use of air as part of the respiratory gas mixture. Increased inspired carbon dioxide may be due to the presence of carbon monoxide or the presence of carbon dioxide due to carbon dioxide absorbent exhaustion or leaking valves in a circle system. If 500 ppm (0.05%) carbon monoxide was present in a patient's breathing circuit and was displayed as an increase of either 0.05% nitrogen or 0.05% inspired carbon dioxide, I speculate that this increase would not be distinguishable from innocuous fluctuations of these gases. Therefore, I suggest that, before direct detection of carbon monoxide by mass spectrometry can be used to warn of a patient's exposure to carbon monoxide during anesthetic breakdown, studies must be conducted to show the validity of this technique with clinically relevant concentrations of carbon monoxide.

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Binding of Halothane to Serum Albumin: Relevance to Theories of Narcosis

To the Editor—The report by Johansson et al. provides further insight into the molecular site at which general anesthetics act.1 The investigators found that halothane quenches the tryptophan fluorescence of bovine serum albumin in a concentration-dependent manner with a dissociation constant of 1.8 mm. They also reported that diethyl ether competes with halothane with a 50% inhibition concentration of 59 mm.

These concentrations surpass those required for anesthesia. At 1.8 mm, halothane equals a partial pressure at 37°C of 0.06 atm (1.8 mm = (1.8 × 10^{-8} mol/ml) (2.5436 × 10^{4} ml/mol)/0.75, where 0.75 is the partition coefficient for halothane in Krebs' solution at 37°C.2 This exceeds the anesthetizing partial pressure of halothane in humans by a factor of 8.3 Similarly, the partial pressure of ether at 59 mm equals 0.76 atm, assuming a partition coefficient of 13.4 This exceeds the anesthetizing partial pressure of ether in humans by a factor of 40.5

Although Johansson et al. performed their studies at 25°C, the above ratios (8 for halothane and 40 for ether) for 37°C will approximate ratios at 25°C because of the counterbalancing changes in solubility and potency of anesthetics with decreasing temperature.6 Furthermore, the dissociation constant of 1.8 mm for halothane quenching found by Johansson et al. is also an order of magnitude greater than the anesthetic potency of halothane measured in animals at lower temperatures: The righting reflex EC50 of halothane in tadpoles is approximately 0.1 mm at 20°C.7 The calculations of partial pressure also assume that the solution used in the experiment was equivalent to an isotonic salt solution. If the albumin added appreciably to the solubility of halothane, this would lower the partial pressure calculated for halothane but not that for ether, whose solubility in blood scarcely differs from that in water.8

Even allowing for these factors, it appears that the partial pressures applied exceed those that produce anesthesia. If so, can the results provide us with insights into mechanisms of anesthetic action? Does the five-fold difference in the ratios for ether and halothane (8 vs. 40) mean that the finding for halothane does not apply equally to all anesthetics, and thus that the tryptophan site is not representative of a relevant anesthetic site of action? Finally, do results obtained at 25°C apply at the higher temperatures sustained by homeotherms?

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