THE PEDIATRICIAN ROLE IN CARIES PREVENTION

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E CHIRURGIA ORO-MAXILLO-FACCIALE
OSPEDALE “Guglielmo da Saliceto”
PIACENZA
Pathologic, infectious degenerative process causing progressive and even irreversible destruction of tooth tissues. Caries can affect any person independently of age

TSUBOUCHI.J. e coll. ASDC J DENT CHILD 1995
HOLBROOK W.P. e coll. J. ORAL SCI 1995
Multifactorial etiology of carious pathology: factors and co-factors

- Education
- Cariogenic Flora
- Saliva
- Carbohydrates
- Knowledge
- Caries
- Ability
- Tooth structure
- Oral Hygiene
- Motivation

L. STROHMENGER M. MADAU 2003
CARIogenic BACTERIA

- streptococcus mutans
- lactobacilli

The edentolous child’s mouth contains no *streptococcus mutans*. Colonization occurs after tooth eruption due to the germs entering through the mother’s and baby-nursing saliva.

BERKOWITZ R. J Public Health Dent 1996
Bacteria cause lesions because of their metabolic action on exogenous sugars

Starch hydrolysis
Synthesis of intra – and extra – cellular polysaccharides
Glycolysis
Fermentation of simple sugar
BACTERIAL PLAQUE

- Matrix of insoluble extra-cellular polysaccharides (dextrans, glucans, levans) synthesized by sucrose ingested whit food
- Bacteria
- Cellular deposits
- Food residues
- Saliva
The fermentation process of exogenous sugary by bacteria forms organic acids (lactic, butyric, acetic, formic and propionic acid) that reduce the bacterial plaque pH to 5.5. Such acids in contact with the surface of the tooth cause demineralization of the enamel. Fermentation begins within a few minutes after eating carbohydrates and last about 30 minutes.
The enamel structure shows a virtual volume (10% of tissue) consisting of porosity between the hydroxyapatite crystals, which allows exchanges of H2O and ions with saliva. In such a way, a dynamic evolution of possibly cariogenic lesions of the enamel may take place.
1. Early phase of temporary demineralization
   (release of calcium, phosphorus and fluorine)

   pH far from meal

2. Phase of mineral re-deposit – remineralization and repair of early lesions

   “(Phase supported through the cleaning and tamponading action of the saliva that carries also calcium, phosphorus and fluorine). Such elements in due concentrations may play an important role in repairing early cariogenic lesions. Repairing ability restricted to small and surface lesions.”
The presence of carbohydrates in the mouth is the necessary condition for caries to form. They do not show a direct damaging effect, however, they are the fermentation substratum for cariogenic bacteria.

<table>
<thead>
<tr>
<th>Monosaccharides</th>
<th>Glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fructose</td>
</tr>
<tr>
<td></td>
<td>Galactose</td>
</tr>
<tr>
<td>Disaccharides</td>
<td>Sucrose</td>
</tr>
<tr>
<td></td>
<td>Maltose</td>
</tr>
<tr>
<td></td>
<td>Lactose</td>
</tr>
<tr>
<td>Oligosaccharides</td>
<td>(from 3 to 8 glucose molecules)</td>
</tr>
<tr>
<td>Polysaccharides and starches</td>
<td>Several chains of linear or branched glucose molecules</td>
</tr>
</tbody>
</table>
Sucrose is the most cariogenic, followed by glucose, fructose and lactose.  
Lactose is the least acidogenic among carbohydrates – moreover, it contains not only sugar but also protective factors.  
(CALCIUM – PHOSPHATES – PROTEINS)

Marci e coll. Dent. Mod. 1996
Situlin R. Toigo G. Dietetica e nutrizione clinica Masson 1998
A good saliva secretion protects against caries:

- Cleansing and splitting up action of food residues and bacterial mass
- Buffer action for the content in proteins, phosphates and bicarbonates
- Vehicle for remineralization factor (calcium, phosphorus and fluorine)
- Content in soluble immunoglobulins
PREVENTION

1. Provide parents with oral hygiene and alimentary indications
2. Evaluate and sustain the general and topical fluoride prophylaxis
3. Determine the caries high-risk subjects
ORAL HYGIENE

Brush teeth at least twice a day after both main meals and sweetened food and drinks.

Starting at the first primary teeth

Age

0-1 rub the gingivae and erupted teeth with a wet gauze

1-4 toothbrush and toothpaste when children can rinse their mouth

Over 4 children brush their teeth with toothbrush and paste. Parents’ supervision
FOOD HYGIENE

Main factors that may increase the harmful effect of sugar

1. High consumption
2. Frequency of carbohydrates intake
3. Personal oral clearance
4. Bad alimentary habits
BABY BOOTLE TOOTH DECAY (BBTD)

Example of severe caries due to long exposition to simple sugars

In Affect 3/6% of children below 4 years of age

- Rapid development of caries
- Several teeth involved at the same time, destructive character
- Early localization of upper incisors
- Late localization of lower incisors and primary molars
49 BBTT cases – 1995 - 1997

- rubber teat with honey 34%
- Sweetened infusions 25%
- Feeding bottle with biscuits 11%
- Sweetened rubber teat 09%
- Feeding bottle with sweetened milk 07%
- Teat-shaped candies 07%

Ottolenghi e coll. Dent. Cad. 1998
INTERACTIONS OF SEVERAL CARIOGENIC FACTORS

1. Poor mineralization
2. Repeated, bad alimentary habits
3. Cariogenic microorganisms and consumption of carbohydrates
4. Personal carioreceptivity
LOCAL INVOLVEMENT

- Pulpitis
- Periapical abscess
- Fever
- Germ involvement of permanent dentition
- Extraction
- Space defect
- Atypical swallowing
- Bone hypo-development
- Retarded eruption of permanent dentition

GENERAL INVOLVEMENTS

- Difficulty in phonation
- Possible jaw protrusion forward involving the development of the oral maxillofacial complex
- Poor body weight and height

L. Strohmenger  Doctor Pedia tria Suppl. 1998
BBTD MAIN CAUSE

PARENTS’ DISINFORMATION
At present, this method is still regarded as the best caries-protective.

