

Schweizerische Zahnärzte-Gesellschaft  
Société Suisse d'Odonto-stomatologie  
Società Svizzera di Odontologia e Stomatologia

**SSO**

**Kongress  
Lausanne  
14.–16. Juni  
2001**

**Misserfolge  
und forensische  
Aspekte in der  
zahnärztlichen  
Praxis**

**Freitag, 15. Juni 2001  
Fortbildungsanlass für  
Dentalassistentinnen**

*(Alle Referate des Kongresses und der Fort-  
bildungsveranstaltung für Dentalassisten-  
tinnen werden simultan übersetzt d/f resp. f/d)*





**Dr Didier Dietschi**

Born in Geneva-Switzerland, on June 21th, 1959. Professional activities: 1984 license in Dentistry, at the Faculty of Medicine, University of Geneva. 1988 accomplishment of a thesis for the M.D. degree at the University of Geneva. Academic activities and positions, at the dental school of the University of Geneva: 1984-1986 full time assistant in the Department of Restorative Dentistry & Endodontics. 1986-1989 part-time clinical assistant in the Department of Periodontology. Part-time lecturer in the Department of Restorative Dentistry & Endodontics. 1989- part-time senior lecturer in the Department of Restorative Dentistry & Endodontics. 1996-1998 interim co-director, Department of Restorative Dentistry & Endodontics. Research topic: in-vivo and in-vitro behaviour of adhesive restorations. Since 1995, works specifically on in-vitro fatigue tests of adhesive class II and post & core restorations. Main clinical interests and academic graduate & post-graduate teaching: adhesive and esthetic restorations, chemical and conservative treatments of discolorations.



**Dr Asbjørn Jokstad**

Education: 1974-1979 DDS graduate 1979. Dental Faculty, University of Oslo. 1983-1984 Postgraduate Education. General Biology. University of Oslo. 1992 Dr. odont. Dental Faculty, University of Oslo. 1992-1994 Postgraduate Education. Oral Prosthetics and Function. University of Oslo. Academic positions: 1984-1992 Research associate, Department of Anatomy, Dental Faculty, University of Oslo. 1992-1996 Instructor, Department of Prosthodontics, Dental Faculty, University of Oslo. 1996-1998 Faculty Scholar, Department of Prosthodontics, Dental Faculty, University of Oslo. 1998- Associate professor, Institute of Clinical Dentistry, Dental Faculty, University of Oslo. Teaching activities: 15 teaching compendiums for dentists/students. Pre-clinic and clinical teaching for dental student, dental post-graduate, researcher and non-dental audiences. Computer assisted teaching resources. Tutored candidates working on doctor theses, master thesis and clinical specialities. Presentation of dental topics nationally and internationally on different formats/levels. Professional reports. Seminar presentations. Scientific presentations at various nationally and internationally meetings. Panel debates. Emphasis on: dental materials and restorations, colour theory and aesthetics, anatomy, computing, statistics, toxicology, temporomandibular dysfunction, treatment decisions in oral rehabilitation, prognosis and longevity, evidence based dentistry.



**Prof. Dr. Dr. J. Thomas Lambrecht**

1967-1968 USA-Stipendium. 1969-1979 Studium der Medizin und Zahnmedizin in Liège (Belgien) und Mainz (D). 1975-1977 Uniklinik Mainz (D). 1977 Dr. med. dent. 1977-1979 Assistent (ZA) in freier Praxis. 1979-1980 Städtisches Krankenhaus Wiesbaden (D). 1980 Dr. med. 1980-1991 Universitätsklinikum Kiel (D). 1982 Zahnarzt für Oralchirurgie. 1984 Arzt für Mund-, Kiefer- und Gesichtschirurgie (D). 1986 Plastische Operationen. 1988 Habilitation. 1989 Deutscher Hochschulforschungspreis. 1991 Ordinarius für Zahnmedizin der Universität Basel (CH). 1992 Facharzt FMH für Kiefer- und Gesichtschirurgie (CH). 1993-1995 Präsident der International Society for Computer Aided Surgery (ISCAS). Seit 1997 Präsident der Schweizerischen Gesellschaft für Dentomaxillofaziale Radiologie (SGDMFR).



**Dr Patrick Assal**

Scolarité à Lausanne et baccalauréat littéraire en 1996. En 1991 diplôme fédéral de médecin-dentiste à l'Université de Berne. Thèse en implantologie et obtention du doctorat à l'Université de Berne. De 1991 à 1993, assistant en implantologie à l'Université de Berne et travail en cabinet privé. De 1993 à 1995, formation post-graduée et spécialisation en parodontologie aux USA. Cabinet dentaire privé à Lausanne. Reconnaissance comme membre actif de l'Academy of Osseointegration (AO).

