

Fluorides in dental caries prevention



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Fluorine has an extremely important task in dental caries prevention. Fluorine can be naturally found in water and in various food. It is the most electronegative element that is why it cannot be found in the nature in the elementar form.

Fluorine chemically fixed in the fluoride form creates 0,06 – 0,09% of the earthly surface. Minerals and sea salt can contain even to 2500 ppm F. Phosphates for fertilizer production have till 4,2% fluorine (= 42000 ppm). Fluorine in the mountains is due to permanent erosion washed away to lower locations and to the sea. Sea water has about 0,8 – 1,4 ppm fluorine. Thermal water as a rule 3-6 ppm fluorine, rivers and lakes less than 0,5ppm. Fluorine can come to the water as a waste during the industrial production (glass works, ceramic industry, production of artificial fertilizer). Fluorides in the air originate from the earth dust, from gas sources, industrial sources, from coal fires and volcanic gases (up to 1,4 mg/cubic metre of the air).

Food: tea leaves and some tropical fruits have relatively high fluoride concentration. Meat – low –

0,2 – 1,0ppm F, fish 2-5ppm F, fish concentrate even 370 ppm F.

Water: concentration is various, human milk about 0,1ppm F, this level is not connected with the level of F amount in the drinking water. Cow milk 0,1 – 0,3 ppm F., tea leaves as far as 400 ppm F and tea as beverage 0,5- 1,5 ppm = the fluorine level in tea beverage depends on tea kind, used amount of leaves for one cup of tea and time of making. Fresh fruit juice 0,1- 0,3ppm F, beer 0,3 – 0,8ppm F, wine 6-8ppm F.

Other sources: NaF tablets 0,25 mg F, gels and solutions for topical use 0,025 – 2%, toothpastes 0,1 – 0,15 %F: children toothpaste 500 ppm F till the age of 6, children at the age 6-10 years 1000ppm F, adults 1450 ppm F.

The general intake of fluorine – the optimal level is 0,05 – 0,07 mg F /1kg weight / day. The absorption of the majority of fluorides is quickly and almost total, it happens mostly in the stomach wall. The maximal concentration in plasma will increase to 30 minutes, absorption from water can be even 97%, from food about 80%. Blood contains fluorine blocked in organic or inorganic compounds. Fluorine is able to spread through the placenta, foetus has about 75% concentration of fluorine in blood in the comparison with mother. Fluorine is noted for its protective effect for teeth that arise and mineralize in utero (especially primary dentition).

The suspicion of the cancer and teratogenic effect of fluorine was disproved. The fluorine allergy is extremely rare. Fluorine doesn't raise the inclination to cardiovascular diseases. Fluorine is accumulated in the bones during the whole life, its normal content is 1000 – 4000 ppm.

The fluorine content in enamel and dentine is lower than in bones. The changes in teeth after the fluorine overdosis are permanent = dental fluorosis.

Fluorides are excreted especially by kidney, 40-60% of received amount in adults is excreted by urine. Kidney provides a shorttime regulation of fluoride metabolism, skeleton a longtime regulation of fluorides. The fluorine level in saliva creates about 2/3 of the plasma fluorine level. Fluorine contained in saliva is accumulated in the dental plaque, its concentration in this place can move 5-50 ppm.

Mechanism of the cariostatic effect in tooth is multifactorial. After all researches is still not completely explained. There exist two basic different principles: the first is the reduction of the enamel solubility in acids and inhibition of demineralization and the second is the support of remineralization. There exists a dynamic balance on the tooth surface between remineralization and demineralization. After food intake the organic acids develop in the dental plaque which move this balance towards demineralization. The balance is re-established with the help of buffer saliva capacity and its oversaturation by phosphates and calcium compounds. Fluorides interfere in this balance by demineralization defend and remineralization support of already demineralized areas.

With the increasing fluoride concentration the metabolic activity in dental plaque is influenced first, the microbes are then restricted in growth and in the end they are destroyed (this concentration cannot be reached in the dental plaque).

