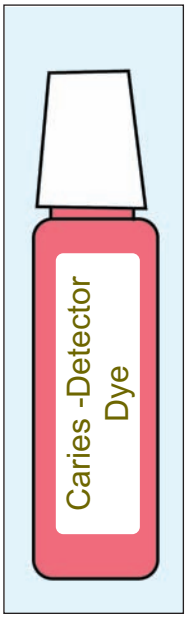
Caries detector dyes

- what do they really detect?



Can a simple protein dye actually diagnose incipient occlusal lesions or differentiate between infected and non-infected dentine?

With the advent of minimal invasive dentistry as a potential growth market for various products and procedures there has been a renewed emphasis on the use of caries-detector dyes. Ostensibly the use of these agents makes the task of detecting early enamel caries and assessing the depth of dentine caries more “scientific”.

Regrettably the accuracy of caries detector-dyes for these purposes is very low.

All the popular caries-detector dyes appear to be based on the protein dye, acid red. The usual formulation is 1 percent acid red in propylene glycol.

Detecting occlusal caries

Acid red is a non-specific protein dye. Quite sound pits and fissures contain protein of some nature - pellicle, food debris and so on. Therefore if a caries-detector dye is applied to these sites some staining would be expected, even though the sites are completely sound.

Sites of early demineralisation may also be stained. If it is actually early demineralisation,operative intervention is still not indicated. These sites can be treated with fluoride and watched or covered with an appropriate sealant.

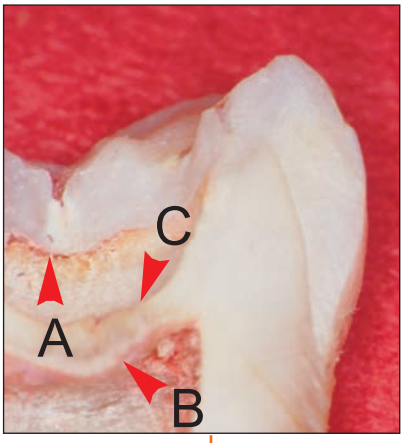
If operative intervention is undertaken and a caries-detector dye is used to check whether all “caries” is removed there is another problem. Once the preparation reaches the dentino-enamel junction that actual junction area can stain, even though it is completely sound (see opposite page).

Differentiating between infected and non-infected dentine

Ideally a caries-detector dye would differentiate between infected and non-infected dentine. However a caries-detector dye does not stain bacteria and so cannot tell where infected dentine finishes and non-infected dentine starts.

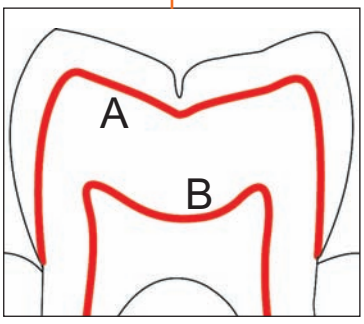
Caries-detector dyes stain the organic matrix of less mineralised dentine. This has led to problems with selective staining of the dentino-enamel junction and the circumpulpal dentine even in completely healthy teeth.

In practical terms this can result in over-preparation of a cavity. In a deep lesion all infected dentine may have been removed and the floor of the cavity may feel firm. However, if it is close to the pulp, the floor of the cavity still may be staining because it is near circumpulpal dentine. This increases the risk of a direct pulp exposure.



Caries-detector dyes can selectively stain normal healthy dentine at the dentino-enamel junction (A) and circumpulpal dentine (B). The presence of stain does not mean that either area is carious.

In the area (C) a caries-detector dye cannot tell where infected dentine finishes and sound dentine starts.



detecting occlusal caries

It is quite normal for completely sound pits and fissures to stain after the application of a caries-detector dye. The plaque, pellicle and other constituents found in these sites will all be temporarily stained. Sites of early demineralisation may also stain.

None of this staining is an indication for operative intervention.

References

McComb D. Caries-detector dyes - how accurate and useful are they? J Can Dent Assoc 2000; 66:195-198

Kidd EAM, Joyston-Bechal S, Beighton D. The use of caries detector dye during cavity preparation: a microbiological assessment. Brit Dent J 1993; 174: 245-248

Yip HK, Stevenson AG, Beeley JA.The specificity of caries detector dyes in cavity preparation. Brit Dent J 1994; 176: 417-421.