
SHORT
COMMUNICATIONS

A Safe Physiological Challenge Test for Specification of Intolerance to Dental Materials

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The accuracy of the *in vitro* tests currently used to determine allergic sensitivity of the body to various substances, including dental materials, based on the detection of histamine-producing and other leukocytes or on the determination of changes in cell mobility is about 50–80% [1, 2]. The sensitivity of such tests can be most effectively increased by using a series of different dilutions of an antigen. In the present study, 10 tenfold dilutions of the antigen were used and the sensitivity to the antigen was estimated by the neutrophil damage in the reaction of neutrophil rosette formation [3].

The patients' sensitivity to various polymeric and metallic dental materials was tested; 530 specimens of such materials were studied. A weak specific response to dental materials was found in 25% of the patients, and it corresponded to the 10–15% suppression of neutrophil adhesion in the rosette-formation test. The use of these dental materials did not induce unfavorable reactions in most of the patients. However, characteristic manifestations of intolerance developed in some patients immediately after the setting of these dental materials or some months later, and these manifestations disappeared after removal of the material. Before the study, in most of these patients, lichen ruber planus of oral mucosa was found.

To prevent unfavorable consequences, it is important to reveal the patient's reaction to dental materials prior to the laboratory test.

Challenge tests for allergies are the most specific and reliable for detection of allergies, but they are seldom used because of the danger of severe pathological reactions [4]. Such tests include the injection of a small dose of the allergen studied into the shock organ, i.e., into the organ or tissue most sensitive to this allergen, and its response is evaluated by the development of local reactions (erythema, edema, and burning sensation).

We decided to use the challenge test to specify the tolerance to the dental material only in the patients who displayed the minimal *in vitro* reaction, because in these cases, no serious local manifestations were expected, and, afterwards, they did not occur. Our test included counting the leukocytes and epithelial cells in the oral lavage before and after the 1-h contact (incubation) with the material under study in the patient's mouth.

In the control group of 16 subjects, the difference between the cell numbers in two washings from the oral cavity at the 1-h interval without contact with the allergen was 12–24%, and the cell number in the second washing was higher or lower in the same number of cases.

First, five patients were examined with clear clinical manifestations of denture intolerance, which completely disappeared after the removal of the dentures. The cells were counted in the oral-cavity washings before and after the 1-h contact of oral mucosa with a fragment of the denture removed, and the difference was between 200 to 380%. Note, that, in four patients, the number of leukocytes and epithelial cells after the incubation was increased, and in one patient, it was decreased.

Dental materials are known to induce a mixed allergic response consisting of antibody-dependent and cell-mediated components [5]. The cellular reaction is mainly associated with the inhibition of cell migration, whereas during the antibody-dependent reaction, the cell chemotaxis is activated upon contact with the allergen. This seems to determine the direction of changes in the cell number in the oral cavity washing before and after contact with the dental material.

Our examination of the patients for intolerance to dental materials included the assessment of the neutrophil damage by the *in vitro* test of neutrophil rosette formation (with a series of the allergen dilution), and a weak reaction was detected in 115 subjects. The above-described challenge test in no case induced clinical reactions during its execution (there were no complaints by the patients); however, in 25 patients, the cell numbers after the 1-h contact with the material tested in the washings from the oral cavity significantly changed (by 150–260%) and, more often, increased.

In all these cases, we urgently recommended the dentists not to use this material for such patients. However, in two cases, this material was used, but two and four months later, respectively, the dentures were removed because of complaints about the permanent feeling of burning in the oral cavity.

In all cases of a weak reaction to the material detected by the *in vitro* test of neutrophil damage when the cell number in the challenge test changed less than 100%, the use of the material tested did not cause complaints by the patients.

CONCLUSION

Thus, the specific, weak *in vitro* sensitivity of patients to dental materials usually did not cause clinical manifestations when these materials were used. Therefore, the specifying challenge test for the oral cavity has been proposed. The reaction in this test is evaluated by changes in the cell number in the washing from the oral cavity after a 1-h contact with the dental material. The 1.5-fold and more-pronounced changes in the cell number show that this material is inappropriate for the patient.

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