Deposition of C3 in perilobal skin. These appearances were consistent with pemphigus erythematosus. The HLA genotype was HLA-A1, 3, 8, 18/BL, 

\(-/-6, D R W 3, D R W 5 . \)

**Comment**

Though several hundred patients have been treated with captopril for at least six months, this is the first report of captopril-induced pemphigus. In Jewish patients with pemphigus vulgaris there is a particularly high prevalence of HLA-A10 and DRW4. Our patient had neither of these.

Prolonged penicillamine treatment may also induce pemphigus. It has been estimated that 7% of patients taking penicillamine for at least six months develop pemphigus. Most patients have had pemphigus foliaceus, a few pemphigus erythematosus (as in our patient), and one pemphigus vulgaris. The side effects of captopril, such as maculopapular and urticarial eruptions, which occur in the first few weeks of treatment, mouth ulcers, temporary aguesia, the nephrotic syndrome, and now pemphigus, are the same as those of penicillamine.

The chemical structures of penicillamine and captopril are strikingly similar (figure). Each compound has a highly reactive, negatively charged sulfhydryl group in a stable stereochemical relation to a similarly negatively polarised oxo group. The stereochemical similarities between penicillamine and captopril, combined with the clinical evidence of their ability to produce similar disorders, suggest that the toxicity of both drugs may prove disconcertingly similar.

We thank Dr F Marsh, Dr H Baker, and Dr J Pegum for advice during the investigations of this patient and preparation of the manuscript.


**Captopril-induced pemphigus**

Captopril (SQ 14225), an oral inhibitor of angiotensin-converting enzyme, offers a new approach to treating several forms of hypertension. The commonest unwanted effects are morbilliform or maculopapular rash and fever, which usually resolve on stopping or reducing the dose. Other unwanted effects include aphthous ulcers of the mouth, transient aguesia, the nephrotic syndrome, and reversible renal failure. We report a case of pemphigus induced by captopril.

**Case report**

A 45-year-old previously fit English Jew began captopril 25 mg thrice daily in July 1979 for essential hypertension. The dose was increased weekly for four weeks to 150 mg thrice daily. Propranolol 10 mg thrice daily was added, being increased at weekly intervals until control was achieved with 80 mg thrice daily. He remained on the same dose of both drugs until January, when he presented with a two-week history of lesions on the trunk, scalp, and face and painful tongue erosions. The skin lesions were sore, red patches which had rapidly lost their surface, oozed, and crusted. Pemphigus erythematosus was diagnosed. Captopril was stopped, and after five weeks the skin and mouth ulcers had healed, though one new cutaneous lesion appeared. Blood cell count, erythrocyte sedimentation rate, blood glucose concentrations, liver and renal function values, protein electrophoresis, and immunoglobulin and serum complement concentrations were normal; antinuclear factor was weakly positive at 1/10.

Antibodies to epidermal intercellular cement substance was positive at 1/40. Skin biopsy of the trunk showed an intraepithelial bulla high in the epidermis, containing a few acantholytic cells. On direct immunofluorescence upper epidermal intercellular IgG and lower epidermal intercellular C3 were detected in a biopsy specimen of a lesion. There was basement-membrane pemphigus.
concentrations normal, though with creatinine clearance 37 ml/min; serum albumin concentration 20 g/l; and 24-hour urinary protein loss 24 g. There was microscopic haematuria but no casts were seen. LE cell preparation was strongly positive, ANF titre 1/160, and anti-ds DNA 99% (normal 0-20%). She was treated with prednisolone and azathioprine. The rash cleared but the nephrotic syndrome persisted without change in creatinine clearance. Anti-ds DNA remained high and ANF continued strongly positive.

Four months later the patient developed status epilepticus with acute oliguric renal failure. Her temperature was 38°C and there was generalised oedema. Haemoglobin concentration was 5.7 g/dl, white cell count 10.2 x 10^9/l (10 200/mm^3), potassium concentration 6.4 mmol/l (4.7 mmol/l); and creatinine concentration 666 mmol/l (7.5 mg/100 ml); urine microscopy showed profuse red-cell casts. Blood, cerebrospinal fluid, and urine cultures were sterile. ANF and LE cell preparations were repeatedly negative and anti-ds DNA normal (18%). Serum concentrations of C3 (0.48 g/l) and C4 (0.13 g/l) were low (normal ranges 0.65-1.25 g/l and 0.20-0.50 g/l respectively) and circulating immune complexes were detected. Immunosuppressive treatment was intensified with high-dose corticosteroids, cyclophosphamide, azathioprine, and subsequently plasma exchange (figure). Renal biopsy showed extreme example of this phenomenon; complete disappearance of antinuclear antibody was associated with an acute and severe exacerbation of the disease.

We thank Dr Helen Chapel for the immunological assays, and Dr M S Dunnill for the renal biopsy report.

Requests for reprints should be sent to Dr JGG Ledingham.

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**Echinococcus granulosus: infection and malignancy**

Yong et al reported a possible antigenic similarity between pulmonary carcinoma and cysts of *Echinococcus granulosus*. They found a broad precipitin band due to real antigen-antibody reaction in the immunoelectrophoresis test, but the line did not join the so-called echinococcus-specific arc-5 band in the reference system that was run simultaneously. Since similar cases are rare, our experience may be of interest.

**Methods and results**

In our institute serological diagnosis of hydatid disease is routinely carried out by indirect immunofluorescence using protoscolices of horse cysts in combination with a classical complement-fixation test with polysaccharide antigen. In positive cases a questionnaire is sent to the physician to obtain background information as well as the final diagnosis. Out of a total of 1500 examinations in the past five years there were at least eight cases in which a positive result in the serological test for *E granulosus* was associated with a confirmed malignant neoplastic growth instead of surgically confirmed hydatidosis (table).

**Malignancies in eight patients with serological evidence of hydatid disease**

<table>
<thead>
<tr>
<th>Case No</th>
<th>Immuno-fluorescence test*</th>
<th>Complement-fixation test*</th>
<th>Final diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>320</td>
<td>negative</td>
<td>carcinoma of sigmoid</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>negative</td>
<td>adenocarcinoma of colon</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>positive</td>
<td>planocellular carcinoma (bronchus)</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>negative</td>
<td>renal carcinoma + pulmonary metastases</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>negative</td>
<td>bronchial carcinoma</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>negative</td>
<td>liver metastases</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>positive</td>
<td>carcinoma of the pancreas</td>
</tr>
</tbody>
</table>

*Reciprocal antibody titre.

**Comment**

As the evidence for an antigenic similarity between *E granulosus* and some tumour types increases we should keep in mind that the presence of specific antibodies in the serum is not always diagnostic of hydatid disease or a related-elimhinfection. Similar cross-reactions between bacteria and tumour cells have been reported. For example, *Mycobacterium bovis* (BCG) and guinea-pig line 10 hepatocarcinoma cells as well as human melanoma cells share surface antigens. This