**Freitag, 15. Juni 2001 – Nachmittag**

**Vorsitz:** Dr. P. Assal, Dr. D. Kraus

**14.30-15.00**

Vorbeugung von Misserfolgen bei der Anwendung von direkten Füllungstechniken im Molarbereich (F)  
*Dr. D. Dietschi, Genf*

**15.00-15.30**

Biological aspects of dental restorations with composites (E)  
*Prof. Dr. A. Jokstad, DDS, PhD, Oslo (N)*

**15.30-16.00**

Pause

**16.00-16.30**

Chirurgische Fallstricke und Fallgruben in der oralen Implantologie (D)  
*Prof. Dr. Dr. J. Th. Lambrecht, Basel*

**16.30-17.00**

Vorbeugung von und Umgang mit Komplikationen bei implantat-getragenen Prothesen (F)  
*Dr. P. Assal, Lausanne*

**13.50-17.00**

**Parallelprogramm für Dentalassistentinnen**

Themen: Identifizierung über die Zähne: Was man wissen muss  
Orale Implantologie: Die Rolle der Dentalassistentin  
Digitales Röntgen

**Simultanübersetzung d/f**



*Biological aspects of  
dental restorations  
with composites*

*Asbjørn Jokstad  
Institute of Clinical Dentistry  
University of Oslo, Norway*



*[http://www.odont.uio.no/  
prosthodont/sso](http://www.odont.uio.no/prosthodont/sso)*



*Any  
reasons  
for  
biological  
concern?*



# *Standard Screening Tests for Biocompatibility; ISO, CEN, ANSI...*

- ◆ Acute systemic toxicity (Animal LD<sub>50</sub>)
- ◆ Cytotoxicity (Cell cultures LD<sub>50</sub>)
- ◆ Mutagenicity (Salmonella typhoidea)
- ◆ Implantation, local toxicity (Animals)
- ◆ Pulpal & gingival reactions (Animals)
- ◆ Sensitisation (Guinea pig)





# *Composite resin components*

Monomers: BIS-GMA... TEGDMA...  
HEMA... UDMA.. BIS-PMA... UPGDMA...  
EGDMA... DEGMA... PRDMA... BIS-  
DMA...

Additives and contaminants: CQ...  
BPE... DPO... MBEP... HMBP... CEMA... BPA...

Degradation products: MMA... BEA...  
MAA... Formaldehyde...

Product Number: **436909**

Product Name: **Diurethane dimethacrylate, mixture of isomers**

**Product Information**

Valid 11/2000 - 01/2001

[Description / Pricing](#)

Aldrich Chemical Co., Inc.

[Cert. of Analysis](#)

1001 West St. Paul

[MSDS](#)

Milwaukee, WI 53233 USA

**Options**

Phone: 414-273-3850

[Print Preview](#)

[Bulk Quote](#)

[Ask A Scientist](#)

M A T E R I A L   S A F E T Y   D A T A   S H E E T

SECTION 1. - - - - - CHEMICAL IDENTIFICATION- - - - -

CATALOG #: 436909  
 NAME: DIURETHANE DIMETHACRYLATE, MIXTURE OF ISOMERS

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - -

CAS #: 72869-86-4  
 MF: C23H38N2O8  
 EC NO: 276-957-5

SECTION 3. - - - - - HAZARDS IDENTIFICATION - - - - -

LABEL PRECAUTIONARY STATEMENTS  
 POSSIBLE RISK OF IRREVERSIBLE EFFECTS.  
 POSSIBLE CARCINOGEN.  
 POSSIBLE SENSITIZER.  
 WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - FIRST-AID MEASURES- - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.  
 IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS

*Relevance for  
daily clinical  
practice?*





Estrogenic potential

Acute allergy

Clinical use of composite resins and biological concerns?

Systemic toxicity

Chronic allergy

Local toxicity

Postoperative sensitivity

Secondary caries

Dentin and pulp reactions

Pulp capping



# *Acute allergy*



Hensten-Pettersen, Eur J Oral Sci, 1998:

Anaphylactoid reactions in children have been reported following the placement of fissure sealants, which are based on the same ingredients as composite materials



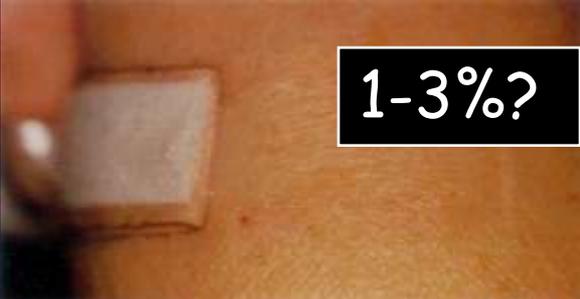
Björkman & Helland, Nor Dent Assoc J, 2001:

Signals from the Sweden about asthma attacks in relation to restorative therapy using resin based materials cannot be verified by data from the Dental Biomaterials Adverse Reaction Unit in Norway.

