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In vitro antioxidant properties of *Agaricus bisporus* protein hydrolysates and their membrane ultrafiltration fractions

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In the recent years, attention has been directed towards enzymatic generation and use of bioactive peptides from food protein sources as natural antioxidants. Several reports have indicated that the activities of these peptides depend on the protein source, enzyme specificity, molecular weight, the degree of hydrolysis and amino acid composition. *Agaricus bisporus* (white button mushroom) is an edible fungus and the world's leading cultivated mushroom with yields accounting for 70% of the total edible fungi. Several bioactivities from *A. bisporus* have been reported including ACE inhibitory activity, hypoglycemic, antioxidant and antimicrobial. However, no reports have been made on the antioxidant potential of *A. bisporus* protein hydrolysates. In this study, *A. bisporus* mushroom protein isolate (MPI) was hydrolyzed using single (alcalase, pancreatin and flavourzyme) and sequential (alcalase-pancreatin and alcalase-flavourzyme) enzymatic processes. The obtained hydrolysates (MPHs) were ultra-filtered to generate peptide fractions (UFs) of molecular sizes (<1, 1-3, 3-5 and 5-10 kDa). The electrophoretic profile results indicated that the enzymatic systems were efficient in hydrolyzing the MPI into low molecular weight peptides. Hydrolysate yields of >57% and protein recoveries of >43% were obtained. Effective concentration that scavenged 50% (EC50) of DPPH radicals was similar for the MPHs, while inhibition against linoleic acid oxidation was strongest (66.49%) for alcalase-flavourzyme hydrolysate on day 5 of incubation. UFs exhibited a concentration-dependent ferric reducing antioxidant property (FRAP), with the highest activity for fractions from alcalase and pancreatin recorded in 1-3 kDa. Considering the yield and the antioxidant activity, the pancreatin 1-3 kDa fraction was also used in the DNA damage assay, where it demonstrated significant oxidative protection against damage induced by Fenton's reagent. The antioxidant activities of MPHs and their UFs suggested that they could be potential bioactive ingredients for use in the formulation of functional foods as well as natural antioxidants in lipid food systems.

Biography

Benard Muinde Kimatu has been working on bioactive molecules especially peptides, since 2014. He has co-authored several articles while working at the Nanjing Agricultural University, China, under the leadership of Professor Qiuhui Hu. Over the years, he has gained experience in the generation of bioactive peptides from food protein sources, their purification and determination of their amino acid sequence and their possible application as functional foods and nutraceuticals. Before joining Professor Hu's laboratory, he had been teaching at the Department of Dairy and Food Science and Technology, Egerton University, Kenya.

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