Diagnosis, Classification & Clinical Detection of Dental Caries

Presented by

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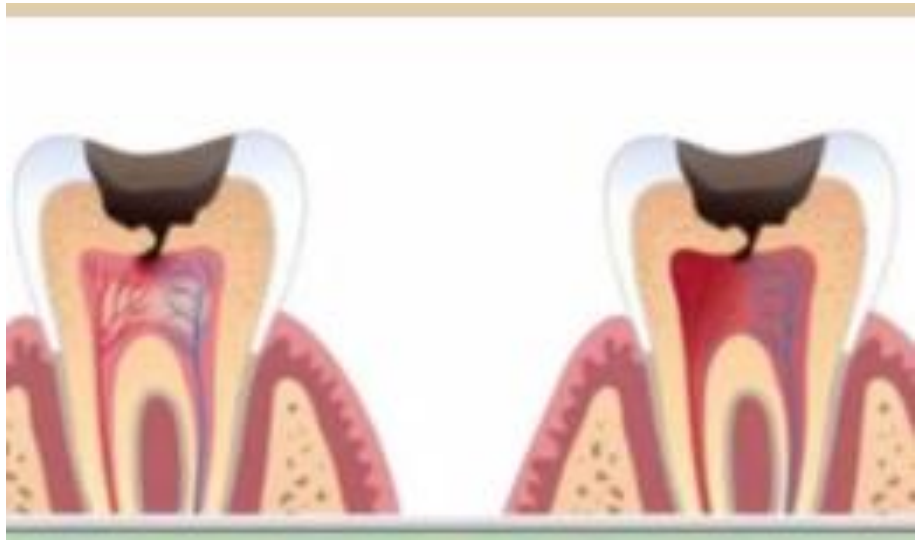
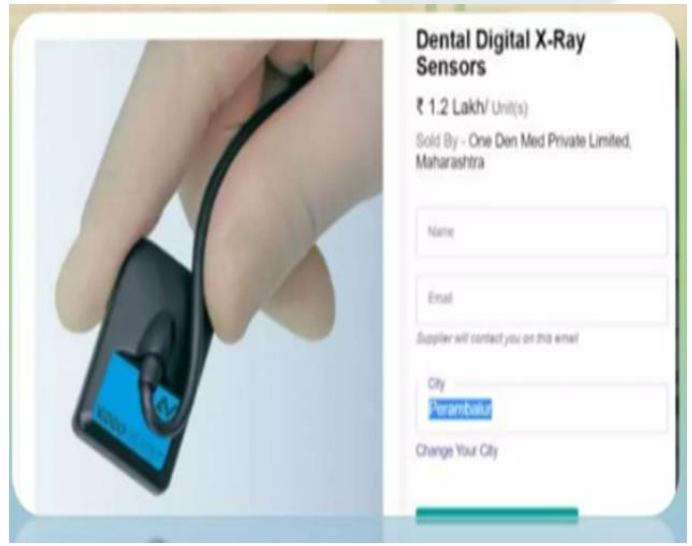


NOVEL METHODS FOR CARIES DETECTION

Digital radiography

- is a filmless technique for intraoral radiograph
- The image is displayed immediately
- No need for processing



Advantages

- Digital manipulation of the image is possible to enhance the viewing
- Image enhancement (zoom, contrast adjustment)
- Easy storage and sharing

- Reduction in radiation dose
- Can be used as a visual aid to be shown to the patient on the computer screen

Disadvantage

-the rigidity and thickness of the sensor can cause patient discomfort
-high cost