Fluorides and bacteria metabolism in the plaque:

Fluorides influence the bacteria metabolism in various places:

- on the first place they influence the saccharides metabolism, especially glycolysis
- the glucose transport to bacterial cells is inhibited
- they cause the decrease of the bacterial adherence ability
- they cause the inhibition of the intracellular synthesis of polysaccharides
- the reduction of intracellular reserve polysaccharides is not disturbed
- they have no convincing inhibition effect to synthesis of extracellular saccharides

The receptivity of dental tissues towards to dental caries can be reduced by fluorides that can be applied systematically or topically. The systemic fluoridation should be started only after former establishing of fluoride intake in water and food. The oversized receipt of fluorides can lead to dental fluorosis.

The dental caries is a dynamic process with demineralization and remineralization periods. The enamel is in favourable circumstances in a dynamic balance with saliva which is regarding to enamel overfed with calcium and phosphate ions. Oscillation balance and the ion exchange connected with the oscillation passes through several times a day, always when the oral environment changes as an answer to the oral hygiene and dietary factors.

The prism is the basic structural element of enamel. Each prism contains a crystalline material that is by its composition near to apatite $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$. Immediately after finishing of mineralization all crystals of human enamel are not created by the pure hydroxyapatite, many of them contain admixtures in the shape of radicals and elements (Carbon trioxide, Mg, Si, Na, Zn, Cl, K). These substances make the enamel more soluble in acids in the comparison with the enamel created by pure hydroxyapatite. Carbonates and magnesium are step by step substituted by phosphates and calcium and newly arisen crystals replies by their composition to pure hydroxyapatite.

After replacement hydroxyl group with fluorine ion, the fluoridated hydroxyapatite arises (hydroxyfluoroapatite) which is more resistant to acids effect. According to the j.kuklová

recent opinions the key fluorine effect (activity) depends on the presence of fluorine ions especially in the surface layer of enamel and closely under it. The influence of the local topic application of fluoride product to inhibition of caries development is today found as remarkably forceful and the presence of fluorine ions in the enamel surface is found as even more important than fluorine incorporation to enamel during enanmel development.

The effort of a permanently protection against dental caries requires the teeth must be continually exposed to fluorine ions, namely both during dental development and after their eruption to the oral cavity. Fluorine available in ion form is incorporated to the enamel crystals both in the surface and closely under the surface. This proces passes through before and also after teething.

Before the tooth eruption the fluorine ions coming to the enamel surface originate in the tissue liquid which surrounds the crown. This fluorine intake is a part of the process known as the **preeruptive tooth maturation** and it is caused by the experimentally verified fact that the biggest amount of fluorine is located on the tooth surface and just below it.

The erupting primary dentition transiently contains less fluorine in the surface layer than the erupting permanent dentition. This fact can be explained by the shorter preeruptive mature period in the primary dentition.

The proces in the oral cavity of losing magnesium and carbonate ions from apatite crystals and the process of changing apatite crystals to forms that are more acid resistani is called **posteruptive maturation**. This maturation passes as long the tooth is situated in the oral cavity and is in contact with saliva. The posteruptive maturation phernomen explains the observation, both the tooth is longer in the oral cavity and more resistant is to dental caries development.

Before and after the tooth eruption the bigger amount fo fluorine is located to the external enamel surface in the comparison to the fluorine content close to the enamel-dentin border. The fluorine cunct in this area is constant (about 100 ppm F) because this area is neither in contact with the tissue liquid nor with the saliva. The increase of fluoride content in the enamel surface after the tooth eruption is caused by the fluorine ions intake from oral liquids. The fluoride vale is in the surface changed from 500 ppm in the preeruptive mature to 900ppm during the posteruptive mature.

The key mechanism of fluoride efect is the everyday creation of low F levels in the oral cavity. After demineralization the fluorides help the enamel crystals in the tooth surface and in the lesion body to their recrystalisation. The crystals are losing their admixtures (magnesium, carbonates) and they turn into bigger and more resistant against the dental caries. The acids production by the microbial flora is found as the reason of an early caries lesion. The continual minerals exchange physiologically exist between enamel and saliva.

