
بسم الله الرحمن الرحيم

Community Dentistry Third class

Water Fluoridation and Dental Public Health Part 1

11th lecture

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What is fluoride?

- Fluorine: Freely available in nature, not in its elemental state —high reactivity.
- Oxidation state of fluoride ion: –1
- Concentration varies: earth, fresh ground water, sea water
- Dietary constituents: fish, tea
- Non-dietary: toothpaste, mouth rinses, etc

Historical background

When Frederick began dental practical in Colorado spring in 1901 has been noticed a feature of dental enamel among local residents which he had previously not encountered elsewhere, this condition was known as Colorado Brown Stain and exhibited itself as a stain of varying intensity ranging from fine pale to dark brown mottling which could be quite ugly.

Since 1930 fluoride (F), was demonstrated for its anti caries effect. Fluoride in small doses has a remarkable influence on dental system. It causes a strong inhibition of dental caries, while in large concentration it may cause disturbances of the enamel formation (dental fluorosis).

- Frederick become interest in the condition and his investigation showed that the stain in area around Colorado and these led him to conclusion that causative agent was found in the drinking water of communities and also he observed in this area where mottled enamel condition was found the prevalence of dental caries appear lower.
- Dean began by devising an index of mottled enamel in 1934 then modified in 1942 and this index is used today in six grades of severity.

FLUORIDE in TEETH

- **Fluoride: identified as one of the elements present in dental hard tissues.**
- **Fluoride ion is "calcium –seeking"**
- **Apatite: the principal mineral of skeletal tissues. Crystallized form of calcium phosphate :**

$Ca_{10}(PO4)_6(X)_2$. If:

'□ X' is OH □ hydroxyapatite

'□ X'is F □ fluoroapatite : more regular

Fluoride Concentration in Teeth:

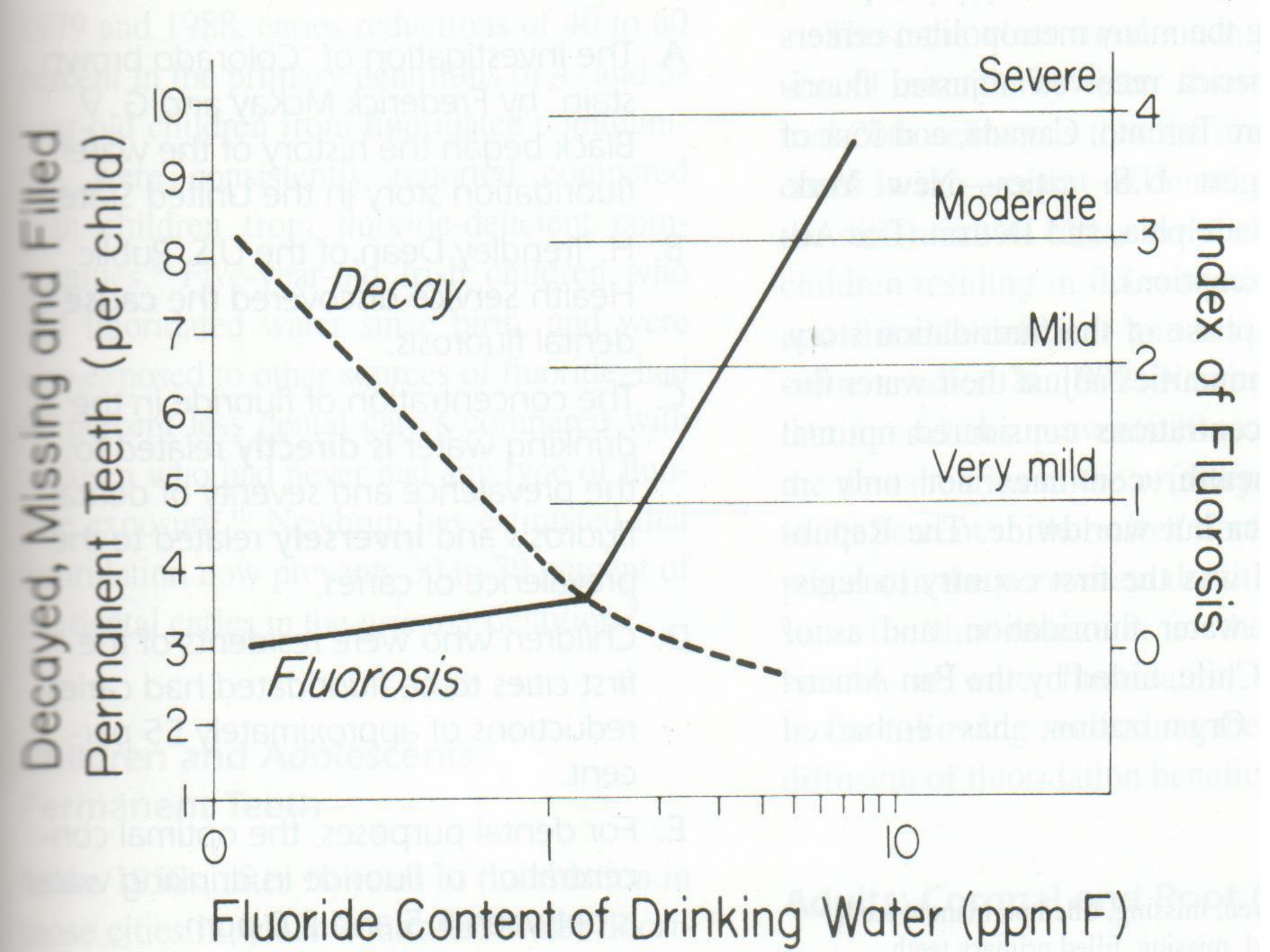
It is estimated that substitution of only 10% of hydroxyl groups in enamel apatite by fluoride, renders the enamel maximally resistant to caries • Concentration of fluoride is higher on the surface enamel compared to the deeper layer, in permanent teeth compared to deciduous teeth formed under the same circumstances

