MRAP with only small decreases in $\dot{Q}$. However, from these data we cannot define the shape or slope of change in ventricular function. The peripheral vasculature demonstrates intense sympathetic activity, perhaps instrumental in maintaining filling pressure and cardiac function. Thus, with SV maintained by an increase in filling pressure and HR remaining constant, $\dot{Q}$ remains normal.

Block of Pain Transmission by Halothane in the Spinal Cord of the Cat. R. H. DE JONG, M.D., R. ROBLES, M.D., and K-I. MORIKAWA, M.D., *Department of Anesthesiology, University of Washington, Seattle, Wash.* Melzack and Wall (Science 150: 971, 1965) proposed that the passage of impulses related to pain is affected by a presynaptic gating mechanism residing in the dorsal horn of the spinal cord. Because general anesthetics suppress the response to pain, we investigated the effects of halothane on the rate of discharge of dorsal horn neurons. These cells characteristically discharge at a rapid rate when the innervated skin is stimulated mechanically, as by stroking of hairs or by pinching a fold of skin. *Methods:* Under endotracheal halothane anesthesia, cats were decerebrated and the spinal cords transected at C_1. Therefore, the lungs were ventilated mechanically with oxygen. Arterial blood pressure, end-expired CO_2, temperature and urinary output were monitored continuously. Partial pressure of halothane in arterial blood was measured chromatographically. The lumbar spinal cord was exposed via a laminectomy and a metal-filled microelectrode advanced hydraulically into the dorsal horn until it recorded potentials from a single cutaneous afferent neuron. Most neurons discharged slowly and irregularly at rest. When the skin of the foot or leg was stimulated, the firing rate increased ten to 20 times. Following measurement of controls, 1 to 3 per cent halothane in oxygen was delivered to the nonrebreathing system. *Results:* In the first one or two minutes halothane usually accelerated the firing rate of an afferent neuron. Thereafter, the rate slowed progressively, and firing ceased eventually. Resting discharge was suppressed at an average arterial halothane content of 1.3 per cent, the response to stroking of hairs at 1.6 per cent and that to skin pinching at 2.2 per cent. *Summary:* Earlier we showed that halothane affects neither the discharge of cutaneous receptors nor the conduction of impulses to the spinal cord. Halothane thus blocks these impulses from the skin in the dorsal horn of the spinal cord. Hence, analgesia may be attributed, at least in part, to blockade by halothane of impulse transmission at the first synapse of the extralemniscal pathway.

Immediate Circulatory Effects of Anesthesia in Conscious Dogs. J. H. EISELE, M.D., D. TRENCHARD, M.D., J. STUBBS, M.D., and A. GUZ, M.D., *Department of Medicine, Charing Cross Hospital Medical School, Fulham Hospital, London, England, and Department of Anesthesia, University of California, San Francisco Medical Center, San Francisco, Calif.* The time course of circulatory changes during induction with halothane and/or nitrous oxide was studied in six healthy awake dogs. *Methods:* Beat-to-beat changes in cardiac performance were measured with implanted ascending aortic electromagnetic flowmeters. Pressures were recorded from right and left atria, pulmonary artery, and descending aorta. The dogs were trained to breathe anesthetic gases from a mask. *Results:* Both 3 per cent halothane and 60 per cent nitrous oxide reduced peak aortic flow and maximum acceleration within eight to 12 seconds after inhalation of the first breath of either anesthetic. These changes were greater with halothane than with nitrous oxide, and were even more marked when the combination of halothane and nitrous oxide was inhaled. Cardiac acceleration decreased before any reduction in cardiac output, aortic or central pressures occurred, thus indicating that these anesthetics have a direct depressant effect on the myocardium. This was confirmed in three of the dogs that were studied after surgical denervation of the heart, when halothane and nitrous oxide alone and in combination produced a rapid cardiac depression similar to that in the nondenervated dogs.