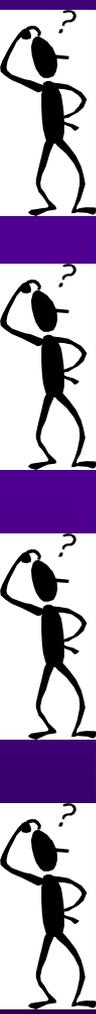




# *Chronic allergy*



1-3%?



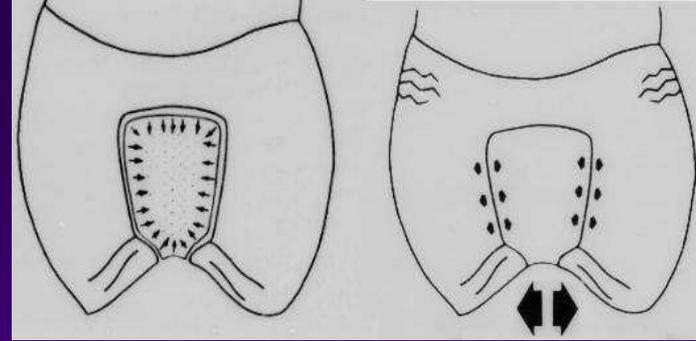
Kanerva et al., Contact Dermatitis, 1999:  
Finnish dentists have the highest risk of any occupation for developing occupational allergic contact dermatitis. The risk is 6.4-fold as compared to the general working population.

Wallenhammar et al., Contact Dermatitis, 2000:  
The prevalence of contact allergy to acrylates was below 1% in the population of responding dentists, and in most cases did not have serious medical, social or occupational consequences.





# Postoperative hypersensitivity



Christensen, J Am Dent Assoc, 1996:

The exact cause of tooth sensitivity related to class I and II resin restorations has not been clearly identified. There are many and varied clinical concepts associated with post-operative tooth sensitivity.



Cox et al., Pract Periodontics Aesthet Dent, 1999:



Cohesive hybridization of vital dentin prevents immediate postoperative hypersensitivity under all restorations and completely seals the entire tooth-restoration interface



# *Dentin and Pulp reactions*



Al-Fawaz et al., J Endod, 1993:

TEGDMA and HEMA are able to diffuse through dentin and cause pulp reaction without bacterial infection.



Schmalz, Eur J Oral Sci, 1998:



Composite resins apparently do not evoke pulp damage if bacterial penetration is prevented. Bacterial penetration may occur because of gap formation due to polymerization shrinkage.



# *Pulp exposure - capping*



Costa et al., J Endodont, 2000:

Adhesive resins may release particulates that may induce a persistent local inflammatory reaction. Consequently, in this specific condition, these materials cannot be regarded as biocompatible



Schuurs et al., Endodontic Dent Traumatol, 2000:

The cytotoxicity of the resin-based composites and the temperature rise during polymerisation may not be of concern... Based on available data, pulp capping with resin-based composites may be said to be promising.





# *Secondary caries - Plaque Adhesion*



Leinfelder, In: Garber & Goldstein, 1994:

The occurrence of secondary caries is greater than it is with amalgam. In addition, secondary caries progresses at a much slower rate in conjunction with amalgam than it does with posterior composite resins.



Lutz & Krejci, Compend Contin Educ Dent 1999:

Amalgam alternatives, if they are placed using a sophisticated operative technique resulting in perfectly adapted restorations, meet the high expectations outlined in the Swiss Dental Society quality guidelines





# *Local toxicity*



Schmalz, Eur J Oral Sci, 1998:



The gingiva may be damaged due to chemical release or due to bacterial growth on composite resins



Söderholm & Mariotti: J Am Dent Assoc, 1999:

Toxicity of commonly used dental resins should not be of concern to the general public.



# *Systemic toxicity*



Engelmann et al., J Dent Res, 2001:



TEGDMA is not only cytotoxic, mutagenic and acts as a surfactant-like agent, but may have a toxic potential which can result in higher susceptibility of cells for subsequent damages or injuries from other xenobiotics.



Hume & Gerzia, Crit Rev Oral Biol Med, 1996:

There are no data which suggest that systemic toxicity is a risk with any of these materials.



