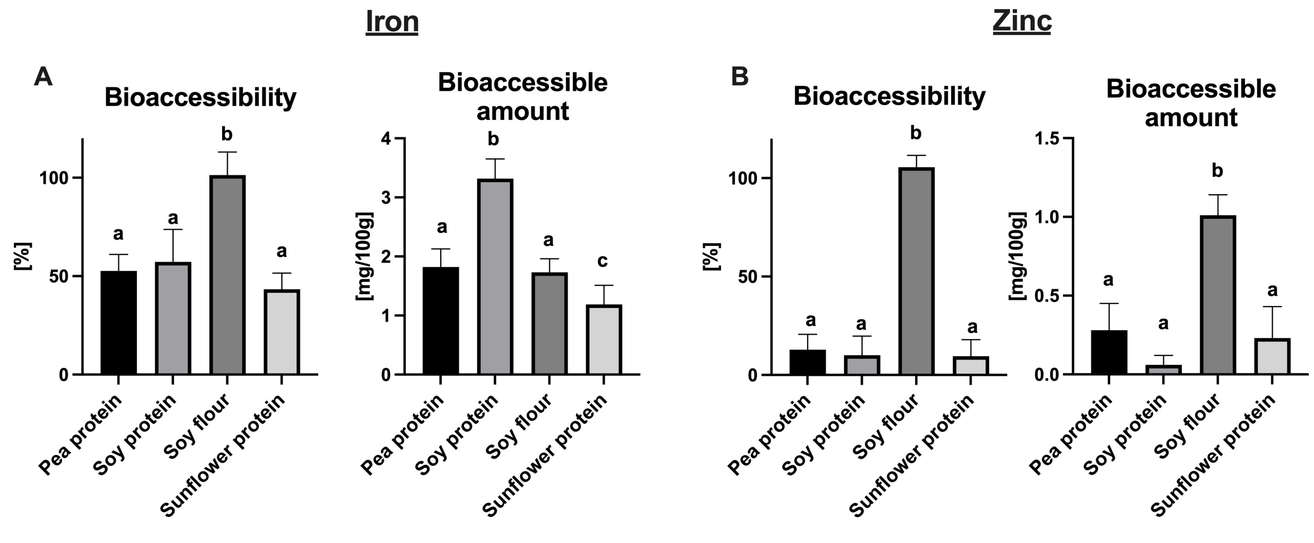


Figure 1. Bioaccessibility [%] and bioaccessible amount [mg/100 g fresh weight] of iron (A) and zinc (B) in pan-fried plant-based burger patties after simulated digestion (n=3). Values within a group not sharing a common letter significantly differ at $p < 0.05$; one-way ANOVA with Tukey's post-hoc test.

Table 2. Pearson correlation coefficients and associated probabilities (p) between phytic acid (mg/100 g) and the bioaccessibility of either iron or zinc in pan-fried plant-based burger patties.

Main variable	Secondary variable	Pearson Coefficient	R^2	p
Phytic acid (mg/100)	**Bioaccessible iron (%)**	-0.7561	0.5718	0.0044
	Bioaccessible zinc (%)	-0.6992	0.4889	0.0114

CONCLUSION

In conclusion, we found that commercially available plant-based meat alternatives have moderate to high iron and zinc contents after pan-frying and a comparably high bioaccessibility, in particular the soy flour-based burger patty. The phytic acid content was negatively correlated with both the iron and zinc bioaccessibility. Overall, plant-based meat alterantives may be important sources of bioaccessible iron and zinc and contribute to an adequate supply of these minerals.

ACKNOWLEDGEMENTS

This project was funded by the Avina Stiftung (Switzerland). The authors thank the Core Facility of the University of Hohenheim (Stuttgart, Germany) for the mineral analyses.

Jonas Pospiech
University of Hohenheim, Institute of Nutritional Science, Department of Food Biofunctionality
Garbenstraße 28, 70599, Stuttgart, Germany.
E-Mail: jonas.pospiech@nutres.de; www.nutres.de