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Designing plant foods for optimal iron and zinc bioavailability

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Two billion people in the world suffer from iron deficiency. The magnitude of zinc deficiency is likely of the same order. Low absorption from plant-based diets is considered a major factor in the etiology of iron and zinc deficiency. Thus there is a need for sustainable methods for providing more bio-available iron and zinc. The bioavailability of iron and zinc in plant foods is low due to the presence of inhibitors of iron and zinc absorption, despite a sometimes high content of these metals. Inhibitors (phytate and for iron also polyphenols) and enhancers (amino acids, for iron also ascorbic acid) in a meal affect the complexation and solubility of iron and zinc at the site of absorption in the gut and thus the availability. The speciation of iron is also crucial for uptake. Furthermore recent advances in knowledge concerning regulation of iron absorption show that dietary factors (ascorbic acid, calcium and polyphenols) have intracellular effects by influencing the iron uptake and transport proteins in the intestinal epithelial cells. Optimized biological processing techniques (malting, fermentation, addition of enzymes) are a means to substantially improve iron and zinc absorption from plant foods by enzymatic degradation of inhibitors or formation of enhancers. These methods can be used in combination with breeding and genetic engineering for biofortification with zinc, iron (ferritin), reduction of inhibitors and engineered yeast and *Lactobacillus* strains for use in fermentation. Plant based foods then can become good sources of dietary iron and zinc. Efficacy trials in humans are still needed to prove the consequences for prevalence of iron and zinc deficiency on a population level.

Biography

Ann-Sofie Sandberg has completed her MSc in Food Science, PhD in Clinical Nutrition and she is a Doctor of Technology and presently the Head of the Division of Food and Nutrition Science at Chalmers University of Technology, Sweden. The major theme in her research is the utilization of biological techniques to improve nutrient properties or physiological function of foods. This includes development of *in vitro* and *in vivo* models for the estimation of bioavailability of nutrients and bioactivity of food compounds and human intervention trials. She has an extensive record in the field of phytate/bioavailability of minerals, food processing/bioavailability of nutrients and in the development of analytical methods for measuring nutrients and bioactive compounds e.g., inositol phosphates. She has authored more than 130 scientific articles and is on ISI list of highly cited authors in Agricultural Sciences. She has been elected to the Royal Swedish Academy of Engineering Sciences and received in 2013 as honorary Doctorate in Medicine at Sahlgrenska Academy, University of Gothenburg.

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