FLUORIDE THERAPY

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FLUORIDE

Do You Know What Is Fluoride?

OBJECTIVES

1. Define the element of fluoride.

2. Describe the process of fluoride metabolism in the body.

3. List multiple sources of fluoride.

4. Evaluate the role of fluoride in preventing tooth decay.

5. Indicate a commitment to remain aware of potential toxic effects of fluoride.

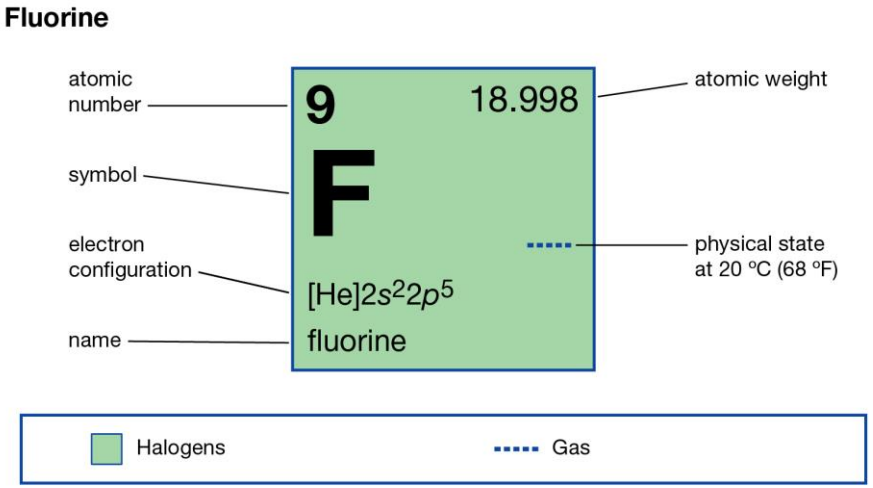
What is **Fluoride**?

❖ **Definition:** A salt of hydrofluoric acid; the ionized form of fluorine that occurs in many tissues and is stored primarily in bones and teeth.

❖ **Fluorine:**

- Rarely found in nature.
- Naturally occurring mineral
- A pale –yellow in nature.
- 13th mosy abundant element.
- Released from:

