Title : PERSONAL SAMPLING OF HALOTHANE IN THE OPERATING ROOM AIR

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Introduction: It is recommended to decrease the exposure of operating room personnel to waste anesthetic gases and vapours as much as possible. To determine whether the proposed criteria [1] are met in practice requires straightforward methods for measurements. Integrated personnel sampling [2] enables one to determine average concentrations of volatile anesthetics over prolonged periods. The present study was set up to determine the average concentrations of halothane to which the anesthetic personnel is exposed when they are working in operating rooms, equipped with the Leiden scavenging system to reduce the concentrations in the room air. The Leiden scavenging system is also explained.

Methods: Small stainless steel tubes (length 7,5 cm, internal diameter 4.3 mm) were packed with 200 mg Porapak Q. The tubes were placed in a holder and air was drawn through the tubes using a battery powered air sampling pump. The holder was attached to the operating gown of the anesthetist or the anesthetic nurse and the pump was warn on a belt.The sample volume was chosen such, that an estimated amount of 0,5 to 50 mg halothane was observed by the Porapak Q, taking into account the breakthrough volume of the sampling tubes. The flowrate was varied between 5 and 100 ml/min, depending on the sampling time (15-240 min) and the chosen sampling volume. After the collection of the sample the sampling tube was capped and stored until the analysis could be performed. The amount of halothane retained by the Porapak Q was determined by gas chromatography after thermal desorption at 160° C. A gas chromatograph, equipped with a flame ionization detector and a 120 cm long stainless steel column (internal diameter 2.1 mm), packed with Chromosorb 102 (80-100 mesh) was used for the analysis. The gas chromotograph was calibrated with sampling tubes loaded with known amounts of halothane.

Results: Representative chromatograms from a calibration sample and a sample of room air are shown in Fig. 1. The concentrations of halothane in the air, inhaled by the anesthetist were on average well below the suggested maximum of 2 ppm (vol/vol) [1]. Higher concentrations were found in samples collected during the induction and extubation.

Discussion: Integrated personnel sampling is a time-saving technique making it possible to determine with relatively little effort the average concentrations of volatile anesthetics in the room air, inhaled by the personnel. Under the conditions met in operating rooms equipped with a scavenging system halothane and enflurane are quantitatively trapped, provided the sampling volume does not exceed the breakthrough volume. The recovery of halothane and enflurane is more than 98%, even when samples have been stored for eight days. The results of the measurements show that the installation of scavenging systems in operating rooms reduces the concentrations of halothane to levels, now considered as acceptable. The installation of a scavenging system may not interfere with the normal use of an anesthetic machine. Therefore the Leiden scavenging system was introduced. The construction of the system is shown.

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References.

1. US Department of Health, Education and Welfare: Occupational exposure to waste anesthetic gases and vapours. DHEW (NIOSH) Publication No. 77-140.
2. Burm A.G. and Spierdijk Joh. A method for sampling and enflurane present in trace amount in ambient air. Anesthesiology, 50: 230-233 (1979).

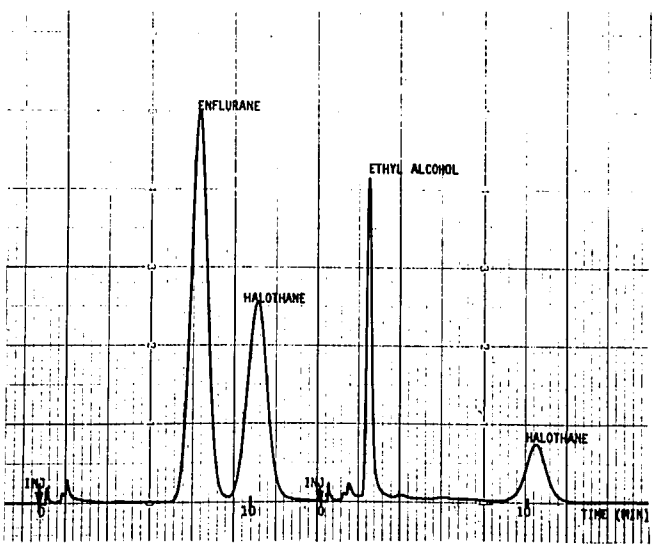

Fig. 1. Chromatograms from a calibration sample (left) and a sample of room air.