AC External Defibrillator, Canad. Med. Ass. J. 89: 1103 (Dec. 7) 1963.)

CIRCULATORY ARREST Effect of circulatory arrest on cerebral function was studied in two groups of dogs, one at normothermia and the second at 27° C. hypothermia. Each of the two groups was subdivided into three divisions, the first ventilated with atmospheric air, the second with oxygen at 1 atmosphere of pressure and the third with oxygen at 2 atmospheres of pressures. Circulatory arrest was produced by temporary occlusion of the venae cavae and cross-clamping the aorta and pulmonary artery. Hypoxic damage was detected by evaluation of the dog after the procedure and by subsequent post-mortem examination of various body tissues. In the normothermic dog, hyperventilation with air or with oxygen at 1 atmosphere did not appear to prolong the period of safe circulatory arrest time, but there was a significant difference with 2 atmospheres of oxygen. However, with reduction of body temperature to 27° C., the time of safe circulatory arrest was prolonged 20 minutes by prior ventilation with oxygen at 1 atmosphere of pressure and to 30 minutes if 2 atmospheres of oxygen were used. *(Smith, G., and others: Prolongation of the Time of "Safe" Circulatory Arrest by Preliminary Hyperbaric Oxygenation and Body Cooling, Surg. Gynec. Obstet. 117: 411 (Oct.) 1963.)*

MYOCARDIAL ISCHEMIA Maximal time of cardiac standstill after which immediate restoration of full function can be achieved was studied in 49 dogs in normothermia. Myocardial ischemia was produced by clamping the aorta just distant to the coronaries while the rest of the body was perfused by a pump oxygenator. After 4½ minutes of ischemia 50 per cent of the animals succumbed from the resulting myocardial insufficiency. After 5 minutes, 100 per cent of the animals died. Resuscitation of the organism is limited by cardiac rather than cerebral function. After anoxic cardiac standstill of more than 4½ minutes duration myocardial function has to be supported by massage or extracorporeal circulation to prevent death due to postischemic cardiac failure and secondary damage to other organs. *(Grote, G., and others: Determination of Resuscitation Time of the Heart with Instant Restoration of Full Function in Animals, Thoraxchirurgie, 11: 20 (Sept.) 1963.)*

CARDIAC PACEMAKERS Patients with Stokes-Adams attacks should first have a vigorous trial of medical therapy with isoproterenol hydrochloride, atropine, chlorothiazide, and possibly steroids. If severe attacks continue, an electrode catheter placed in the right ventricle offers reasonably good interim pacing and makes anesthesia and operation for permanent implantation safer. However, with the catheter there is constant hazard of dislodgement from the ventricle and even of perforation of the heart. *(Parker, B. M., and others: Indwelling Electronic Cardiac Pacemakers, J.A.M.A. 186: 754 (Nov. 23) 1963.)*

EXTRACORPOREAL CIRCULATION Following use of a pump oxygenator, postoperative cyanosis often occurs even after correct perfusion and satisfactory correction of the cardiac defect. Arterial oxygen tensions are abnormally low whereas carbon dioxide tensions are normal proving alveolar ventilation is normal. Diffusion capacity for oxygen and pulmonary shunting is increased. Animal experiments show this increase in shunt flow to be associated with the use of the pump oxygenator. During total bypass the lungs obtain only 2 to 3 per cent of normal cardiac output through the bronchial arteries and this may be insufficient for nourishment of the lung parenchyma. Another factor may be the influence of physiochemical blood changes on microcirculation. The Drew technique for extracorporeal circulation is superior because the lungs remain in the circulation and plasma proteins are not changed. Membrane oxygenators are preferable. *(Beers, R., and Loeschcke, G. C.: Changes of Pulmonary Function After Operations with the Heart Lung Machine, Der Anaesthesist 12: 306 (Oct.) 1963.)*

