F27 Ultraviolet Illumination as an Adjunctive Aid in Dental Inspection

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After attending this presentation, attendees will gain an understanding of practical aspects of dental inspection using ultraviolet light. They will understand the differences in fluorescence properties among various restorative materials, and appreciate how this information can help identify unknown individuals.

This presentation will impact the forensic community and/or humanity by demonstrating the potential of fluorescence as a property that can be used to detect materials that might otherwise be missed during postmortem dental charting.

The clinician is presented with a large array of restorative materials on the market today. The popularity of these materials is reflected in the fact that there are currently over 50 brands of restorative resins alone. Materials have been developed which have shade and translucency that can be virtually indistinguishable from tooth structure. The increasing use of esthetic materials in dentistry presents a challenge to the clinician and the forensic odontologist alike. Manufacturers have achieved their esthetic goals, but have created a problem for easy visual detection. Furthermore, radiographic recognition may also be difficult as the contrast between tooth structure and restoration is sometimes similar.

As placement of these materials becomes more common, the ability to recognize their existence and to chart their presence becomes important, especially in forensic situations. All restorations form part of the uniqueness of the human dentition. The presence of a specific material on a given tooth surface may be a significant concordant point in victim identification.

Alternative light sources have been used with success in various fields of forensic science. It was one goal of this research to quantitatively assess the fluorescent properties of modern restorative resins in order to predict their behavior during inspection. The second goal was to demonstrate practical use of UVA light in dental inspection with examples of how different materials fluoresce.

The intensity of fluorescence and the excitation and emission spectra of fifteen composite resins were quantitatively measured. All fifteen resins were prepared according to manufacturers instructions and cured in 1cm discs. In addition, sections of enamel and dentin were prepared in order to compare the fluorescence properties of tooth structure to the resins. Spectroscopy was performed using a laboratory fluorimeter.

All of the composites fluoresced. The composites could be organized into three categories: highly fluorescent, moderately fluorescent, and weakly fluorescent, based on the intensity of light emission. Enamel and dentin also fluoresced. Dentin fluoresced most strongly of all samples, and it was found that some resins fluoresced more intensely than enamel, while some were less intense. In both cases, inspection would reveal contrast between the resin and tooth. Some of the resins exhibited fluorescent properties very similar to tooth, however. If these resins had been placed, they would not be detectable by this method. In such cases, recognition of these resins would depend on their radiopacity.

A UVA light source was also used to inspect the dentition of several unidentified individuals. A number of features were revealed by this method. Some resins fluoresced blue while others were yellow. Even very small restorations were made visible. Some obvious resins did not fluoresce, however. It was also found that porcelain-containing restorations varied considerably in fluorescent properties, from very dark to very bright. Veneers were detected by this method that were difficult to observe visually.

The speed of inspection with a light source warrants use of this technique as an adjunctive means of inspection, as the majority of these restorative materials will be made visible. This is especially appropriate in situations where many bodies are to be screened.

The greater likelihood of encountering esthetic materials in modern dentitions demands that their presence is anticipated. Any means of gaining additional levels of certainty in victim identification should be exploited. This study underlines the critical need for careful record keeping as the complexity and variety of restorative materials broadens. As custodians of records that, although not anticipated, could help to prove a victim's identity, the clinician has a responsibility to select restorative materials that, based on fluorescence, could be used to aid in positive identification.

Fluorescence, Identification, Dental Materials

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