The Respiratory Effect of Methoxyflurane on Dog and Man. KARL L. SIEBECKER, M.D., MARVIN JUMES, M.D., BETTY J. BAMFORTH, M.D., AND O. S. ORTH, M.D., *Department of Anesthesiology, University Hospital, University of Wisconsin School of Medicine, Madison, Wisconsin.* Methoxyflurane is a potent, non-explosive anesthetic agent. It is one of several fluorinated hydrocarbons investigated for anesthetic properties by the Cornell University group. Methoxyflurane (1,1-dichloro-2,2-difluoro-2-methoxyethane) produces adequate relaxation for any surgical procedure, and for endotracheal intubation. No halogenated hydrocarbon studied or used clinically has been found free of all physiological and pathological effects which make it undesirable for routine clinical use. In clinical use methoxyflurane resembles diethyl ether in its effects on the circulatory system, particularly blood pressure levels. In contrast to diethyl ether, methoxyflurane has a tendency to depress respiration. This observation led us to the present study. Seventeen unpremedicated mongrel dogs were anesthetized by to-and-fro absorption technique using only oxygen as a vehicle to vaporize the agent. No other anesthetic agents were used, so that any changes observed could be attributed to the agent itself. The dogs were allowed to breathe spontaneously and respirations were never assisted or controlled. Arterial blood samples were obtained at appropriate times, and the *p*H, P_{CO_2} and oxygen saturation were determined. Respiratory minute volume and tidal volume were measured with a respirometer and the rate was counted visually. In the dog the respiratory rate was decreased as the anesthetic depth was increased. Tidal volume was variable, but usually slightly decreased. The respiratory minute volume was invariably decreased from 5-8 liters per minute awake to as low as 0.175 liters per minute. The *p*H values of arterial blood samples taken during severe respiratory depression showed a sharp decline averaging 7.20 (range 7.05–7.34). In over one hundred clinical administrations of methoxyflurane we found it necessary to assist respiration. Measurement of respiration showed that in man deepening the level of anesthesia resulted in a decrease in tidal volume and respiratory minute volume. The respiratory rate was quite constant. In twelve instances respiration was not assisted or controlled and the anesthetic level was purposely deepened more than necessary for the operation. Analysis of arterial blood samples taken at this time revealed an average *p*H of 7.33 (range 7.29–7.37). During lighter levels of anesthesia, *p*H values of samples taken from the same patients had an average of 7.41 (range 7.38–7.59). This agent possesses a fortunate property which counterbalances this unfavorable respiratory effect. Clinically we have been able to provide satisfactory muscular relaxation for any operation without deep anesthesia. Abdominal relaxation is excellent in apparently very light anesthetic levels. As with diethyl ether, recovery time may be delayed if the agent is not discontinued about twenty minutes before the end of the procedure. This is no serious disadvantage since, as with diethyl ether, analgesia persists through very light levels of anesthesia. In summary, methoxyflurane is not the perfect anesthetic agent. It is potent and is non-explosive. The physiological and pathological effects are minimal compared to other halogenated hydrocarbons in clinical use. Respirations should be closely observed and usually assisted or controlled during methoxyflurane anesthesia.

Ventilator Techniques of Anesthesia for Neurosurgery. COL. HARVEY C. SLOCUM, MC, LT. COL. GEORGE W. HAYES, MC, AND CAPT. BERNARD L. LAEZMAN, MC, *Anesthesia and Neurosurgical Services, Walter Reed Hospital, Washington, D. C.* It is often difficult to attain and maintain adequate exposure for the neurosurgical approach to an intradural lesion. Required are the control of the neurophysiological factors responsible for cerebral blood flow, cerebrospinal fluid pressure balance, and to some extent the shift of tissue fluids within the brain. These controls are necessary to relieve the excess pressures which cause the bulging or tense brain when it is subjected to the effects of pathological lesions, anesthesia, and surgical manipulation. Techniques of anesthesia are presented which take into consideration the mechanical, vascular, and humoral aspects of cerebrovascular circulation. Changes in cerebrospinal fluid pressure vary in direct relationship to changes in cen-

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