CHEMICAL REACTIONS IN COOKED FOODS: THE CONSEQUENCES ON DIGESTIBILITY

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Sometime between two millions and 250.000 years ago humans domesticated the fire and begun to eat cooked foods. This was a turning point influencing human evolution and its sensory preferences. There are many good reasons for humans to prefer cooked foods: cooking strongly decreases the risk of eating foods contaminated by pathogens; cooking inactivate many heat labile toxins: many potential poisoned plant foods become edible after cooking; cooking is a social matter and cooking practices are part of knowledge to be transmitted to our fellows. From the digestion point of view it has been clearly demonstrated that cooked foods provide much more energy than the corresponding raw ones. So it is not surprising that flavours and coloured compounds formed by cooking turned into “signals of trust” for humans. The cooking flavours became potent signals of attraction to our ancestors and we still experience the same sensation when inha ling the smells of foods being prepared in the kitchen flavour or when passing by a bakery shop. In this lecture the details of the mechanisms influencing the digestibility of lipid, protein and carbohydrates present in processed foods will be provided. About lipid the physical accessibility of the fat globules is the most important parameter. Digestibility is enhanced as consequence of the physical damage of the original food structure. This has been showed, for instance, upon cooking of peanuts. When fed to mouse, cooked peanuts significantly increased the amount of energy gain compared to raw peanuts. Mild thermal treatments increase protein digestibility due to protein denaturation, inactivation of the protease inhibitors and modification of cell wall integrity. On the other hand severe thermal treatments, especially those occurring in low moisture foods, decrease protein digestibility because of protein aggregation and blockage of trypsin preferred hydrolysis sites. Finally all treatments promoting starch gelatinization enormously increase its digestibility. However industrial treatments can be much more effective than simple boiling. For instance in extrusion cooking heat, pressure and mechanical sheering to produce plasticized, expanded and cooked products are used. The moist heating combined with the mechanical shearing result in starch gelatinization but also disruption of molecular interactions between starch molecules within the granule which further increase starch digestibility.

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