

## **Occupational skin and respiratory symptoms related to polymer materials among dental technicians. (2:nd draft)**

### **Status report**

#### **Introduction**

CEN/TC55 established in 2007 a task force group WG 8 (Polymer base materials for dentistry - risk assessments). Behind the establishment were questions rose about the risk of occupational problems in dental technicians when working with polymer based materials (e.g. dentures). In some countries those questions have even raise demands for use of encapsulated materials only. The supposed risks are skin problems (i.e. allergic contact dermatitis [ACD]) and concerns have also been made of the risk getting respiratory symptoms.

In 2008 at the meeting in Brussels the task force group was decided to be permanent and the task for the group was widened and the name renewed. The new name is WG 8 (Dentistry – occupational risk assessments).

The first issue for the group is, however, to accomplish the work started with Polymer base materials mentioned above.

#### **Scope** (as decided in Tromsø 070924)

*This scope is after the widening assignment only valid for the first issue concernig polymer base materials – risk assessments. The scope for the WG will be changed and discussed in Bratislava.*

Polymer base materials (e.g. denture and orthodontic base materials, tray materials) may be a risk material for dental personnel (e.g. dental technicians) as well as for patients because of the content of organic substances (e.g. monomers). Still, the prevalence and awareness of the risk of polymer base materials seems to be inhomogeneous surveyed among the European member bodies. The aim for the WG 8 of CEN/TC 55 will be to review the present status regarding the prevalence and awareness of the risk of polymer base materials among dental personnel as well as patients. In addition the occupational health and safety regulations in different countries will be considered. Based on the results of the survey the group will make suggestions for improvements and consider the economical consequences.

#### **Materials and Methods used for the present report**

Scientific articles concerning dental technicians work with polymer base material and presumed occupational dermatological as well as respiratory symptoms caused by such work have been collected and summerized. In addition authority reports, risk assessments and reports written by experts of WG8 have been used for this summary. Also reports (e.g. cohort reports) on dental personnel in general, other working groups relevant for the report and the general population have been included when necessary for a more complete overview. The focus of the report has been on occupational adverse reactions when working with polymer base materials containing methacrylates.

The scientific articles used in the present summary intended to be based cohort studies mainly, but case reports have also been cited when needed. Due to limited evidence value however, conclusions from case reports have been drawn with caution. In addition other scientific articles concerning the issues of skin symptoms, respiratory symptoms and epidemiology have been used for discussion and scientific information.

The search terms used individual or in different combinations have been: Dentistry, Dental technicians, skin symptoms, occupation, occupational adverse reactions, acrylate, methacrylate, polymer base materials, irritative contact dermatitis (ICD), allergic contact dermatitis (ACD), skin symptoms, atopy, wet work and glove.

### ***FEPPD questionnaire among European dental technicians***

In addition to the review of articles, a questionnaire study was decided. The study is conducted by FEPPD and members of WG 8 in cooperation with Dept of Theoretical Disciplines, St. Elizabeth University College of Health and Social Work, Bratislava, Slovakia, Dept. of Biomaterials, Institute of Clinical Odontology/Medical Faculty, Tromsø University, Norway and the Dept. of Prosthetic dentistry/Dental material science, Institute for Odontology/Sahlgrenska Academy, Göteborg University, Sweden.

The background for the study was that only a few cohort studies have been performed among dental technicians concerning prevalence of skin and respiratory symptoms. Larger cohort studies on the subject including assumed causes and differences between European dental technicians are to a great extent lacking.

To enhance the knowledge of prevalence of and causes for skin and respiratory symptoms among European dental technicians at work the present questionnaire study was decided. In addition differences in prevalence of skin and respiratory symptoms between the European countries and suggested causes for such differences will be studied.

### **Materials and methods**

#### ***Ethical approval***

Before the study started, ethical approval according to the Helsinki declaration was performed and sent to the Ethical committee of St. Elizabeth University College of Health and Social Work, Bratislava, Slovakia. The application was approved.