a. Soil
b. Water
c. Air

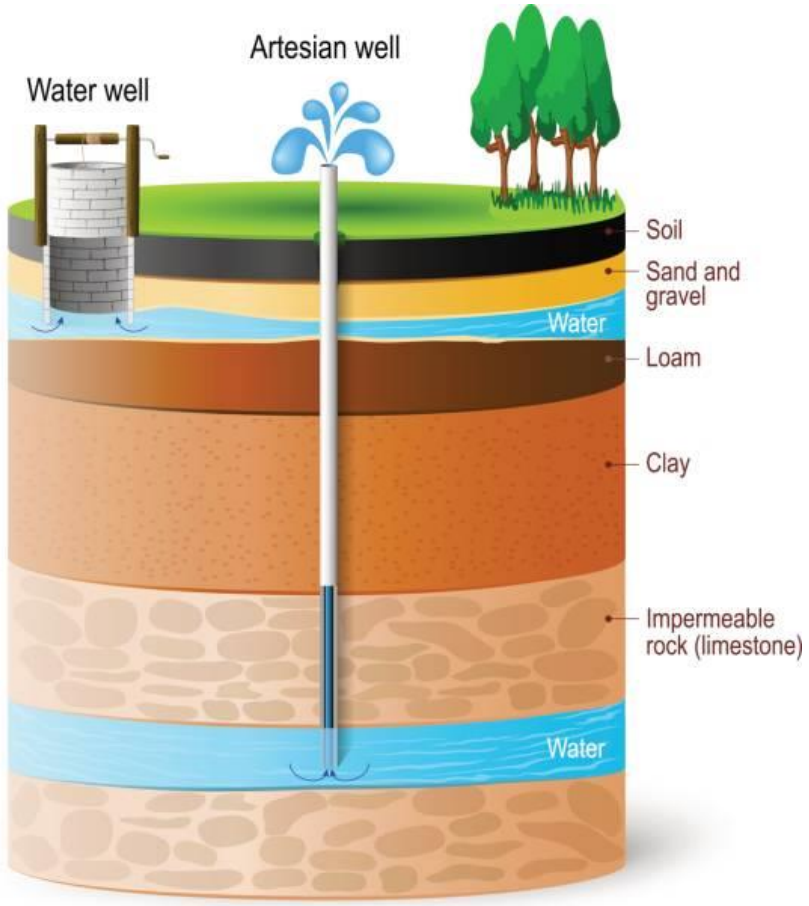


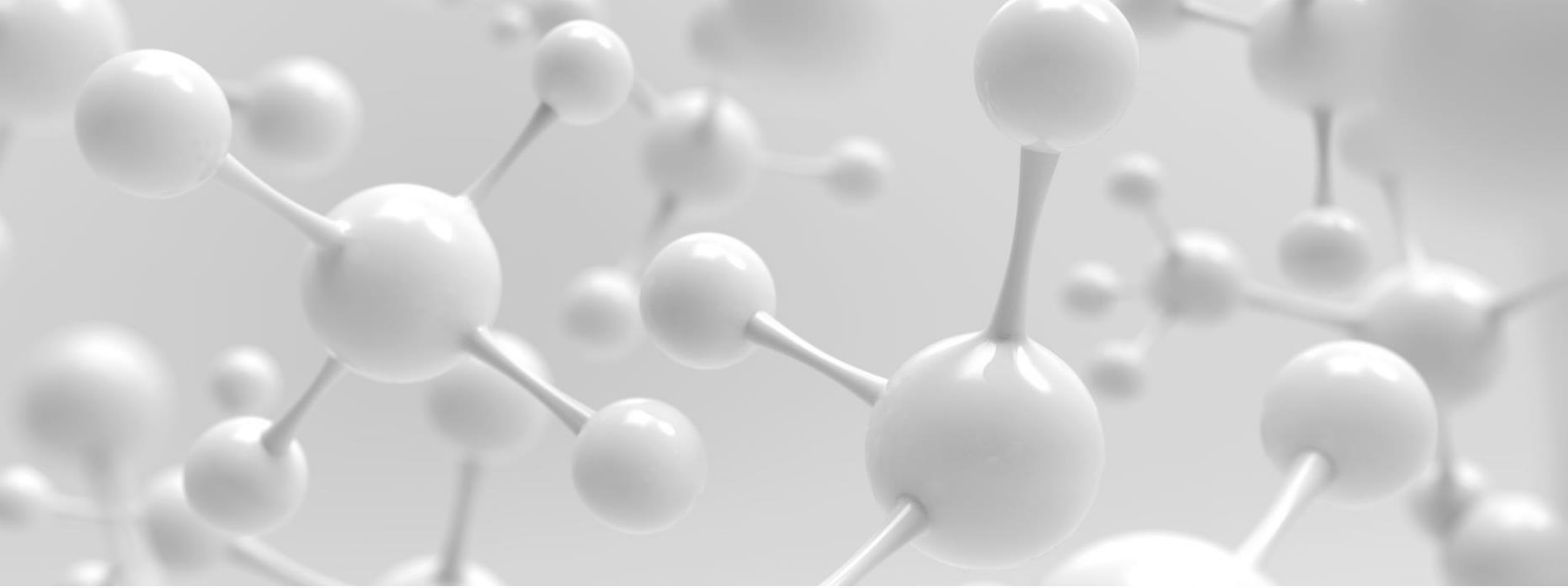
What is **Fluoride**?

❖ Concentrations:

