Preventive effect of rare sugars against dental caries and periodontal disease

Keywords: D-Psicose, Non-cariogenicity, Anti-cariogenicity, Dental caries prevention, Periodontal disease prevention

Outline of technology

Dental caries is a highly prevalent disease in the entire human race, and its prevention and treatment are an urgent requirement. Dental caries occurs as oral bacteria generate acids using sugars, particularly sucrose, as a source of energy, and the acids demineralize dental materials (dissolve phosphoric acid and calcium from the enamel and dentin) and make the cavity. Presently, dental caries is considered to begin as insoluble polysaccharides (insoluble glucans) generated by oral resident bacteria, e.g., *Streptococcus mutans* (*S. mutans*), attach to the dental surface. Insoluble glucans attached to the dental surface and food debris form dental plaque by the action of oral bacteria. In oral plaque, many bacteria including *S. mutans* live in symbiosis and proliferate. Acids are produced by metabolism performed by these micro bacteria, and they are considered to reduce the pH, demineralize the teeth, and cause the occurrence and progression of dental caries. Because of this series of processes, *S. mutans* is said to be the cause of dental caries (Figure).

Since dental caries is caused by such a mechanism, one recommendable preventive measure is not to eat sugars such as sucrose that generate insoluble glucans or acids by the actions of oral bacteria. However, as sucrose is indispensable for our diet as a seasoning and food component, its intake is very difficult to avoid. Also, dental plaque is widely known to cause not only dental caries but also periodontal diseases such as gingivitis and periodontitis.

Xylitol, a rare sugar, is widely known to be used as an additive for foods and sweets and to produce a marked preventive effect against caries. We are examining the effects of some rare sugars of Izumoring on the *S. mutans* proliferation, acid production, insoluble glucan formation, etc. by adding them to the culture medium of the bacteria.

Sales points

- Some of the rare sugars of Izumoring are poorly or scarcely metabolized by *S. mutans*, which causes dental caries (non-cariogenic).
- D-Psicose practically controls the bacterial growth and acid production (anti-cariogenic) also in combination with existing sweeteners.

Expected application fields and products

(1) Drugs (2) Foods and beverages (3) Foods for specified health uses (4) Cosmetics

Comparison with existing products

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Psicose</td>
<td>Uses as a substitute for glucose and fructose</td>
<td>Risk of diarrhea by massive intake</td>
</tr>
<tr>
<td>Xylitol</td>
<td>Wide</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Narrow</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Same as sugar</td>
<td>Low</td>
</tr>
</tbody>
</table>

References, patents, etc.

- Related industrial property rights: PCT/JP2007/056449

Other matters to note

(Developer’s comment)

Our objective was to discover a new “caries-preventing sweetener” or “anti-cariogenic sweetener” that can substitute xylitol and to eventually popularize and market it. D-Psicose is also expected to be effective for the control of causative bacteria of periodontal disease by suppressing the growth of oral bacteria by a similar mechanism. Eventually, joint research will be conducted with cake makers and pharmaceutical companies to develop products containing D-psicose such as mouthwash, tooth paste, gum, candies, and healthy foods. If it can be marketed, it will acquire a large share, and products will be easy to prepare. I hope that new rare sugars contribute to the prevention of dental caries and periodontal diseases through this research.

(Developer’s contact address)

TEL: +81-87-898-5111 (main number)   E-mail: ogawata@med.kagawa-u.ac.jp