F38   Age Assessment: Use of Chartier Digital Colorimeter

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After attending this presentation, attendees will understand how the color of the dental root is an indicator for age assessment. This digitalized tool helps to provide a fast and easy first intention age assessment, especially as part of mass disaster identification.

The technique mixing image processing and forensic science is an original tool in the dental age assessment. It is currently being tested within Forensic Science Institute of the French Gendarmerie (IRCGN). This presentation will impact the forensic science community by presenting practical applications which can be used as a guideline available to forensic odontologists.

Age assessment is a crucial stage in dental forensic examination. It is often required by magistrates and investigators at the time of victim identification. Many assessment methods are based on dental measures (Lamendin, Solheim), others lean on different databases (Ubelaker, Nolla, Demirjian). The method we are going to address in this report requires a dental shade capture.

In 1957, Brudevold correlated the change in dental shade with the age. In 1972, Ten Cate, who observed dental roots of persons of differing ages, noticed that an age assessment should be possible using dental root shade. In the 1980s, Bequain selected teeth of known ages in order to create an assessment of dental root coloration, going from lighter to darker. In 1988, Solhein introduced the shade assessment score of the radicular dentin in some of his age assessment formulae. In 1995, Collet created a natural "shade chart" of dental roots based on a selection of teeth extracted from 45 individuals, aged from 8 to 93 years. Age assessment is carried out by comparing a tooth with the shade chart. This process seems simple but the major problem resides in the fact that there is only one shade chart and therefore cannot be easily used by other forensic odontologists. Recognizing the availability of IT systems Laurent Chartier designed MAORI software which allowed automated age assessment of dental root colorimetrics in the HSB (hue, saturation, brightness) space.

The current study undertook to constitute a database from teeth collected during dental extractions. Simply, MAORI software provides a simple user interface for assessing root color. The system is simple; first, the user takes a digital photograph of the dental root with a graded

test card. The image is taken in artificial (white light) or natural light. Secondly, the user loads the image into the software. The algorithm decodes the exact shade of the dental root color by comparison with the graded test card. As such, any differences in illumination are controlled. This comparison carried out in relation to a preprogrammed standard. Of course, this standard must be evolving. In increasing the quantity of samples, the standard equation increases in accuracy. Unlike the shade chart, it offers a better repeatability. The accuracy, which is totally independent of expert subjectivity and visual acuity, is in the order of +/- 5 years. Given the modularity and the possible evolutions, this first version should rapidly lead to a more stable version able to be deployed more widely in the future.

Age Assessment, Dental Root, Chart Color