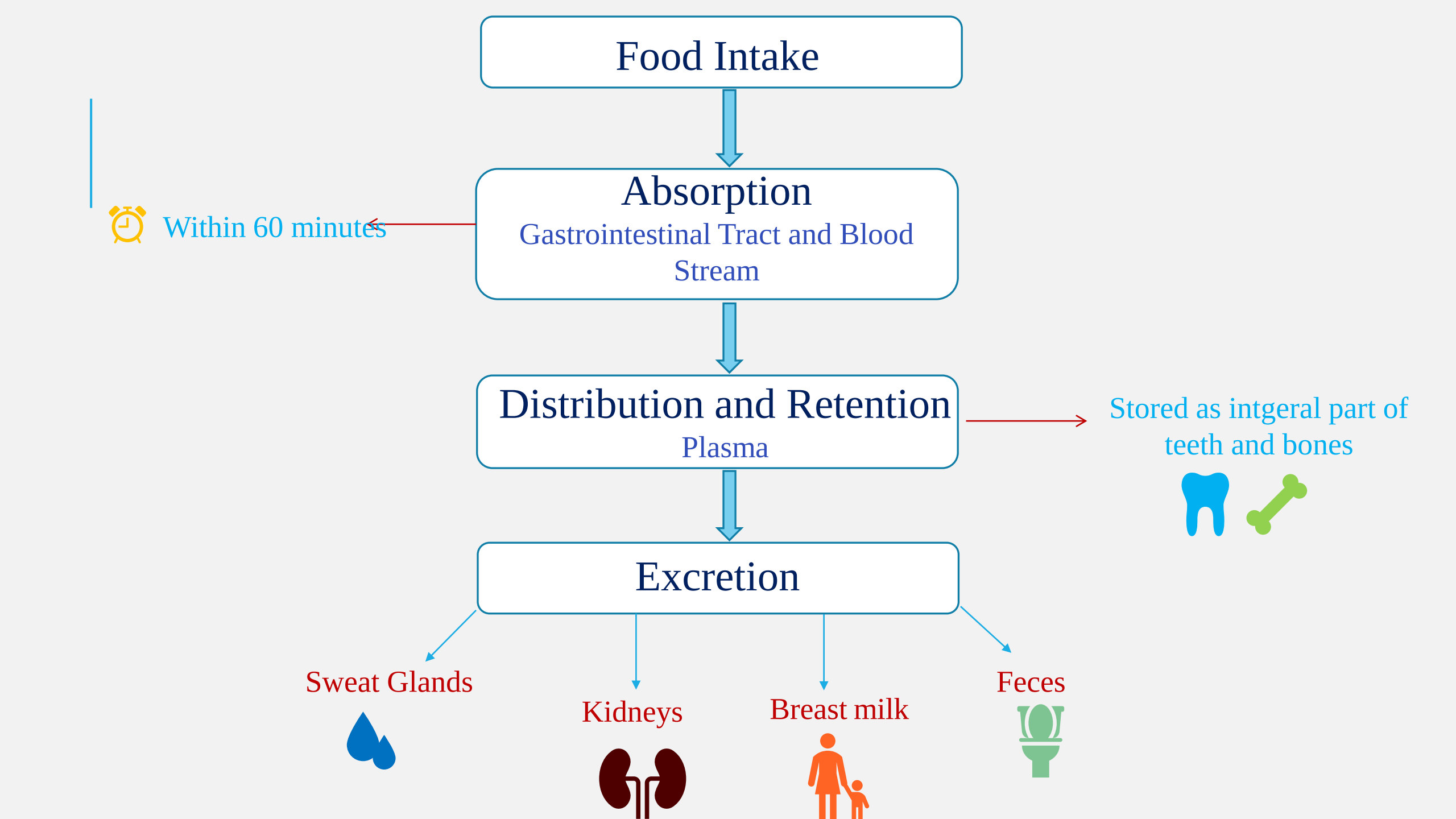
- Variable in water according to:
- Quantity of fluoride
- Water depth
- Toxic in high concentrations.
- Measured in:

a. Plasma
b. Saliva
c. Urine
d. Bones
e. Nails
f. Hair
g. Teeth





FLUORIDE METABOLISM


Food Intake
Absorption
Gastrointestinal Tract and Blood Stream
Within 60 minutes
Distribution and Retention
Plasma
Stored as intgeral part of teeth and bones
Excretion
Sweat Glands
Kidneys
Breast milk
Feces

Fluoride Metabolism

I. Fluoride Intake: Multiple sources.

II. Absorption:

A. Gastrointestinal Tract

- In the stomach:
  - Passive diffusion
  - Hydrogen fluoride (HF)
  - Within 60 minutes
- By small intestine

