patient and several weeks later from the mother. Genital swabs from the mother were negative for *Neisseria gonorrhoeae*, *Trichomonas vaginalis*, and *Candida*.

The baby was initially thought to have severe bronchopneumonia and was treated with parenteral flucloxacillin and amoxycillin, oxygen, and nasogastric feeding. His condition improved slowly. When the results of chlamydia culture became available treatment was changed to oral erythromycin. He recovered and was well at follow up.

Comment

Chlamydial pneumonia of infancy has been well characterised since its first full description,[3] and our patients' illness closely resembled the most commonly described pattern. The disease usually occurs in the second or third month of life. Respiratory symptoms such as rhinitis or mild cough gradually increase, and in the fully developed syndrome the infant, who remains afebrile, develops tachypnoea with a paroxysmal cough. This cough bears some resemblance to pertussis, but whooping is not a feature, though apnoeic attacks may occur. The blood count characteristically shows mild eosinophilia, and the chest radiograph is often abnormal with bilateral interstitial shadows and hyperinflation. Moderate hypoxia with a normal arterial carbon dioxide tension is found.

Isolation of *C trachomatis* from the nasopharynx is usually accepted as evidence of the disease, but this is strengthened by additional serological findings suggestive of recent infection in the form of specific IgM antibody. In this case there was also an exceptionally high maternal antibody concentration.

C trachomatis has now emerged as a common cause of pneumonia in infants in the United States of America, especially in those groups with the highest incidence of sexually transmitted infection.[4] It seems unlikely that this infection is as rare in this country as the lack of previous reports would indicate since the illness is often mild and develops long after the baby has left hospital. A careful prospective survey would be timely.

We thank Professor Darougar of the Institute of Ophthalmology for performing the serological tests.

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Galactorrhoea as side effect of domperidone

Domperidone (Motilium) has recently become available for use in Britain. It is a potent peripheral dopamine antagonist which has gastrointestinal kinetic properties.[1] Unlike the similar agent metoclopramide, domperidone does not cross the blood-brain barrier and is therefore virtually free of central adverse effects.[1] To our knowledge galactorrhoea has been reported on only one previous occasion,[2] and the *British National Formulary* (No 4, 1982) does not mention this adverse effect.

In a recent clinical trial (paper in preparation) we compared the effect of domperidone (20 mg four times a day) with identical placebo in 30 patients (28 women, two men; median age 35, range 19-61) with the irritable bowel syndrome. Five of these patients complained of galactorrhoea and mastalgia and two of mastalgia alone while taking the domperidone. These effects were reported spontaneously and patients had no reason to anticipate any problems with their breasts. We give a summary of the case histories of these patients together with the results of prolactin assays carried out in all those patients with adverse effects and 11 of the other women patients.

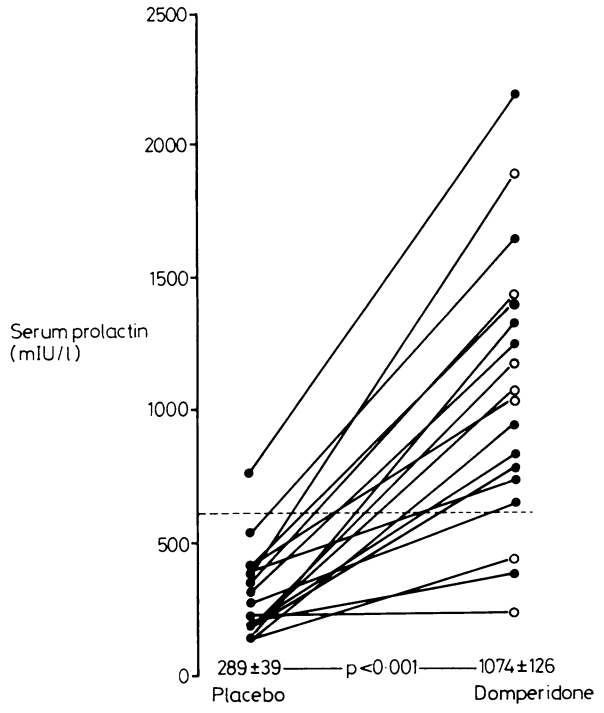
Blood samples were taken during the fourth week of each treatment, within one to two hours after an oral dose, the domperidone and placebo being given in double blind cross over fashion.

Case reports

Two women (aged 22 and 48) developed swollen, tender breasts after three and seven days of domperidone treatment. In both cases the condition had disappeared one week after stopping the drug. Five other women (aged 19-42) developed mastalgia and galactorrhoea, varying from mild and intermittent to a profuse production of milk requiring several changes of clothing a day. In four of these patients the adverse effects developed between three days and two weeks after starting treatment. The other patient had no adverse reactions during the four week trial period but developed galactorrhoea after three months of continuous treatment, having elected to continue with the drug after the clinical trial. In all five cases the galactorrhoea had settled within one week to two months after stopping treatment.

Three of these five patients reported a disturbance in menstruation while taking domperidone. One noted a delayed period, one an early and heavy period, and the other an unduly protracted and heavy period at the expected time. All patients subsequently returned to a regular menstrual pattern once domperidone was stopped.

During domperidone treatment the serum prolactin concentration was abnormally high in 15 of the 18 subjects in whom it was measured (figure). Only one patient had a raised concentration during the placebo period; in her case, however, placebo was given after domperidone, so that the concentration might not have returned to normal. Two patients with breast symptoms had normal prolactin concentrations. There was no direct relation between the actual value and the occurrence of adverse effects.



