

2. Copeman, P. W. M. & Wallace, H. J.: Eczema vaccinatum. *Br Med J* 11: 906, 1964.
3. Denman, A. M.: Lymphocyte function and disease. *Br Med J* 11: 980, 1978.
4. Fauci, A. S., Dale, M. D. & Balow, J. E.: Glucocorticosteroid therapy: Mechanisms of action and clinical considerations. *Ann Intern Med* 84: 304, 1976.
5. Freed, F. R., Duma, R. J. & Escobar, M. R.: Vaccinia necrosum and its relationship to impaired immunologic responsiveness. *Am J Med* 52: 411, 1972.
6. Holst-Larsen, L. & Svaar, H.: Vaccinia gangrenosa. *Tidsskr Nor Lægeforen* 24: 1269, 1976.
7. Lane, J. M., Ruben, F. L., Neff, J. M. & Millar, J. D.: Complications of smallpox vaccination, 1968: Results of ten state-wide surveys. *J Infect Dis* 122: 303, 1970.
8. Olansky, S., Graham Smith, J. & Hansen Pruss, O. C. E.: Fatal vaccinia associated with cortisone therapy. *JAMA* 162: 887, 1956.
9. Robinson, M. J., Murugasu, R., Thong, Y. H. & Chen, S. T.: A fatal case of progressive vaccinia—clinical and pathological studies. *Aust Paediatr J* 13: 125, 1977.

## Acquired Zinc Deficiency in Alcoholic Liver Cirrhosis: Report of Two Cases

Kaare Weismann, Henrik Høyer  
and Erik Christensen

Department of Dermatology and Medical Department A,  
Division of Hepatology, University of Copenhagen,  
Rigshospital, Blegdamsvej 9, Copenhagen, Denmark

**Abstract.** Acquired zinc deficiency in two patients suffering from alcoholic liver cirrhosis is reported. Skin changes included bullae and erosions on the heels, desquamating dermatitis on feet, hands and shins, and localized alopecia. Following oral zinc therapy the skin changes disappeared and Beau lines were later seen on the finger nails. Concomitantly with the rise in the depressed plasma zinc levels, serum alkaline phosphatase and prothrombin levels rose and serum bilirubin decreased. The observations are in agreement with earlier reports dealing with congenital and conditioned zinc deficiency and oral zinc therapy in alcoholic liver cirrhosis.

**Key words:** Cirrhosis; Bilirubin; Prothrombin; Zinc deficiency

Acrodermatitis enteropathica, a congenital primary zinc deficiency disorder, and acquired zinc defi-

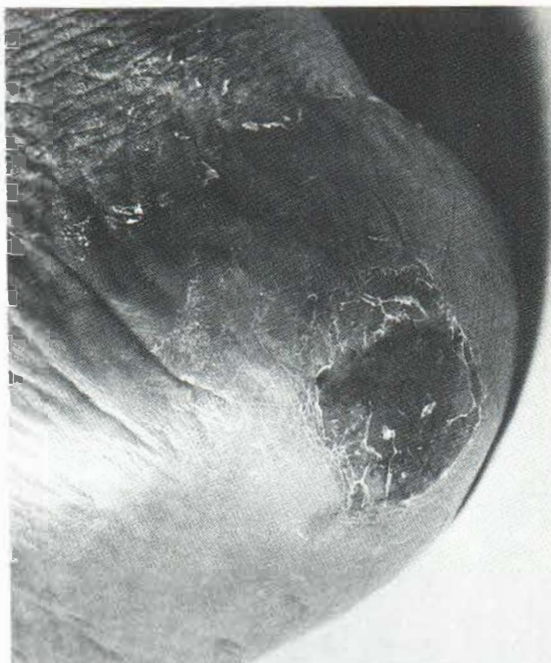


Fig. 1. Healing erosion on the right heel. Note collarette at the periphery of the former bullous lesion (Case 1).

ciency are both characterized by low serum zinc levels and well-defined skin manifestations (8).

In the present communication zinc deficiency dermatosis in 2 patients suffering from alcoholic liver cirrhosis is reported.

## CASE REPORTS

**Case 1.** The patient was a 52-year-old male with a long history of alcohol abuse which had resulted in alcoholic liver cirrhosis of at least 5 years' duration. In February 1979 he was admitted to hospital in a poor condition, with pneumonia, decompensated cirrhosis with ascites and renal insufficiency. After a few days, hepatic coma developed. Initially, he was given an appropriate parenteral supply of electrolytes and glucose. After 2 weeks he was started on a protein-restricted diet supplying 40 g protein per day.

