

Table 3. Release of chromium in artificial sweat

Test alloy	After 2 days		After 7 days	
	chromium (III) ($\mu\text{g}/\text{cm}^2$)	chromium (VI) ($\mu\text{g}/\text{cm}^2$)	chromium (III) ($\mu\text{g}/\text{cm}^2$)	chromium (VI) ($\mu\text{g}/\text{cm}^2$)
A	0.08	<0.01	7.65	<0.01
B	0.01	<0.01	0.60	<0.01
	0.02	<0.01	1.21	<0.01
C	0.03	<0.01	1.28	<0.01
	0.04	<0.01	0.65	<0.01

Table 4. Release of chromium in 0.9% saline

Test alloy	After 7 days	
	chromium (III) ($\mu\text{g}/\text{cm}^2$)	chromium (VI) ($\mu\text{g}/\text{cm}^2$)
A	2.3	<0.01
	2.5	<0.01
B	1.1	<0.01
	4.2	<0.01
C	0.9	<0.01
	5.6	<0.01

limit for Cr(VI) in artificial sweat and 0.9% saline was found to be better than $0.01 \mu\text{g}/\text{cm}^2$.

The formation of hexavalent chromium ions from the trivalent form is favoured by alkaline solutions and presence of oxidants. In strongly alkaline solutions, atmospheric oxygen is sufficient to cause oxidation to the hexavalent state. In acid solutions, ammonium persulfate or other strong oxidant is required to effect the same purpose.

The experimental results (Tables 3, 4) show that, in the case of sweat and saline solution at neutral pH, atmospheric oxygen is an insufficient oxidizing agent to permit formation of hexavalent chromium in the reaction products from corrosion of chromium-containing alloys. This finding is in contrast to that of Merritt & Brown (8), who describe the formation of hexavalent chromium ions in blood and plasma from Type 316 stainless steel implants in animals. Their experiments in-

involved artificially oxidizing conditions resulting from the application of external anodic current, and determination of hexavalent chromium was made indirectly by biological methods.

The conclusion from these experimental results is that any allergic contact dermatitis arising from prolonged contact with chromium-and-nickel-containing alloys would not be due to the presence of hexavalent chromium ions. It is more likely to be due to formation of nickel ions, since nickel ions are classified as a skin sensitizer; these alloys are found to release nickel at levels of up to $80 \mu\text{g}/\text{cm}^2/\text{week}$.

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Cutaneous reaction to captopril with positive patch test and lack of cross-sensitivity to enalapril and benazepril

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Key words: captopril; enalapril; benazepril; angiotensin-converting enzyme inhibitors; adverse drug reactions; positive patch test; lack of cross-sensitivity; oral challenge. © Munksgaard, 1998.

Case Report

A 47-year-old man began oral treatment for hypertension with the angiotensin-converting enzyme (ACE) in-

hibitor captopril. A few hours after the 1st dose of 25 mg, he experienced facial burning followed by an erythematous eruption on both cheeks, which resolved with scaling in 2 weeks. He had no atopic background and

no other drug or food allergy. Initially, we carried out a double-blind oral challenge test with captopril 5 mg, which reproduced the lesions the patient had previously experienced.

Patch testing was then performed with captopril, other ACE inhibitors and a standard series (TRUE Test™, Pharmacia). Pure and commercial captopril (Capoten™, Bristol-Myers Squibb), as well as commercial enalapril (Baripril™, Lesvi) and benazepril (Cibacen™, Ciba), were all tested at 10% pet. Positive reactions were obtained to both pure and commercial captopril at 2 days, the others tests being negative. The same tests were negative in 5 controls, as well as in another patient with an adverse cutaneous reaction to captopril.

Following the negative test results to enalapril and benazepril, we performed a double-blind oral challenge test with Baripril™ and Cibacen™. These drugs elicited no reaction.

Comment

There have been few reports of cutaneous or systemic reactions to ACE inhibitors (1) with positive patch tests, and then only to captopril. It has been suggested that a positive patch test indicates the need for total drug withdrawal, rather than the dose reduction that may otherwise improve adverse reactions to ACE inhibitors (2).

Captopril has a sulfhydryl (SH) group in its structure,

which is considered to be the chief cause of positive patch test reactions (3, 4). Our patient, however, did not react to the SH-group-containing mercaptobenzothiazole in the standard series. The negative patch tests, as well as oral tolerance, of other ACE inhibitors lead us to believe that there is no cross-reactivity among these compounds (5, 6).

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Pseudoinoculum barbae: beard-induced contact dermatitis

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Case Reports

Case no. 1

A 20-month-old girl presented with intermittent lesions on the face, mainly on the cheeks. Her mother described them as clusters of bright red dots that appeared suddenly, but lasted no longer than 1–2 h. They had been appearing 1× or 2× a week over a 3-month period. There were no allergies or current medications.

Physical examination revealed a cluster of erythematous, slightly raised papules on the right cheek. The cluster was 1 cm in diameter and consisted of approximately 12, 1-mm papules (Fig. 1). A yellowish papule consistent with juvenile xanthogranuloma was noted on the upper back. Dermatographism was demonstrated.

Case no. 2

The 4-month-old sister of the 1st patient presented with a similar history. Physical examination revealed a lesion on the infant's left cheek very similar to the sibling's. Dermatographism was also demonstrated.

Discussion

The pattern of the lesions suggested an artefactual dermatitis. The lesions usually appeared after the father had



Fig. 1. Clusters of papules on the cheek.