# *Estrogenic potential*



Olea et al., Environ Health Perspect, 1996:

The use of BIS-GMA-based resins in dentistry, and particularly the use of sealants in children, appears to contribute to human exposure to xenoestrogens

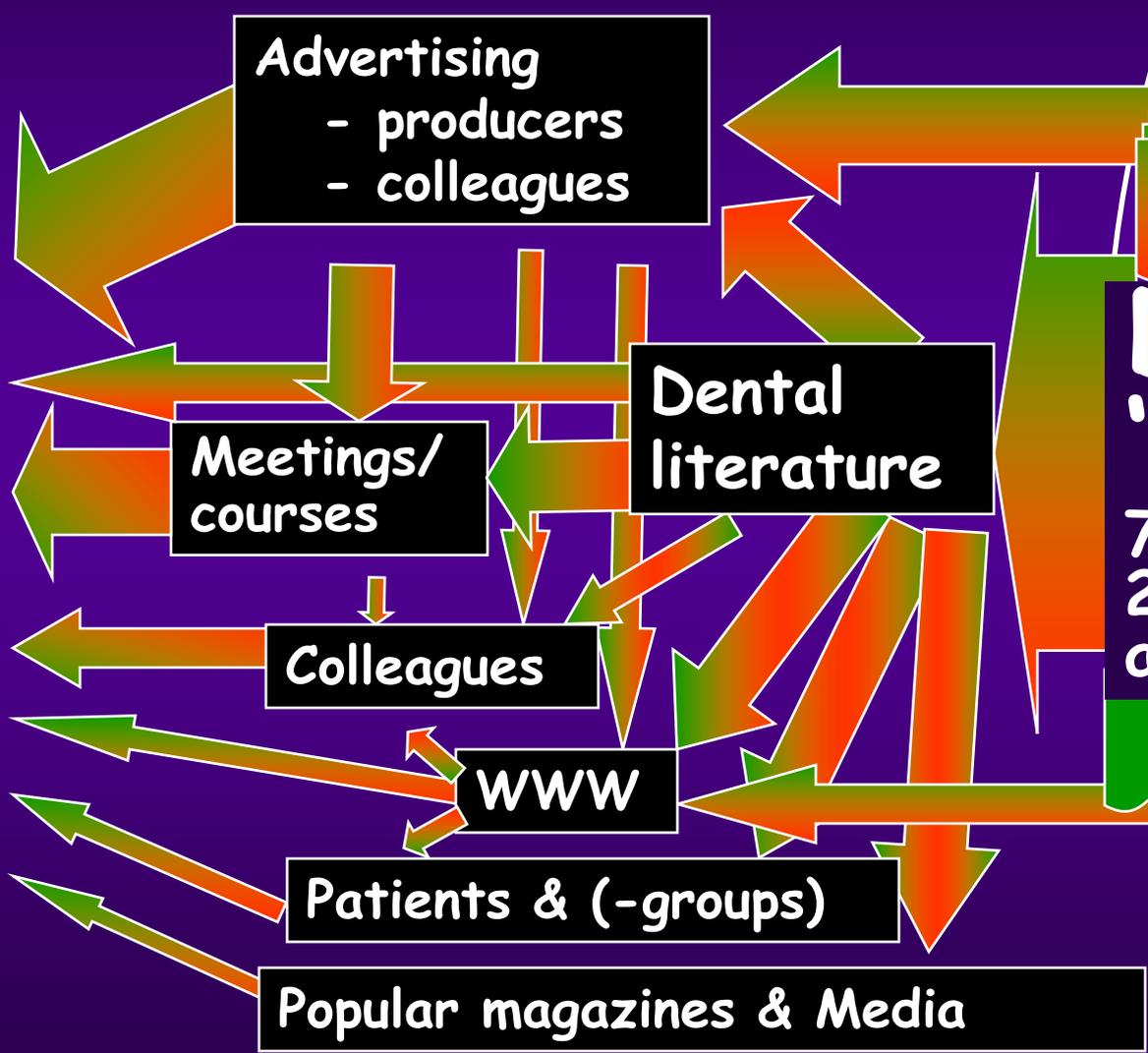
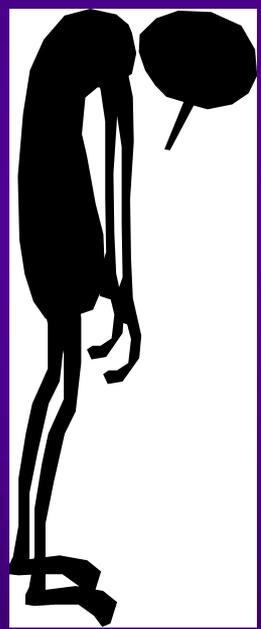


American Dental Association. [www.ada.org](http://www.ada.org), 2001:

