

epinephrine is due to their acceleration of quantum energy and electron transfer from high energy phosphate bonds to the contractile proteins. (This is consistent with the high oxidation-reduction potential of epinephrine.) The thyroid hormones have been found to have no effect upon the rate of relaxation or upon energy transfer in the absence of epinephrine and norepinephrine. Their activity in the presence of the sympathoadrenal hormones can be explained by considering thyroxine and triiodothyronine, both amino acids, active only when incorporated into the polypeptides actin and myosin. In these proteins, their heavy iodine ions can serve as localizers of electron charge density. As such, they would increase total coulomb repulsive forces between charged points in the protein molecule. This factor would both increase the rate of dissociation of actin and myosin and increase the internal energy of the dissociated system.

It has also been observed that when the "contractility" of heart muscle is depressed by anoxia, anesthetic agents, or by increased blood pCO_2 , the primary characteristic of depression is a parallel decrease in contractile force and rate of relaxation. This implies that the primary effect of an anesthetic agent is to block the transfer of energy from high energy phosphate bonds to the contractile proteins. (This work was supported by a grant-in-aid from the Massachusetts Heart Association. Dr. Brewster is a Research Fellow of The American Heart Association.)

Disturbances in Blood Clotting Associated with Multiple Transfusions. JOHN P. BUNKER, M.D., Anesthesia Laboratory of the Harvard Medical School at the Massachusetts General Hospital, Boston, Massachusetts.

STEFANINI [Clin. Res. Proc. 2: 61, 1954] and Krevans and Jackson [J.A.M.A. 159: 171, 1955] have demonstrated a gradual progressive fall in circulating platelets during multiple blood transfusions. The degree of thrombocytopenia, as found by these workers and in our laboratory, is extremely variable, depending on the number of transfusions, the speed of infusion, and, possibly, on the occasional presence of platelet agglutinens in the donor blood. Thrombocytopenia is probably not solely responsible for the bleeding diathesis which may occur during transfusion. Banked blood is low in anti-hemophilic globulin and in accelerator globulin (labile factor); depressions in both have been observed. Although usually present in generous quantities in stored blood, SPCA (stable factor) falls frequently in the patients studied by us. It appears probable that bleeding defects, when they occur, are caused by simultaneous defects in several factors.

Uncontrollable bleeding during surgery is occasionally caused by fibrinolysis. In our experience, this hematologic disaster is particularly apt to occur in patients with liver disease and in patients in shock; such patients are usually receiving massive transfusion therapy, but it is not possible to implicate the transfused blood as responsible for the appearance of lysis.

The Combined Effect of Thiopental-Flaxedil®, Intubation and Atropine on Dead Space. S. J. CEDARLEAF, M.D., E. A. SCHULTZ, M.D., J. R. GORDON, M.D., AND F. H. VAN BERGEN, M.D., Department of Anesthesiology, University of Minnesota School of Medicine, Minneapolis, Minnesota.

RADFORD [J. Appl. Physiol. 7: 451, 1955], has published a ventilation nomogram with ventilation volumes based on sex and body weight. On the basis of work by previous investigators, he suggested that the respiratory dead space be taken as 1 cc. per pound of body weight. He further indicated that intubation or tracheotomy would halve the dead space since these procedures eliminate the dead space of the mouth, nose and nasopharynx. Since many of our anesthetics and premedicants could be bronchodilators or bronchoconstrictors, we believed the dead space should be measured in the anesthetized patient and compared to Radford's estimated dead space. The nomogram could then be applied to anesthetized individuals more accurately.

As far as we are aware, neither the effect of thiopental-flaxedil® nor that of tracheal intubation on the dead space volume has been measured. Atropine in 1 mg. doses subcutaneously has been reported by Higgins and Means [J. Pharmacol. & Exper. Therap.