A005 A crude polysaccharide from Abelmoschus exhibits strong antiadhesive effects against *Helicobacter pylori* in an *in situ* adhesion model on human gastric mucosa

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Okra pod is the fruit of *Abelmoschus esculentus* (L.) Moench., Malvaceae. Originally grown in tropical Asia, the plant has become a commonly cultivated crop in the (sub-)tropical regions of Africa, Latin America and Asia and in some parts of the Mediterranian area. Okra is traditionally prepared as a vegetable and is used in traditional medicine as a dietary meal in the treatment of gastric irritations, due to its high content of mucilages. Accordingly, the main component of a crude fruit-extract is an acidic polysaccharide of the rhamnogalacturonane-type with about 10% protein content (1). Here we report of studies with crude and purified polysaccharide extractions from the mature okra fruit in an *in situ*-adhesion model on sections of human gastric mucosa with *Helicobacter pylori* which is regarded to play a crucial role in the development of severe gastric diseases (2, 3). Preincubation of *Helicobacter*-suspensions with 0.01 to 0.1% solutions of the crude polysaccharide resulted in a concentration-dependent decrease in the bacterial binding to the gastric mucosa of 13 to 67% (average values) compared with the non-treated control suspension. Preincubation of the mucosal sections with 0.1% solutions did not result in a reduced binding. A 0.05% solution of a highly acidic ion-exchange fraction of the crude polysaccharide exhibited 35% reduction, whereas an intermediately acidic fraction was ineffective. Toxicity studies with the crude polysaccharide did not reveal inhibitory effects on bacterial growth *in vitro*. At present a protein digestion of the crude polysaccharide is carried out to examine the role of the peptide fraction in the binding mechanism. We regard the antiadhesive qualities of the crude polysaccharide to be due to synergistic effects of both the glycan and the protein fractions in blocking bacterial surface receptors that coordinate the interaction between host and parasite.

References: 1. Tomoda, M. et al. (1980) Chem. Pharm. Bull. 28: 2933-2940. **2.** Falk, P. et al. (1992) Proc. Natl. Acad. Sci. USA 90: 2035-2039. **3.** McColl, K.E.L. (1997) J. Infect. 34: 7-13.

A006 *In vitro* bioadhesion of polysaccharides on human cell surfaces

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Carbohydrate moieties of glycoproteins and glycosphingolipids are pivotal structures for cell-cell adhesion and signal transduction between cells. This kind of transduction process is mainly triggered after the carbohydrate is bound to an a cell-surface receptor, mediating signal cascades into the cell interior, initiating reactions during cellular maturation, differentiation and activation.

The aim of the following study was to evaluate binding capacities of different plant-derived carbohydrates on a variety of human cells by flow cytometry. We focused our attention on tumor cells and immune cells in order to obtain systematic information on the respective cellular affinity to specific carbohydrate structures.

For preparation of fluorescent-labelled carbohydrates a micro-synthesis was established enabling us to substitute any carbohydrate with a defined amount of FITC. This coupling process using FITC-isothiocyanate, was shown to be a direct and effective way to produce derivatives with a DS between 0,01 and 0,2. Labelled carbohydrates (dextrans, arabinogalactan, rhamnogalacturonans from mistletoe and *Hibiscus*, different pectins and polygalacturonic acid) were assayed by flow cytometry for binding capacity on cells from the GI-system (CaCo2, HT29), on cells from immune system (primary lymphocytes, tonsillar T- and B-lymphocytes, tumor cells (lung and colon carcinoma). Evaluation clearly showed that carbohydrate binding was cell-specific and that the assay system was appropiate for this task.

Especially polygalacturonic acid had strong affinity to gastrointestinal cells (CaCo2, HT29 and Colo320DM), while polysaccharides with lower uronic acid density i.e. a higher esterification of uronic acids showed decreased affinity to these cells. This binding was not only due to the acidic affects because neutral polymers (dextrans) also had strong affinity to these gastrointestinal cells.

These results provide the basis for further functional assays on carbohydrate-mediated adhesion and signal transduction.