On admission, oozing lesions were present in the groins and bullae were seen on the feet at sites subject to mechanical pressure. The lesions progressed slowly despite local care, so that about 3 weeks later the patient was referred to the skin clinic. At that time he showed desquamating dermatitis on palms, soles, and persisting erosions on the heels (Fig. 1). A localized alopecia was seen in the occipital region (Fig. 2). The clinical picture was suggestive of zinc deficiency. Consequently, the plasma zinc level was determined and found to be depressed; 7.7  $\mu\text{mol/l}$  (normal range in males 11.4–18.9  $\mu\text{mol/l}$ ).

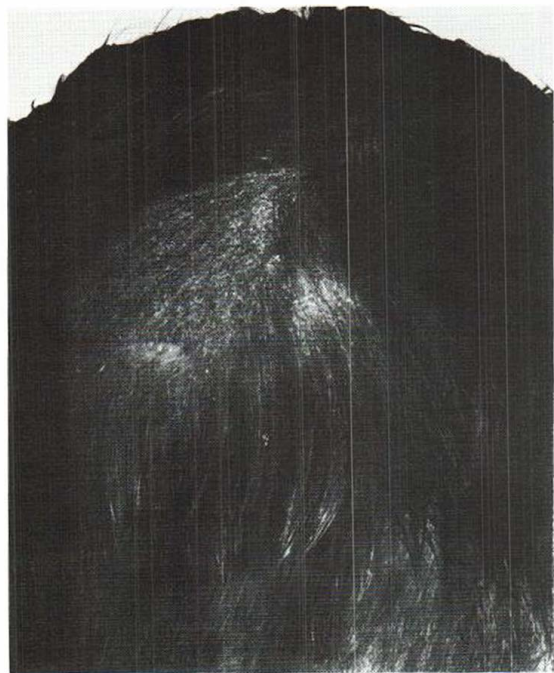


Fig. 2. Alopecia in the occipital region (Case 1).

Plasma albumin was  $310 \mu\text{mol/l}$  ( $532\text{--}813 \mu\text{mol/l}$ ). He was started on coated zinc sulphate tablets, 220 mg three times daily (equivalent to 150 mg zinc per day), but after a week the dosage was reduced to 100 mg zinc daily due to his reduced renal function. After about 2 weeks his skin condition appeared normal. Mentally his condition was also improved. New hair was seen to grow out in the alopecia and Beau lines appeared on the fingernails, most markedly on the thumbs (Fig. 3). Concomitantly with the increase in plasma zinc and serum alkaline phosphatase levels (Fig. 4) prothrombin rose from 72 to 96 arbitrary units (normal range 85–115) and serum bilirubin decreased from 72 to  $24 \mu\text{mol/l}$  (2–17).

After this improvement the patient's condition deteriorated, and after one month in hospital he died. Autopsy revealed pronounced alcoholic cirrhosis and an adenocarcinoma of the pancreas with hepatic and osseous metastases.

**Case 2.** This patient was a 52-year-old male who for about 7 years had suffered from alcoholic liver cirrhosis which was now in a stable phase. In September 1979 after a few days intake of bumetanid (NFN) he developed bullous eczema on extremities and trunk. Upon withdrawal of the medication the skin changes regressed except for persisting scaly dermatitis with perilesional collarette formation on palms and soles. The plasma zinc level was low,  $6.2 \mu\text{mol/l}$ , while plasma albumin was  $420 \mu\text{mol/l}$ .

The patient was given coated zinc sulphate tablets supplying 150 mg zinc daily. After 2 weeks the skin had cleared. It took 2 months before his serum zinc concentration reached the normal range. Serum alkaline phos-

phatase activity ran a parallel course with the zinc levels as in Case 1 (Fig. 4).

In this patient the prothrombin level also increased, whereas the serum bilirubin concentration—which was only slightly increased—showed no consistent changes during zinc therapy. Beau lines on fingernails appeared after 5 weeks' zinc therapy.

## DISCUSSION

It is well known that alcoholic cirrhotics are often hypozinaemic and may show pronounced hyperzincuria (4). Apart from losing zinc via the urine, such patients may develop a negative zinc balance due to malabsorption, an insufficient nutrition and a protein-restricted diet. Furthermore, spirits and beer happen to be extremely poor in zinc (1, 7).

Only a few cases of acquired zinc deficiency in alcoholics with or without liver cirrhosis have been reported (1, 2, 3, 7, 8). The suspicion of zinc deficiency was, as here, aroused by the acrodermatitis enteropathica-like skin and hair changes. The diagnosis was corroborated by the finding of hypozinaemia and the clinical improvement following oral zinc therapy. The appearance of Beau lines on fingernails, as noted in the present report about a month after initiation of the zinc therapy supplies the clinician with additional evidence of a former zinc deficiency state of the patients (5).

Recently, oral zinc therapy (150 mg zinc per day for 6 weeks) in patients suffering from alcoholic cirrhosis in a stable phase was found to significantly increase the prothrombin and the serum alkaline



Fig. 3. Beau's lines on finger nails. Photo taken 5 weeks after the start of zinc therapy (Case 1).

