

Abstracts

Work in Progress

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The following are abstracts of papers presented at the WORK IN PROGRESS program of the Annual Meeting of The American Society of Anesthesiologists, Chicago, November 4 and 5, 1963.

The Contractile and Cell Membrane Effects of Halothane. C. H. AWALT, M.D., and E. L. FREDERICKSON, M.D., *University of Kansas Medical Center, Kansas City, Kansas.* While local anesthetics are thought to act by stabilizing the cell membrane, thus preventing depolarization and the formation of a propagated impulse, the site of action of general anesthetics is not known. One possibility would be that they also interfere in some way with the formation of cellular action potential. The microelectrode technique of transmembrane recording, introduced by Ling and Gerard (*J. Cell Comp. Physiol.* 34: 383, 1949), makes possible the observation of instantaneous electrical changes across the membrane of individual cells. *Method:* In the present study, the effect of halothane was observed using rabbit atria as the excitable tissue. Contraction of the entire atrial preparation and transmembrane action potentials from individual cells were simultaneously recorded in a manner essentially as described by Levy, Ichiyangi, and Frederickson (*ANESTHESIOLOGY* 24: 185). A comparison was made between those recordings made under stable control conditions and those made with the preparation exposed to approximately 1.0 per cent and 1.5 per cent halothane by means of a Fluotec vaporizer connected in series with the oxygenation line. *Results:* Tabulation and analysis of measurements made on transmembrane action potential amplitude and duration did not demonstrate any significant difference between records made under control conditions and those made when halothane was administered. On the other hand, contraction was notably depressed by the 1.0 per cent concentration and almost completely abolished at the 1.5 per cent level. *Conclusions:* From the data it is inferred that the effects of halo-

thane on excitable tissue are not the result of primary alterations at the level of the cell membrane. Further, since marked changes are produced in contraction which is an intracellular activity, while cyclic electrical events at the surface membrane continue without apparent alteration, it would appear that halothane penetrates the membrane and exerts its depressant effect on contraction at some point within the cell. These conclusions are substantially in agreement with those made by Levy *et al.* (*loc. cit.*) as a result of their studies on cyclopropane, and one is tempted to speculate that similar conditions would prevail with other gaseous hydrocarbon anesthetic agents. (This work was done during the tenure of a postdoctoral fellowship granted to Dr. Awalt by the National Heart Institute. Dr. Awalt is now at the University of Texas Medical Branch, Galveston, Texas.)

Effect of Mephentermine Upon Venous Circulation During Spinal Anesthesia. KALMAN J. BERENYI, M.D., SHIRO SHIMOSATO, M.D., and BENJAMIN E. ETSTEN, M.D., *Department of Anesthesia, Tufts University School of Medicine and Pratt Clinic, New England Center Hospital, Boston, Massachusetts.* Peripheral blood flow and vascular distensibility, by means of venous occlusion plethysmography, using the temperature compensated mercury-in-rubber strain gauge, as described by Whitney (*J. Physiol.* vol. 121, p. 1), were simultaneously obtained in the upper and lower extremities of human volunteers and surgical patients prior to operation. Eighty-three simultaneous determinations of forearm blood flow were obtained by means of water plethysmography in one arm and the mercury-in-rubber strain gauge in the other arm in 6 volunteer subjects. There was a