Definition of Fluoridation

'Water fluoridation is defined as controlled adjustment of the concentration of fluoride in a communal water supply so as to maximum caries reduction and a clinically insignificant level of fluorosis.'

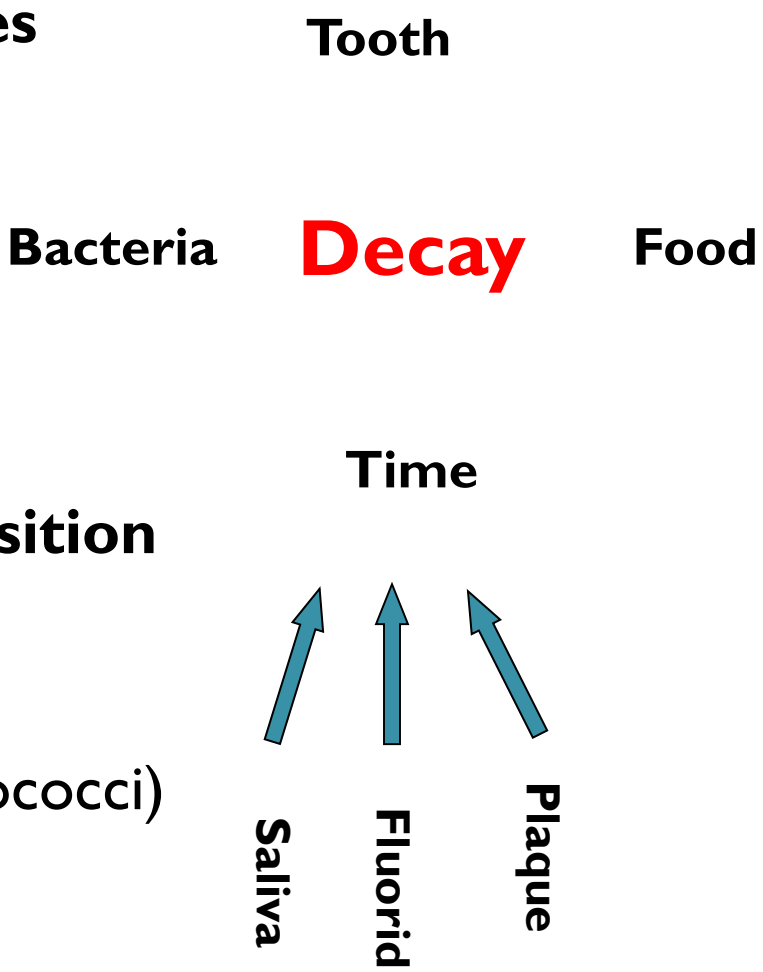
Adjusted water fluoridation

- Optimal level varies in the U.S. range from 0.6-1.2 parts per million
  - Exact level for a given location depends upon ambient air temperature
- 1 part per million (ppm) is the same as 1 milligram per liter (mg/L)


Decayed, Missing and Filled Permanent Teeth (per child)
10
9
8
7
6
5
4
3
2
1
Decay
Fluorosis
Severe
Moderate
Mild
Very mild
4
3
2
1
0
Index of Fluorosis
0
1
10
Fluoride Content of Drinking Water (ppm F)

Risk Factors for Caries

- Diet
  - **sugars and carbohydrates**
- Oral hygiene
- Xerostomia (Dry Mouth)
  - **fluoride**
  - **salivary flow and composition**
- Bacteria Levels
  - (especially mutans streptococci)



Advantages of water fluoridation

Easiest way to ↓ prevalence of dental caries.

1- Costless.

2- Saving the working time.

3- Saving the human suffering (toothache).

4- Saving physical and mental trauma.

5- Reduction 50-60 % in dental caries, when children drink fluoridated water during the total period of tooth calcification.

6- Both dentition are affected.

7- Benefits last throughout the life mainly effect on smooth surfaces of the teeth rather than pits and fissures.


Thank You