



FDI DRAFT POLICY STATEMENT

Nanoparticles in Dental Practice

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Final Draft 2

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2 **CONTEXT**
3 Nanoparticles are present in nature or can be purposely manufactured and are used
4 to a large extent in everyday life, e.g. in cosmetics like sunscreen containing zinc
5 oxide nanoparticles.
6 Nanoparticles are intentionally added/embedded into dental products to improve
7 material properties. In addition, nanoparticles can be byproducts from milling
8 processes for fillers and thus get embedded in many dental materials.
9 In the dental laboratory, dental technicians are exposed to nanoparticles as dust.
10 In the dental practice, dental personnel are mainly exposed to nanoparticle dust
11 produced by grinding and polishing dental materials, irrespective of nanoparticles
12 being present in the material. The lungs are the prime target organ. Recent risk
13 assessment has shown that the health risk for dental personnel after inhalation of
14 nanoparticles as dust is likely to be low. No data are available regarding the effects of
15 long-term exposure of dental nanoparticles for dental personnel. Despite exposure to
16 dental nanoparticles for many decades, there are no indications of an increased rate
17 of lung disease for dental personnel.
18 Patients are exposed to dental nanoparticle dust or debris but to a much lesser extent
19 than dental personnel. Recent risk assessment has shown that the health risk for
20 patients for both inhalation of nanoparticles or ingestion from wear is likely to be low.
21 Available information is limited, especially regarding the effect of dental material
22 nanoparticles on vulnerable patient groups, such as those with asthma or chronic
23 obstructive pulmonary disease.
24 Current evidence suggests that the general risk of titanium nanoparticles from dental
25 implants in the alveolar bone is likely to be low.
26 Recently, nanoparticles have become a matter of public and scientific concern.
27 National and international agencies are dealing with nanoparticles and their safety as
28 they may cause adverse effects due to their size and possibly their chemical
29 composition.

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32 **SCOPE**

33 This FDI Policy Statement covers the effects of nanoparticles in and from dental
34 materials on the health of patients and dental personnel, and on the environment.

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36 **DEFINITIONS**

37 For the purpose of this document, a nanoparticle is defined as a particle having one or
38 more external dimensions in the size range from 1 nm-100 nm.

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40 **PRINCIPLES**

41 Effective oral healthcare must be based on high quality and safety. As nanoparticles
42 in dentistry have become a matter of concern, FDI has analyzed the most recent data
43 on the matter to advise and protect patients, dental personnel, and the environment.

44
45 **POLICY**

46 FDI supports the following statements:

- 47 1. FDI agrees to promote research on the health effects of ingestion/inhalation, and
48 cell and tissue exposure to nanoparticles from dental materials.
- 49 2. In the dental laboratory, dental personnel must follow available relevant
50 national/international occupational health safety regulations. In countries where
51 no regulation is available, efforts should be made to reduce the risks by wearing
52 filtering masks and providing effective local ventilation in the laboratory.
53 Encapsulated powder/liquid systems may further reduce the dust exposure.
- 54 3. In order to minimize any possible risk to dental personnel in practice and
55 patients, the amount of generated dental nanoparticle dust should be kept to a
56 minimum and the following measures are recommended:
 - 57 a. Proper sculpting of the restorations before setting/curing may reduce the
58 amount of material that is cut during the finishing and polishing step.
 - 59 b. Adequate amount of water coolant and effective suction when grinding
60 and polishing intraorally whenever possible.
 - 61 c. Effective local ventilation in the treatment area and the installation of
62 ventilation devices designed for air purification purposes could also be
63 considered.
 - 64 d. Encapsulated powder/liquid systems may further reduce the dust
65 exposure.
 - 66 e. Common surgical face masks and FFP3 (FFP=Filtering Face Piece)
67 reduce exposure to nanoparticles. Attention should be given to ensuring a
68 close fit of the mask.
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70 4. Available data on possible adverse reactions derived from nanoparticles in and
71 from dental materials by manufacturing and processing dental materials and
72 environmental exposure are sparse, and more research is necessary. When
73 developing dental materials and application methods, emphasis should be given
74 to minimizing nanoparticle exposure.

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76 **KEYWORDS**

77 Nanoparticles, dentistry, dental personnel, dental materials, patients.

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79 **DISCLAIMER**

80 The information in this Policy Statement was based on the best scientific evidence
81 available at the time. It may be interpreted to reflect prevailing cultural sensitivities and
82 socio-economic constraints.

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84 **REFERENCES**

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