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INHALATION AND NASAL INSTILLATION OF CRYSTALLINE B12 THERAPY IN PERNICIOUS ANEMIA

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Parenteral therapy of pernicious anemia with vitamin B12 has been established as the treatment of choice while oral administration of the drug has been ineffective except in massive doses or in combination with "intrinsic factor."1,2,3 In view of the demonstration that pharmacologic agents may be absorbed from the respiratory tract mucosa4, this report is a summary of one year's experience with crystalline B12 inhalation and nasal instillation in the treatment of pernicious anemia.

METHODS AND MATERIALS

Six cases of pernicious anemia in relapse were treated with vitamin B12 by inhalation or nasal instillation. Three of these patients received crystalline B12 in physiological saline without a preservative by vaponephrin nebulizer. B12 lactose powder was administered to one patient by dust inhalator (aerohalor—Abbott). Nasal instillation of vitamin B12 in saline was utilized in the last two cases. Twenty patients with pernicious anemia in remission were given Inhalation B12 therapy at comparable intervals to maintenance parenteral treatment.

CASE REPORTS

Case 1. F.Z., a white male, aged 56 years, presented classical clinical and hematological findings of pernicious anemia with an initial erythrocyte count of 1,360,000. On the 8th day of B12 aerosol therapy a maximum reticulocyte response of 44.2% was obtained. The subsequent treatment and course of the patient are shown in Chart 1. The bone marrow and peripheral blood smears before and three weeks after therapy are illustrated in Figure 1.

Case 2. L.H., a white female, aged 71 years, was studied for mild manifestations of pernicious anemia and minimal peripheral neuritis. Her response to therapy is depicted in Chart 2.

Case 3. S.G., a white female, aged 51 years, demonstrated typical manifestations of pernicious anemia with an initial erythrocyte count of 1,640,000.

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Treatment consisted of inhalation of \( B_{12} \) lactose powder which resulted in the production of over 400,000 erythrocytes a week in the first twenty-one days of therapy, Chart 3.

Case 4. C.C., a white male, aged 66 years, with usual findings of pernicious anemia did not respond to oral administration of \( B_{12} \) (15 mcg. daily) for 10 days, but demonstrated a satisfactory course on inhalation at the same dose, Chart 4.

Case 5. J.P., aged 82 years, white male with severe pernicious anemia in relapse was given a single inhalation of 100 mcg. crystalline \( B_{12} \) followed by a reticulocytosis of 17\% on the 5th day. Three weeks after his initial therapy nasal instillations were administered daily with the hematological improvement shown in Chart 5.

Case 6. J.A., white male, aged 69 years, with classical findings of pernicious anemia of a moderate degree (erythrocytes 2,880,000) was treated by a single nasal instillation of 100 mcg. of \( B_{12} \) in 1 ml. saline. On the 8th day a reticulocytosis of 37\% was recorded. Three weeks later reinstitution of nasal therapy resulted in continued satisfactory improvement, Chart 6.

The twenty patients on maintenance inhalation therapy for one year have had no evidence of relapse and appear to be adequately treated.

**DISCUSSION**

The six cases presented in this paper demonstrate the efficacy of the treatment of pernicious anemia by inhalation and nasal instillation of crystalline vitamin \( B_{12} \). Further, the maintenance of pernicious anemia in remission by inhalation \( B_{12} \) therapy has proved feasible. Inhalation and nasal instillation of crystalline vitamin \( B_{12} \) in saline and lactose powder has thus far produced no irritating or sensitizing action at the local sites.

Oral administration of vitamin \( B_{12} \) in amounts of 10,000 mcg. results in urinary excretion of less than 0.05 millimicrograms per ml. On the other hand, inhalation of 200 mcg. of \( B_{12} \) in saline produced an urinary excretion of 0.26 millimicrograms per ml. Direct instillation of 100 mcg. of \( B_{12} \) into the pulmonary tree by means of a bronchoscope gave an urinary excretion level of 9.76 millimicrograms per ml. Nasal instillation of 200 mcg. \( B_{12} \) in saline resulted in a concentration of 1.36 millimicrograms per ml.

**SUMMARY**

Inhalation and nasal instillation of crystalline vitamin \( B_{12} \) in saline and lactose powder has produced satisfactory clinical and hematologic responses in six patients with pernicious anemia in relapse. Twenty patients with pernicious anemia in remission have been maintained by inhalation \( B_{12} \) techniques for over a period of one year.
B-12 Aerosol Treatment in Pernicious Anemia.

**CHART 1**

Charts 1, 2, 3 and Figure 1 with kind permission, from Monto, R. W., Reuck, J. W., and Brennan, M. J.: Crystalline B₁₂ Inhalation Therapy in Pernicious Anemia, AM. J. M. SC. Feb. 1953.
**B-12 Dust Inhalation Treatment in Pernicious Anemia.**

**Chart 3**

**B-12 Aerosol Treatment in Pernicious Anemia.**

**Chart 4**

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B-12 AEROSOL & NASAL INSTILLATION TREATMENT OF PERNICIOUS ANEMIA.

CHART 5

B-12 NASAL INSTILLATION TREATMENT OF PERNICIOUS ANEMIA

CHART 6

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Fig. 1. Case 1. Representative megaloblasts and a giant neutrophilic metamyelocyte in the marrow aspirate prior to treatment. X1200.

Fig. 2. Case 1. Normoblasts and unaffected members of the neutrophilic series in the marrow aspirate after crystalline B₁₂ aerosol treatment. X1200.

Fig. 3. Case 1. Megalocytes and poikilocytes in the peripheral blood prior to treatment. X1200.

Fig. 4. Case 1. Normocytes with only an occasional macrocyte in the peripheral blood after crystalline B₁₂ aerosol treatment. X1200.

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