The presence of fluorinde ions can inhibit the mineral loss eventually fluorides make the loss reversible. There exist an important establishment that the ion balance tends to incline to the favourable side. Fluorine ions from drinking water or from other fluoride sources come back to the oral cavity in such concentration that is sufficient to the dental caries inhibition and that is supporting the remineralization. Small differences in fluoride of exogenic origin levels in saliva (already close to 0,01ppm value) can be the reason of the various senzitivity to the dental caries in children. The frequent fluoride application to the tooth surface through using toothpastes containing fluorine, using fluoridated drinking water, using rinsing of fluorine solutions and application of gelée raises the healing of early caries leasions and inhibit demineralization. Using of fluoride containing products create the reduction of dental caries on smooth and approximal teeth surfaces. Sealants protect pits and fissures on the

chewing teeth surfaces against caries. combination of these methods can contribute to very effective dental caries prevention.

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Because fluoride is such an active trace element the overdosis can be dangerous for the child's life. The **acute toxic dose** – this situation may occur if 5mg F /kg body weight has been ingested. The child will rapidly develop nausea and epigastric distress, often followed by vomiting. The child should be referred to hospital emergency immediately for observation and emergency treatment. From reported cases it can be concluded that if a child ingests a fluoride dose in excess of 15 mg/kg body weight, death is likely to occur. **Certainly lethal dose:** death will happen if the intake of fluoride is 32 – 60 mg F/kg body weight (calculated on adults). Symptoms are spasm, depression of respiration and finally unconsciousness. Immediately transportation to hospital is essential.

In the case the child ingests higher amount of pills, it is useful to call out vomiting and let the child drink higher amount of milk. It is proper to rinse the stomach by 10% calcium chloratum, this solution will reduce the F absorption. Calcium is possible to use as an antidote for instance Calcium Biotika i.v. in 10ml dose.

The whole package of NaF tablets – the whole package has 250 pills = 62,5mg F = 137,5 mg NaF. The child is not endangered after eating the whole package. The toxic dose is 5mg F / 1kg weight, the lethal dose is 15mg F / 1Kg body weight. The child in the age of 2 years has about 15 kg body weight = the toxic dose is $5 \times 15 = 75$ mg F = more than one package. The lethal dose is $15 \times 15 = 225$ mg F = 3,6 whole packages.

Lethal dose in children is also drinking of 100 ml 2% NaF at the age of 2 years.

Dental caries prevention – methods of systemic application

= drinking water fluoridation, tablets, drinking of mineral waters, milk fluoridation, salt fluoridation

Drinking water fluoridation

Fluoridation of drinking water was and still is a basic part of preventive programmes in many countries. This preventive method reduces the number of caries for 40-50%. Advantages: this method doesn't need neither the cooperation of the recipient nor the direct participation of the medical worker. Charges are relatively low especially when comparing cost/benefit. Drinking water fluoridation can be indicated as highly effective. The most suitable concentration of fluoride ions in respect to the dental caries prevention is **1 mg F / 1 l water = 1 ppm (parts per million)**. This dose has still preventive anticaries effect and it already doesn't cause toxic manifestation. For the first time the water fluoridation by means NaF started in 1945 in the USA, in Grand Rapids town. In the Czech Republic started to be used in 1958. In 1990 in our Republic the water fluoridation was canceled because of the non-democratic possibility to choose of using this method.

The used compounds:

- NaF – graywhite powder without smell, small and middle waterworks
- Na_2SiF_6 – soft. Almost colourless, lower solubility than NaF
- MgSiF_6 – high solubility
- KF- in some countries for home waterworks
- H_2SiF_6 – highly corrosive material

- (NH₄)SiF₆ – well soluble used in the USA

Drinking water fluoridation is recommended in areas where

- the central drinking water source exist
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- people really drink the water supply water

- DMF index in 12 years children is 1,2 and more

- caries incidence is growing

Fluoridation effect: decline of caries number goes towards to lower number of teeth extracted due to caries in the middle age and this means the prosthetic is moved to higher age groups. The patient is saved from the pain and caries complications, we can expect time saving of dentist and nurse, saving of materials, instruments and energy costs for fillings and prosthetic substitutes.

