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Caries Prevention

By

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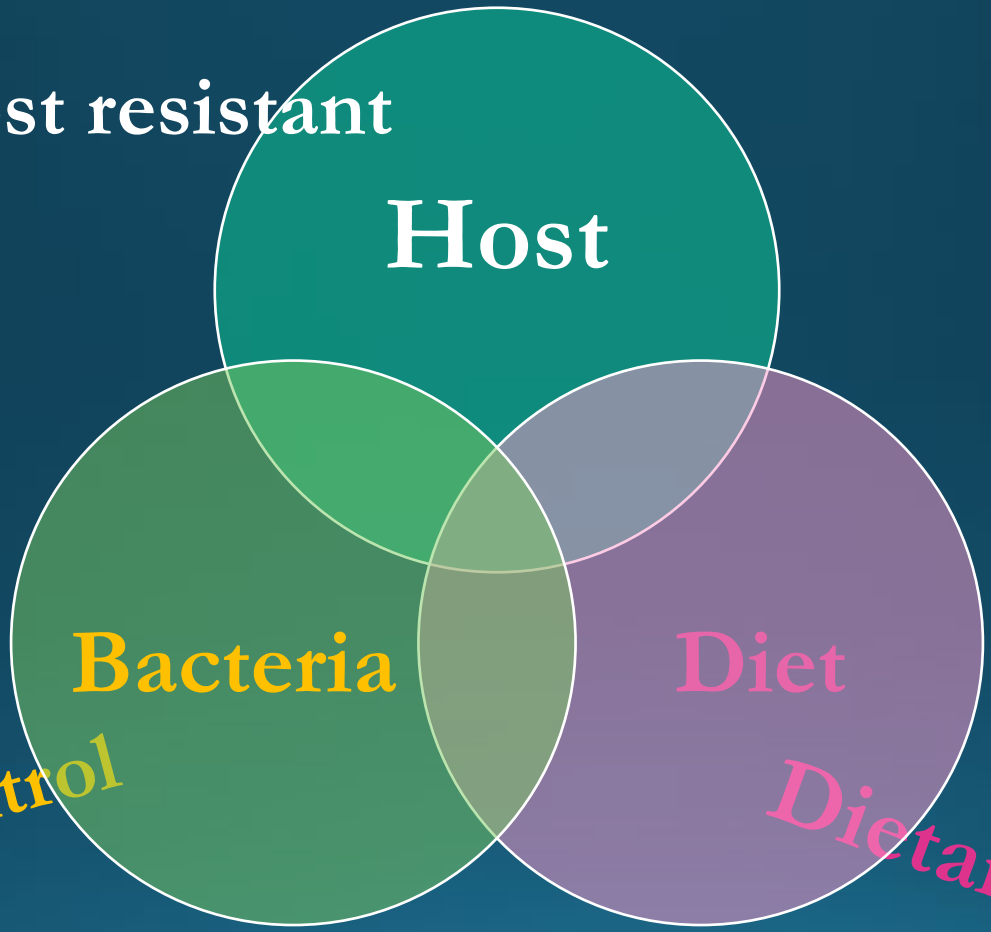
Dental Caries Prevention

Improve host resistant



Strategies for caries prevention

- Modifying caries promoting ingredients of the diet:
  - Reduction of carbohydrate
  - Sucrose substitutes
  - Additives for caries prevention
- Combating caries inducing microorganisms:
  - Mechanical
  - Chemical
  - Immunological
- Increasing the resistance of the tooth to caries:
  - Fluoride
  - Fissure sealant
  - Laser light
  - Remineralizing solutions