#### ***Study population***

The size of the study was based on power calculations and available resources. To get reliable results of large populations a cohort study preferably have to include 10-15% of all dental technicians in the selected European countries. Together with FEPPD, 11 of their member countries were selected (Germany, France, the Netherlands, Belgium, Norway, Denmark, Slovakia, Luxemburg, Malta, Slovenia and the Czech republic). In those countries 10 % of the dental technicians at work was randomly selected ( $n_{\text{tot}}=8656$ ).

#### ***Questionnaire***

A questionnaire on skin and respiratory symptoms, atopy, occupational experience and other background factors (Appendix 1) was sent by mail and distributed by the member bodies of FEPPD in the selected countries in the autumn of 2008. Most of the questions used in the questionnaire have been used previously in a large questionnaire study on dentists (Örtengren et al 1999). The questions on hand eczema are also identical to those used in a previous (Meding & Swanbeck, 1987) and a recent (Larsson, 1997) population study and the Swedish study made on dental technicians (Meding et al 2006). By using the same questions, comparison between populations is possible. Three reminders will be sent. When needed, the questionnaires will be supplemented by a telephone interview.

All questionnaires was filled in anonymous but have to be coded, using the countries initial and a number, until the answers have been put in to the database. By use of a code, completion of default answers can be done and the dispatch of reminders can be restricted.

After input of data the questionnaires will be decoded so that full anonymous can be guaranteed.

#### *Analysis of non-responders*

Out of those who not return the questionnaire a number of dental technicians will be randomly selected for a short telephone interview. The aim is to compare the prevalence of self-reported hand eczema in responders and non-responders and to analyse the reasons for not responding.

#### *Process of data and statistics.*

Input and descriptive analyses of the data will be performed using the Microsoft Excel software at the The National Health Information Center in Slovakia (Bratislava). The data will then be statistical analyses using SPSS at the National Health Information Center (Bratislava), University of Bratislava and at the University of Tromsø. For comparisons between two proportions, and for confidence intervals, the standard normal approximation and the chi square test will be used. When comparing continuous variables between groups, Wilcoxon's rank sum test will be used.

When testing differences in prevalence between groups, taking gender, age group or history of childhood eczema into account, Mantel Haenszel chi-square statistics and logistic regression is used. With respect to age, a linear trend will be tested for. When comparing dental technicians with and without a history of hand eczema, and when comparing dental technicians, dental technicians in Sweden, dentists and general population samples (Meding & Swanbeck 1987, 1990a,b, Larsson 1997, Örtengren et al 1999, Meding et al 2006), prevalence ratios and their confidence intervals were calculated. Unless otherwise specified, 'statistically significant' refers to  $p < 0.05$  in two-tailed tests.

At present the collection of questionnaires and reminders are in progress. Preliminary results will be presented during 2009 in the a coming draft for WG 8 under the subheading "***Results from the FEPPD questionnaire among European dental technicians concerning skin and airway symptoms, causes and differences between countries***"

#### **Adverse effects on the skin**

Skin symptoms (*e.g.* hand eczema) seem to be the most common work-related symptoms associated with uncured methacrylic resin-based materials (Jacobsen & Hensten-Pettersen 1993, Rustemeyer & Frosch 1996, Kanerva *et al.* 1997a, Kanerva *et al* 1999, Mürer *et al.* 1995a,b, Örtengren *et al.* 1999, Wallenhammar *et al.* 2000, Meding et al 2006).

Since skin symptoms are a general expression, including dry and rough skin as well as hand eczema, more distinct definitions are often preferred. The reason is to facilitate attempts for comparison and tries to achieve an increased certainty of the prevalence of and the causes for hand eczema.

