

# Congenital Atransferrinemia

## A Case Report and Review of the Literature

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A four-year-old Polynesian girl with a two-year history of severe microcytic, hypochromic anemia (which was refractory to iron therapy) had a decreased beta-globulin fraction on serum protein electrophoresis, resulting from the absence of the transferrin (TRF) band. Subsequent assays for TRF showed a level below the detectable range. Liver biopsy revealed significant deposition of hemosiderin within hepatocytes and Kupffer cells, in addition

to early fibrosis. Two bone marrow aspirates were hypercellular, with decreased myeloid-erythroid ratios. This case represents the eighth reported example of congenital atransferrinemia, a rare, apparently autosomal recessive disease. (Key words: Congenital atransferrinemia; Anemia; Hemosiderosis; Therapy) *Am J Clin Pathol* 1991;96:215-218

Congenital atransferrinemia (CAT) is an extremely rare, recessively inherited disorder. To date, only seven cases have been reported in the world literature. Transferrin (TRF) is a glycoprotein with a single polypeptide chain and a molecular weight of approximately 90,000 daltons, that mediates the transfer of hemoglobin iron and absorbed iron to cells and storage sites.<sup>1</sup> Patients who have CAT or acquired atransferrinemia (AT) have moderate to severe microcytic, hypochromic anemia, with normal serum iron levels, high serum ferritin values, and a significantly low total iron-binding capacity (TIBC). Intestinal iron absorption continues, and iron overload can be expected to develop in all patients. We report an additional case of CAT in a four-year-old Polynesian girl from American Samoa, along with the literature on this topic.

### REPORT OF A CASE

In April 1989, a four-year-old Samoan girl was referred to the Pediatric Hematology/Oncology Service at Tripler Army Medical Center for evaluation of recurrent anemia associated with significant hepatosplenomegaly. The child's medical history included chronic hypochromic, mi-

crocytic anemia, which had required transfusion therapy on at least three occasions. She had been given iron several times without benefit. About three weeks before her transfer to Honolulu, the child was seen in the Pediatric Clinic of another institution in Pago Pago, American Samoa. At that time, she was febrile, with mild respiratory symptoms. She also had significant hepatosplenomegaly. A complete blood count was performed, and her hemoglobin level was 40 g/L (4.0 g/dL). She received transfusions of whole blood, and, subsequently, she was transferred to our hospital. When she arrived, additional history was obtained from her mother, who denied a family history of anemia. Additionally, the patient's mother stated that the child had no known history of blood loss and that multiple tests to detect blood in the stool had been negative.

### LABORATORY FINDINGS

The hemoglobin level was 50 g/L (5.0 g/dL), with a mean corpuscular volume of 66.7 fL ( $66.7 \mu\text{m}^3$ ), a mean corpuscular hemoglobin concentration of 313 g/L (31.3 g/dL), and an absolute reticulocyte count of  $104 \times 10^9/\text{L}$  ( $104,000 \text{ mm}^{-3}$ ). The white blood cell count was  $6.9 \times 10^9/\text{L}$  ( $6,900 \text{ mm}^{-3}$ ), with a normal differential analysis, and the platelet count was  $555 \times 10^9/\text{L}$  ( $555,000 \text{ mm}^{-3}$ ). Abnormal forms included teardrops, ovalocytes, and target cells. Serum electrolytes, liver enzymes, and renal function tests were normal. Iron studies showed a total iron concentration of 3.40  $\mu\text{mol}/\text{L}$  (19  $\mu\text{g}/\text{dL}$ ) (normal, 65-175  $\mu\text{g}/\text{dL}$ ), TIBC of 12.36  $\mu\text{mol}/\text{L}$  (69  $\mu\text{g}/\text{dL}$ ) (normal, 250-410), and ferritin level of 783  $\mu\text{g}/\text{L}$  (783 ng/mL). Serologic results for hepatitis B virus, hepatitis A virus, Toxoplasma, and cytomegalovirus were negative. Serum protein electrophoresis showed a significantly decreased beta-globulin fraction, resulting from the absence

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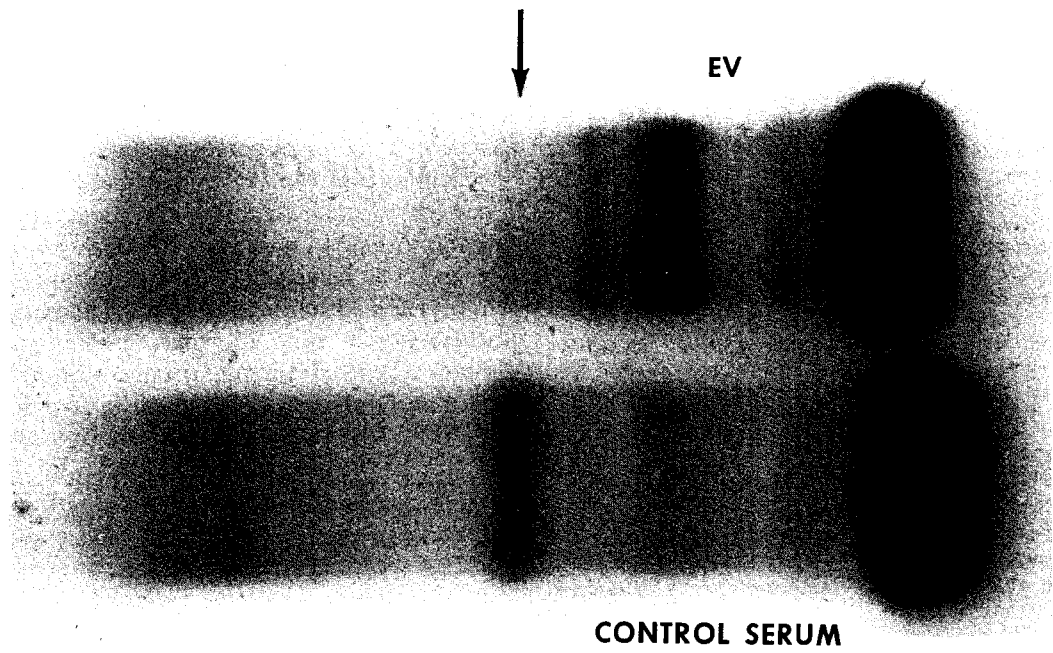


FIG. 1. Serum protein electrophoresis strip. *Arrow* marks normal location of the transferrin band, which is easily visualized in the control.



FIG. 2. Liver biopsy with marked hemosiderosis. Pearl's iron stain ( $\times 600$ ).