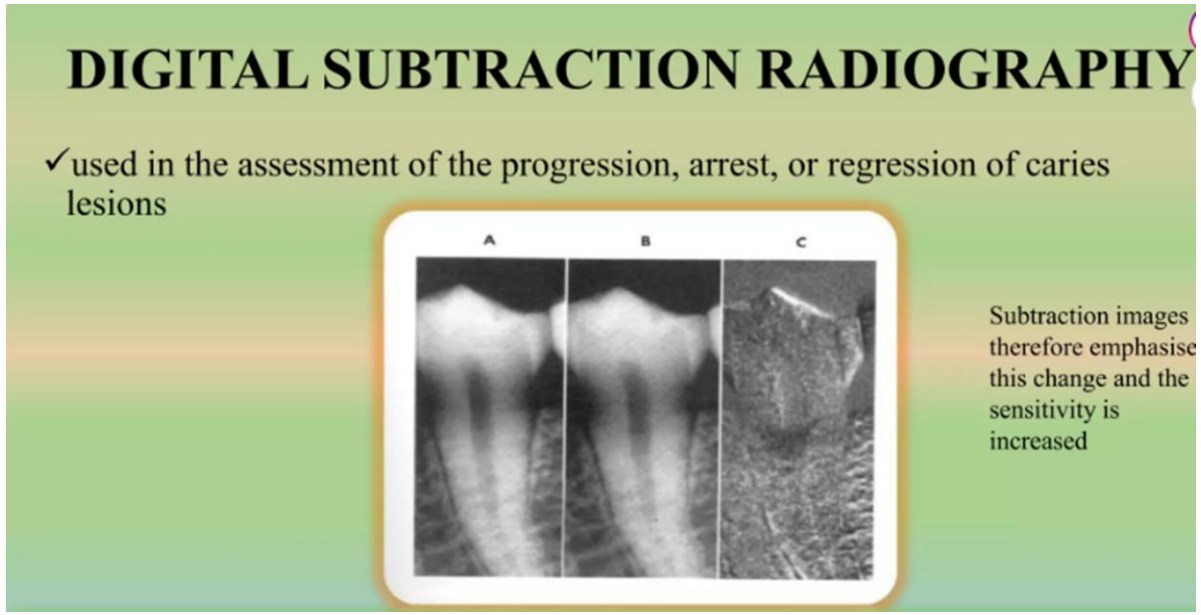
Types:

- Digital bitewing radiographs – best for detecting interproximal caries (between teeth).
- Digital periapical radiographs – show the entire tooth and surrounding bo

Digital Subtraction Radiography (DSR)

Definition:

is a radiographic technique in which **two radiographic images of the same area taken at different times are digitally compared and subtracted to detect small changes in mineralized tissues.



Principle

* Two radiographs are taken at **different time intervals** with identical geometry.

* A computer **subtracts the unchanged structures**.

* Only **areas of mineral change** (bone loss or caries progression) remain visible.

Steps

1. Take a **baseline digital radiograph**.
2. Take a **second radiograph later** with the same positioning.
3. Computer software aligns the images.
4. Subtraction process highlights differences between the images.

Uses

- Early detection of dental caries progression
- Monitoring bone changes in periodontal disease
- Evaluation of periapical lesions
- Monitoring healing after treatment

Advantages

* Detects **very small mineral changes (≈5–10%)**.
* **More sensitive** than conventional radiography.
* Useful for **monitoring disease progression**.

Limitations

* Requires **exact positioning of radiographs**.
* Technique sensitive.
- Requires **digital imaging software and equipment**.

Caries detecting dyes

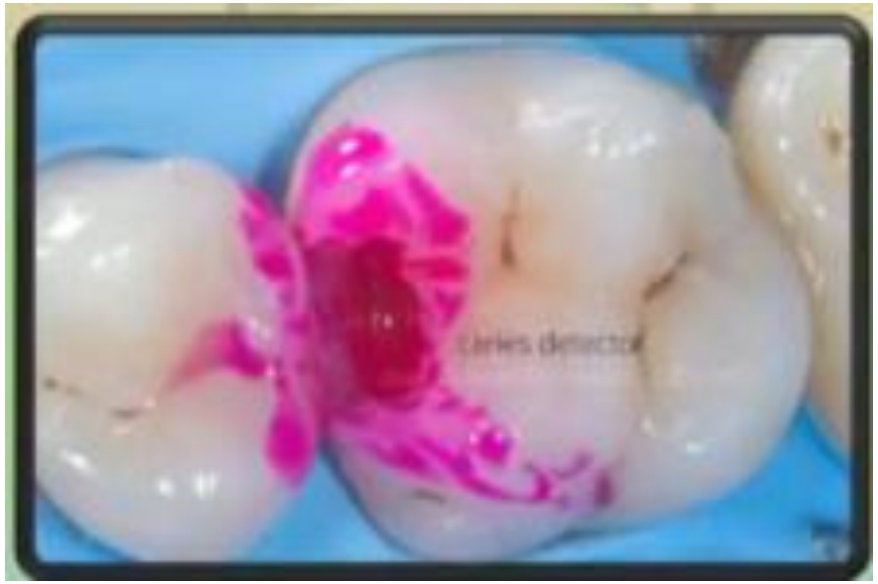
Example: Basic Fuchian

- Stains **demineralized dentin**.
- Detect early enamel caries

* Used mainly during **caries excavation**.