#### *Hand eczema*

In the general population, hand eczema is a common disease and more among women than men (Agrup 1969, Meding & Swanbeck 1987). Well-defined risk factors are atopy, wet work and sensitising substances (Meding & Swanbeck 1990 a,b, Lammintausta & Kalimo 1993, Nielsen 1996, Larsson 1997). There are several types of hand eczema with "Irritative Contact Dermatitis" (ICD) as the most common (Meding & Swanbeck 1987, Meding *et al.* 2006).

**Diagnosis of hand eczema and the criteria for common types of hand eczema with relevance for the present report.** (Meding & Svanbeck 1987)

Irritant contact dermatitis	A history of exposure to skin irritants and periods of eczema related in time to such exposure
Allergic contact dermatitis	A positive patch test and a history of present exposure to the allergen
Atopic dermatitis	A history of previous or present atopic dermatitis at other body sites

The main cause for ICD is wear through repeated hand-wash, cleaning etc. Allergic Contact Dermatitis (ACD) is caused by sensitising substances (*e.g.* nickel, fragrance mix, colophony, methacrylic monomers etc.) while “Atopic Dermatitis” is due to a skin barrier sensitive to damage, occurring in persons with a hereditary susceptibility (*e.g.* history of childhood eczema). Thus, as dentistry and also work at dental laboratories is associated with repeated hand-wash, wet work and handling of sensitising and/or irritant substances, it is assumed that dental technicians as well as dental personnel in general are at increased risk for hand eczema. (Mürer *et al.* 1995a,b, Munksgaard *et al.* 1996, Rustemeyer & Frosch 1996, Hill *et al.* 1998, Ortengren *et al.* 1999, Meding *et al.* 2006).

*Epidemiology of hand eczema*

Epidemiological studies of hand eczema as well as other skin symptoms are generally based on questionnaires where questions about occupational activity/experience, skin symptoms, atopy and other background factors are asked. Such questionnaires are sent to a sample among the general population or to people working in specific occupations. Based on the answers, the occurrence of certain symptoms (*e.g.* self-reported hand eczema) can be calculated. The validity, *i.e.* whether “the results of a measurement correspond to the true state of the phenomenon measured”, of the investigation, is often dependent on comparison with an accepted standard (Fletcher *et al.* 1996). The size of the population sample and the response frequency are important, *i.e.* a large random sample and a large fraction of responders will often result in high validity. Analysis of non-responders is desirable for the reliability. In addition, if the questionnaire items are identical to those of other studies, occurrence can be compared across the studies.

The prevalence of hand eczema among the general population has only been estimated to a limited extent making comparisons to dental technicians uncertain. Still in some of the studies performed on dental technicians and dental personnel, control materials have been used making assumptions more certain. Based on those studies, the prevalence of hand eczema in general can be estimated to be about 10% (Meding & Swanbeck 1987, Larsson 1997, Anveden *et al.* 2006, Meding *et al.* 2006). In a review made by Thyssén *et al.* (2007) it was concluded that the weighted average prevalence for ACD to at least 1 allergen in the general population and selected subgroups was about 19%. The most frequent allergen found were nickel, thimerosal and fragrance mix (Thyssén *et al.* 2007).

*Clinical examination for hand eczema*

In questionnaire studies, a crucial question is whether the self-diagnosis of hand eczema respond in questionnaires is correct. Meding & Swanbeck (1987) reported among those who declared hand eczema in the last 12 months, a hand eczema diagnosis was confirmed by clinical examination by a dermatologist in 89% of the cases. A similar result was found among car mechanics (Meding *et al.* 1994) and for dentists (94%) (Wallenhammar *et al.* 2000). If the aim of an investigation is to study allergic contact dermatitis due to acrylic resin-based materials, a clinical dermatological examination together with a patch test is of great value to establish the diagnosis (Ortengren 2000).

### *Patch testing*

If allergic contact dermatitis is suspected, the “patch test” is a common and established test method (Bruze *et al.* 1999). With patch testing, the suspected sensitising substances are tested. In most countries patch tests are performed with a standard series and, in case of dental materials, a dental screening series. For classification of the patch test results, established methods are used (Wahlberg 1995).

