

AN ATTEMPT TO CLASSIFY THE DIAGNOSTIC ALLERGENS OF CONTACT HYPERSENSITIVITY IN DENTAL BIOMATERIALS

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ABSTRACT

There is a wide range of dental biomaterials with varied and complex composition. There are too many sensitizing substances in dental materials and a careful study of their composition is necessary for choose the appropriate contact allergens in cases of suspicion of contact hypersensitivity to dental materials. We attempt to facilitate the diagnostic of contact allergy due to dental biomaterials by classifying the basic sensitizing components in different groups of dental biomaterials.

Key words: dental materials, contact hypersensitivity, diagnostic

The diagnostic of contact hypersensitivity to dental materials in Bulgaria was carrying out for many decades with

allergens made from commercial products (2, 3). A certain difficulty in the diagnostic process was the wide variety of commercial products and the impossibility to prepare the diagnostic allergens opportunely (4, 5). A serious problem was the low concentration of some substances in the material, which was the cause of missing of such substances in the diagnostic allergen made on the base of commercial product (1, 4). It is a real cause to read false negative results in cases of sensibilization to those substances.

We made a large study on the composition of dental materials using monographs on dental biomaterials, information of data safety material sheets and correspondence with manufactures. We succeeded to classify the basic standardized diagnostic allergens for different groups of dental materials and we propose that information at Tables 1, 2, 3, 4 and 5.

Table 1. Allergens for diagnostics of contact hypersensitivity to restorative composite materials.

ALLERGENS	Conc./pet.%(w/w)
Methacrylate monomers:	
1. Bis-GMA – Bisphenol A diglycidyl ether methacrylate; [2,2-bis-(4-(2-hydroxy-3-methacryloxypropoxy)phenyl)propane];	2.0 pet
2. Bis-EMA – Bisphenol A polyethylene glycol diether dimethacrylate; [2,2-bis-(4-(2-methacryloxyethoxy)phenyl)propane];	2.0 pet
3. UDMA – Urethane dimethacrylate;	2.0 pet
4. TEGDMA – Triethyleneglycol dimethacrylate;	2.0 pet
5. EGDMA – Ethyleneglycol dimethacrylate	2.0 pet
Initiators:	
1. CQ – Camphoroquinone;	1.0 pet
2. BP – Benzoyl peroxide	1.0 pet
Activators:	
1. DMAEMA – N,N-dimethylaminoethyl methacrylate	0.2 pet
2. DMPT – N,N-Dimethyl-4-toluidine	5.0 pet
Inhibitors:	
1. MEHQ – Methylhydroquinone	1.0 pet
UV-absorbers:	
1. HMBP – 2-hydroxy-4-methoxy benzophenone;	10.0 pet
2. Tinuvin P – 2-(2-hydroxy-5 methylphenyl) benzotriazole	1.0 pet

Tab. 2. Allergens for diagnostics of contact hypersensitivity to dental amalgam.

ALLERGENS	Conc./pet. %(w/w)
1. Hg – Mercury	0.5 pet
2. Ag – Silver nitrate	1.0 aq
3. Sn – Tin	50.0 pet
4. Cu – Copper sulfate	2.0 pet
5. Zn – Zinc chloride	2.0 pet

Tab. 3. Allergens for diagnostics of contact hypersensitivity to dental acrylate plastics.

ALLERGENS	Conc./pet.%(w/w)
Methacrylate monomers:	
1. MMA – Methyl methacrylate;	2.0 pet
2. EGDMA – Ethyleneglycol dimethacrylate;	2.0 pet
3. UDMA – Urethane dimethacrylate	2.0 pet
Initiator of polymerization:	
1. BP – Benzoylperoxide	1.0 pet
Possible component in initiator system:	
1. Cu – Copper sulfate	2.0 pet
Initiator for visible light dental acrylic composite materials:	
1. CQ – Camphoroquinone	1.0 pet
Accelerator for polymerization:	
1. DMPT – N,N-dimethyl-p-toluidine	5.0 pet
Stabilizer and antioxidant:	
1. HQ – Hydroquinone	1.0 pet
Plastificator:	
1. Dibutyl-phthalate	5.0 pet
Product of oxidation of MMA:	
1. Formaldehyde	1.0 aq

Tab. 4. Allergens for diagnostics of contact hypersensitivity to metals in dental alloys.

ALLERGENS	Conc./pet.%(w/w)
No noble metals:	
1. Ni – Nickel sulfate	5.0 pet
2. Co – Cobalt chloride	1.0 pet
3. Cr – Potassium dichromate	0.5 pet
4. Mo – Molybdenum	5.0 pet
5. Al – Aluminum chloride hexahydrate	2.0 pet
6. Mn – Manganese (II) chloride	2.0 pet
7. Ti – Titanium ¹	10.0 pet
8. Ti – Titanium oxalate ²	5.0 pet
9. Zn – Zinc chloride	2.0 pet
10. Cu – Copper sulfate	2.0 pet
Noble metals:	
1. Au – Goldiumthiosulphate	2.0 pet
2. Ag – Silver nitrate	1.0 aq
3. Pd – Pallidium chloride	2.0 pet

¹ The allergen is appropriate for suspicion of contact allergy to dental implants.

² The allergen is appropriate for suspicion of contact allergy to titanium in dental alloys.

Tab. 5. Allergens for diagnostics of contact hypersensitivity to materials for endodontic fillings.

ALLERGENS	Conc./pet.%(w/w)
1. Eugenol	2.0 pet
2. Formaldehyde	1.0 aq
3. Balsam Peru	25.0 pet
4. Epoxy resins	1.0 pet

CONCLUSION

Such classification of contact allergens assure with relatively little number of diagnostic allergens to assess the reactivity of the patients to a large number commercial dental biomaterials.

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