

and an end point of block effect could not be determined. Following amputation above the knee, 6 blocked nerves were available for microscopic examination and were compared with sections of unblocked nerves from the same patient. The pathological report indicated that the nerves at the site of, and slightly distal to the block showed acute degenerative neuropathy. It is apparently impossible with the material that has been submitted to differentiate between degeneration of motor and sensory fibers, though clinically the distinction can be readily made. No difference was observable clinically between ammonium sulphate or the chloride salt. Thirty-one intercostal nerve blocks were performed on 8 patients suffering from late "postthoracotomy neuralgia." Although clinical analgesia over the distribution of the blocked nerve was obtained following 28 blocks, only one patient considered symptomatic relief of pain satisfactory, the others continued to complain of "deep pain" and superficial numbness. Eight injections of areas of myositis or "trigger zones" in 5 patients with 1 per cent mepivacaine and 10 per cent ammonium chloride produced analgesia which lasted the duration of the mepivacaine block only. In 3 patients following successful lumbar sympathetic block with 1 per cent mepivacaine, the needles were left in place and 1 per cent mepivacaine and 10 per cent ammonium chloride was injected (3-8 ml.). Moderate pain was produced for about 10 minutes but the sympathetic block was not prolonged beyond that produced by the mepivacaine. *Conclusion:* Although this is a small series of cases and the results are of doubtful significance it seems likely that prolonged sensory block can be produced with 7.5 or 10 per cent ammonium salts without producing motor loss.

Respiratory Effects of Anesthesia with Innovar and Nitrous Oxide in Man. B. S. DUNBAR, M.D., A. OVASSAPIAN, M.D., and T. C. SMITH, M.D., *Department of Anesthesia, University of Pennsylvania, Philadelphia.* *Methods:* Respiratory response to carbon dioxide was studied in seven patients of physical status 1 and 2, anesthetized with Innovar and nitrous oxide. Premedication con-

sisted of 1.0-2.0 ml. Innovar administered intramuscularly. Sixty minutes later anesthesia was induced with an intravenous infusion of 5.0 ml. Innovar in 100 ml. of 5 per cent glucose in water administered over a 5 minute period. Administration of nitrous oxide (4 liters/minute) and oxygen (2 liters/minute) was begun by mask 3-4 minutes after the infusion had been started. Succinylcholine was then given and the trachea was intubated. Spontaneous breathing resumed within the next 10 minutes and continued throughout the study while anesthesia was maintained with nitrous oxide and oxygen. Measurements of end-tidal CO_2 tension and resting ventilation, as well as ventilatory response to CO_2 inhalation, were made while the patient was awake and unpremedicated. The same measurements were repeated 30 minutes after premedication, and again 30 and 60 minutes after the induction of anesthesia. *Results:* Mean end-tidal CO_2 tension during oxygen breathing was 42.0 Torr before premedication, and 39.9 Torr 30 minutes after premedication. Anesthesia with Innovar and nitrous oxide was associated with only moderate CO_2 retention as shown by mean end-tidal P_{CO_2} of 46.5 Torr 30 minutes after induction; and 44.0 Torr 60 minutes after induction. However, by itself, P_{CO_2} is an insensitive index of respiratory depression. Neither P_{CO_2} tidal volume, respiratory frequency, nor minute ventilation are as revealing as carbon dioxide sensitivity curves, which can quantitate the response of respiration to a measurable challenge. Normal ventilatory response to elevated P_{CO_2} consisted of an increase in ventilation of 1.5 liters/minute for each unit rise in P_{CO_2} . The mean ventilatory response fell to 1.0 liter/minute/Torr 30 minutes after the intramuscular dose of Innovar. Thirty minutes after the induction of anesthesia the response fell further to 0.56 liters/minute/Torr. These values represent mean reductions in response to CO_2 of 32, 63, and 54 per cent, respectively. *Conclusion:* In these studies Innovar premedication and Innovar with nitrous oxide anesthesia have been shown to be potent respiratory depressants with rapid onset and exhibiting peak duration of action in somewhat less than one hour. (Supported in part by U.S.P.H.S. Grant GM-09070-04.)