Does the Aqueous Fraction (Press Juice) of Herring (*Clupea harengus*) Retain its Antioxidative Capacity During Simulated Gastrointestinal Digestion?

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The aqueous fraction (press juice, PJ) from herring muscle was recently shown to inhibit hemoglobin-mediated oxidation of washed fish mince lipids during ice storage. Herring PJ also prevented reactive oxygen species production in a human monocyte model system, indicating activity also under physiological-like conditions. As a first step to evaluate potential *in vivo* antioxidative effects from herring PJ, the aim of this study was to investigate whether herring PJ retains its antioxidative capacity during a simulated gastrointestinal (GI) digestion.

PJ from whole herring fillets (WMPJ) and light muscle (LMPJ) were mixed with gastric juice followed by step-wise pH-adjustment to 2 to simulate the stomach during food digestion. The small intestine was simulated by adding pancreatin and bile solutions and by adjusting the pH to 6.5. Samples were taken after 0, 30, 75, 105 and 165 min digestion. Digestive enzymes were removed from samples by ultrafiltration (10 kDa). Before, during and after digestion, antioxidative capacity of samples was analyzed with oxygen radical absorption capacity (ORAC) and low-density lipoprotein (LDL) oxidation assays. Protein/polypeptide content was also measured.

From 0 to 165 min digestion, the content of <10 kDa peptides in LMPJ and WMPJ samples increased 7 and 12 times, respectively. Further, both samples got ~12.5 times higher ORAC values, and gave rise to ~1.3 times increased delay Cu-induced LDL-oxidation. The largest changes in all three parameters occurred between 30 and 75 min digestion, indicating that they might be inter-related. When comparing analytical data obtained after 165 min digestion with data obtained from analyses of crude non-digested and non-ultrafiltered PJ´s, it was found that the data on peptide content, ORAC and LDL-oxidation from digested PJ´s were 64%, 121-161% and 112-115% of those of crude PJ´s. The study thus showed that enzymatic breakdown of PJ-proteins under GI-like conditions increases the peroxyl-/LDL-radical scavenging activity and Cu-scavenging activity of herring PJ´s. These data provide a solid basis for further studies of uptake and in vivo activities of herring derived aqueous antioxidants.