

Cross-reactions between ethylenediamine, diethylenetriamine and triethylenetetramine

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A consecutive series of 1544 patients and 137 patients in occupational contact with epoxy resins were tested with ethylenediamine and/or triethylenetetramine; some were tested with diethylenetriamine. Guinea pigs sensitized to triethylenetetramine were tested with ethylenediamine and diethylenetriamine. The results showed that cross-reactions may occur between triethylenetetramine and ethylenediamine, although the majority of the patients were sensitized to only one of the compounds.

Key words: Cross-reactions – diethylenetriamine – ethylenediamine – triethylenetetramine.

Received for publication July 9, 1976

It has been reported that a patient primarily sensitive to triethylenetetramine (TETA) was positive to ethylenediamine (EDA). Similarly, two other patients primarily sensitive to EDA were positive to TETA (van Hecke 1975). The present investigation involved two groups of patients and guinea pigs sensitized to TETA.

Materials and Methods

Two groups of patients were patch-tested: 137 patients with dermatitis following occupational contact with TETA, and 1544 consecutive patients with various types of dermatitis.

TETA (15 %) in water was rubbed on the shaved skin of ten guinea pigs every day except Sundays and holidays. The solution was applied alternatively to each side every second day. The rubbing was repeated 34

times. During the experiments, which were performed in May and June, two animals died.

For patch testing of patients and animals, we used 1 % EDA in yellow paraffin, 1 % TETA in water and 1 % diethylenetriamine (DETA) in water.

Results

Among the 1544 patients, positive reactions to EDA were noted in 28; 400 patients of this group were also tested with TETA and the results were all negative. Twelve of the 28 patients positive to EDA were tested with TETA; two reacted positively.

All 137 patients in occupational contact with epoxy resins were tested with EDA and TETA and a large number of them with DETA. The results are shown in Tables 1 and 2.

Table 1. Coexistence of positive reaction to TETA and EDA in patients in occupational contact with epoxy resins

Reactions to EDA	Reactions to TETA	
	positive	negative
positive	23	0
negative	48	66

From among the eight guinea pigs sensitive to TETA, one reacted to DETA and another to DETA and EDA.

Discussion

We have long observed that some patients working with epoxy resins are at the same time positive to TETA and EDA. It seemed probable that cross-reactions occur here, although simultaneous sensitization could not be ruled out. For elucidation of this problem it seemed important to establish:

1. Whether there are patients positive to TETA who had no contact with this hardener
2. Whether there are patients positive to EDA who had no contact with it
3. Whether among patients primarily sensitive to TETA patch tests are more frequently positive with DETA than with EDA.

In the group of 1544 consecutive patients 28 were positive to EDA. Twelve of them were tested with TETA and two gave positive results.

These two had no contact with epoxy hardeners; thus cross-reactions between EDA and TETA appear to be very probable, the more so since in 400 consecutive patients, tests with TETA were negative. This also indicates that in Poland the situation is not analogous to that observed in Sweden in the case of epoxy resins, where unexplained reactions sometimes occur (Fregert 1973).

In consecutive patients positive to EDA

Table 2. Coexistence of positive reaction to TETA and DETA in patients in occupational contact with epoxy resins

Reactions to DETA	Reactions to TETA	
	positive	negative
positive	40	0
negative	12	13

the source of sensitization was nearly always unclear. Mycolog cream is almost never used in Poland and Polish industrial oils do not contain EDA (Rudzki et al. 1976). Although we know that in our patients with occupational exposure to epoxy resins 32 certainly had contact with EDA used as impregnators in one industrial establishment, we do not know how many had non-occupational exposure. Therefore it proved impossible to exclude contact with EDA in humans. This was possible, however, in the case of guinea pigs. Among the eight animals sensitized to TETA, one also reacted to EDA. This was undoubtedly a cross-reaction.

If cross-reactions occur in people positive to TETA and EDA, the patients must be positive to DETA as well. In patients with primary sensitization to TETA, tests with DETA should be more frequently positive than with EDA. In our 137 patients primarily sensitized to TETA, about 80 % were positive to DETA, and only one third were positive to EDA. This seems to confirm sensitization between TETA and EDA. It should be stressed that DETA is very seldom used in Poland and there was no evidence that any of our patients had contact with this substance. In the eight guinea pigs sensitized to TETA, a reaction was found more frequently to DETA (two) than to EDA (one).

Cross-reactions between EDA and TETA no doubt exist, but the frequency of this reaction in humans is difficult to evaluate,

since simultaneous sensitivity may sometimes occur. In the eight guinea pigs sensitized to TETA, one was positive to EDA. It is possible that if the animals had been sensitized to a greater degree (for example by longer sensitization, use of Freund's adjuvant or sodium lauryl sulphate) cross-reactions might have appeared in a higher percentage.

References

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