B. Blood Stream

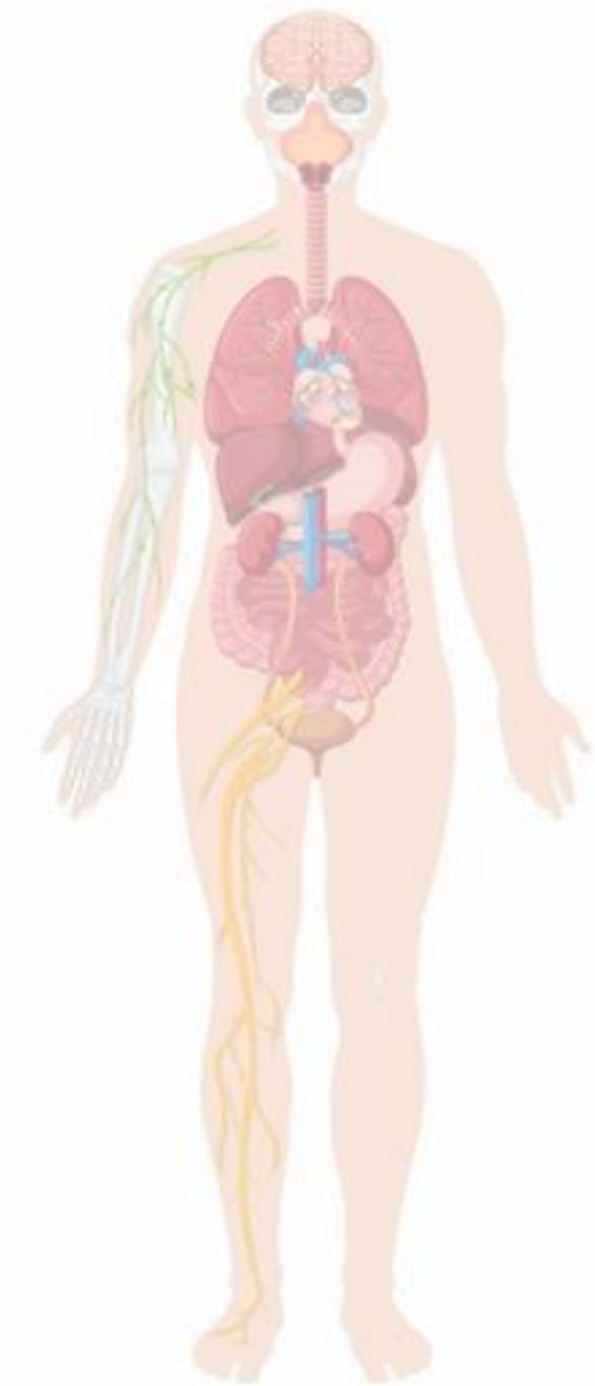
- Carried by plasma

III. Distribution and Retention

- Distributed by the plasma
- 99% in teeth and bones

IV. Exretion

- kidneys in the urine
- Sweet glands
- Faces
- Breast milk



Fluoride and Tooth Decay

❖ **Preventing of Tooth Decay**

➢ Maximum caries inhibiting

- Pre-eruptive exposure
- Post-eruptive exposure

➢ Reduction in caries

- 27% in permanent teeth
- 40% in primary teeth

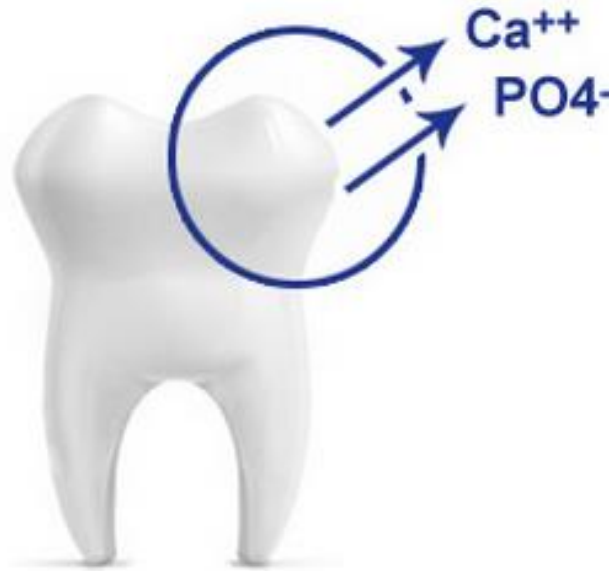
➢ Caries risk assessment

- Low caries risk
- Moderate caries risk
- High caries risk

Fluoride and Tooth Decay

- **Demineralization:**
  - breakdown of the tooth structure
  - Loss of minerals
    - calcium
    - phosphorus.
- **Remineralization:**
  - Reversal of demineralization
  - Restoration of mineral
  - enhanced by fluoride
  - Resistant to dental caries

