Caries Management Course
Module: Caries Diagnosis Part II

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Caries Diagnostic Tests

Lesion Detection Devices
Fluorescence-based Optical Detection-
Covered in Caries Diagnosis Part II
Scattering Based Optical Detection-
Covered in Caries Diagnosis Part III

Caries Susceptibility Tests
Covered in Caries Diagnosis Part IV

Module Objective
• Adding adjunct caries detection leads may lead to overtreatment
• Reference Article: Caries Detection Systems
Lesion Detection Issue

• **Original Problem:** Need to detect early caries to arrest the lesion and avoid surgical treatment
• **Solution—New Caries Detection Devices**

• **New Problem:** We detect some form of early caries in almost everyone

Caries: A Continued Diagnostic Challenge

*Enamel caries, especially occlusal pit and fissure caries are difficult to detect in the early stages, using the conventional methods of the dental explorer and bitewing x-rays.*

Fluorescence-based Optical Detection

**DIAGNOdent**

- LED (light-emitting diode (LED))—red
- Detects red fluorescence
- 2 signals—visual and audible
  - Fluorescence Value
  - Beeping (if you like beeping)
- Use on a clean, dry surface
**DIAGNOdent**

- **Red Light 655nm**
  - Carious Lesion

- **Bacteria Porphyrins Absorb-655nm**
  - Carious Lesion

**DIAGNOdent**

- **Fluorescence!!!**
  - Porphyrins Re-emit >680nm
  - Carious Lesion

- **Red Light 655nm**
  - Sound Enamel

Nothing Happens with Sound Enamel
• *Porphyrins* from bacteria (Koenig 1994)

Mostly from Anaerobic Gram –

• *Porphyrins* from bacteria (Koenig 1994)
• Co-populating Bacteria (Lennon 2006)

• *Porphyrins* from bacteria (Koenig 1994)
• Co-populating Bacteria (Lennon 2006)
• Enamel Lesions: *low sensitivity* (0.4)(Shi 2000)
• Early White Spots have no porphyrin metabolites (Lussi 2001)
• False Positives exogenous porphyrins (Lussi 2001, Shi 2000)

Tooth should be clean and dry. 
-Lussi et al 2005

• False Positives exogenous porphyrins (Lussi 2001, Shi 2000)

Detecting Hidden Dentinal Lesions

False positive rate ~20% with a cut-off value of 25 (Huth 2008)

Too High of a False Positive Rate for Clinical Practice

• SoproLife 450 nm

• Spectra 405 nm
SoproLife

Blue Light 405-450 nm

Sound Enamel

Dentin

Dentin

Absorbs Blue
Reemits Green

SoproLife

SoproLife

Blue Light 405-450 nm

Caries Lesion

SoproLife

Red Light Fluorescence

Porphyrins Absorb Blue
Reemits Red
Blue Light 405-450 nm

SoproLife

Air Techniques Spectra™
Marketed as the VistaProof (Durr, Germany)

SoproLife and Spectra

Same issues with exogenous stains

False Positive Rate up to 30%
False Negative Rate is Very Low
("Dentinal Caries 4%)

Reference Article:
Caries Detection across Multiple Devices
Lesion Detection Issue

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• New Problem: We detect some form of early caries in almost everyone