The effect of the physicochemical properties of chitin and chitosan on its binding to fat in an in vitro simulation of the digestive tract.

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Chitin is the second most abundant biopolymer in nature after cellulose. It is the main structural constituent of the protective shell in insects and crustaceans, like shrimp and lobster. The chitin polimers are embedded in a protein structure which may be calsified with salts forming a hard shell structure. The biopolymer is composed of poly-N-acetyl-D-glucosamine (GlcNAc), which is bio-degradable but not water-soluble. The acetyl group connected to an amine group in the C_2 position on the glucan ring may be removed by enzymatic or chemical hydrolysis in caustic soda at elevated temperatures, producing a deacetylated form exposing free amino groups at some of the C_2 positions. When the fraction of acetylated amine groups (F_A) is lower than 0.35-0.40, the co-polymer of D-glucosamine (GlcNH2) and N-acetyl-D-glucosamine (GlcNAc) is referred to as chitosan.

The properties of chitin and chitosan are highly dependent on the physico-chemical nature of the polymers. Currently applications have been reporte in agriculture, foods, cosmetics and its properties are being investigated for both medical and pharmaceutical applications. Approximately half of the chitosan produced is being sold as a dietary supplement due to suggested lipid binding and hypocholesterolemic properties. Reports from clinical research on the effect of chitosan on fat absorption in humans has been conflicting. Some researchers have reported reduction in body fat in patients taking chitosan prior to food intake while other research groups have not observer d a signinficant effect in there trials.

Our research has indicated that the reactions are both highly dependent on the type anc chemical nature of chtosan, environmental conditions and the type of lipid involved.