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Effect of Ash of Liver on Blood Regeneration in Pernicious Anemia.

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In connection with experiments conducted by Whipple, Robscheit-Robbins, Elden, and Sperry on the effect of ash of liver on blood regeneration in dogs,[1] observations were made of its effect in 3 cases of pernicious anemia.

The first of these (12986, Strong Memorial Hospital) was a woman, 55 years of age, with typical pernicious anemia. The hemoglobin was 20% (2.9 gm. per 100 cc.). The red cell count was 750,000. There was leucopenia, thrombocytopenia, marked aniso- and poikilocytosis, occasional normoblasts and stippled macrocytes. The reticulocytes constituted 1% of the erythrocytes. From February 8-25, 1928, the patient received 3 gm. of ash of beef liver daily, which represented 369 gm. of raw liver. The reticulocytes rose to 3% on the second day, 5 on the third, 6.5 on the fourth, 7 on the fifth and sixth days. The erythrocytes and hemoglobin remained unchanged. The leucocytes rose slightly on the sixth day. The patient was in a precarious condition due to the onset of a severe upper respiratory infection. She took little food of any kind, and the diet contained none of the foods known to be active in blood regeneration. With the onset of the intercurrent infection it was decided to give a transfusion of 500 cc. of citrated blood, which was done on the eighth day. Following this the reticulocytes decreased to 2% on the tenth day and remained at 1% throughout the remainder of the period. The hemoglobin rose to 32% and erythrocytes to 1.2 millions and remained at this level throughout the remaining period of 11 days. All evidences of regeneration were at a standstill after transfusion. On February 26th Minot's liver extract, No. 343, was given, equivalent to 300 gm. of liver daily. On the fifth day thereafter the usual signs of a remission appeared. The reticulocytes rose to a maximum of 12% on the seventh day. The patient subsequently had a complete remission.

The second patient (Strong Memorial Hospital No. 13857) was a woman of 60 years, with a typical pernicious anemia. The hemoglobin was 26%, erythrocytes 1.12 millions, leucopenia, aniso- and

[1] Robscheit-Robbins, Elden, Sperry, and Whipple, PROC. SOC. EXP. BIOL. AND MED., 1928, xxv, 416.

poikilocytosis, a few normoblasts, and punctate basophilia. The platelets were considerably reduced.

The patient was first given the whole ash of liver in doses amounting to from 3.0 to 4.5 gm. per diem, representing 369 to 387 gm. raw liver. Subsequently the ash was treated with hydrochloric acid to dissolve it, the acid was neutralized, and the salts evaporated to dryness, this was given in equivalent doses. Finally, Minot's liver extract 343 was given in equivalence of 300 gm. liver.

The course of events is best shown in the graphical chart, Fig. 1.

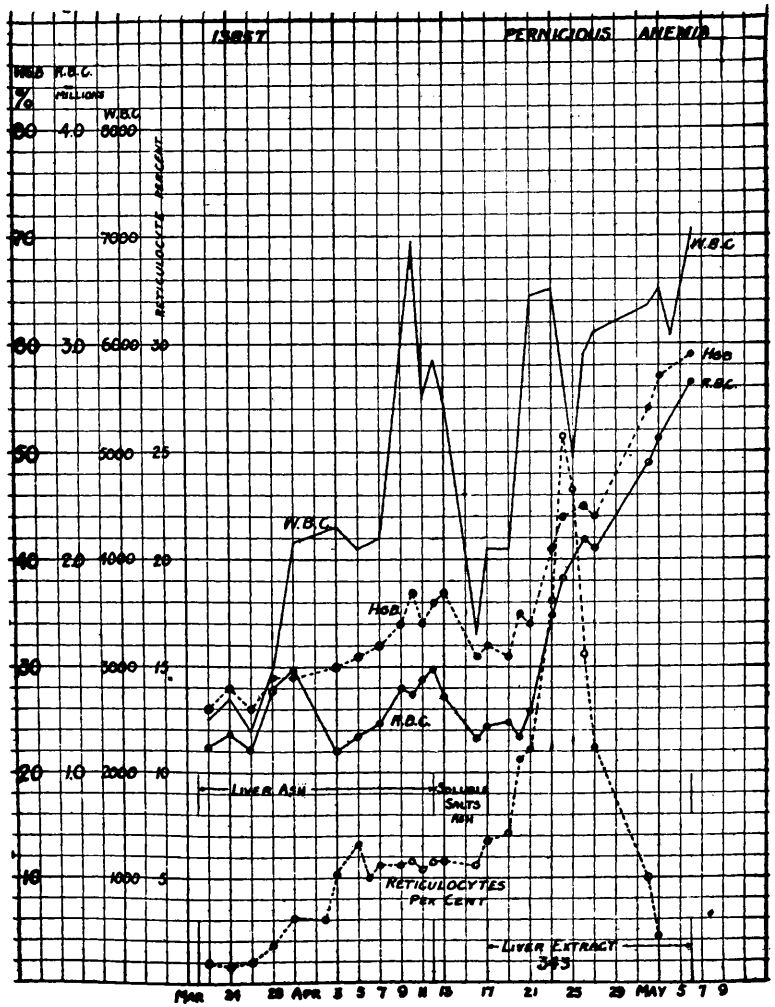

FIG. 1.

Effect of liver ash compared with Minot's Liver Extract No. 343 in pernicious anemia.

During the period of 22 days in which liver ash was given, many of the preliminary phenomena of a remission were observed. The hemoglobin rose from 26 to 37%, the erythrocytes fluctuated from 1.2 to 1.5 millions. The leucocytes increased from 2500 to 7000. The reticulocytes began to increase on the 7th day and reached a maximum of 6.5% on the 17th day, remaining at about that level until further elevated by the administration of the liver extract.

The signs of beginning regeneration just enumerated began to diminish as soon as the soluble salts of the liver ash were given. After a few days it was determined to discontinue the ash experiment. When Minot's liver extract was given a true remission of the disease began.

A third patient with pernicious anemia received the soluble salts of the liver ash for a period of a week. There was no evidence of any activity of marrow tissue observed, either in the total blood count and hemoglobin and leucocytes or in the percentage of reticulocytes.

These results are reported as a supplement to the experiments of Whipple and Robscheit-Robbins on the effects of liver ash and inorganic substances on the blood regeneration of dogs made chronically anemic by repeated bleedings.

Conclusions: 1. The administration of the ash of liver to 2 patients with typical pernicious anemia resulted in the appearance of some of the preliminary phenomena of a remission, in particular an increase in the percentage of reticulocytes. In neither case did a true remission occur until Minot's liver extract 343 was given.

2. The substance responsible for the above was apparently lost or inactivated by dissolving the ash in hydrochloric acid, neutralizing with NaOH, and evaporating the salts to dryness.

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Blood Regeneration in Severe Experimental Anemia. Influence of Inorganic Elements.

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We have recently reported in these PROCEEDINGS[1] a rather startling reaction to the inorganic ash of liver, kidney and apricots. This