High hydrostatic pressure as a tool to modulate techno-functional properties of quinoa (Chenopodium quinoa) protein and nutritional effects

DE CARVALHO OLIVEIRA L. (1), DOS SANTOS F. (1), JANSER SOARES DE CASTRO R. (1), CRISTIANINI M. (1), FONSECA MONTEIRO S. (1)
1 FEA/UNICAMP, Campinas, Brazil

Quinoa protein has attracted growing attention of scientists due to its nutritional quality and it is referred to as a sustainable and promising plant-based protein source. Modulating plant-based proteins' properties has recently received interest in order to make them multifunctional ingredients for food systems. Quinoa protein concentrate (QPC) dispersions (5 %; w/v) were subjected to high hydrostatic pressure-HHP (200, 300, 400, 500 and 600 MPa; 25 °C; 20 min). Non-pressurized sample was used as a control. The effects of HHP on techno-functional properties and in vitro digestibility (IVDP) of QPC were evaluated. Water absorption capacity of QPC (3.3 g/g) was significantly ($P<0,05$) improved after HHP, with a maximum at 400 and 500 MPa (4.4 and 4.3 g/g). Fat absorption capacity (2.5 g/g) was however unaffected by the process. Emulsifying activity and stability indexes of CPQ were both decreased with HHP application. Although foaming capacity of QPC was slightly reduced above 200 MPa, foam stabilities at 10 and 60 min were practically unchanged by HHP. It is noteworthy that modulation of QPC techno-functionalities by HHP treatment was achieved with no noticeable loss of its nutritional value (IVDP). The major changes in QPC properties, according to these findings, indicate that HHP was more effective at exposing hydrophilic groups of its amino acids. This could be useful in the development of alternative plant-protein ingredients for gluten-free baked products with better mouthfeel, for example. Moreover, HHP is environmentally friendly and its uses meet the essential requirements for sustainable and clean-label ingredients production.