Caries prevention
by
Increasing the tooth resistance

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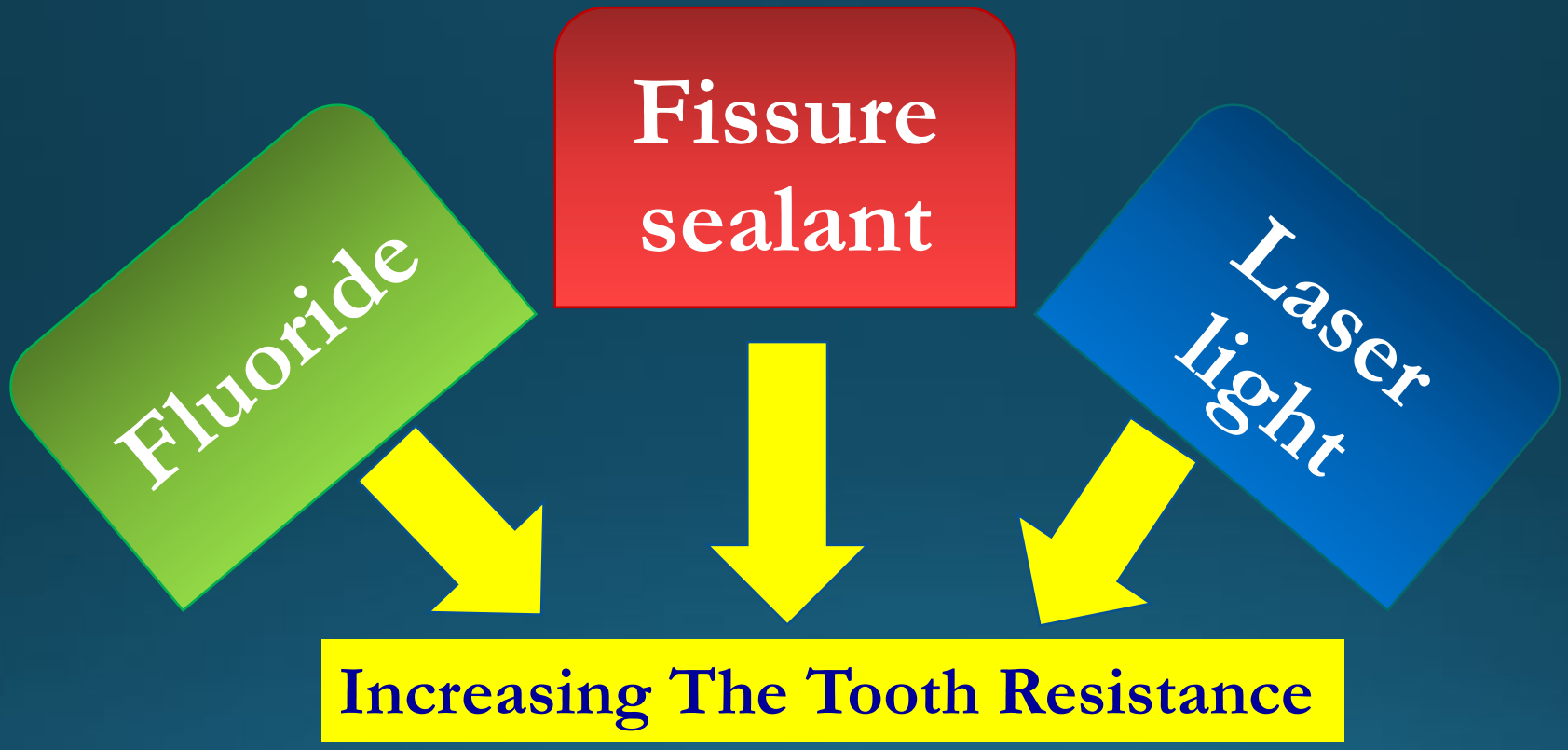
Increasing The Tooth Resistance



FLUORIDE

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What is fluoride?

- Halogen.
- Electronegative (F^-)
- Most active element.
- Not present in the free form.
- Possess anti-cariogenic effect

Sources of fluoride

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Sources of fluoride

- **Soil:** Rocks, soil, and volcanic rocks
- **Water:**
  - Sea water (1.2-1.4 mg/kg)
  - Rivers (Nile river: 0.37-0.42mg/kg)
  - Oceans (1mg/kg)
  - Deep wells

- **Air:** Air of the non-industrial areas contains 0.05 to 1.9 mg/m^3.

  Air in industrial areas have higher level of fluoride 18-19 mg/m^3 (production of aluminum, phosphate fertilizers ,plastics & heavy metals)

- **Food:**
  - Meat and poultry contain little fluoride
  - Sea foods may contain 2.5ppm
  - Most of beverages & tea.
  - Banana &Potatoes

- **Drugs and general anesthetics:**
  - Diuretics (Benzothiadines)
  - Tranquilizers (Phenothiazines)
  - Anesthetic agents (Halothane ,Enflurane)

Metabolism

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Metabolism

- **Absorption** :

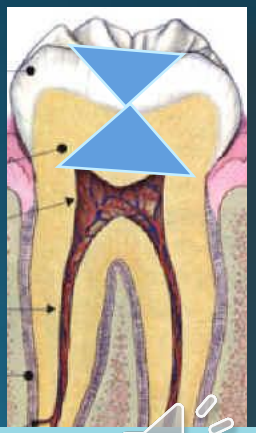
  Over than **85%** of the ingested fluoride is absorbed through the **GIT** & via **lungs**

- **Distribution** :
- **B**one: more than **95%** of the fluoride in body is retained in bone (cancellous > compact)
- **T**eeth : Enamel…high conc at surface (**2,200-3,200 ppm**)

  Dentin…higher conc at pulpal surface

  Cementum……(**4,500** ppm)

  Pulp…..(**100-650** ppm)



Soft tissue:

- The **k**idney , **h**eart and **l**unges accumulate the **maximum** amount of fluoride

- **B**rain and **a**dipose tissues accumulate **the least** amount of fluoride

Fluoride in the plasma : **0.4- 0.9** mg/L

Excretion of fluoride:

- Kidney: **30%** within **3** hrs and **40-60%** within **24 hrs**.
- Gut :**10%** is excreted in feces
- Sweat : **10-25%**
- Traces: in saliva , milk , tears and hair.