### ***Examinations among dental personnel with focus on dental technicians***

Although dentistry is assumed to be a risk occupation for problems with the skin, epidemiological studies on hand eczema and symptoms associated with dental materials (*e.g.* acrylic resin-based materials) among dental personnel and dental technicians are still sparse. Occupational skin disorders have been observed in dental technicians and there have been reports of an increase (Rajaniemi & Tola 1985, Mürer *et al.* 1995a,b, Rustemeyer & Forsch 1996, Lee *et al.* 2001, Meding *et al.* 2006). Rustemeyer and coworkers investigated technicians at 7 laboratories and a questionnaire was sent to 1132 technicians in Germany. Fifty-five technicians that reported occupational skin disease were investigated clinically. Sixty-three % had allergic contact dermatitis (ACD) and 23% irritative contact dermatitis (ICD). Mürer *et al.* (1995a,b) as well as Rajaniemi & Tola (1986) found an increase in skin symptoms among dental technician students during their studies compared to the general population. The study showed that trainees developed the same magnitude of skin symptoms as for dental technicians at work. Their explanation was the extensive use of acrylates and they recommended more information and education of hazardous materials as well as use of encapsulated systems and use of gloves with documented protective effect. Jacobsen and Pettersen (1993) concluded from an investigation on 201 dental technicians that skin reactions were reported by 28% of the responders. Information and knowledge have been shown lower the risk of hand eczema in dental personnel (Olsson *et al.* 2002) and have also been emphasized in dental technicians (Meding *et al.* 2006).

Despite the risk of getting ACD, Irritative contact dermatitis (ICD) are often find to be a greater cause for skin symptoms among dental health care personnel including dental technicians and the prevalence for ICD are often higher than for ACD. (Meding & Swanbeck 1987, Ortengren *et al.* 1999, Wallenhammar *et al.* 2000, Anveden *et al.* 2006, Schedle *et al.* 2007). Rustemeyer & Forsch (1996) on the other hand found a higher prevalence if ACD in their material as mentioned above. In a report about the risk for getting sensitized against methacrylic based material Ledenmann (2001) estimated the risk to  $\approx 5\%$ . In a recent performed retrospective cohort study of dental technicians in Sweden, Meding and coworkers investigated 2139 dental technicians and compared them with a population control ( $n=2288$ ) (Meding *et al.* 2006). The study was based on a postal questionnaire and the response rate was similar in both groups ( $\approx 58\%$ ). Drop out analysis showed a higher frequency of hand eczema among the responders compared to the non-responders (20% vs 13%). Among the controls, the figures were 13% and 4% respectively. Eighty percent of the dental technicians reported skin exposure to uncured methacrylates (MA). The incidence rate ratio (IRR) for hand eczema was 8.5 cases/1000 person-years during MA exposure time compared to 3.3 for the controls. The males had a higher IRR than the females. Their conclusion was that the risk for dental technicians getting hand eczema due to MA exposure and frequent hand washing was double compared to the general population.

### **Risk factors for adverse effects on the skin**

Most allergens identified by patch tests have been organic substances in polymer based materials. Methylmethacrylate (MMA) and triethyleneglycoldimethacrylate (TEGDMA) have been observed as common allergens among dental technicians (Guekens & Goosens 2001, Lee *et al.* 2001, Wrangsjö *et al.* 2001a, Lendemann 2001, Dermann 2007, Aalto-Korte *et al.* 2007). Other methacrylates as EGDMA (Ethylene glycoldimethacrylate) and 2-HEMA (2-hydroxyethylmethacrylate) have also been associated with adverse reactions on the skin (Aalto-Korte *et al.* 2007). 2-HEMA, however, is not used in dental base polymer materials.

