Hydrolysate from rainbow trout (Oncorhynchus mykiss) raw material a valuable source of multifunctional bioactive peptides

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Seafood side streams are abundant, sustainable and contain valuable bioactive peptides, lipids and polysaccharides with health promoting properties, which all together make them an excellent alternative ingredient source for the food and nutraceutical industries.
Even though seafood rest raw materials as a source of multifunctional peptides have already been reported in scientific literature, extraction of bioactive peptides from farmed fish and fish residues for non-communicable disease prevention, is currently underexplored. Therefore, the current study's aim was to fill this gap by identifying new multifunctional peptides isolated from rainbow trout (Oncorhynchus mykiss) which can be further used in high-value applications such as functional foods and nutraceuticals.
Rainbow trout raw material (“Hofseth AS”, Ålesund, Norway), was used for enzymatic hydrolysis in the study. Hydrolysis was performed in 4-litre bioreactors at 50±2°C, adding 0.05 % papain and 0.05 % (w/w) bromelain enzymes.
A peptidomic investigation (using HPLC-MS/MS technique) was performed to display chemical composition of the trout hydrolysates and identify peptide sequences which are present in the hydrolysate mixture, as well as proteins to which each peptide belongs to. In addition, direct antioxidant activity of the hydrolysate by using a combination of ABTS, FRAP and DPPH assays, was measured.
The study has shown that trout hydrolysate exerts a multifunctional bioactivity through the ability of reduction of the oxidative stress induced by H_2O_2 in human intestinal Caco-2 cells, as well as inhibition of ACE and DPP-IV activities, respectively, suggesting antioxidant, hypotensive, and anti-diabetic effects. The results of bioactivity investigation indicated that trout peptide mixture is able to scavenge the ABTS and DPPH radicals, respectively. In addition, it increased the reduction of Fe^{3+} at Fe^{2+}. At cellular levels, the same peptides reduce oxidant stress induced by H_2O_2 in Caco-2 cells.
The high presence of hydrophobic peptides within the hydrolysate is correlated to the antioxidant effect and other biological activities. Indeed, it was observed that the peptide mixture can reduce with a dose-response trend both ACE and DPP-IV activities, suggesting hypotensive and anti-diabetic activities of the hydrolysate.