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Value-added uses of bioactive soy proteins and hydrolysates

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Proteins are of major interest for nutritional value and functionality in foods, and biological activity as health-promoting ingredients. Soybean is an abundant source of protein which is known for its high nutritional value and excellent nutraceutical properties. Soybean meal, a by-product from soybean oil industry, has been utilized to obtain value-added bioactive proteins and hydrolysates. Forty four Arkansas grown soybean lines were subjected to analysis for protein and amino acid content to select lines that had high protein attributes. Three soybean lines, R95-1705 (high yield, non-transgenic and high protein), N98-445A and S03-543CR (high oleic acid), were selected, ground, and defatted to obtain soy meal for preparing soy protein isolates (SPI). The SPI (90-93% protein) were enzymatically hydrolyzed with a food grade Alcalase. The obtained soy protein hydrolysates (SPH) were treated with simulated gastric and intestinal juices to determine the gastro-intestinal (GI) resistance of the peptide fractions. The GI resistant hydrolysates were fractionated to distinct molecular size cut-offs of <5, 5-10, 10-50, and >50kDa using ultra-filtration. Research highlights include demonstration of angiotensin-I converting enzyme inhibitory and cancer cell anti-proliferation activities by the GI-resistant peptides. A comprehensive screening provided definitive selection criteria for choosing the 10-50kDa fraction from N98-4445A for further purification to separate a single pure peptide with enhanced biological activity. A purified peptide with a sequence of 158 amino acids and molecular weight of 18kDa from the 10-50kDa fraction showed nearly 75 and 80% inhibition of blood and colon cancer cells respectively. *In vitro* anti-oxidative studies showed that <5kDa fraction had the highest radical scavenging activity (46.1% vs. 66.6% for glutathione). The importance of this investigation is in the potential ability of the obtained soy peptides to sustain a progressive impact on human health condition. The peptides also have the potential for application in pharmaceutical and functional food products.