Fluoride tablets with NaF

These tablets have been distributed in the Czech republic since 1966 as Natrium Fluoratum Slovafarma tablets. One package has 250 tablets, each of them contains 0,55 mg NaF = 0,25 mg F. The recommended dose depends on the fluoride content in drinking water and in food. The total daily dose must be separated to portions. It is not possible to take these pills immediately after toothbrushing with fluoride toothpaste. To reach the same effect of NaF tablets as the effect of drinking water fluoridation, it is necessary to take tablets at least 300 days a year. Tablets are caught on doctor receipt. It is necessary to determine the F content in drinking water and dietary habits in the family at first (which type of water is used for children in the family – baby water, Good water – the content of F in this water). The pills can be dissolved in spoon of tea for sucklings, j.kuklová

older children can let the pill dissolve in mouth and the local F concentration will be higher, even 1000 ppm. These pills can be recommended to pregnant woman as well in the second part of pregnancy. Sucklings can receive the pills after the 6th month and then to the age of 14. Various study show the dental caries reduction in the range of 25 – 80%, majority of researches over 50%

The newest recommended dosage for NaF tablets depends on age and F level in the drinking water in the family:

	In the water is less than 0,3mg F	amount of F 0,3 – 0,5	more than 0,6 mg F
Age			
6 month to 3 years ○	1tbl = 0,25 mg	○	
3 to 6 years ○	2 tbl = 0,50 mg	1 tbl = 0,25 mg	
6 to 16 years ○	4 tbl = 1,0 mg	2 tbl = 0,50 mg	

In the case the NaF tablets will be given collectively, it is necessary to provide:

- the establishment, check-up and organisation must be managed by dentist
- taking pills on free days, during holidays or illness of a child must be reserved

- proper skill of people giving tablets to children
- monitoring of dental condition in children at the same time

Advantage: the possibility of exact fluoride dosing, the possibility of an individual and collective prevention, the technical equipment is not necessary, an easy application method.

Disadvantage: the cooperation with the parents and guarantee of the right dosage

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Fluorine and mineral water

Mineral water is according to the Czech standard ČSN 86 8000 defined by this way:

- natural mineral waters : they spring up from natural and other springs, that at the place of the spring contain more than 1g dissolved solid substances or 1g dissolved carbon dioxide in 1l of water

- natural curative waters: they have thanks to their chemical composition and the physical character scientifically proved useful effect to the human health

- natural mineral table waters: waters that are by their chemical structure, physical and gustatory features acceptable as beverages. One liter contains minimally 1g of dissolved carbon dioxide and maximally 6g dissolved solid substances that have no significant pharmacological effects

Dental caries prevention by the help of table mineral water is a method, that can be used individually and collectively. Mineral waters with lower F content are more useful in summer (the people are drinking a higher amount of liquid) and on contrary in winter. It is necessary to follow the nitrate content in the table mineral waters. The level higher than 15mg nitrogen trioxide in 1l water is dangerous, in small children it can cause the alimentary methemoglobinemia.

Salt fluoridation

It was proposed 1950 in Switzerland by dr. Wespi, who imitated the salt iodination which was established 1920. The salt fluoridation was for the first time established in the town Curych in 1955. Fluoridated salt contains 250 ppm F. Fluorine is in the form of NaF or KF added as a solution during the salt production. The solution makes the constant a homogenous fluoridation possible. Disadvantage: it is not possible to check the fluorine amount exactly, the small children eat meals without salt at all or with only a small number. In the case the family will use this salt, the basic part of salt for food has to be the normal iodinated salt, for the salt with F only for giving a small amount. The dental caries reduction is described even 60%. On the market in our republic is since 1994.

The milk fluoridation

Milk is a food recommended especially for pregnant women and small children. The milk fluoridation is done before pasteurization by adding 100ml 2,2% NaF solution to 1000 litre of milk, no other equipment is necessary. The milk fluoridation was established 1962 in Switzerland for the first time. Disadvantage: the milk consumption is not constant even in the same person. Some people are allergic to cow milk. After 6 years of usage the caries reduction on the level 30% in the primary and permanent dentition in 5-6 years old children was found out. In our republic this type of fluoridation doesn't exist.

