Dental personnel exposed to many hazards in dental clinics
A recent article co-authored by NIOM scientist Jan Tore Samuelsen in “Tandlægebladet” breaks down the risks dental personnel face during their working day in terms of exposure to a variety of chemicals.

Dental personnel have the potential of being exposed to a variety of chemicals during the working day, many of which may cause temporary or permanent injury.

Dentists and dental assistants belong to professional groups most frequently experiencing work-related eczema caused by chemicals giving local irritation or allergic reactions. Chemical exposure may originate from dental materials, where reactive chemicals are released during preparation, polishing and removal of restorations. Other sources of exposure are medical gloves containing allergenic latex protein and rubber chemicals as well as different biocides/chemical disinfectants for infection control purposes.

The article focuses on a number of occupational risk factors in the dental clinic and the limitation of exposure as a major strategy to reduce health risk. Ideally, damages can be prevented by substitution of hazardous substances; a measure that can be difficult to achieve in the dental clinic. The effectiveness of e.g. polymer-based materials and disinfectants is based on properties that also may be the origin of toxic responses. As development of injury basically follows direct contact or inhalation of chemical substances, the damage can be prevented by measures taking these exposure routes into consideration.

Attention is drawn to the use of “no touch technique”, high-volume evacuation reducing spatter and aerosol formation and proper use of personal protective equipment in the form of protective gloves, eyewear and surgical masks.

Read more in:
NIOM has recently acquired a new hardness tester (Figure 1). The instrument is used in a range of different research projects at NIOM. One example is the effect of abrasion and erosion on surface hardness of different dental materials (Figure 2). Two visiting researchers are investigating the results of different treatment methods to improve the surface of molar-incisor-hypomineralization (MIH)-affected teeth.

Hardness is an important mechanical property of dental materials and is defined as the resistance to permanent surface indentation. Sufficient hardness ensures that the placed restorations are resistant to in-service scratching, from both mastication and abrasion.

The instrument is configured to carry out two types of microhardness testing; Vickers and Knoop. In both methods a standardized load is applied to a fixed point on the sample. This creates a symmetrically shaped indentation, which can be measured and the hardness of the material calculated. In the Vickers hardness test, a diamond in the shape of a square-based pyramid is used to make the indentation with a force load ranging from 100 g to 30 kg. In contrast, the pyramid-shaped diamond indenting tool used in the Knoop method has a more narrow and elongated base and a lower load is applied (20 g to 2 kg) (Figure 3).

Traditionally, Vickers is used to measure the hardness of very hard and brittle materials, such as cast dental alloys, but is also applicable to softer materials. Knoop has been used for a wider range of materials, from amalgam and ceramics to resin-based composites, but is also useful for materials that vary in hardness over an area of interest, such as enamel and dentin.