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A Test for the Mechanical Fragility of Blood.

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Oxalated venous blood is centrifuged and the plasma separated from the cells. Two mixtures are prepared, one consisting of 2 cc. of packed cells and 4 cc. of 0.9% NaCl solution, the other of 2 cc. of packed cells and 4 cc. of the plasma which had just been removed from the cells. A portion of each mixture is then placed in a glass stoppered vial of 3 cc. capacity. Each vial contains a segment of glass rod 5 mm. in diameter of such length that the weight is 0.6 gm. The vials are completely filled, no air being allowed to remain under the stopper. They are then shaken in a shaking machine 40,000 times at the rate of 560 per minute. The vials are then centrifuged and the supernatant fluid from each vial is separated from the cells. One cc. of supernatant fluid from each vial is mixed with 4.5 cc. of 1% NH_4OH solution. Illuminating gas is bubbled through these mixtures to turn the hemoglobin to carbon monoxide hemoglobin. Standards are prepared as follows: From that portion of the saline cell mixture which was not used to fill the vial a number of fills of a 20 cu. mm. pipette are taken into 5.5 cc. of dilute ammonia, until a rough match of color is obtained. After saturation with illuminating gas this standard mixture is placed in a colorimeter and the mixture of saline supernatant fluid and ammonia is read against it. Similarly a mixture is made of 1 cc. of plasma saved from the original centrifuge tube and 4.5 cc. of dilute ammonia. A number of 20 cu. mm. quantities of the plasma mixture left over after the vial was filled is added to this until a rough match is obtained with the mixture of supernatant plasma and ammonia. Then after passing illuminating gas through this standard the 2 solutions are placed in the colorimeter and a reading made. The amount of hemoglobin in the original saline cell and plasma cell mixture is determined by the Newcomer method. From these various readings it is possible to calculate the amount of hemoglobin set free in the supernatant fluid of each vial by the process of shaking and so to calculate the percentage of breakage.

In normal blood under the conditions listed above the average breakage in the saline tube is about 0.7%. The plasma tube shows a somewhat smaller amount of breakage, averaging 0.55%. Abnormal bloods have been observed which show a breakage as high as

4.0%. The results obtained are compared with those of the ordinary saline fragility test. Some interesting differences in the results of the 2 tests have been observed. For example, certain severe untreated cases of pernicious anemia have shown a definitely increased mechanical fragility at a time when the saline fragility test was normal. The clinical results of the test will be reported in full at a later date.