

## Christian Lengsfeld, Summary

### **„Isolation and characterization of bioactive polysaccharides and extracts from okra (*Abelmoschi esculenti fructus*) and their use in GI-relevant physiological assays**

doctoral thesis, submitted in 2004

In the course of the works presented here several polysaccharide- and protein-containing fractions from okra fruits (*Abelmoschus esculentus* [L.] MOENCH) were isolated, characterized and examined regarding their effects in diverse physiological assays with relevance for the gastrointestinal tract.

The investigations focused on a rather native fruit extract, a raw polysaccharide fraction isolated thereof and its purified carbohydrate-containing subfractions. Furthermore, partly purified protein fractions of the native material were used. The native extract represented a protein- and carbohydrate-containing raw mucilage of high viscosity and pseudoplastic rheology. The purified polysaccharides were practically protein-free and their sugar backbone structures were corresponding to the rhamnogalacturonane type. Regarding monosaccharide composition, main differences were found in individual uronic acid contents, galacturonic to glucuronic acid ratios and the degrees of polymerization. Isolated protein fractions were predominantly consisting of glycoproteins with molecular weights of less than 40 kDa. The native okra mucilage as well as the raw polysaccharides extracted thereof exhibited pH stabilizing effects *in vitro* which proved to be due to their content of uronic acids. Moreover, the high molecular weight polysaccharide fraction displayed to some extent adhesive effects towards mucous gastrointestinal membranes from porcine colon *ex vivo* due to adhesive interactions with structures on the respective epithelial tissues.

In order to examine anti-adhesive properties of isolated compounds against epithelial binding of microbial gastrointestinal pathogens an *in situ*-adhesion model was established and functionally qualified using *Helicobacter pylori* on tissue sections of human gastric mucosa. After implementation for routine testing a comparable assay was established for comparable adhesive interaction studies using *Campylobacter jejuni* and mucous tissue sections from poultry colon since this species is considered as a main transmitter of *Campylobacter* infections on humans. During a broad range effector screening the native okra preparation proved to inhibit the epithelial adhesion of *H. pylori* almost completely. The most important contribution to this effect was found within the proteinaceous proportion of the extract, to a less intensive extent also within the acidic, high molecular weight polysaccharide fraction. The antiadhesive potential of active fractions was caused by their interactions with structural elements on the bacterial surface and not by mucilaginous interactions with gastric mucosa.

Similar results as with *H. pylori* on human gastric mucosa were received during assays with *Campylobacter* on tissue sections from poultry. In this case, however, bacterial binding was not found specific towards epithelial tissues but rather unspecific in areas of connective tissue. In contrast to the situation with *H. pylori* the obeyed inhibitory effects of okra were considered to reside within its glycan proportion since the native extract and the raw polysaccharides were of comparable effect.