The European Chemicals Bureau has assessed Methylmethacrylate (MMA), the main monomer in polymer base materials used in dentistry (European union risk assessment report 2002). The report concluded that there is a risk for toxic as well as sensitising reactions in dental laboratories and there is need for limiting the risks. The Swedish Work and Environment Authority came to the same conclusion in the mid 90:ths and dental personnel working with thermosetting polymer materials are included in their working regulations for thermosetting plastics (AFS 2005:18).

Methacrylate based products have also been causing sensitization among people working with or use nail-care products extensively (Lazarov 2007).

In addition polymer based materials used in dentistry as thermosetting polymers contain different additives such as benzoylperoxide also capable of inducing sensitisation and/or toxic reactions (Gebhart & Geier 1996, Bester *et al.* 2003). Thus it can be concluded that it is the uncured material that may cause adverse reactions (Jacobsen & Hensten-Pettersen 1993, Mürer *et al.* 1995 a,b, Ortengren 2000, Wallenhammar *et al.* 2000, Guekens & Goosens 2001, Wrangsjö *et al.* 2001a, Lendemann 2001, Dermann 2007, Aalto-Korte *et al.* 2007, Schedle *et al.* 2007).

The polymerized material represents a minor risk and the grinding dust reported giving skin problems in dental technicians are most likely due to the dusts particles shape not residual monomer content. It is also established that the residual monomer content in polymerized base materials are very low if the material is properly cured. One exception from that could be the autopolymerized materials since the polymerisations is depended on the powder/liquid ratio and the mixing procedure (Therselius 1995).

The main risk factor for hand eczema seems not, however, to be the monomers in polymer base materials. The reason for that is the higher prevalence of diagnosed ICD. Wet work and extensively hand wash seems therefore to be a greater risk together with extensive use of gloves without change or glove reuse (Wrangsjö *et al.* 2001, Anveden *et al.* 2006). Proper skin care must therefore be emphasized.

In addition to the risk factors at work, attention also should be drawn to the fact that the chemical environment in general and smoking seem to cause an increased amount of sensitisation reactions (Thyssen *et al.* 2007)

Reports of a toxic capacity of methylmethacrylate have been published concerning both personnel working in surgery (Wesley & Brinsko 1992) and in dental personnel and technicians (Munksgaard 1992a, Jacobsen & Hensten-Pettersen 1993, Leggat & Kedarune 2003). Jacobsen & Hensten-Pettersen recorded a frequency of 7% neurologic reported health problems among dental technicians (n=201). A toxic capacity on the fingers in contact with MMA uncured has been reported although it was considered as a mild axonal degeneration (Seppalainen & Rajaniemi 1984). Also neuropathy caused by exposure to MMA has been

reported (Donaghy et al 1991, Sadoh et al. 1999). The risk seems, however, to be less than the capacity of sensitization (Schuurs et al 1999). It must also be remembered that there is a risk for neurological damage when working with vibrating instruments (Hjortsberg *et al.* 1989). It seems therefore difficult to separate the causes for neurological disorders at present and more research is needed before any certain conclusions can be drawn.

### **Airway symptoms.**

Airway symptoms due the work with methacrylic based materials among dental technicians have been reported (Brune & Beltersbrekke 1981, Rom *et al.* 1984, Piirilä *et al.* 1998). The symptoms described have been “rhinitis, stuffed nose, sneezing, cough and asthma” (Piirilä *et al.* 1998, Kanerva 2001). Hu *et al.* (2006) reported low levels of MMA in dental 5 dental laboratories and measured lung capacity was not decreased among the technicians investigated (n=45). Golbabaie and coworkers (2005) investigated 20 dental laboratories and they concluded that the Short-Term exposure of MMA vapour was not low enough to protect technicians from adverse effects. The same authors, however, also stated that smoking was a health-influencing factor that may have affected the results. Measurements carried out in Sweden on vapour of MMA at dental laboratories showed short time values of 21mg/m<sup>3</sup> (limit value 600mg/m<sup>3</sup>). (Brisman 2005 unpublished data). Navezadeh & Dufresne (1999) reported even lower values (6.4 mg/m<sup>3</sup>). Sheikh & Guest (1990) studied dental technicians (n=18) in the UK compared to a match sample (n=69) with respect to gender age and smoking status. They reported an increased risk for inhalation problems among dental technicians, the study, however, was not focused on monomers in particular.