Limitation

May stain **affected dentin**, not only infected dentin



Fiber Optic Transillumination (FOTI)

- Principles :

Light passes through tooth; caries scatter light differently appearing dark shadows

- Uses:

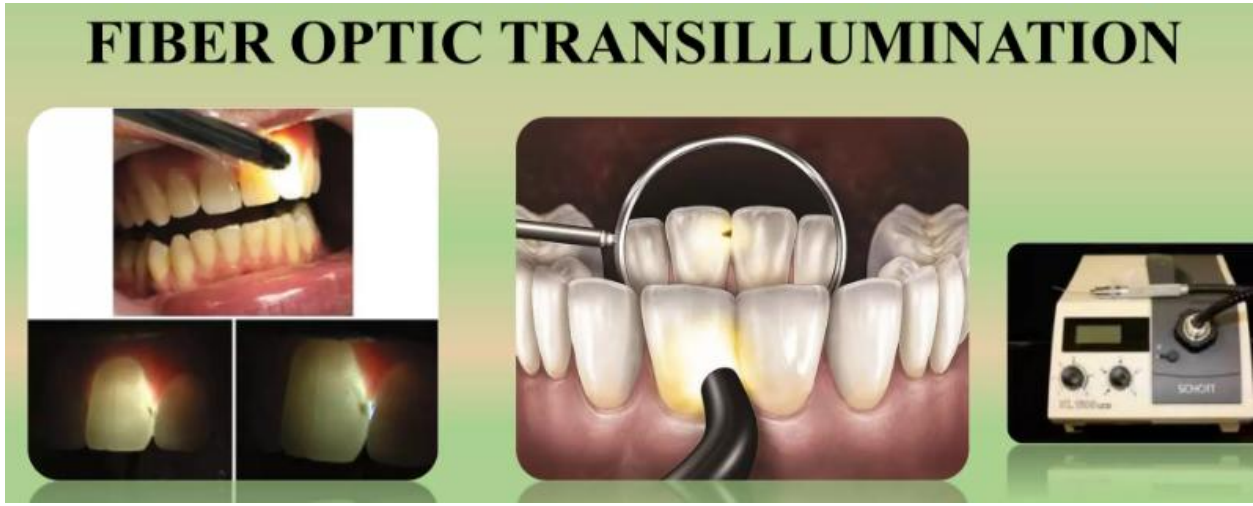
Proximal, anterior caries, cracks

- Advantages :

No radiation, quick, non-invasive, low cost

- Limitations:

Operator dependent, cannot quantify depth, less effective on posterior occlusal surfaces.



DIGITAL IMAGING FIBER OPTIC TRANSILLUMINATION

New method for detection of dental caries in which the images of the teeth are obtained through light fiberoptic transillumination and digital CCD camera

- The images are then sent to a computer for analysis

USES

- ✓Incipient.
- ✓ frank and secondary caries lesions on occlusal, approximal and smooth surfaces.
- ✓used to detect other changes in coronal tooth anatomy, such as tooth fractures and fluorosis.

Advantage

Can indicate the presence of incipient and recurrent caries even when radiological images fail to show their presence

