

Contact sensitivity to chromate: comparison at a London contact dermatitis clinic over a 10-year period

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It has been argued that for chromate sensitivity to be reduced, then ferrous sulfate should be added to cement. This has not yet been done in the UK. To explore this further, we have looked at the comparative sensitization rates of patients attending the St. John's Institute of Dermatology Contact Dermatitis Clinic between the years 1982–3 and 1992–3. Patch-test-positive rates for females were not significantly different between the 2 populations studied (1982–3, 1.59% and 1992–3, 1.99% *p* NS). Similarly, there was no significantly different rate between the males (1982–3, 3.99% and 1992–3, 4.25% *p* NS) in the same time period. There was no difference in the distribution of eczema in chromate-positive subjects, nor of cobalt co-sensitization, a crude indicator of sensitization via cement. This work demonstrates no appreciable difference in the frequency of chromate sensitivity between the early 1980s and 1990s in London. Adding ferrous sulfate to cement may help to lower the frequency in the future.

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There has been much debate over whether the rate of contact sensitization to chromate is falling in Europe. Denmark has seen such a fall, which has been attributed to the addition of ferrous sulfate to cement, thus reducing chromate to its trivalent chromium salts, which cannot permeate the skin. However, other authors (1) have reported a decline without the addition of ferrous sulfate. This paper describes a constant rate of contact sensitivity to chromate between the years of 1982–3 and 1992–3. Ferrous sulfate has not yet been added to cement in the UK.

Patients and Methods

All patients attending St. John's Institute of Dermatology Contact Dermatitis Clinic for patch testing between the years 1982–3 and 1992–3 were patch tested to potassium dichromate 0.5% pet. as part of the European standard series. Patch tests were read at 2 or 3, and 4 or 5 days.

Results

Frequency of chromate sensitivity

In 1982–3, the frequency of chromate sensitivity was 1.59% for females and 3.99% for males. In

comparison, there was surprisingly little change in this rate in 1992–3 for females (1.99%) and males (4.25%) (χ^2 *p* NS), i.e., the male/female ratio of positive reactions was approximately the same.

Sex

In 1982–3, 99 patients were diagnosed as chromate sensitive, 65 (65%) of these being male and 34 (34%) female. In 1992–3, 92 patients were diagnosed as chromate sensitive, 54 (59%) of these being male and 38 (41%) female. There was no statistical difference in the rate between the 2 time periods.

Age distribution

In 1982–3, the greatest incidence was in the 4th decade (31–40), whereas in 1992–3, the greatest incidence was in the 3rd decade (21–30). Both age group distributions were broadly comparable. The reduction in age may relate to earlier retirement in the later period.

Distribution of the eczema (Fig. 1)

The distribution was similar in both time periods, in both the hands alone being the most frequent

pattern. The 2nd highest group in 1982–3 were hand and foot eczemas (15%), whilst the 2nd highest group in 1992–3 were generalized (19.5%). Feet only (possibly related to shoes) was present in 6 subjects in both 1982–3 and 1992–3, 6% and 5.5%, respectively.

Occupations

In a large proportion of chromate-allergic subjects, the source of chromate sensitization was not evident. There were only a small number currently working as builders in both time periods (12% and 13%, respectively). However, these figures do not include those who had to leave the industry or those using cement at home.

Concomitant sensitization (Fig. 2)

Cobalt was the most common source of co-sensitization. Its rate among chromate-allergic subjects (41% in 1982–3 and 34% in 1992–3) remained largely unchanged in both time periods. Nickel was the next commonest positive patch test allergen at over 20%. Thiuram was also a common positive allergen, especially in the time period 1992–3 (1982–3 at 8.8% and 1992–3 at 19.2%).

Other comparative data

A history of eczema as a child was recorded in 29 (29%) subjects in 1982–3 and 13 (14%) subjects in

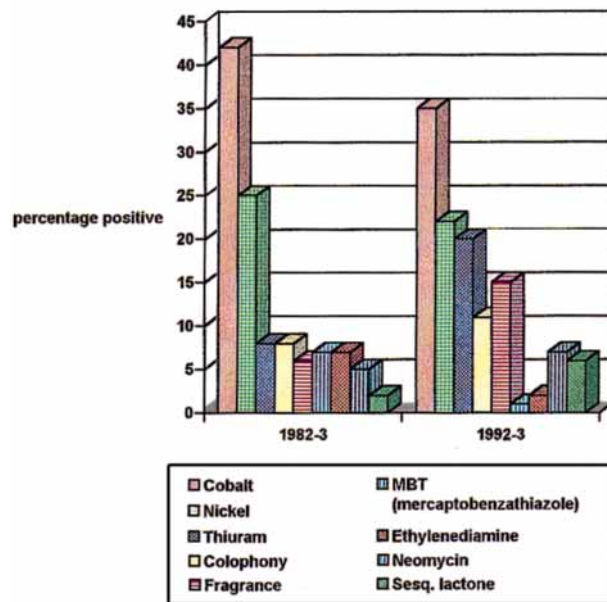


Fig. 2. Positive patch tests in chromate-positive subjects (not included if <5 % in both years).

1992–3. An endogenous form of eczema was thought to be present in 56% and 44%, respectively, in chromate-sensitive patients during the 2 time periods.