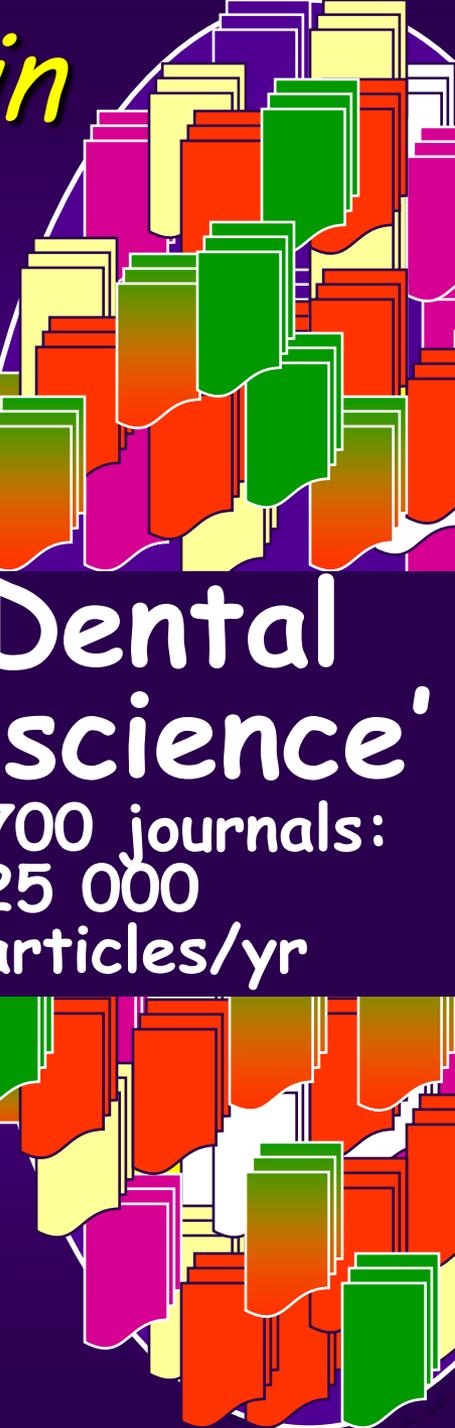
There is no evidence to suggest a link between any adverse health condition and Bisphenol-A leached out of dental sealants.



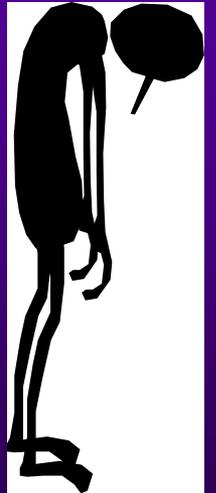
# The information overload in modern dentistry



**Dental 'science'**  
700 journals:  
25 000  
articles/yr



# *Why the confusion?*





# *Why confusion?*

There is little reliable information with respect to the biological interactions between resin components and various biological tissues.



# *Why confusion?*

Little reliable information on biological interactions between resin components and biological tissues:

1. Variables in planned studies influence the outcomes.

- ◆ Controlled, Uncontrolled, Confounding variables
- ◆ Synergy of variables?



## *In vitro studies; e.g. elution of leachable components- variables*

- ◆ *Surface oxygen inhibition*
- ◆ *Time after curing before immersion*
- ◆ *Type of solvent; water, ethanol*
  - ◆ *Selective extraction*
- ◆ *Time in solvent*
- ◆ *Unreacted components vs. Degradation*
  - ◆ *Oxidation*
  - ◆ *Hydrolysis*



## *In vitro / In vivo studies;* *variables*

- ◆ *Light intensity & Spectral distribution*
- ◆ *Access of light & Depth of light cure*
- ◆ *Curing time*
- ◆ *Conversion rate*
- ◆ *Polymerization shrinkage*
- ◆ *Microleakage*
- ◆ *Wear*
- ◆ *(Enzymatic) Biodegradation*



# *Why confusion?*

Little reliable information on biological interactions between resin components and biological tissues.

1. Variables in planned studies influence the outcomes.
2. All study designs are correlated with a probability of error.



# *Appraisal of harm; study design and probability of error*

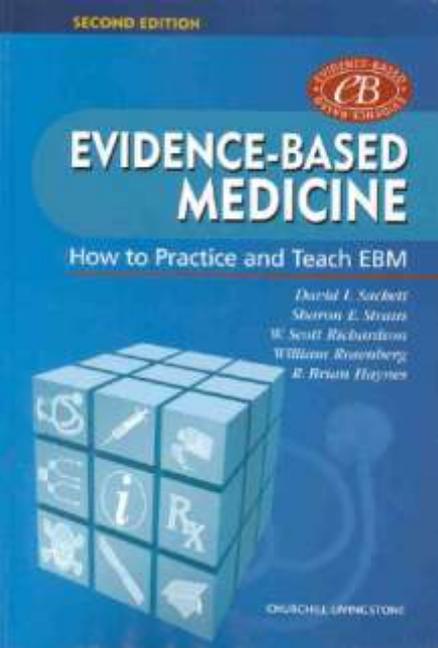
<http://cebm.jr2.ox.ac.uk/docs/levels.html>

