FEBRUARY – 2018

NEWSLETTER

NIOM
NORDIC INSTITUTE OF DENTAL MATERIALS

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Be proactive: pointers for safe and effective physical protection in the clinic

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The incidence of occupational infections among employees in the health sector appears to be under-reported. There is no doubt that the most serious health risk to dental staff is due to infection by microorganisms such as viruses and bacteria. In addition there are other hazards that pose a health risk and require physical protection, such as nitrous oxide ("laughing gas"), radiation and noise.

The hazards dental clinicians face seemingly come from every facet of their working environment; long term exposure can potentially pose a serious threat to both health and well-being.

....the most serious health risk to dental staff is due to infection by microorganisms such as viruses and bacteria.

The effective use of protective equipment to safeguard against hazards in a clinical environment requires commitment, and a proactive and flexible mindset.

Clinicians need to take into account why a need for protection exists in the first place, when to use physical protection and when to switch to other, more effective methods as conditions continually change, and with them the degree of exposure. Examples are the purchase of new equipment and the outbreak of new or altered microorganisms.

..... to safeguard against hazards in a clinical environment requires commitment, and a proactive and flexible mindset.

For a full rundown of the hazards found in dental clinics and the most effective physical protective equipment against them, be sure to read our full article, published in Tandlægebladet (for full link see article reference in the bottom of this text).

Be vigilant and proactive

The selection and use of physical and other protective equipment must be ongoing, practical and scientifically based. Changing exposure conditions necessitate a continuous review of prophylactic routines to address the possibility of increased need for protection. The need for protection may extend beyond that specified in guidelines or clinical procedures, simply because physical protection contributes to general health and wellbeing.

Full article:
Tandlægebladet 2017;121(9):760-766

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Toxicity testing of composites

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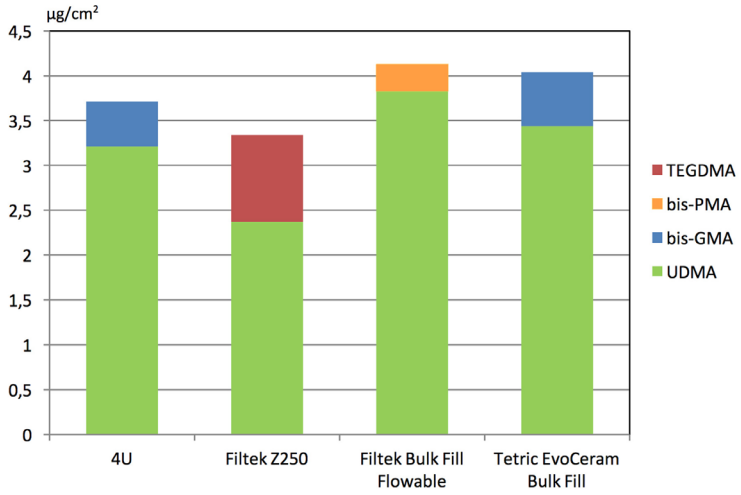
None of the tested composite materials was deemed less safe to use than the others, a recent report from NIOM concluded. The release of monomers from the different composites was similar. Initial cytotoxicity screening of extracts of the materials indicated some differences between the products. However, further evaluations could not verify a cytotoxic potential. The report concerning the safety of composites, including "bulk fill" and Own Brand Label (OBL)-materials, was prepared for the Norwegian Directorate of Health.

None of the tested composite materials was deemed less safe to use

Four composite materials were included in the investigation: 4U (Nordenta, OBL-material), Filtek Bulk Fill Flowable (3M ESPE), Tetric EvoCeram Bulk Fill (Ivoclar Vivadent) and Filtek Z250 (3M ESPE) as reference material. Filtek Z250 is a well-established material in clinical use for years. Composite specimens were cured from one side according to instructions, and polished to remove the inhibition layer. The specimens were immersed for 24 h in water for elution studies and in cell medium for cytotoxic evaluations.

For each material, the two most dominant monomers eluted were quantified and the results are shown in the figure. Smaller amounts of other monomers may also leach from the materials. None of the composites released significantly larger amounts of monomers than the others.

The composites released similar amounts of monomers



Concentration of eluted monomers from the composites, in microgram per square centimeter surface area.

The results of the screening tests for cytotoxicity are given in the table. Two cell lines (L929 mouse fibroblasts and BEAS-2B bronchial epithelial cells) were used to obtain a more secure evaluation.

Flow cytometry did not indicate any changes in cell growth pattern or increased cell death

Materials	L929 cells	BEAS-2B cells
4U	81,0 (3,9)	95,3 (1,5)
Filtek Bulk Fill Flowable	50,8 (2,1)	64,8 (7,4)
Filtek Z250	66,8 (1,9)	71,4 (4,9)
Tetric EvoCeram Bulk Fill	75,8 (4,8)	93,2 (7,6)

MTT results after exposure to extracts of cured composite materials, shown as the percentage of cell metabolic activity relative to control after 24 h (average (standard deviation), n=3).

The test results for Filtek Bulk Fill Flowable and Filtek Z250 were below the acceptable limit for non-cytotoxic agents (70 % cell metabolic activity, according to international standard) and were therefore investigated further. Flow cytometry did not indicate any changes in cell growth pattern or increased cell death after exposure to extracts of the materials. Neither were there any indications of increase in oxidative stress, DNA-damage or protein damage.

Read more:
The full report (in Norwegian) can be found here: www.niom.no\komposittmaterialer

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