In orthopedic surgery reports of occupational caused asthma when using methacrylate based bone cement has been reported (Villar *et al.* 1986).

In the report made by The European Chemicals Bureau, repeated inhalation of MMA vapour is considered as hazardous in dental laboratories and as for the risk of getting ACD there is a need for limiting the risks (European union risk assessment report 2002). A recent report on exposure to methacrylates among dental assistants (n=799) showed an increased risk for respiratory symptoms when handling volatile substances. A relationship between type IV and respiratory symptoms was found (Jaakkola *et al* 2007). As for several other studies, atopy was found as a risk factor.

Thus it seems that the risk of getting airway symptoms caused by methacrylates are less than getting dermatological symptoms. Still, the reports are few for making any certain conclusions. The risk for respiratory symptoms seems also to be complex because of other environmental factors such as grinding dust working with different materials (e.g. metals etc.) (Radi *et al* 2002). Therefore adequate prevention, occupational precautions and information/education about the risks should be emphasized.

## **Results from the FEPPD questionnaire among European dental technicians concerning skin and airway symptoms, causes and differences between countries.**

### **To be included**

### **Occupational consequences *To be continued after further discussions***

Until today only a few studies have focused on the effects of skin (either ICD and/or ACD) and respiratory symptoms on occupation conditions among dental personnel and dental technicians (Lonnroth & Shahnavaz 1998, Andreasson *et al.* 2001, Meding *et al* 2006).

Andreasson *et al.* (2001) concluded that, even if occupational adverse symptoms may cause difficulties to work in the dental profession, skin and/or respiratory symptoms rarely cause sick leave or change of occupation. Lonroth & Shahnnavaz (1998) came to the same conclusion, even if change in occupation conditions not was studied exclusively. Among dental technicians hand eczema seemed to give more consequences in form of physician consultant and change of occupation compared to the population control (similar age and gender) (Meding *et al.* 2006). Wrangsjö *et al.* (2001a) investigated allergy towards MMA among dental personnel (n=174) and concluded that for all positive cases of MMA allergy the symptoms was seen together with atopy and/or other allergens.

Still, even if fewer persons may suffer from ACD toward organic substances in polymer based materials (*e.g.* MMA), those how does often have to be treated for a long period of time, have to be on sick leave and in some cases have to change assignment (Andreasson *et al.* 2001, Wrangsjö *et al.* 2001a).

### **Regulations concerning work with thermosetting polymer materials in dental profession in different EU countries.**

*To little information at present. Additional information from Sweden is added below*

In Sweden the work with thermosetting polymer based materials (*e.g.* denture base materials, acrylics etc.) are based on regulations from The Swedish Work and Environment Authority (AFS 2005:17,18). Dental technicians and dental personnel are included if there is a risk for exposure to uncured components in thermosetting plastics or the amount of material handled is over 500 gram/year. The risk of adverse reactions to uncured components in thermosetting plastics should be minimized through proper handling and the personnel handling those type of materials are educated and should work according to the regulations. A health care control by a physician is emphasised if the amount of material handled are over 500 grams.

The daily limit for MMA vapour is 200mg/m<sup>3</sup> and the limit for short time exposure are set to 600 mg/m<sup>3</sup>.

***PLEASE OBSERVE. A letter was sent before the last meeting but no answers given from other countries. The issue was also emphasized in Brussels. Please provide the group with sufficient information so that can be included..***

### **Precautions and advices *To be further discussed***

Because of the risk of having irritative and or allergic contact dermatitis as well as respiratory symptoms working in dentistry and for dental technicians, the need for information, instructions and increased knowledge about the causes for skin- and respiratory diseases have been stressed (Ortengren 2000, Wallenhammar *et al.* 2000, Ohlson & Svensson 2002, Jacobsen & Hensten 2003, Meding *et al.* 2006).