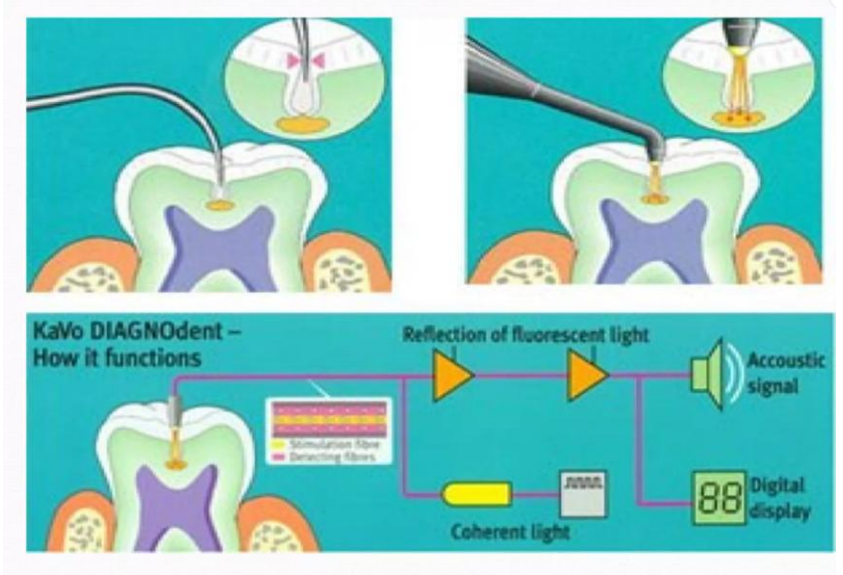
FLUORESCENT TECHNIQUES

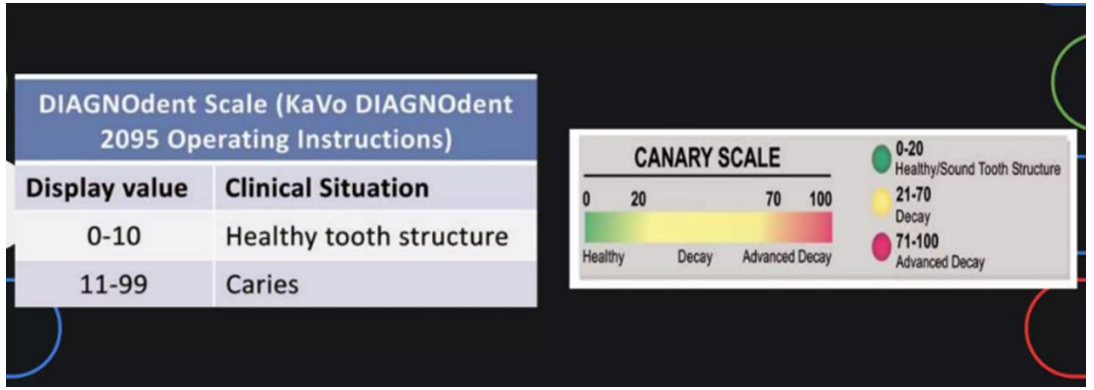
Quantitative Light induced Fluorescence (QLF)

- The tooth is irradiated with visible light (wavelength of 370 nm.)
- The teeth appear fluorescent green , while demineralized areas appear as dark spots
- the data is collected stored and analysed by custom made software
- Advantages :
- Detection of small incipient lesions in enamel and dentin
- Act as motivational tool for patient
- Limitations:
- Isolation sensitive procedure

Laser Fluorescence (DIAGNODENT)

- In this method , using a small laser, the system produce excitation wavelength of 655 nm. Which produce red light
  - Has two intraoral tips , one designed for pits and fissures, and the other for smooth surfaces.
  - The tip emits the excitation light and collects the resultant Fluorescence.
  - The signals comes out as number on instrument on a scale of 0-99
  - Higher the number , more is caries



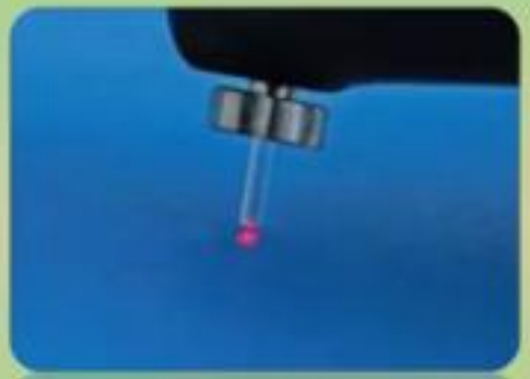


READINGS

5-12: INITIAL LESIONS

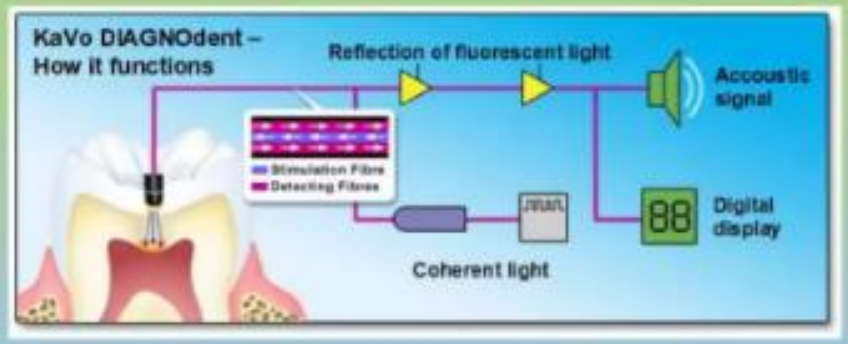
25-35: EARLY DENTINAL CARIES

>35: ADVANCED DENTINAL CARIES



DIAGNOdent

- ✓This system has a range of 0 to 99.
- ✓The value 0 indicates the healthiest state of the tooth.
- ✓It is an effective method in detecting initial lesions without cavitation.
- ✓ It's also useful for measuring different decalcification values in different surfaces of the tooth.
- ✓The fiber optic probe directed onto the occlusal surface of the tooth emits a light of wavelength 655 nm.
- ✓The changes caused by demineralization are converted into numeric values and displayed on the screen.



Limitations:

False positives possible

Can not detect secondary caries

Conclusion

Dental caries is preventable.

Early diagnosis improves outcomes.

Combination of clinical + radiographic methods is best.


Thank
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