Dental caries prevention due to the local methods – topical application of fluorides

The centre of gravity of fluoridation is gradually displaced to local = topical methods of fluoride application. The aim of these methods is to create a protective fluoride concentration in the surface enamel layers in value about 1000 ppm and by this way to raise the enamel resistance against acids. This concentration is gradually spontaneously reduced that is why the fluoride application has to be repeated.

Fluoride application has also a protective influence to the physiological and pathological processes in tooth plaque (microbs growth, polysaccharides production, acids production).

The topical fluoride application is acceptable especially in areas where drinking water contains less than 0,7mg F /1 l water. Topical application is suitable for children at the age from j.kuklová

3 years to the end of the compulsory school attendance. The local topical methods can be each other combined. Dental caries reduction can be found between 20-50%. The local topical application is done by these ways:

- personal oral hygiene – toothpastes, gels, mouthrinses
- collective using of fluorides in children groups (kindergartens, grammar school, children´s home) – toothpastes, mouthrinses, gels. The cooperation with the teachers is necessary
- consulting room – using by dentist or educated medical staff = mouthrinses and gels in higher concentration, varnishes, compress application methods. These methods have to be done in children and young people twice a year. Even more frequent application of fluoride products is suitable in these cases:
 - children with acute forms of caries
 - children with fixed orthodontic appliances, removable denture
 - children physically and mentally handicapped – treating according to their cooperation possibility

Methods: toothpastes, rinsing methods, gels, varnishes, compress methods, chewing gums

Toothpastes with fluorides

They can reduce dental caries for 20-30% if they are regularly used. The toothpastes are divided according to the organic and nonorganic fluoride compounds content in:

- toothpastes with 500 ppm F = preschool age
- toothpastes with 1000 – 1500 ppm F = commonly used
- toothpastes with higher F content 1800 – 2500 ppm = therapeutic. These toothpastes are recommended and suitable for people with increased caries risk.

Children in preschool age must use toothpastes suitable for this age because children in this age swallow a large amount of the used toothpaste during each toothbrushing. It is necessary to put only small amount of the toothpaste to the toothbrush. Dental fluorosis can be caused by using cosmetic toothpastes and their swallowing in this age.

The fluoridated toothpastes by using twice a day are estimated as a very effective device in caries protection. They cause the increase of fluorine ions in saliva for several hours, they

increase the fluorine concentration in the dental plaque, they inhibit the demineralization and support the remineralization.

NaF, monofluorophosphates, aminfluorides and tin difluoride are the various effective compounds of fluoride toothpastes.

Rinsing methods

They have created the part of all preventive programmes since the 50th in the last century. They can be used both as a part of an individual dental care and as a part of a collective dental care in school preventive programmes.

The effective substances of solutions for rinsing are especially: NaF, aminfluorides, fluorophosphates, tin difluoride.

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NaF solution in 0,05% concentration is suitable for *home care*. The rinsing is recommended for 1-2 minutes after the evening oral dental hygiene. The irrigations are done either daily or in short time intervals.

The solutions in 0,2 – 0,5% concentration are suitable for *group using*, the irrigations are performed under the supervision of educated person. This method is not recommended in children younger than 6 years due to the danger of solution swallowing. It is an ideal method for school preventive programmes in areas with middle and high cariogenicity (caries risk). The fluoride prevention by *Berggren's method* can be used in groups in kindergartens: children clean their teeth with fluoride toothpaste, then they brush teeth with the toothbrush dipped in F solution for 4 minutes. This application is done 4 times a year. The educated person is necessary as a supervisor.

Compress methods

They are relatively laborious. That is why they are only seldom used. They are carried out by a dentist or educated medical workers. *Knutsson's method*: cleaned teeth are faced for 5 minutes by absorbent cottons which are dipped to 2% NaF solution before. After this application the child will not rinse and eat for 30-60 minutes. The solutions are applied 4 times in week intervals every 6 month.

Solutions, varnishes, gels

These methods are carried out by dentist or educated staff.