- 1 Systematic review of randomized clinical trials (RCT) & Individual RCTs
- 2 Systematic review of cohort studies & individual cohort studies & Low quality RCTs
- 3 Systematic review of case-control studies & Individual case-control studies
- 4 Case-series & Poor quality cohort and case-control studies
- 5 Laboratory research & Expert opinion without explicit critical appraisal & Rationale basis on physiology & Case descriptions



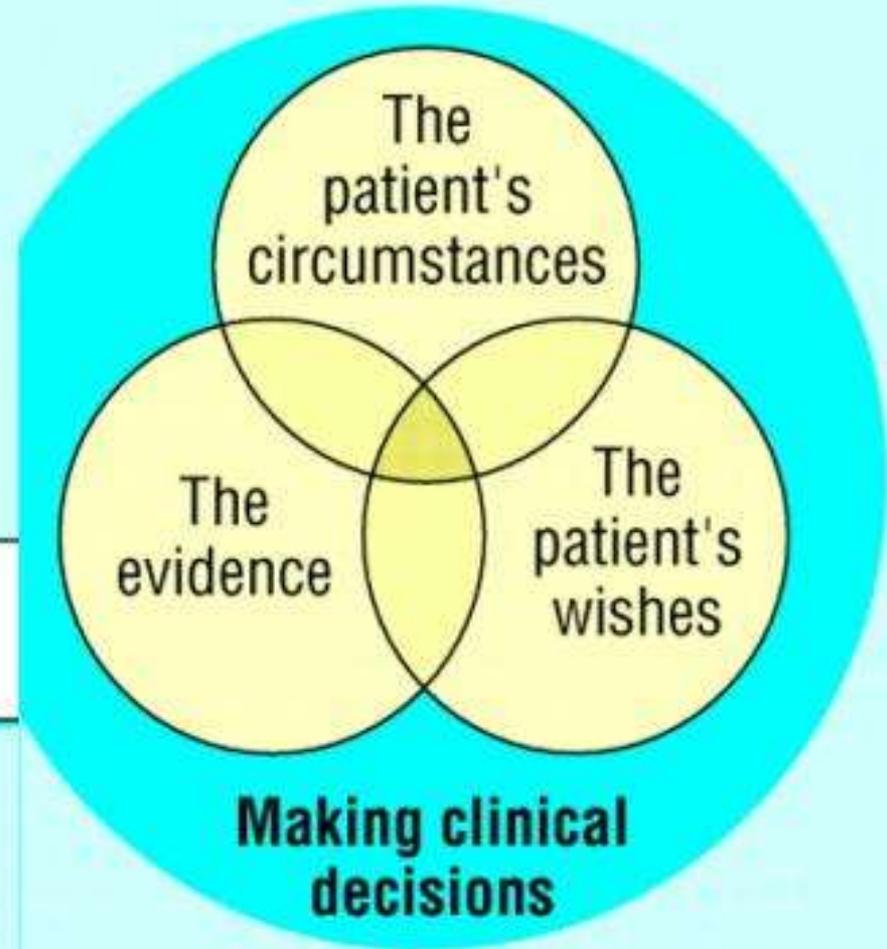
*Strategy for  
finding  
answers?*

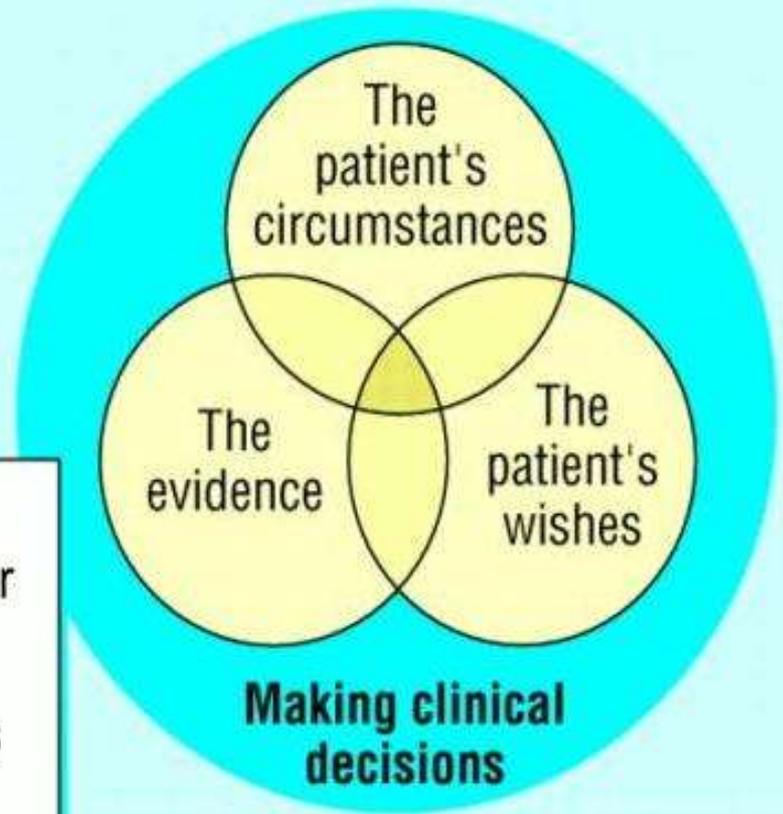
# Learn critical appraisal: EBM



Generating evidence  
from research

Synthesising  
the evidence



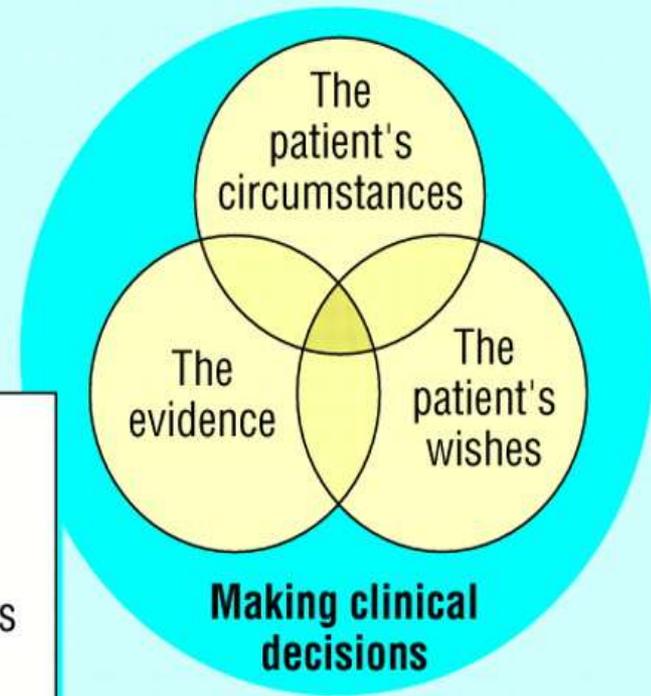
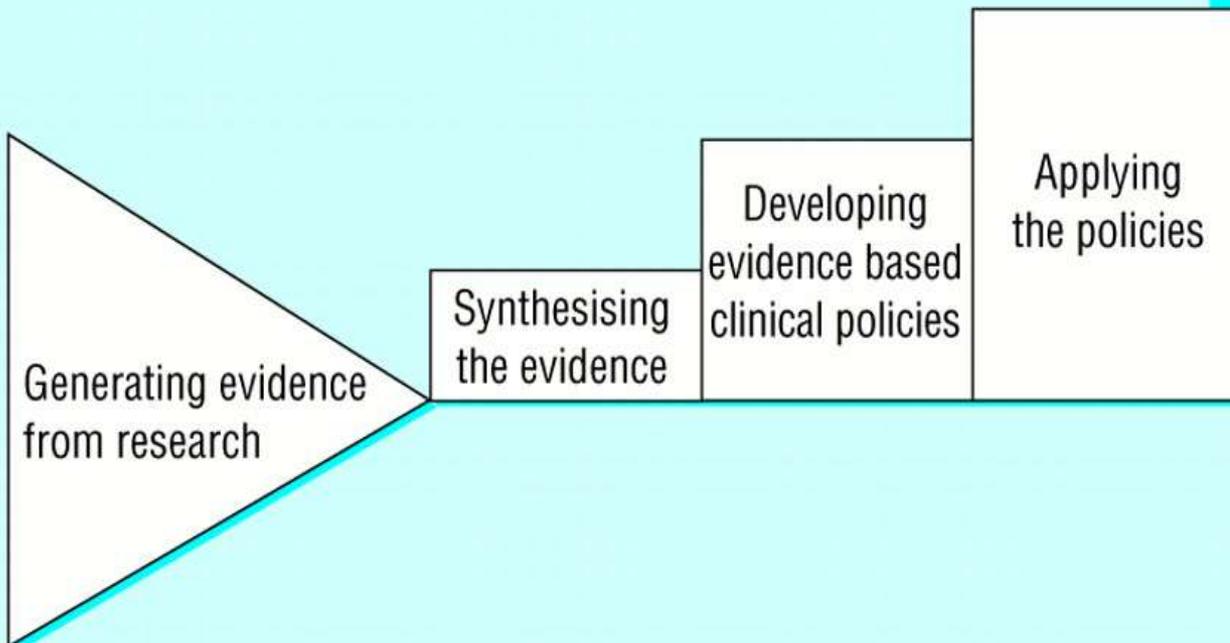