Discussion

Previous reports about the frequency of allergy to chromate have varied from 1.1% in California (2) to 11.1% in Germany (3). Our frequency is in broad agreement with previous rates from Norway (4) and Sweden (5). Cronin (6) reported a frequency of sensitivity at St. John's Institute of Dermatology for the years between 1967–1976 of 4.2–7.6% for males and 1.0–3.1% for females.

We found surprisingly little difference in the frequency of chromate sensitivity over 10 years. Sensitivity to chromate is influenced by various factors, such as the degree of exposure to cement. Although very few of the patients tested were currently working within the building industry, many more had used plaster and cement domestically. In domestic cementing, where it may be much easier to become sensitized, casual workers are more likely to be unaware of the hazards of handling wet cement and may therefore handle it with less care. Co-sensitization with cobalt did not alter significantly, and this may be a better index of changes in the rate of sensitization from cement, as cobalt co-sensitization readily occurs from cement exposure rather than through other forms of chrome sensitization.

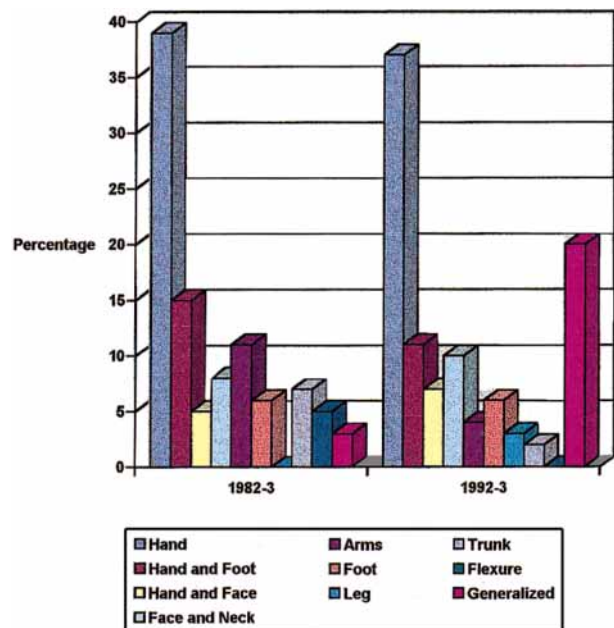


Fig. 1. Distribution of dermatitis in chromate-allergic subjects: 1982–3 versus 1992–3.

The sex ratio did not change significantly (m:f 1.5:1 to 2:1). As cement exposure would occur predominantly in males, a similar sex ratio would suggest no significant change in cement sensitization rate. This study showed no significant changes in frequency over 10 years. Ferrous sulfate has not yet been added to cement in the UK. This finding is in direct contrast to Avnstorp (7), who found a large decrease over a 6-year period in Denmark after the addition of ferrous sulfate (which reduces soluble hexavalent to insoluble trivalent chromium). This would add evidence to the suggestion that the decrease found in the Avnstorp study was due to the addition of ferrous sulfate and not due to a general decrease in chromate sensitivity, as has been suggested elsewhere (1). The high frequency in females would suggest that cement is not the only significant source of exposure. Females may be working with cement more than before, but this would still represent a small proportion of those who patch test positive to chromate. Chromate may be found in industrial materials besides cement, such as paint primers (8), printing and lithography chemicals (9), galvanized sheets (10) and diesel coolants (11). These sources may contribute to the male frequency of chromate sensitivity, but to explain the high rate of female frequency, one may have to look at non-industrial exposure, such as leather, matches and fuel ashes. Fregert (10) has studied chromate exposure in housewives in various domestic products, especially bleaches. Dietary exposure is also relatively understudied.

In both time periods, there was a reasonably even spread amongst adult age-group decades, with a low frequency in childhood. There was a greater proportion of chromate-sensitive patients with generalized involvement in the 1992–3 group. This can sometimes be associated with cement exposure, but also with exposure to other sources such as tanned leather.

In both groups, over 2/3 of patients had their eczematous rash for more than 1 year and over 1/3 in each group had their rash for over 5 years. In the 1982–3 time period, 56% of patients were thought to have an endogenous dermatitis in addition to their chromate allergy. In the 1992–3 time period, this figure was 43%. The close association with endogenous eczema would be in keeping with a 'domino' behaviour, i.e., the presence of one form of hand eczema could facilitate the development of other forms of eczema, such as contact allergy. Likewise, there was a relatively high frequency of irritant contact dermatitis associated

with chromate allergy (1982–3, 35% and 1992–3, 26%).

The most common co-allergy is to cobalt (41% and 34% incidence for the time periods). Cobalt co-sensitization is commonly found with cement exposure, with rubber sensitization also frequently seen. This could be because of the increased wearing of rubber gloves in chronic hand eczema, or the replacement of leather use with rubber use in clothes, gloves and shoes.

In summary, we have demonstrated an equivalent pattern of chromate sensitivity in patients presenting to a London contact dermatitis clinic over a 10-year period. This is in contrast to the report from Denmark, where ferrous sulfate has been added to cement to reduce the risk of chromate sensitization. It would be prudent to add it in the UK if a similar reduction in chromate sensitivity is to occur.

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