- **Fluoride in Biofilm and Saliva:**
  - Reservoirs for:
  - Fluoride
  - Minerals:
    - calcium
    - phosphorus
  - Low concentrations
  - High remineralization
  - 5-50 ppm in biofilm



Demineralization

Remineralization

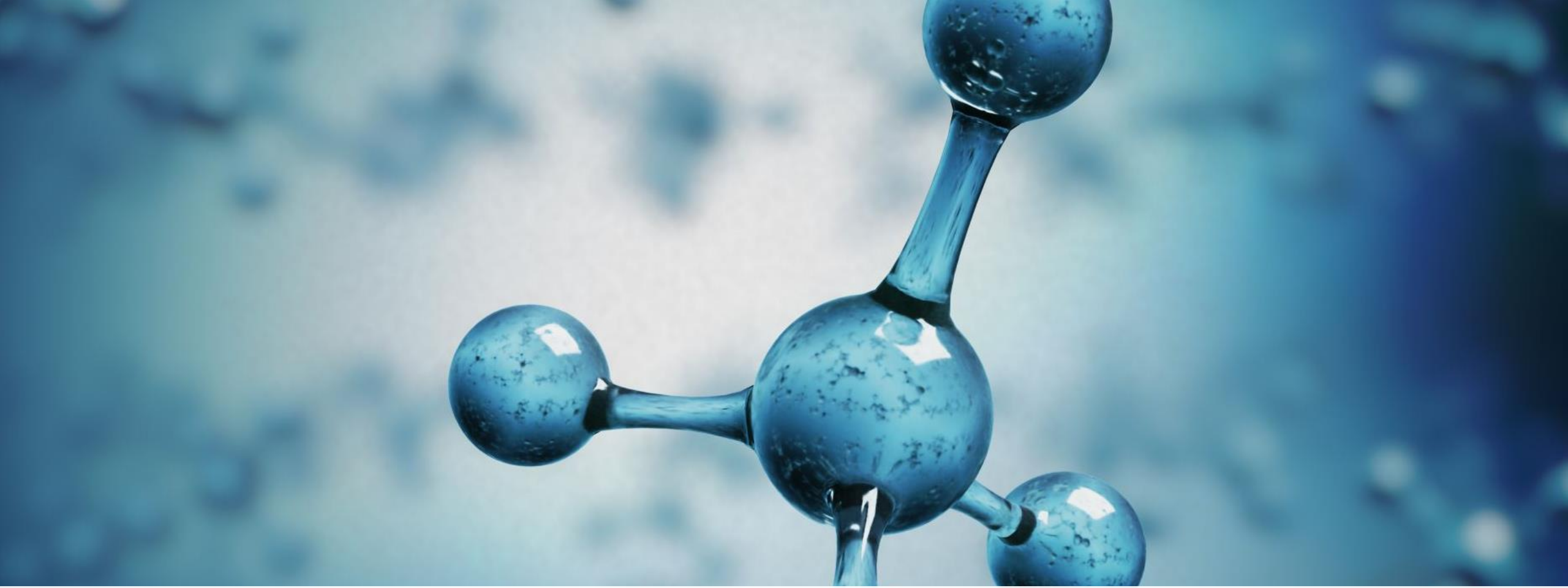
Fluoride and Tooth Decay

❖ **Fluoride Mechanism of Action**

- Inhibit demineralization
- Enhance Remineralization
- Inhibit bacterial activity

Watch this video

What did you notice ?



SOURCES OF FLUORIDE

❖Fluoride in Foods

Tea

Fish

Meat

Vegetables and fruits

Eggs

Fluoridated salt

Infant formula

Bottled water

Fluoridated drinking water

SOURCES OF FLUORIDE

❖ Dietary Fluoride Supplements

- Sodium fluoride supplements
- Tablets
- Lozenges
- Oral drops
- Dosage: 0.25 mg, 0.50 mg and 1.0 mg

❖ Fluoride Mouthrinses

- Moderate or high caries risk
- Limitation:
- Under 6y/o
- 26% - 29% of caries prevention

❖ Fluoride Dentifrices

- Basic caries prevention intervention
- 23% of caries prevention

SOURCES OF FLUORIDE

- **Professional Topical Fluoride Application**

2.0% Sodium Fluoride,
1.23% Acidulated Phosphate Fluoride
(Gel, Foam), (Tray)

5% Sodium Fluoride Varnish
(Soft brush)

FLUORIDE TOXICITY

FLUORIDE TOXICITY

❖ Lethal and Safe Doses of Fluoride.

