Caries Management Course
Module: Caries Diagnosis Part I

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Module Objectives

• The surface zone of carious lesion is the determinant for treatment decisions.

• When a surface zone diagnosis is unattainable, we use ‘lesion depth’ to decide when to treat.

• Lesion depth is not as important as surface zone integrity.

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Fluorosis or Caries

• Fluorosis
• Opacity
• Incisal/Cusps
• Horizontal
• Follows Developmental lines
• Rarely on lower central incisors

• Caries
• Opacity
• Gingival
• Curved
• Follows Plaque line
White Spot Lesion

• What makes caries white?

Sound Enamel

Visible Light

May get some surface reflection

Weak Backscattered Signal

Sound Enamel

Carious ‘White Spot’ Enamel

Acid from Biofilm

Causes Demineralization

Demineralization Causes Porosities

360 degree isotropic scattering
White Spot Lesion

• Active caries?

White Spot Lesion

• Active Caries Example

White Spot Lesion

• Surface Zone
  — Barrier for Bacteria
White Spot Lesion

- Surface Zone
  - Barrier for Bacteria
  - Template for Remineralization

Ca$_5$(PO$_4$)$_3$F

Surface Zone
Lesion Body

White Spot Lesion

- Surface Zone
  - Barrier for Bacteria
  - Template for Remineralization

Ca$_5$(PO$_4$)$_3$F

Surface Zone Grows

Surface Zone
Lesion Body

Lesion Body Remineralization

- Enhanced Barrier
- Prevents Deeper Lesion Body Remineralization

Ca$_5$(PO$_4$)$_3$F

Surface Zone
Lesion Body

Lesion Body Still Scatters

Ca$_5$(PO$_4$)$_3$F

Surface Zone
Lesion Body
White Spot Lesion

- Remineralized Lesion Looks the Same

Clinical Assessment

- Assessment
- Roughness
- Surface zone cavitation
  - Bacterial barrier removed

White Spot Lesion

- Side of Explorer
- Or Blunt End
- Check for subtle surface zone cavitation
- Pigmentation is not a determinate

Proximal Caries

Reference Link that you would need to have access to the conclusion in the article
Pigmentation and Lesion Severity
**Surface Zone/Lesion Depth**

- A lesion’s surface zone diagnosis is the determinant for treatment decisions.
  
  We can not directly evaluate surface zone

  Unless we place ortho separators between teeth and check later

**Surface Zone**

- Surface Zones can be visualized using ortho separators. But the patient has to return to clinic within a few days.

Photos Courtesy of Dr. Vladimir Leon Salazar

**Surface Zone/Lesion Depth**

- A deeper lesion has a higher probability of having a Surface Zone Cavitation

**Surface Zone/Lesion Depth**

- 2D image hides a localized enamel cavitation.

Radiolucency to DEJ or greater increases the risk of local cavitation but it is not an absolute threshold
Surface Zone/Lesion Depth

• **Reference: Surface Zone and Lesion Depth**

• Our Threshold for intervention is based on a lack of surface zone data, and the fear of the consequences of not intervening.

• **Reference Link: Intervention Thresholds**

Occlusal Caries

Know General Concepts

• International Caries Detection and Assessment System- a.k.a. ICDAS-II

<table>
<thead>
<tr>
<th>Sound</th>
<th>Early Stage Lesion</th>
<th>Established Lesion</th>
<th>Severe Lesion</th>
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</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>Dry/White or stain</td>
<td>Dentine shadowing</td>
<td>Dentin evident</td>
</tr>
<tr>
<td>Decayed/Damaged</td>
<td>Wet or dry</td>
<td>Decayed internal breakdown</td>
<td>Dentin evident</td>
</tr>
<tr>
<td>Severely Decayed/Damaged</td>
<td></td>
<td></td>
<td>Dentin evident</td>
</tr>
<tr>
<td>Really bad!!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ICDAS-II Caries Assessment System

ICDAS-II

• Helpful for Occlusal Lesions
• Research Tool for Clinical Trials
• Validated in Primary Teeth

ICDAS-II Primary Teeth
Applicable Concepts

- Visualizing Decay Wet and Dry
- Game of Probability
Enamel to DEJ Demineralization

- Stained Fissure
- Distinct Color When Wet
- Evidence of White Opacity When Dry

Blue stain = Demineralization

Enamel-Dentin Demineralization

- Local Enamel Breakdown

Blue stain = Demineralization
Enamel Demineralization

Excessive drying shows no local cavitation but local demineralization

Blue stain = Demineralization

Threshold for Intervention

Early Stage Lesion
- Distinct Changes, Wet or Dry
- Small or No Dentin Involved

Probability Game
- Can’t be assured of a perfect diagnosis
- Even localized enamel breakdown may not progress to dentin.
- Minimal invasive dentistry
Conclusion

• A lesion’s **surface zone** diagnosis is the main determinant for treatment decisions.

• However, future modules will address how clinical treatment decisions need to address a patient’s caries risk and recall history in formulating a final treatment decision.