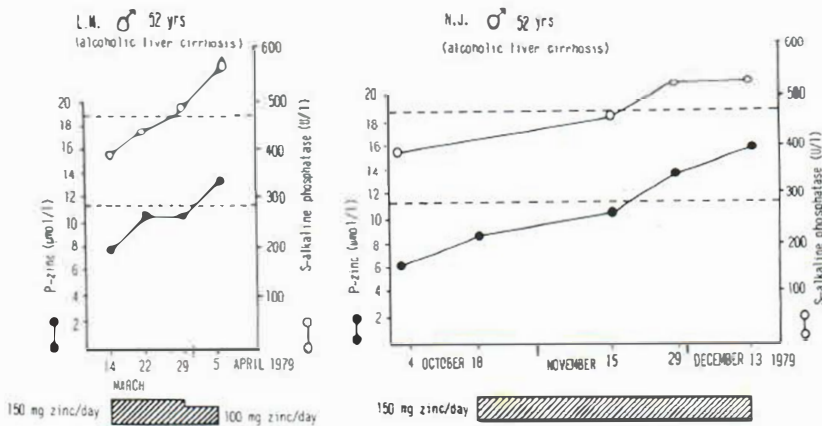


Fig. 4. Plasma zinc and serum alkaline phosphatase levels in Case 1 (L. M.) and Case 2 (N. J.) during oral zinc therapy. Serum alkaline phosphatase, normal range 50–250 U/l. Plasma zinc, normal range (males) 11.4–18.9  $\mu\text{mol/l}$  indicated by dotted lines.

phosphatase level and cause a decrease in the serum bilirubin concentration (6), as also demonstrated here. It is conceivable that this effect of zinc is somehow related to restoration of pre-existing low zinc levels in the cirrhotic liver, which was first demonstrated by Vallee et al. (4).

It remains speculative whether the bumetanid therapy in Case 2 was involved in the onset of the zinc deficiency symptoms. Wester (9) has shown that diuretics (furosemide, chlorthalidone and thiazides) which cause sustained hyperzincuria with maintained or increased serum zinc levels, reduce the zinc content of normal livers. Were a depletion of zinc also to take place in patients with liver cirrhosis receiving diuretic treatment, it might explain the sequence of symptoms observed in Case 2.

## REFERENCES

1. Ecker, R. J. & Schroeter, A. L.: Acrodermatitis and acquired zinc deficiency. *Arch Dermatol* 114: 937, 1978.
2. Esca, S. A., Brenner, W., Mach, K. & Gschnait, F.: Kwashiorkor-like zinc deficiency syndrome in anorexia nervosa. *Acta Dermatovener (Stockholm)* 59: 361, 1979.
3. Thomsen, K.: Zinc, liver cirrhosis and anorexia nervosa. *Acta Dermatovener (Stockholm)* 58: 283, 1978.
4. Vallee, B. L., Wacker, W. E. C., Bartholomay, A. F. & Robin, E. D.: Zinc metabolism in hepatic dysfunction. *N Engl J Med* 255: 403, 1956.
5. Weismann, K.: Lines of Beau: possible markers of zinc deficiency. *Acta Dermatovener (Stockholm)* 57: 88, 1977.
6. Weismann, K., Christensen, E. & Dreyer, V.: Zinc supplementation in alcoholic cirrhosis. *Acta Med Scand* 205: 361–366, 1979.
7. Weismann, K., Roed-Petersen, J., Hjorth, N. & Kopp,

H.: Chronic zinc deficiency syndrome in a beer drinker with a Billroth II resection. *Int J Dermatol* 15: 757, 1976.

8. Weismann, K., Wadskov, S., Mikkelsen, H. I., Knudsen, L., Christensen, K. C. & Storgaard, L.: Acquired zinc deficiency dermatosis in man. *Arch Dermatol* 114: 1509, 1978.
9. Wester, P. O.: Zinc during diuretic treatment. *Lancet* i: 578, 1975.

## Acquired Dermatitis Due to Zinc Deficiency in a Premature Infant

E. Bonifazi<sup>1</sup>, N. Rigillo<sup>2</sup>,  
B. De Simone<sup>2</sup> and C. L. Meneghini<sup>1</sup>

Departments of <sup>1</sup>Dermatology and <sup>2</sup>Pediatrics,  
University of Bari, Bari, Italy

Received February 28, 1980

**Abstract.** A case of dermatitis with lesions reminiscent of enteropathic acrodermatitis of the premature of low gestational age is presented. The condition responded dramatically to oral zinc sulphate therapy.

**Key words:** Zinc; Acquired dermatitis; Premature infant

While the importance of zinc in the nutrition of the premature infant and the occurrence of skin lesions in the zinc deficiency syndrome are well known, the pertinent literature so far seems to have brought no reports of enteropathic dermatitis-like lesions in the bottle-fed premature infant.