Solutions: application of 2% NaF solution for 4-5 minutes. Child will neither drink or eat for 30-60 minutes after application. Application should be repeated 4 times in week interval every 6 month.

Fluorides gels and varnishes: an ideal method for dental caries prevention. It is indicated especially in handicapped and risk children.

Using at home: the materials are applied with the help of toothbrush technique. They are established for children with higher dental caries susceptibility and for children with fixed orthodontic appliances. The material Elmex gelée is used most often once a week. The child will brush the teeth in the evening with the toothpaste and with the toothbrush. After rinsing the parents or the child put pea amount of Elmex gelée on the toothbrush and then the child cleans teeth again for 2-3 minutes. After then the child can only spit out and without rinsing will neither eat or drink till morning.

Using in the dental office: the same material is applied to tooth surface after the professional cleaning of the teeth, dry field is necessary. The gel will be applied in quadrants.

Material: Elmex gel 1,25% - aminfluorides, APF = acid fluorophosphates – acidulated phosphate fluoride 1,8%

Fluoride varnishes: they have the advantage of longer contact of fluorine ions with enamel surface. They are determined first of all for the professional application by dentist especially in people with high caries risk. Even 50% caries reduction can occur after their application. They are used after professional toothbrushing in dry field, in quadrants, , after the application the treated person will neither eat or drink for 30 – 60 minutes. The treated person will not brush the teeth during the application day and it is necessary to eat soft food during this day. That is why afternoon is the best time for this type of application. The application is recommended 4 times a year. Varnishes create a thin film on the tooth surface and make the fluoride contact to the enamel longer. Varnishes materials are most frequently produced on the self-polymerized polyuretan base. They contain: fluorsilan (Fluor-Protector Vivadent), aminfluorides (Elmex-Protrector Gaba), monofluorophosphates (Difluena Spofa Dental) in 2-3% concentration.

Using at least 3 times a year is convenient.
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Chewing gums

This method is popular especially in children and adolescent. The chewing gum Fluorgum containing NaF was present on the market in the Czech Republic.

Dental fluorosis

Dental fluorosis is a qualitative defect of enamel caused by a long-term intake of high amounts of fluoride during the period of tooth formation. The threshold dose to develop mild fluorosis in permanent teeth has been estimated to 40-100 mikrogram F/kg body weight and day. However, it has been found that for the individual there are no threshold values below which fluorosis can not occur. From many parts of the world trends towards increasing levels of mild fluorosis following F-supplements have been reported. The reason might be the increased ingestion of fluoride from water, food, beverages and dentifrices during the period of tooth formation, in particular the first 2-4 years of life. Control and recommendations of fluoride intake are the major obligations of the pediatric dentist. However, it should be emphasized that carefully, professionally applied topical fluorides are not a risk factor for dental fluorosis.

Clinical description: dull opaque whitish areas in enamel, stripping, spotted arrangement, uneven surface, in serious cases even areas with enamel hypoplasia

For the first time classification of fluorosis was done 1934 by Dean. Fluorosis was 1974 divided by Jackson to 6 groups according to the findings:

Type A: white spots with diameter less than 2mm

Type B: white spots with diameter 2mm and more

Type C: brownish coloured spots with diameter less than 2mm regardless to possible presence of other white spots

Type D: brownish coloured spots with diameter 2mm and more regardless to possible presence of other white spots

Type E: horizontal white strips regardless to possible presence of other white unlinear areas

Type F: brownish coloured or white spots or strips connected with small hollows or hypoplastic areas

This damage is originated during the formative phase of enamel and it is irreversible. It cannot be formed after completing of enamel mineralization – approximately after the 8th year of child's life.

Prevention: forestalling an excessive F supply to organism during the mineralization of the enamel. Excessive dose: double of optimal F level in drinking water for given geographic area. Our geographic location – optimal F level= 0,8 – 1,2 mg F /l. Prevention of fluorosis: it is necessary to know: F content in the used drinking water + other F sources in food, external environment + used toothpastes and mouthrines. Only after knowledge of all these informations it is possible to determine proper preventive F dose.

