

Urinary Epinephrine and Norepinephrine During Innovar-Nitrous Oxide Anesthesia in Man

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Urinary excretion of norepinephrine (NE) and epinephrine (E) was measured in 12 healthy adult patients during a control period of 6-8 hours preoperatively, an anesthetic period of at least 2 hours, during operation and a postoperative period of 6-8 hours. Their tracheas were intubated, respirations controlled and blood gases monitored during the anesthetic and surgical periods to prevent respiratory acidosis. Five patients were anesthetized with Innovar-nitrous oxide, 4 with halothane and three with cyclopropane. A significant increase in the rate of excretion of E was observed during the anesthetic, surgical and postoperative periods with Innovar-nitrous oxide anesthesia. No change was observed in NE excretion. The mechanism for this increased E excretion is unknown but increased E secretion helps to explain the marked cardiovascular stability observed during Innovar-nitrous oxide anesthesia.

THE DEVELOPMENT of specific and sensitive methods for estimating concentrations of catecholamines in plasma¹ or urine² has made possible the study of the variations in production of sympathetic mediators, such as epinephrine (E) and norepinephrine (NE), in response to anesthetic agents. The response of plasma E and NE has been observed during anesthesia with various agents. Price *et al.*³ measured plasma E and NE during anesthesia with thiopental, cyclopropane, diethyl ether, and halothane. Subsequently, Sechzer *et al.*⁴ observed the plasma E and NE response

to respiratory acidosis. Hammelberg *et al.*⁵ compared plasma E and NE levels during light and deep anesthesia. No significant change occurred in E and NE levels after one hour of light anesthesia with cyclopropane, ether, halothane, thiopental, or with spinal anesthesia. Norepinephrine was significantly increased in deep anesthesia with ether and with cyclopropane.

There is a valid relation between blood and urine levels of E and NE. Anton *et al.*⁶ observed elevation of plasma E and NE levels during thoracotomy and cardiopulmonary bypass with ether anesthesia, but no change in these mediators during halothane anesthesia. They also found that urinary excretion of E and NE run parallel to the blood levels. In 1951 Von Euler and Luft⁷ initially demonstrated that urinary NE excretion closely parallels plasma NE levels during an infusion of NE. Ozdil and Powell⁸ have measured urinary excretion of E and NE for a 24-hour period which included an operation and light anesthesia performed with cyclopropane, halothane, diethyl-ether, and epidural anesthesia. They concluded that there was no significant deviation from normal 24-hour excretion in their patients; however, it is possible that timed samples would have demonstrated changes which were lost in a pooled 24-hour sample.

Dobkin *et al.*^{9,10} have recently extended the investigation of the plasma levels of biogenic amines, including E and NE, to the use of Innovar[®]-nitrous oxide anesthesia in dogs. They found no appreciable or consistent alterations in plasma levels of E and NE during

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[®] Innovar is a 50:1 (w/w) combination of droperidol, a tranquilizer, 2.5 mg./ml., and fentanyl, an ultra short-acting narcotic, 0.05 mg./ml.