➢ Certainly lethal dose (CLD)

- Adult: 5-10 g NaF
- Child: 0.5-1.0 g NaF

➢ Safety tolerated dose (STD)

- Adult: 1.25-2.5 g NaF
- Child: 500 mg NaF

BOX 35-5 Lethal and Safe Doses of Fluoride

A. LETHAL AND SAFE DOSES OF FLUORIDE FOR A 70-KG ADULT

Certainly Lethal Dose (CLD)
5–10 g NaF
or
32–64 mg F/kg

Safely Tolerated Dose (STD) = 1/4 CLD
1.25–2.5 g NaF
or
8–16 mg F/kg

B. CLDS AND STDS OF FLUORIDE FOR SELECTED AGES

Age (years)	Weight (lbs)	CLD (mg)	STD (mg)
2	22	320	80
4	29	422	106
6	37	538	135
8	45	655	164
10	53	771	193
12	64	931	233
14	83	1,206	301
16	92	1,338	334
18	95	1,382	346

Reprinted with permission from Heifetz SB, Horowitz HS. The amounts of fluoride in current fluoride therapies: safety considerations for children. *ASDC J Dent Child.* 1984 Jul-Aug;51(4):257–69.

FLUORIDE TOXICITY

I. Acute Toxicity

- Cause: Excess dose over short time
- Signs and Symptoms
  - 30 minutes to 24 hours
  - Gastrointestinal tract:
    - Nausea
    - Vomiting
    - Diarrhea
    - Abdominal Pain
    - Increased Salivation
    - Thirst

FLUORIDE TOXICITY

- Systemic involvement

- Blood: Hypocalcemia
- Central nervous system: Hyperreflexia, convulsions, paresthesia.
- Cardiovascular and respiratory depression: Cardiac failure and respiratory paralysis.

➢ Emergency Treatment

- Induce vomiting : Digital stimulation
- Second person: Emergency services.
- Fluoride-binding liquid: Milk, milk of magnesium, lime water.
- Support respiration and circulation

FLUORIDE TOXICITY

II. Chronic Toxicity

➢ Cause:

- Long-term ingestion
- Exceed dose

1. Skeletal Fluorosis

- Cause:

• Ingestion:
• 8 to 10 ppm of fluoride
• 10 or more years

• Industrial fumes or dust

- Characteristics:

• Stiff and painful joints.

- Predisposing factors:

• Dietary deficiency
• Fluoride metabolism
• Fluoride exposure

FLUORIDE TOXICITY

2. Dental Fluorosis

- Cause:

- Excess fluoride intake from drinking water and dental products
- during tooth development from birth to 12 or 16 years old.
- No systemic symptoms.

3. Mild Fluorosis

- White opacities in the enamel
- Young children

FLUORIDE TOXICITY

III. Accidental Ingestion:

- Cause: Concentrated fluoride ingestion

V. Acute Fluoride Poisoning

- Occurrence:

- Follows fluoride toxicity
- Rare to occur

SUMMERY

- Fluoride is a naturally occurring mineral used in many dental products to strengthen tooth enamel and prevent cavities.
- Approximately 99% of fluoride in the body is located in the mineralized tissues.
- Saliva and biofilm are reservoirs for fluoride, so it is avaiable for reminiralization when needed.
- Fluoride mechanism of action include inhibit demineralization, enhance remineralization of incipient lesions and inhibit bacterial activity.
- Fluoride can be toxic in extremely high concentrations.

