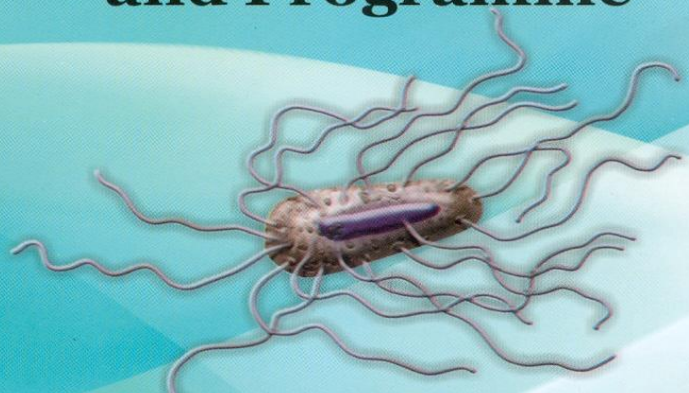
МАКЕДОНСКИ МЕДИЦИНСКИ ПРЕГЛЕД
СПИСАНИЕ НА МАКЕДОНСКОТО ЛЕКАРСКО ДРУШТВО

5-ти КОНГРЕС НА МИКРОБИОЛОЗИТЕ НА МАКЕДОНИЈА СО МЕЃУНАРОДНО УЧЕСТВО

5-th CONGRESS OF MACEDONIAN MICROBIOLOGISTS WITH INTERNATIONAL PARTICIPATION

ЗБОРНИК НА РЕЗИМЕА
и програма

BOOK OF ABSTRACTS
and Programme



28-31 Maj / May 2014

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B.16 Microbial polysaccharides as prebiotics: βeta-glucan and levan

Kekez B[1], Djuric A[1], Gojgic-Cvijovic G[2], Spasic S[2], Lugonja N[2], Beskoski V[1], Jakovljevic D[2], Vrvic M[1]

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Introduction: Use of prebiotics, nondigestible food ingredients beneficially affecting the health of the host by selectively stimulating the growth and/or metabolic activation of one or a limited number health-promoting bacterial species in the intestinal tract, has a significant role in human and animal nutrition. Beta glucans and levans from microbial origin are very actual due to many positive biological properties: anticancer and antiviral activity as well as immunomodulatory and immunostimulatory activity and this is why they have broad application in many areas.

Aim: The aim of this work was the testing prebiotic properties of two polysaccharides: levan, exopolysaccharide obtained from the strain of *Bacillus licheniformis* and β-glucan isolated from baker's yeast *Saccharomyces cerevisiae*. These two polysaccharides are structurally very different.

Material and methods: Bifidogenic effect of β-glucan was tested in a model system based on infant formulas. Prebiotic properties of levan were studied by growth of pure strains of *Lactobacillus* and *Bifidobacterium* on native polysaccharide and levan after in vitro digestion in gastric and pancreatic juice.

Results: β-D-glucan from cell wall of *S. cerevisiae* is composed of (1,3)-linked β-glucopyranoses in the main chain of which part is substituted through the position C-6 by single glucopyranosyl residues. This polysaccharide is nondigestible in the gastrointestinal tract and by testing in a model system based on infant formulas. It was shown that pure β-glucan has the greatest bifidogenic effect in relation to the crude glucan samples, which makes it a promising candidate for prebiotic. Levans are fructans, consisting of β-D-fructose residues connected by (2,6)-glycosidic linkages and one terminal α-D-glucose at nonreducing end of the main chain. Branching occurs through C-1 by fructofuranosyl residues. In comparision to the native polysaccharide the levan sample after digestion stimulated growth of tested strains to a greater extent indicating molecular weight as a key factor influencing prebiotic properties.

Conclusion: The present study showed that investigated levans and β-glucans are microbial polysaccharides which are promising candidates for prebiotics.

Keywords: β-glucan, levan, prebiotics

B.17 Dry heat depyrogenation validation

Ilioska-Zlatanovic S, Babunovska H, Popovska E, Todorovic D

Alkaloid AD, Skopje, R. Macedonia

Introduction: Pyrogens are fever-inducing substances. They are classified as exogenous and endogenous pyrogens , upon their origin from outside or insade the body. Exogenous pyrogen is any substance, foreign to the body, capable of inducing a febrile response upon injection or infection. The most potent pyrogen is endotoxin. Endotoxin occurs in the outer membrane of a dual layered, asymmetrical shell that protects gram-negative bacteria from their environment. Endotoxin is a concern for animals and people only when it comes into contact with the circulatory system via medically invasive techniques, including injection or infusion of parenteral solutions. Depyrogenation is process of inactivation or removal of the pyrogens. Dry heat depyrogenation is often the agent of choice in the pharmaceutical industry for depyrogenating items which tolerate high temperature, i.e. glassware.

Objective: The aim of our study is to validate the process of depyrogenation in the depyrogenation oven "SANYO"(PLUS II OVEN) Tip:OPL 225.DT 1.C at our microbiology laboratory.