Fluoride and dental health

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Uptake of fluoride by the teeth

- Before eruption:

  During calcification and further amounts of fluoride are taken up from the surrounding tissue fluids before eruption.

- After eruption:

  After tooth eruption, during enamel maturation? There is continued accumulation of fluoride in enamel from saliva, fluoride containing water and food.

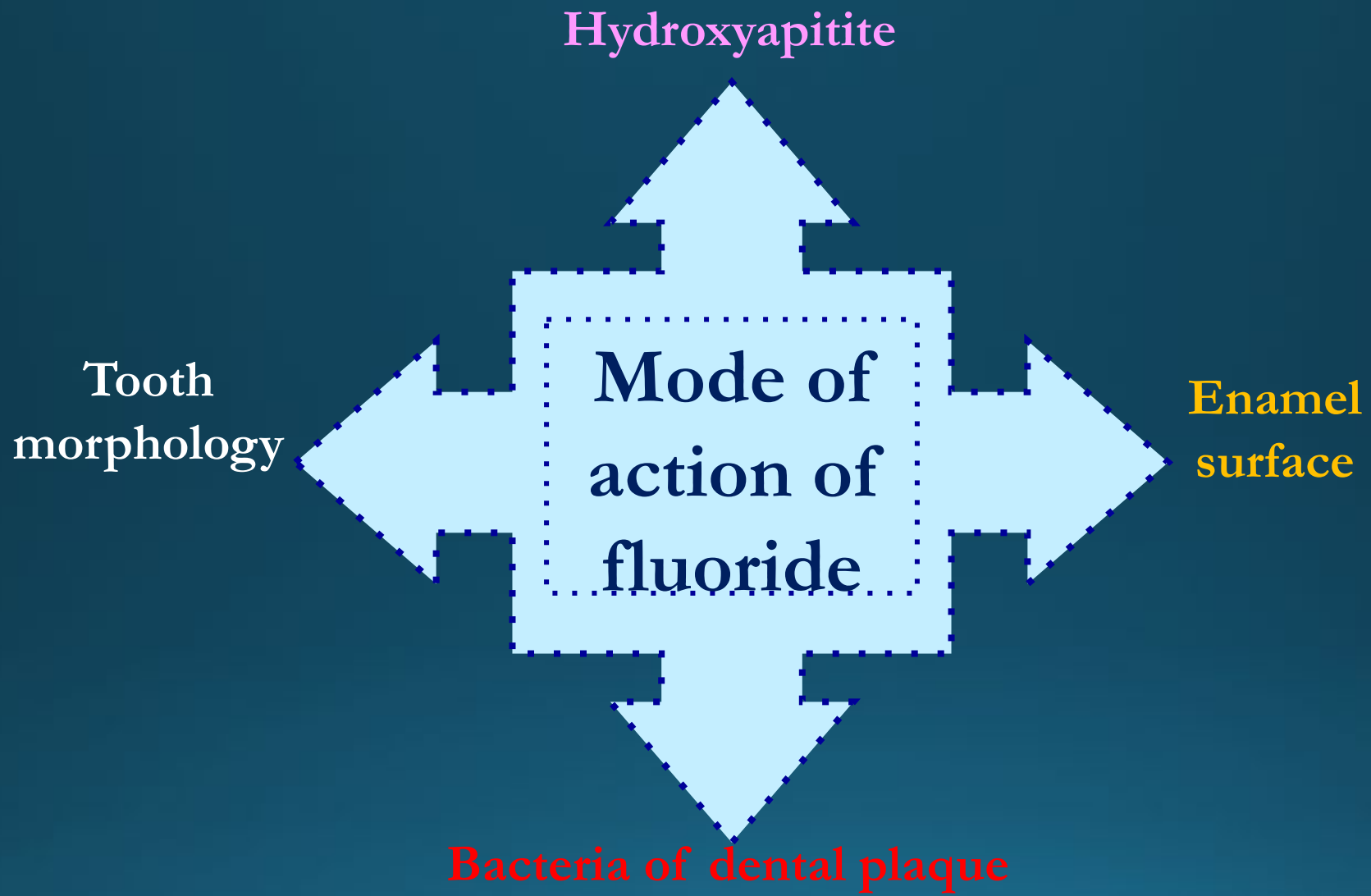
Fluoride and dental health

- Affinity between **fluoride** ions and **hydroxyapetite** of teeth and bone.
- Inverse relationship between **fluoride** and **carbonate** concentrations in enamel
- **Fluoride** is an important anticariogenic agent
- It inhibits **demineralization** and enhances **remineralization** process.

