F27 Detection of Pit and Fissure Sealants Using UV LED Light

Gerald Guzy, DDS, 259 Kinderkamack Road, Westwood, NJ 07675*

After attending this presentation, attendees will gain knowledge of the usefulness of UV LED light in detecting the presence of pit and fissure sealants during the forensic dental examination.

This presentation will impact the forensic science community by demonstrating that the use of small, inexpensive, battery operated UV LED lights can make the presence of pit and fissure sealants more easily detected by the examining forensic odontologist.

The development of pit and fissure sealants has been shown to be effective, efficient, and a safe method of preventing pit and fissure caries in children. The increasing use of sealants will help to prevent the caries process and reduce the need for invasive procedures such as amalgam and resin based composite placement to restore dental caries. Ultimately, this may prevent the need for more advanced procedures such as endodontic treatment, extractions, crown and bridge, and implant placement.

The caries free/restoration free individual is becoming more common requiring the forensic odontologist to use anatomical landmarks such as root size and shape and bone patterns for forensic dental identification. Many of the caries free/restoration free individuals have pit and fissure sealants which would be useful for forensic dental identification.

Pit and fissure sealant materials are available as clear, opaque, tooth colored, white, and tinted. However, sealants may be difficult to detect visually, radiographically, or with a dental explorer and may be overlooked during the forensic dental examination. Sealants applied to permanent molars in six to eight year old patients may be significantly worn and difficult to detect in a teenager or young adult.

UV light has been used in the evaluation of fluorescence of resin based composite restorations. The fluorescent properties of resin based composites when exposed to UV light has been studied and revealed that some composites fluoresced brighter or darker than the surrounding tooth. In addition, a small inexpensive battery operated UV LED light was used in determining the presence of resin based composites in a recent forensic dental identification of a severely decomposed body.

The purpose of this preliminary study was to evaluate the use of UV LED lights at 365nm and 395nm for the detection of pit and fissure sealants.

A total of eighteen extracted noncarious nonrestored human molars were used in this study. The occlusal surfaces were cleaned with a slurry of oil-free pumice and water, and the teeth were stored in distilled water until used. Sixteen different pit and fissure sealants from nine different manufacturers were applied to the occlusal surfaces of sixteen different teeth. Two teeth were left unsealed as controls. Eleven teeth had filled sealants applied, and five teeth had unfilled sealants applied. The sealants were cured with a Morita Jetlight 5000 LED curing light R. The light output was measured using the radiometer built into the charging base of the curing light. The light output was measured each time a sealant was cured and was consistently greater than 900 mW/cm2. Curing times were based on the sealant manufacturer's recommendations.

The teeth were then examined using standard overhead fluorescent lighting, then re-examined in a darkened room using a Nichia 365nm 5 LED UV light R and a Inova X5 395nm 5 LED UV light R. These lights were chosen because they are small, inexpensive, easily obtained, and battery operated.

In general, pit and fissure sealants appear darker than the surrounding tooth structure when illuminated with UV LED light due to the absorption characteristics of the sealants as compared to the fluorescence of the natural tooth. UV LED lights at 365 nm and 395nm both enhance the appearance of pit and fissure sealants. The presence of pit and fissure sealants was easier to detect using the 365 nm UV LED light as compared to the 395nm UV LED light. The sealants appeared darker than the surrounding tooth with the 365 nm light than with the 395 nm light.

The results of this study suggest that the use of small, battery operated UV LED lights can be valuable in the detection of pit and fissure sealants during forensic dental identifications; however, their use does not preclude a thorough visual and radiographic examination.

UV LED Lights, Pit and Fissure Sealants, Forensic Odontology

 ** Presenting Author*