

to 24 hours. Resuscitation could be successfully completed even if undertaken 65 minutes after onset of apnea and 45 minutes after cardiac arrest. *Conclusion:* Tentatively, it is concluded that, if cold exposure has not progressed to the point of circulatory failure, conservative measures are effective for resuscitation. However, if the syndrome has progressed to the stage of circulatory failure, external measures are expected to fail; while some hope of success might be expected from mechanical assistance of the circulation and respiration and highly efficient means for heat transfer. [Supported by a grant from the Research Council of the American Medical Association.]

#### **Halothane Versus Cyclopropane in Shock.**

P. P. BOSOMWORTH, M.D., Z. NIKOLOWSKI, M.D., J. E. TETIRICK, M.D., C. B. EDWARDS, PH.D., and W. HAMELBERG, M.D., *University of Kentucky Medical Center, Lexington, Kentucky, and Ohio State University Hospital, Columbus, Ohio.* General anesthesia during progressive degrees of hypovolemia is usually associated with varying changes in metabolism, cardiovascular compensation, and organ function. These changes are dependent on many factors including the anesthetic agent itself. This study investigated responses of 16 conditioned mongrel dogs to two anesthetic agents, halothane and cyclopropane, in terms of renal blood flow and resistance and femoral blood flow and resistance during progressive hemorrhage through time. The controversy between using cyclopropane and halothane anesthesia for hypovolemic states continues. Fabian (Fabian, L. W., and others: *Anesth. Analg.* 41: 272, 962) reported the comparable effects of halothane and cyclopropane on renal blood flow at a 30 per cent reduction in blood volume, concluding that no significant difference in flow existed despite a difference in mean arterial pressure. *Method:* In this study anesthesia was maintained and stabilized for one hour with 0.6 per cent halothane or 10 per cent cyclopropane during exposure of the right renal and left femoral arteries. Square-wave flowmeter probes were placed around the arteries and systemic and central venous pressures were recorded. Arterial blood, 30 ml. per kilogram body weight, was withdrawn in

one minute and four minutes allowed for stabilization. Arterial  $P_{CO_2}$  values were determined frequently to insure no change during measurement of flow. *Results:* With 100 per cent of the blood volume remaining, during halothane anesthesia the mean renal flow was 150.5 ml. per minute with a mean arterial pressure of 105 mm. of mercury; during cyclopropane anesthesia the mean flow was 91.7 ml. per minute with a mean arterial pressure of 125 mm. of mercury. A significant difference existed in renal flow, resistance, and arterial pressure for the two anesthetic agents ( $P > 0.05$ ). With 70 per cent of the blood volume remaining, there was no significant difference in the renal flow and resistance or in the femoral flow and resistance under halothane or cyclopropane anesthesia. There was no significant difference in the percentage blood volume remaining at the termination of renal flow under halothane (54.7 per cent) or cyclopropane (58.0 per cent) anesthesia or of femoral flow for halothane (60.1 per cent) or cyclopropane (56.1 per cent) anesthesia. When dogs were bled (510 ml.) to termination of renal or femoral flow and administered 250, 500, and finally 1000 gamma of metaraminol, blood pressure was restored, to 125 mm. of mercury, but not renal or femoral blood flow. A reinfusion of 180 ml. of whole blood, after femoral and renal flow ceased, restored both renal (65 ml./minute) and femoral (25 ml./minute) flow to approximately one-half of the control values. *Conclusions:* There is a significant difference in the blood flow of the renal artery as influenced by cyclopropane and halothane anesthesia with normal blood volume. There is not a significant difference in the renal or femoral flow as influenced by either agent when the blood volume is reduced by 30 per cent. There is no difference in the percentage blood volume remaining when renal flow shuts off with either agent. A small volume of blood re-infused after cessation of renal and femoral flow is more effective in the restoration of flow than is the administration of metaraminol.

**Potassium Superoxide as an Oxygen Source During Resuscitation.** VERNE L. BRECHNER, M.D., and ROBERT F. WOLFF, M.D., *Division of Anesthesia, University of Cal-*