Speciation and bioaccessibility of selenium in wheat grain from a seleniferous area and derived products

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Samples of wheat (*Triticum aestivum*) collected in the Nawanshahr-Hoshiarpur Region (Punjab, India) showed the highest selenium concentration ever recorded in grains for human consumption. The aim of this study was to assess the identity and content of the selenocompounds potentially bioavailable in wheat-based items consumed by the population of this seleniferous area.

Wheat flour and chapati bread were produced from a batch of high-Se wheat grown locally. In order to investigate the fate of the different selenocompounds along wheat processing up to simulated human digestion, total Se and Se speciation in wheat, derived products and *in vitro* gastrointestinal digests were assessed. The determination of selenium species was carried out after enzymatic extraction by HPLC-ICP–DRC–MS with three separation mechanisms (reversed phase, cation exchange, and anion exchange) in order to cross-check the identification of the different selenocompounds by retention time matching with authentic standards. Chapati was submitted to *in vitro* enzymolysis and detailed information on the different Se species released was obtained by two-dimensional chromatography. Size exclusion chromatography was used for isolation of selenium containing fractions, which were further characterized by HPLC-ICP–DRC–MS and off-line electrospray tandem mass spectrometry in an attempt to identify the selenocompounds generated during gastrointestinal digestion.

The investigation of Se speciation and bioaccessibility in wheat-based products from the seleniferous belt of the Nawanshahr-Hoshiarpur Region provided useful data for risk assessment of selenium exposure in that area. On the other hand, such information will be used to evaluate if and how local grains can be used to supplement the mammalian diet in many areas that are deficient in selenium.