Mode of action of fluoride

1. Ionic exchange.
2. Bacterial inhibition
3. Enzymatic inhibition (inhibits glycolysis)
4. Aids in remineralization of demineralized enamel.

5. Fluoride lowers the enamel surface energy.
6. Effect of fluoride on tooth morphology.


Hydroxyapitite
Tooth morphology
Mode of action of fluoride
Enamel surface
Bacteria of dental plaque

Mode of action of fluoride

- Action on hydroxyapitite
  - Decreasing its solubility
  - Improving its crystalinity
  - Remineralization
- Action on bacteria of dental plaque
  - Inhibiting bacterial enzymes
  - Suppressing cariogenic flora
- Action on enamel surface
  - Lowering the free surface energy
- Alteration of the tooth morphology

Methods of Providing Fluoride

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Methods of Providing Fluoride

Systemic Administration

Topical Application

Systemic Fluoride Administration

- Fluoridation of water supply
- Fluoridation of School water supplies
- Fluoride supplements
- Fluoride incorporation in various foods

Fluoridation of water supply

- **Definition:**

The adjustment of the natural fluoride concentration of fluoride deficient water supplies to the *recommended level* for optimal dental health.

Water fluoridation is the process of adding fluoride to the water supply so that the level reaches 1 ppm (one part F per million parts water)

One mg F/L water

Fluoridation of water supply

- Fluoridation of the public water supply at **1 ppm** has been shown in to reduce caries incidence by around **50%.**

Water fluoridation is an ideal public health measure**?**

- **Its benefits are not dependent on the interest and cooperation of the recipients.**
- **It is cheap .**
- **Reaches many peoples**

Fluoridation of water supply

- The optimal dose of fluoride ingested daily in children from **0.5 to 1.0** gm fluoride (WHO).

- Fluoride concentration in public water supplies for countries with **cold weather (1-1.2 ppm) ,** whereas in countries with **hot weather** the concentration of fluoride should be **lower (0.7).**

- In Egypt the fluoride concentration of Nile water is about **0.36-0.42 ppm**

The recommended optimal fluoride doses
0.7 to 1.2 ppm

Situation of fluoride in Egypt?

In Egypt the fluoride concentration of Nile water is about 0.36 - 0.42 ppm

??

Is it optimal

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Fluoridation of School water supplies

- Fluoridation of school water supply is the best approach **if** fluoridation of community water supplies is not possible
- A higher fluoride concentration up to **5 ppm** have been effective in caries control in School children.
- The reduction in the **DMFS** is about **40%.**

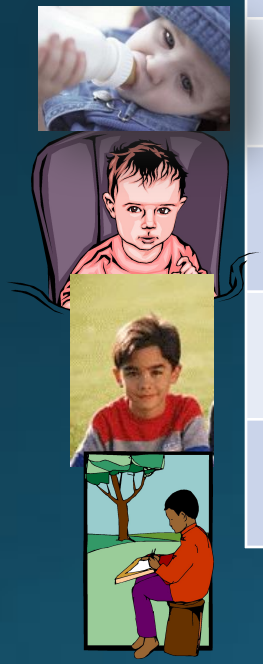
Fluoride supplements

- Supplements can be in the form of tablets, drops or syrups.
- The usual dose varies according child age & conc. of F in communal water supply.
- Fluoride administration should be continued till the age of complete crown formation of the second permanent molar.

Fluoride Supplement Dosage Schedule,1994

Approved by the A. D. A , A .A.P and A.A.P.D

Age	Fluoride Ion Level in Drinking Water (ppm)*		
	< 0.3 ppm	0.3-0.6 ppm	> 0.6 ppm
Birth-6 months	None	None	None
6 months-**3** years	0.25 mg/day	None	None
3-6 years	0.50 mg/day	0.25 mg/day	None
6-14 years	1.0 mg/day	0.50 mg/day	None



* 1.0 ppm = 1 mg/liter
** 2.2 mg sodium fluoride contains 1 mg fluoride ion.

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Fluoride incorporation in various foods

- Fluoride incorporated in certain foods of common use such as **salt, milk, bread, rice.**
- **Personal choice**

Therefore, it is difficult to adjust fluoride concentration as the consumption of these foods may vary significantly from one person to another.

Fluoride and Milk

Fluoride is poorly adsorbed to milk ?

- Formation of low soluble calcium fluoride
- Binding of F to casein and colloidal $CaPo_4$
- Clotting of milk due to gastric acidity, act as physical barrier to further access of F to mucosal surface of GIT

THANK YOU

For any questions feel free
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