Generating evidence from research

Synthesising the evidence

Appraise for reliability validity and results

# Health Technology Assessments



	Health Techn. Assess	Systematic review	Random Control Trial	Clinical trial	Other evidence
Acute allergy	-	-	-	-	+
Chronic allergy	-	-	-	+	++
Local toxicity	-	-	-	+	++
Postoperative	-	-	+	+	++
Dentin and pulp	-	-	+	++	+++
Pulp exposure	-	-	+	++	++
Sec.caries/ plaque	-	-	+	+	++
Systemic toxicity	-	-	-	-	+
Estrogenicity	-	-	-	+	+

# *Strategy in daily clinical practice*



- 1. Identify potential hazard*
- 2. Read producer's instructions*
- 3. Keep adequate risk attitude*

# SKYDDSÅTGÄRDER för tandvårdspersonal vid arbete med plastmaterial

## Ohärdade plastkomponenter får inte komma i kontakt med huden

Allt ljushärdat material kan innehålla ohärdade komponenter.

### BRA SKYDD OCH BRA HYGIEN MINSKAR RISKERNA

Läs varuinformationen noga innan du använder en produkt.

**SKYDDSGLASÖGON/VISIR/HANDSUG** Använd dessa för att skydda ögon och andningsvägar mot stänk och damm.

**ÖGONDUSCH** Råkar du få damm eller droppar av ohärdat plastmaterial i ögonen, spola med vatten minst 15 minuter och kontakta läkare.

### BYT KONTAMINERADE HANDSKAR OCH KLÄDER

Byt snarast när du får ohärdat material eller adhesiver på handskar eller kläder. Det finns inga handskar som stoppar ohärdat material någon längre tid.

**TVÄTTA MED TVÅL OCH VATTEN** Får du ohärdat material på huden, tvätta omedelbart med tvål och vatten.

**AVFALL** Tättslutande avfallsbehållare ska finnas och användas. Märk den "HÄLSOFARLIGT AVFALL", "INNEHÅLLER AKRYLAT", "KAN GE ALLERGI VID HUDKONTAKT". Använd alltid handskar vid avfallshantering. Se till att städpersonal och sterilbiträden inte kan komma i kontakt med ohärdat material.

**UTBILDNING** Se till att ha utbildning om riskerna i arbetet.

**ANMÄL ARBETSSKADOR** via arbetsgivaren till Försäkringskassan, Socialstyrelsens nationella biverkningsregister och även Tandläkarförbundet.



Arbetsmarknadsstyrelsen



Allt innehåller grundar sig på Arbetsmarknadsstyrelsens broschyr AC1 491. Dentåta plastter är snarast allergien.  
Allt innehåller 499 betalt från Arbetsmarknadsstyrelsen Publikationservice.  
telefon 08-730 9700, fax 08-730 98 17.

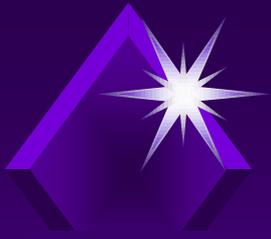
- Inspections of all importers and producers
- Survey to 3000 employers of dental clinics, (Replies 2680= 91%)
- 19634 individuals registered - 6372 dentists
- 22% clinics reported health problems related to resins
- 6% of all individuals reported health related problems (n=1234/19634)
- Only 99 of these had been reported to national register for adverse reactions
- 8% of all dentists reported health related problems (n=511/6372 dentists)
- 3% had allergy documented by physician (n=217 / 6372 dentists)
- Multiple inspections by work authorities
- Many breaches of regulations (n= 1234)
- Several follow-up inspections



## *Identify hazards*

### Read Safety Data Sheets

- ◆ Uncured material: Direct contact can cause eye and skin irritation.
- ◆ The material is contraindicated if a person is known to be allergic to any of the ingredients of the product.



## *Learn First Aid measures*

### Eye contact

Flush with plenty of water. Consult a physician if irritation persists.

### Skin contact

Wash thoroughly with soap and water.

### Ingestion

No hazards anticipated from swallowing small amounts incidentally to normal handling.

### Inhalation

Remove to fresh air.



# *Employ adequate handling and storage & personal protection*

## Handling

Personnel that handle composite resins must be adequately trained

## Personal protective equipment

Respiratory protection

Hand protection

Gloves - replace if contaminated

Eye protection

Safety goggles

Check light source regularly for power output



*Thank you  
for your  
kind  
attention*

*<http://www.odont.uio.no/prosthodont/sso>*