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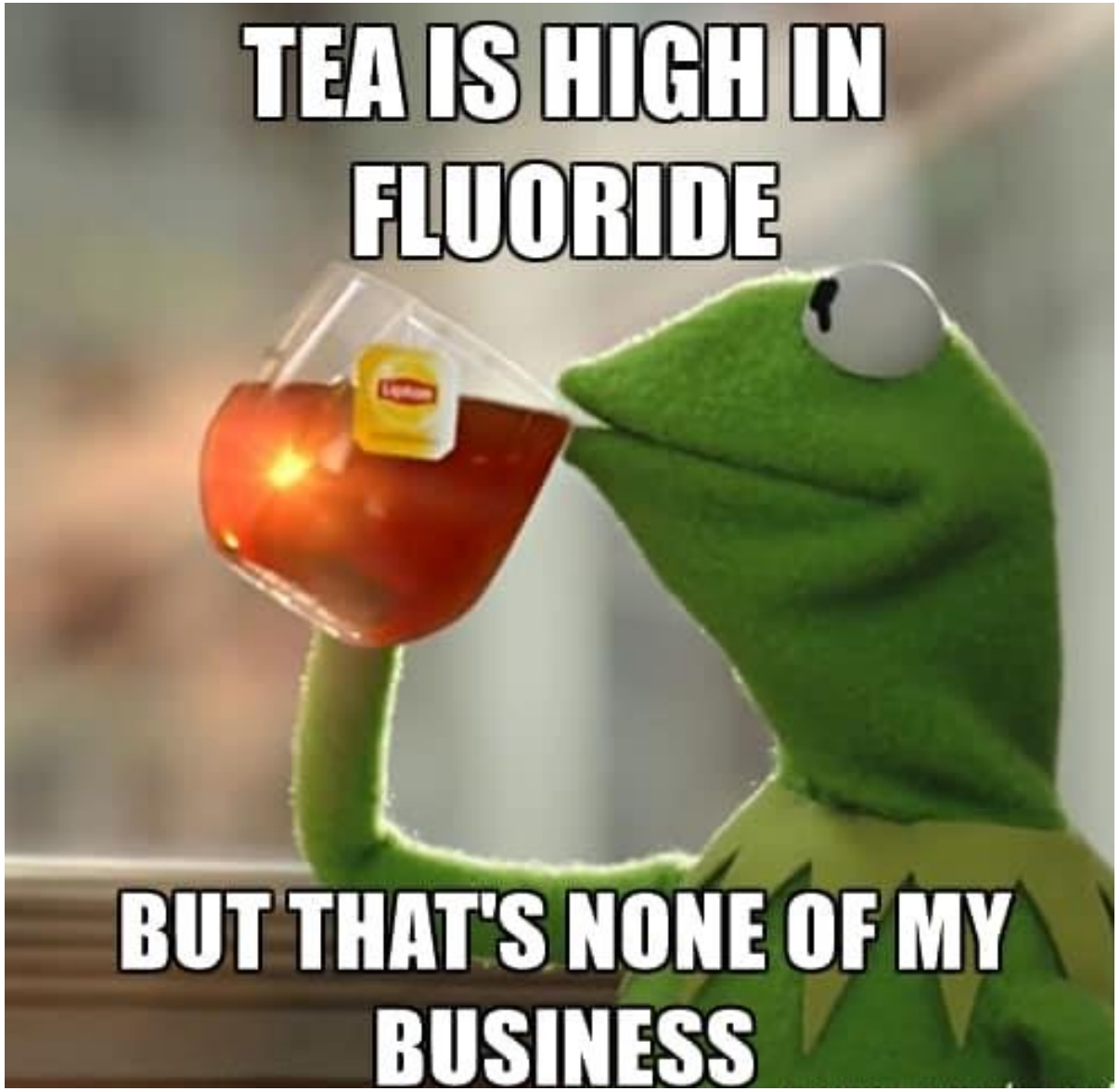
Critical Thinking Activity: Case For Analysis

Case: You have a patient who is a 27-year-old male who has two proximal cavitated lesions and several white spots caused by demineralization of enamel. He states that he uses a daily fluoride toothpaste twice a day and consumes fluoridated water and soda pop daily. He mentions that he doesn't know what the white spots on his teeth are and he is worried about his teeth appearance. Now that you are aware of the relationship between fluoride and tooth decay prevention, its sources, its metabolic process and its potential toxic effects; how will you assess this case, how would you evaluate his risk factors and what information could you tell him about treatment options?

1. How do you assess this patient for fluoride therapy?
2. The patient hears the term of fluoride for the first time and says that he doesn't know the relationship between fluoride and tooth decay prevention, how can you inform the patient of the fluoride material and its role in caries prevention?
3. The patient says he thinks he needs fluoride supplements and believes it will be effective in removing the white spots on his teeth, with your knowledge, what would you tell your patient to make well-informed decisions and advise him of potential toxic effects of fluoride?
4. What are the treatment options you would recommend for this patient?


TEA IS HIGH IN FLUORIDE
BUT THAT'S NONE OF MY BUSINESS