fiber stretched beyond its normal relaxation does not return to its initial length. A delta state is produced. Some active process of relaxation occurs in a normal muscle. This is abolished in the delta state. No answer has yet been found to the correction of the delta state of myofibril contraction. Sympathetic block seems to provide one of the first steps in this direction. Sympathetic block at the nasal ganglion appears to permit normal acetylcholine action. The restoration of muscle tone appears to be further heightened by parenteral use of the adenylic nucleotide as the iron salt. This would tend to indicate that adenylic acid is related to active relaxation as well as to active contraction.

The muscle cell can be stimulated to contraction, thereby bringing about development of mechanical energy and of electrical energy, which provides a mechanism for conduction of a contraction wave from one end of the muscle to the other. This electrical change can be resolved into various parts comparable to the spike and after potentials of nerve. Of particular significance are the potentials associated with activities at the myoneural junction.

It is by way of the sympathetics that we must search for the influence on the electrical potential of muscles induced by anesthetics, particularly the local anesthetics.

The problem of muscle tension is intimately bound up with muscle mechanics and represents a new chapter in physiology.

The third division of muscle physiology is the neuroeffector system. Adenylic nucleotide plays the basic role in muscle dynamics and thermodynamics. The chemical factors which play a role at the myoneural junction are acetylcholine and sympathin and adrenine. Now therapeutically, the anesthetization with cocaine, novocaine, or nupercaine of a sympathetic nerve center (sphenopalatine ganglion) is followed by immediate general relaxation of the muscle spasm not only of smooth muscle but of striated skeletal and syncytial cardiac muscle. This effect is not obtained by systemic administration of the anesthetic solution in the dosages used, but is profound when applied directly to the sympathetic nerve center. The degree of this effect can readily be compared with the surgical intervention on the adrenomedullar sympathetic system.

Cocaine and preganglionic denervation enhance the mechanical while depressing the electrical responses of muscle. Similarly, the injection of the iron salt of adenylic nucleotide, ferrous adenylate, increases the mechanical response of muscle fiber through making available immediately the energy-rich phosphate, and enhances the capacity of the muscle to overcome the spasm, possibly by active relaxation.

Indications for this block: 1. Painful muscle spasm (sacroiliac, torticollis, etc.) ; 2. Acute arthritic and chronic osteoarthritic pains; 3. Hypertension and peripheral vascular spasm; 4. Coronary pain; 5. Migraine and hemicrania; 6. Herpetic pain; 7. Spasmodic hiccups and sneezing; 8. Menstrual pain; 9. Uteral colic; 10. Intercostal neuralgia; 11. Spastic stage of poliomyelitis.

The dramatic nature of the results is its greatest handicap.

M. F. P.

APGAR, VIRGINIA: *Experience with Curare in Anesthesia.* Ann. Surg. 124: 161–166 (Aug.) 1946.

Two hundred consecutive cases received curare during anesthesia. Intocostrin was the drug used. The intravenous route was used and the rate of injection was rapid. The maximum action was usually present in sixty sec-

onds and the duration varied greatly. There were 15 deaths, 2 of which occurred in the operating room. Eleven of the deaths were felt to be unrelated to the curare; 2 were unexplained and 1 of these may have been due to respiratory obstruction shortly after return to bed. One 4-day-old female was given curare and infiltration anesthesia for operative relief of atresia of the jejunum. No premedication was given. Respiratory depression developed during the administration of curare. The dose selected was 10 mg. Efforts to support the respiration by various means were unsuccessful and the heart, which seemed unaffected as long as the patient could be oxygenated, failed after more than two hours. Autopsy revealed that the brain tissue contained 0.25 mg. of curare per 200 mg. of brain tissue. It was later discovered that 1 cc., or 20 mg., of curare had been given instead of the 10 mg. planned.

Pulmonary complications included bronchopneumonia, 2 cases; atelectasis, 2 cases, and mild bronchopneumonia in one of the fatal cases. The results in 25 tonsillectomies anesthetized with pentothal and curare were appreciably better than a parallel series of cases without curare. A reëvaluation of the signs of anesthesia would overcome the main disadvantage of the use of curare. It is suggested that the concentration of the drug be changed to 1 per cent (1 cc. = 10 mg.) to lessen the hazard of mathematical error. 8 references.

F. A. M.

McCUSKEY, C. F.: *Anesthesia for Emergency Surgical Procedures.* California Med. **65**: 93–95 (Sept.) 1946.

In emergency surgical procedures the clinical condition of the patient must be considered when the anesthetic is chosen. Good muscular relaxation is necessary for exposure, hemostasis and gentle handling of tissues. "Before an anesthetic agent is selected its pharmacologic action should be considered and this action correlated with the clinical condition of the patient. It is generally accepted that ether produces a general peripheral vasodilation and when carried to the lower planes, a depression of vasomotion is common. Pentothal sodium also produces a peripheral vasodilation. Spinal anesthesia and regional blocks produce vasodilation in the anesthetized area. Frequently there is a compensatory vasoconstriction in the unanesthetized area. The body's first reaction to blood loss or trauma preceding shock is a peripheral vasoconstriction. This is the automatic attempt of the body to maintain sufficient blood for the vital centers. Following the administration of blood or plasma to patients who have had a severe drop in blood pressure, the pressure may rise to 100 to 120 systolic. This rise may occur before the total volume of blood lost has been replaced and is only possible because of the peripheral vasoconstriction still present. The administration of an anesthetic which produces vasodilation at this time will produce an immediate severe drop in blood pressure."

Treatment of shock, adequate premedication and emptying of the stomach should precede the administration of an anesthetic. The type of replacement fluid indicated can be determined best by evaluating the hemoglobin, hematocrit volumes per cent and plasma protein content of the blood. There is no substitute for whole blood. If a person is to receive repeated transfusions, consideration of the Rh factor is essential. The symptoms of hemolytic transfusion reactions are: a sense of increased heat in the skin, headache, a sense of constriction in the chest, pain in the lumbar region, rigor and fever. The first 100 cc. of every transfusion should be given slowly and transfusion