Prolactin concentrations after four weeks of treatment with placebo and four weeks with domperidone (20 mg four times daily). Dashed line marks normal reference range (< 600 mIU/l). ● ——— ● Subjects without adverse reactions. ● ——— ○ Subjects reporting galactorrhoea/mastalgia.

Comment

We were not surprised that domperidone, like metoclopramide, increased the serum prolactin concentration.[3] Both drugs are thought to have this effect by antagonising dopamine in the median eminence,[4] which lies outside the blood-brain barrier.

Six of the women with adverse reactions complained predominantly of constipation. Constipated patients may in some way be sensitised to

prolactin or sex steroids, since a recent report suggested an association between constipation and benign and malignant breast disease.[5] The high incidence of mastalgia and galactorrhoea—seven out of 28 women in this series—is likely to be a problem only if the drug is to be used for persistent symptoms in an essentially benign condition such as the irritable bowel syndrome. Currently, marketing of the drug in Britain is restricted to short term use in acute nausea and vomiting, such as may be associated with cytotoxic treatment. In such cases the adverse effects that we report are unlikely to be of concern.

We have informed both the Committee on the Safety of Medicines and Janssen Pharmaceuticals Ltd of our findings.

We are grateful to Janssen Pharmaceuticals Ltd for financial support to PAC and the supply of domperidone.

Prolactin concentrations were kindly measured by Dr G W Pennington, of the endocrine laboratory at the Jessop Hospital for Women, Sheffield, using an in house radioimmunoassay.

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Abnormal red cell morphology in venous blood of men climbing at high altitude

Blood samples were collected at intervals during the Mount Kongur expedition[1] to establish whether a period at high altitude would result in an increase in morphological abnormalities in circulating red cells. No previous observations of red cell morphology in blood samples taken during a climbing expedition to a high mountain had been made.

Methods and results

In this study samples were taken by venesection from four climbers on four separate occasions during the climb—namely, on day 2 (3555 m), day 13 (4600 m), day 29 (4600 m, after return from 6270 m), and day 39 (4600 m, after return from 7200 m). During the entire period the climbers were breathing atmospheric air (range of oxygen pressure about 13·7-8·6 kPa (103-65 mm Hg)) without any oxygen supplementation. After each venesection a drop of blood was immediately placed in buffered glutaraldehyde fixative and gently mixed. The tubed samples were sealed and transported so that freezing was avoided. After return blood was similarly taken from four other subjects who had not been to high altitude.

Electron microscopy—Individual aliquots from each sample were gently mixed and the cells rinsed in cacodylate buffer followed by postfixation in osmium tetroxide. The fixed cells were collected on polycarbonate membrane filters and prepared for scanning electron microscopy by ethyl alcohol dehydration and critical point drying using carbon dioxide.

Categorising of cell types—Enough photographs at a final magnification of 2000 were made of representative areas of the prepared blood samples so that no fewer than 1000 red cells were available for examination. One observer only (ESW) carried out the cell examination. The work of Brecher and Bessis[2] was used as a guide for classifying morphological abnormality. Cells showing no deviation from normality were graded 0; slight shape distortion or a single bleb was graded 1; cells with irregular edges or greater shape distortion (including helmet cells) or both were graded 2; multiple irregularities or gross shape distortion were graded 3; category 4 was reserved for late stage echinocytes.

Results—The table records the distribution of cell types observed at the four sampling times. Standard deviations indicate the variations between subjects (small for normal values, but large in response to hypoxia). Clearly a person cannot have fewer than no cells of a particular type in his circulation.

Percentage distribution of the five cell types observed at the four sampling times in four climbers. Normal distribution in four subjects who had not been to high altitude given for comparison. Results are means (SD)

Day at altitude (see text)	Cell category				
	0	1	2	3	4
2	67·5 (9·2)**	14·1 (2·5)***	14·7 (5·6)*	3·1 (2·3) NS	0·6 (0·5) NS
13	54·8 (15·9)*	17·0 (2·9)***	22·6 (10·4)*	5·0 (3·9) NS	0·7 (0·8) NS
29	45·1 (12·8)***	19·6 (3·3)***	25·3 (9·2)**	9·1 (6·6) NS	0·9 (0·7) NS
39	24·7 (12·8)***	16·5 (3·6)***	44·7 (9·6)***	12·7 (7·3)*	1·4 (0·8)*
Normal	88·5 (2·6)	6·9 (1·9)	3·9 (1·0)	0·6 (0·1)	0·2 (0·3)

NS = Not significant.
Mean at each day at high altitude compared with corresponding mean normal (two tailed *t* test): *$p<0.05$; **$p<0.02$; ***$p<0.01$.

Comment

It is apparent that even a mild degree of hypoxia for a short period (two days) is correlated with an increase in the proportion of morphologically abnormal red cells. As longer time was spent at high altitude so there was a decrease in the proportion of morphologically normal cells.

These results raise many questions, none of which can be answered by the present study. Is the hypoxia acting on cells already in the circulation? Is the increase of abnormalities seen with time related to the length of exposure to hypoxia? In this study as time progressed so the subjects had progressed to higher altitudes. No samples were taken on return to sea level for a study of the rate of elimination of the abnormal cells.

Interestingly the abnormalities occurred in the absence of disease known to be characterised by such abnormalities and without complicating factors such as the presence of helium as a diluent for oxygen, as in saturation divers in whom similar changes have been recorded.[3] Divers are provided with increased oxygen partial pressure, which may be a causative factor in the appearance of abnormal red cells in the circulation.[3] Our study excludes this.

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