CARDIAC PERFORMANCE Cardiac output and related variables were measured in patients after open intracardiac surgery. Use of transverse ventriculotomy, prevention of coronary air embolism, and protection by cold

of the myocardium during ischemia can be expected to minimize postoperative myocardial depression. The volume of homologous blood used for priming of the pump-oxygenator should be kept to a minimum, in view of the possible ill effects of large amounts of homologous blood. When cardiac performance is poor soon after repair, sodium bicarbonate is indicated and usually seems to improve cardiac output. Intracardiac or intravenous injection of calcium chloride has an immediate although transient beneficial effect on cardiac performance and is of value when large amounts of citrated blood have been administered. (*Kirklin, J. W., and Theye, R. A.: Cardiac Performance After Open Intracardiac Surgery, Circulation 28: 1061 (Dec.) 1963.*)

EXTRACORPOREAL CIRCULATION Plasma expanders or 5 per cent levulose were substituted as priming fluids for blood during extracorporeal circulation in animals. No essential changes in blood gases and acid-base balance were observed under the condition of hypothermia (rectal temperature 15° C.) with the exception of a metabolic acidosis. This could be prevented by addition of sodium bicarbonate to the perfusing fluid. Hypothermia by heat exchanger is a prerequisite for the use of blood substitutes as perfusates. Dilution of blood and the associated decrease of the oxygen carrying capacity is partially compensated by the increased solubility of oxygen in diluted and cold blood. Partial re-infusion of the pump blood volume will prevent major blood loss. Advantages of pump priming by blood substitutes are decreased incidence of serum hepatitis, smaller number of cross-matchings, and ready availability of extracorporeal circulation in emergencies. (*Schlosser, V., and others: Use of Blood Substitutes in Extracorporeal Circulation, Langenbeck Arch. Klin. Chir. 303: 223, 1963.*)

POSTPERFUSION ANEMIA Fifty-eight patients had preperfusion and postperfusion blood volume determinations made radioactively together with peripheral hematocrits. The postperfusion hematocrit did not reflect cell volume changes occurring during perfusion. The late decline of hematocrit after perfusion was often the result of disproportions of red cell and plasma volumes which occurred asynchronously. Total blood volume, red cell volume, and plasma volume augmentation was demonstrable in the face of a falling hematocrit. Possibly these paradoxical relationships between hematocrit and erythrocyte volumes were related to sequestrative changes of the homologous blood volume. Although total blood volume deficits after perfusion with hemodilution techniques were greater than when homologous whole blood alone was used, proportionally fewer red cells were sequestrated. This is in consonance with the clinical observation that stasis secondary to homologous blood exchange is ameliorated by hemodilution. (*Gadboys, H. L., and Litwak, R. S.: Postperfusion Hematocrit, J. Thorac. Cardiov. Surg. 46: 772 (Dec.) 1963.*)

HEMODILUTION Results of experimental cardiopulmonary bypass procedures in dogs indicate that the relatively large volumes of blood required for priming a rotating disc oxygenator can be diluted without harm to the animal. Arterial and venous oxygen saturations during perfusion remained normal in all groups of animals. Only in those subjected to 100 per cent hemodilution did venous oxygen saturation show a decrease, an hour after perfusion. Flow rates during perfusion were highest with dextran as the hemodilution agent and lowest with undiluted blood. No bleeding problems were encountered. Plasma hemoglobin levels were highest with 5 per cent glucose-in-water as the dilution agent, and lowest with dextran. Actual platelet destruction was decreased by the hemodilution techniques. Unaccountable blood loss was least with dextran and greatest with 5 per cent glucose-in-water; in all experimental groups, this unmeasurable loss affected the red cell mass chiefly and 100 per cent hemodilution did not prevent such loss. (*Kahn, D. R., and others: Hemodilution Studies in Extracorporeal Circulation With the Use of a Rotating-Disc Oxygenator, J. Thorac. Cardiov. Surg. 46: 765 (Dec.) 1963.*)

HEMODILUTION Pump priming with a balanced electrolyte solution prior to extracorporeal circulation results in hemodilution. In a group of patients treated in this way,