**ACTION**

- Solubility of enamel crystals
  - Remineralization
  - Antienzymatic action
    (inhibition of sugar fermentation due to inhibition of bacteria glycolysis enzymatic actions, enolase and phosphoglucomutase)
FLUORIDE PROPHYLAXIS

- Topical administration
- Systemic administration

In particular, a regular administration of drops and tablets turn to be simple and easy to control.

The fluoride dosage shall be determined after checking the fluorine content in local drinking in order to avoid the risk of dental fluorosis that shows greater porosity in enamel and different chromatic alterations.
<table>
<thead>
<tr>
<th>Age</th>
<th>&lt; 0,3 ppm</th>
<th>0,3-0,6 ppm</th>
<th>&gt; 0,6 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 months</td>
<td>None</td>
<td>None</td>
<td>none</td>
</tr>
<tr>
<td>6 months – 3 years</td>
<td>0,25 mg/day</td>
<td>None</td>
<td>none</td>
</tr>
<tr>
<td>3-6 years</td>
<td>0,50 mg/day</td>
<td>0,25 mg/day</td>
<td>none</td>
</tr>
<tr>
<td>6-16 years</td>
<td>1,0 mg/day</td>
<td>0,5 mg/day</td>
<td>none</td>
</tr>
<tr>
<td>Pregnancy (from 4 th month till nursing end)</td>
<td>1,0 mg/day</td>
<td>1,0 mg/day</td>
<td>none</td>
</tr>
</tbody>
</table>

AAPD  EAPD
# Fluorine Rate in Drinking Water

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt; 0.3 ppm</th>
<th>0.3-0.7 ppm</th>
<th>&gt; 0.7 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>0.25 mg/day</td>
<td>None</td>
<td>none</td>
</tr>
<tr>
<td>2-4 years</td>
<td>0.50 mg/day</td>
<td>0.25 mg/day</td>
<td>none</td>
</tr>
<tr>
<td>4-16 years</td>
<td>1 mg/day</td>
<td>0.50 mg/day</td>
<td>none</td>
</tr>
<tr>
<td>Pregnancy (from 4 th month till nursing end)</td>
<td>1 mg/day</td>
<td>1 mg/day</td>
<td>none</td>
</tr>
</tbody>
</table>
- **Toxic dose**: > 200 mg

  toxic effects (nausea, vomiting, abdominal pain, diarrhoea)

- **Lethal dose**: 4-7 g

- **Risk for fluorosis**: chronic intake > 3 mg/day below 14 years of age
1. Determine facial and oral growth, pathologies, possible trauma through full examinations; diagnosis.
2. Provide parents, tutor and nursing people with oral hygiene indications and instructions; effects of their oral hygiene on newborn (saliva diffusion on streptococcus mutans and cariogenic bacteria).
3. Remove supra and sub-gingival plaque, if any.
4. Plan general fluoride treatment after tests on fluorine sources (water, toothpaste, etc.)
5. Provide guidelines for feeding and breast-feeding. Indications and prevention of baby bottle syndrome.
8. Instructions for correction of bad habits.
11. Cooperation between pediatrician and pediatric dentist.
12. Determine the highest-risk patients for oral pathologies.
13. Plan regular checkups.
12-24 MONTHS

1. Every 6 months repeat each intervention so far made in particular in case of subjects showing high risk for oral pathology.

2. Confirm the good dietary principles.

3. Plan the fluoride treatment and topical fluoride prophylaxis.

4. Every 6 months treat with fluoride prophylaxis in caries high-risk patients.
2-6 Years

1. Every 6 months repeat every intervention made until now, in particular in case of subjects showing high risk for oral pathology. Dental hygiene indications provided shall suit the patient’s age.
2. X-Rays in case of anomalies in growth and development and pathologies.
3. Oral hygiene by dental professional every 6 months depending on patient’s needs.
4. Seal the grooves of both deciduous and permanent teeth depending on patient’s needs.
5. Instructions for trauma prevention; possible use of mouth protectors for sport players.
6. Check and treat malocclusions (cross bite, open bite, arched palate).
7. Care of every oral pathology and correct bad habits.
8. Solve any speech difficulties.
6-12 YEARS

1. Every 6 months repeat each intervention so far made.
2. Smoking information and prevention
3. Information on piercing effects
4. Groove sealing: carry out and check if any
1. Every 6 months repeat each intervention so far made, in particular in case of subjects showing high risk for oral pathology.
2. Address the patient to a general dentist.
In conclusion

Pediatricians play a fundamental role as their patients shall not only be treated but also followed and formed according to a wider and wider concept of health. For such reason, the pediatricians’ knowledge shall cover every field included odontostomatologia.