Since the middle of the 1990's the awareness among dental personnel of the allergic potential of methacrylic resin-based materials has grown, however, often with the result of improved handling. It have been concluded that preventive actions such as creating daily routines, change in hygiene factors, use of non touch technique, reduced use of latex and awareness of risk factors and occupational dermatoses seem to reduce the prevalence of skin and respiratory symptoms among dental personnel. (Kanerva *et al.* 1997a, Ortengren *et al.* 1999, Andreasson *et al.* 2001, Wrangsjö *et al.* 2001a, Ohlson & Svensson 2002, Jacobsen & Hensten 2003). It is worth noticing, however, when working with uncured methacrylates, that ordinary protective gloves are still insufficient due to the permeability of natural rubber latex and vinyl gloves to monomers (Munksgaard 1992 b, Andreasson *et al.* 2003, Hamann *et al.*



2005). In addition, symptoms associated with glove use and latex emphasizes the need for preventive skin care and development of new glove materials (Wrangsjö *et al.* 2001b, Hamann *et al.* 2005).

Use of encapsulated materials has been suggested for limitation of the risk for monomer contamination (Mürer *et al.* 1995b, Nayebzadeh & Defresne 1999).

In addition, since working at a dental laboratory is considered as a wet work, technicians must also be aware of the occupational risk of irritant contact dermatitis in their occupation. Awareness of proper skin protection and use of emollients are important to avoid ICD (Meding *et al.* 2006). Childhood eczema is, in addition, an important predictor for hand eczema as an adult, dental technicians should therefore be aware of that risk.

The risk for latex allergy had to be taken into consideration and latex materials should be avoided if possible.

To limit the risk of inhalation of monomer and dust, proper ventilation systems and suction devices have been recommended (Rustemeyer & Frosch 1996, Nayebzadeh & Dufresne 1999, Radi *et al.* 2002). In addition, coal filters have been suggested (Dermann 2007).

Material safety data sheets (MS/DS) for acrylic resin-based materials has been studied and found to be insufficient and improvements are needed (Kanerva *et al.* 1997b, Michelsen *et al.* 2003).

Furthermore, more studies on the prevalence and incidence rate of hand eczema and other skin symptoms among dental technicians seems to be necessary for development of more proper working routines and skin precautions.

Suggested list of advices are given below.

- Read the instructions for use and the table of content (MS/DS)
- Reduce the exposure time for uncured methacrylic resin-based materials
- Use the "Non-touch technique"
- Bottles/packages have to be improved to avoid contact
- Use of proper ventilation/suction devices is emphasized
- Handle the waste material properly to avoid contact with less cured material
- Proper skin care and use emollients
- Change gloves often due to the risk of ICD because of the wet and hot environment beneath the glove if used for a longer period of time
- Avoid working with latex products if the patient or the personnel are sensitive to latex

### **Conclusions (To be further discussed)**

The results from the present status report indicate that serious hand eczema among dental technicians due to work with uncured monomers and other organic substances in polymer base materials does occur but to a limited extent.

Even if dental technicians work with different chemicals, wet work and atopy seems to be the main causative factor for occupational skin disorders.

Hand eczema could cause long lasting sick leave or even change of occupation, rare however. Among those sensitised to methacrylates, most of the cases did not result in serious medical, social or professional consequences.

Respiratory symptoms caused by inhalation of polymer dust and/or methacrylic vapour is less frequent than hand eczema among dental technicians.

Nevertheless, methacrylic and acrylic resin-based materials are important sensitizers and should be handled with caution.  
Precautions have to be taken in dental laboratories to minimize the risk for occupational caused skin and/or respiratory symptoms.

Respectfully submitted 090218

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