Materials and method: We evaluated the depyrogenation process on glassware for BET (Bacterial Endotoxin test), using the LAL (Lymulus amoebocite lysate) test, with Kinetic- turbidimetric method. After the cycle was completed, the log reduction was determined by comparing the endotoxin

MICROBIAL POLYSACCHARIDES AS PREBIOTICS: β-GLUCAN AND LEVAN

B. Kekez [1a], A. Djuric [1], G. Gojgic-Cvijovic [2], S. Spasic [2], N. Lugonja [2], V. Beskoski[1], D. Jakovljevic [2], M. M. Vrvic [1]

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Introduction

Use of prebiotics, nondigestible food ingredients beneficially affecting the health of the host by selectively stimulating the growth and/or metabolic activation of one or a limited number health-promoting bacterial species in the intestinal tract, has a significant role in human and animal nutrition [1]. Beta glucans and levans from microbial origin are very actual due to many positive biological properties: anticancer and antiviral activity as well as immunomodulatory and immunostimulatory activity and this is why they have broad application in many areas [2,3].

Aim

The aim of this work was the testing prebiotic properties of two polysaccharides: levan, exopolysaccharide obtained from the strain of *Bacillus licheniformis* and β-glucan isolated from baker's yeast *Saccharomyces cerevisiae*. These two polysaccharides are structurally very different.

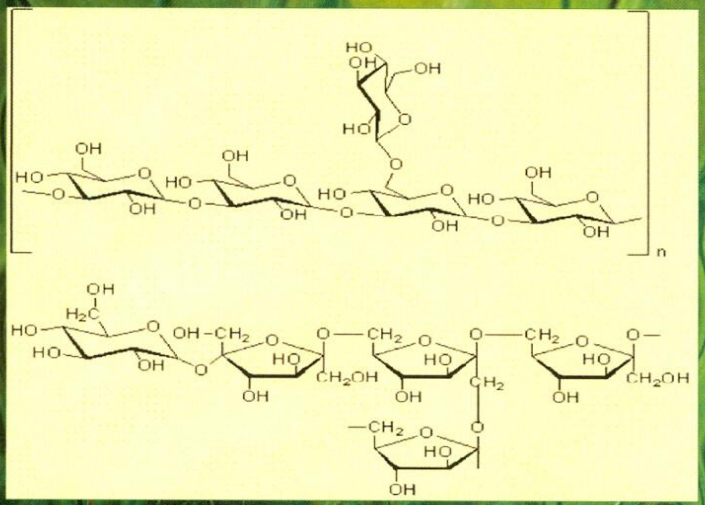

Figure 1. Structure of β-glucan and levan

Material and methods

Bifidogenic effect of β-glucan was tested in a model system based on infant formulas. Infant formula (IF) were prepared according to the producer's instructions with no cell wall extract added (control), with cell wall extracts of different glucan content (49.30%, 75.54%, 93.15% and 99.54%) or with inulin (IN, reference substrate). Mature breast milk (MBM) was also used as a reference substrate. Bifidogenesis lasted 48 h at 37 °C in an anaerostat with 5% CO_2. Total number of bifidobacteria was determinated on BML agar plates.

Prebiotic properties of levan were studied by growth of pure strains of *Lactobacillus rhamnosus* (ATCC 7469) on native polysaccharide and levan after *in vitro* digestion in gastric and pancreatic juice. Different carbon sources (glucose, inulin, fructose, FOS and levan) were used for comparing growth on MRS media after 72 h i 120 h incubation time at 37 °C.

Results

β-D-glucan from cell wall of *S. cerevisiae* is composed of (1,3)-linked β-glucopyranoses in the main chain of which part is substituted through the position C-6 by single glucopyranosyl residues [3]. This polysaccharide is nondigestible in the gastrointestinal tract and by testing in a model system based on infant formulas it was shown that pure β-glucan has the greatest bifidogenic effect in relation to the crude glucan samples (Figure 2), which makes it a promising candidate for prebiotic.

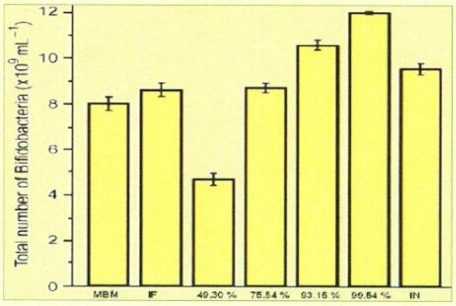

Figure 2. Bifidogenic effect of β-glucan

Levans are fructans, consisting of β-D-fructose residues connected by (2,6)-glycosidic linkages and one terminal α-D-glucose at nonreducing end of the main chain. Branching occurs through C-1 by fructofuranosyl residues [2]. Results on Figure 3. suggested that in comparison to other carbon source, inulin and levan stimulated growth of tested strains to a greater extent. Both native polysaccharide and the levan sample after digestion stimulated growth of tested strains (Figure 4).

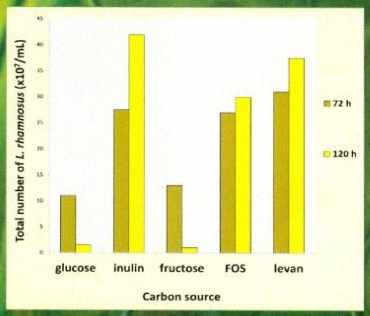

Figure 3. The effects of different carbon source on *Lactobacillus rhamnosus* growth

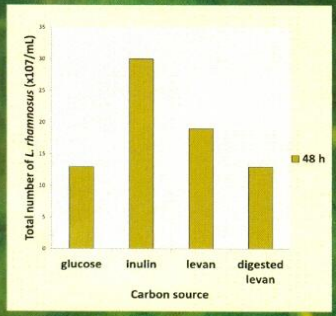

Figure 4. Comparison of prebiotic effect for native and digested levan

Conclusion

The present study showed that investigated levans and β-glucans are microbial polysaccharides which are promising candidates for prebiotics.

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