Therapy: exclusively process that improve esthetic look of teeth

The systemic application of chronic toxic fluorides amount (for example fluorides concentration more than 1,5ppm in drinking water) or single short-term effect of high fluoride concentration to ameloblasts restrict the creation and maturation of enamel during the time j.kuklová

the dental crowns are developing (to the age of 8 years). In consequence the enamel changes develop which are denote as dental fluorosis. The frequency and importance of these changes are growing up together with the growing concentration of chronically increased fluoride intake.

It is not important how was the intake of high fluoride doses caused. All forms of fluoride applications (drinking water application, fluorides tablets, toothpastes with fluorides) can due to relative overdose cause the dental fluorosis.

Especially uncontrolled combination of various fluorides applications represent a certain problem. The total daily fluoride income during longer period determines the risk of dental fluorosis creation. In these changes histologically more or less marked porosity and structure defects under the enamel surface are found. Clinically white opaque spots and strips are found, that in the case of more marked porosities can be coloured due to exogenic pigmentation. The surface defects and enamel losses (pitting) that we can see in severe fluorosis enamel changes are formed only secondary after tooth eruption due to mechanical load in the oral cavity.

In the primary dentition the hypoplastic changes created by fluorides are less often than in the permanent dentition. The enamel changes in the oral cavity are not arranged harmoniously. They increase in the direction from the frontal to distal part and in the lower jaw they are found buccally more often than lingually. In the case of the mild chronic fluoride overdose with minimal fluorosis changes their occurrence is a little other. In this case the central incisors and first molars are affected less than premolars and second molars. It seems the first mineralized teeth have less amount of fluorosis changes.

Dental fluorosis changes appear symmetrically and they show some characteristic. Previously all enamel spots were marked as „mottling“ and that is why according to this created index the diagnosis of part of enamel fluorosis changes was wrong done.

1934 Dean and al. described the fluorosis index and he modified it 1942. Still all opacities were included. This index in its assessment starts only in cosmetically hampering enamel

opacities, it doesn't deal with initial, very mild fluorosis. The fluorosis index according to Dean (better Mottling index) is often used even today. It can be easy done and an adequate lighting and excessive tooth surface drying is not necessary. The community index of dental fluorosis was created on the basis of Dean classification.

Assessment	description	degree of afflictions
Normal	no enamel changes	0
Disputable	isolated white spots	0,5
Very mild	small opaque white enamel areas that cover less than 25% of enamel tooth surface	1,0
Mild	white opacities that cover up to 50% of the tooth surface	2,0
Middle	restricted brownish spots that cover more than 50% of the tooth surface	3,0
Severe	brownish spots, hypoplastic changed tooth erosions or abrazion	4,0

Dental fluorosis or better Mottling-index according to Dean (Community index of dental fluorosis) can be used for epidemiological studies on dental fluorosis occurrence. Selected teeth or all teeth are assessed, only two mostly affected teeth are included.

Formula for index: $F_{ci} = (n \cdot w) \text{ divided by } N$

N – total number of examined pearsons

n – number of pearsons with positive fluorosis finding

w – gravity of affliction

Early Childhood Caries : IAPD Bangkok Declaration

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Early Childhood Caries (ECC) is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing or filled (due to caries) surfaces, in any primary tooth of a child under six years of age.

This disease has major impact on the quality of life in children and their families.

ECC is considered to be a biofilm-mediated, sugar-driven, multifactorial, dynamic disease that results in the imbalance of demineralization and remineralization of dental hard tissues.

Recommendations:

To reduce the prevalence and burden of ECC worldwide, the IAPD Bangkok Declaration recommends the following actions: Four key areas requiring action with multiple stakeholders are as follows:

1. Raise awareness of ECC with parents, caregivers, dentists, dental hygienists, physicians, nurses, health professionals and other stakeholders.
2. Limit sugar intake in foods and drinks and avoid free sugars for children under 2 years of age
3. Perform twice daily toothbrushing with fluoridated toothpaste (at least 1000 ppm) in all children, using an age-appropriate amount of paste
4. Provide preventive guidance within the first year of life by a health professional or community health worker and ideally, referral to a dentist for comprehensive continuing care

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