berg *et al.* stated that the concentration of fluroxene at 1 MAC in the perfusate of our study (14.3 mg/100 ml) is equivalent to a vapor concentration of 17.0 vol per cent (assuming a water–gas partition coefficient of 0.84), which, in turn, corresponds to 3.4 MAC. I attempted to recalculate the MAC value of our study and I find that I cannot accept the calculation of Goldberg *et al.*

Our Calculation

The 14.3 mg fluroxene in 100 ml water is in equilibrium of 17.0 mg fluroxene in 100 ml gas, the water–gas partition coefficient being 0.84. The molecular weight of fluroxene is 126. Therefore, 126 grams of gas fluroxene occupy 22.4 l at 0 C and 1 atm pressure. This volume expands to 25.0 at 32 C (the temperature at which our study was performed), because

$$22.4\ (\text{l}) \times \frac{273 + 32}{273} = 25.03\ (\text{l}).$$

That is, 126 g of gas fluroxene occupies 25.03 l at 32 C and 1 atm pressure. Thus, 17.0 mg fluroxene must occupy 3.37 ml, since

$$17.0\ (\text{mg}) \times \frac{25.0\ (\text{l})}{126\ (\text{g})} = 3.37\ \text{ml}.$$

Therefore, the concentration of fluroxene in the gas is 3.37 per cent, which is equal to 1 MAC.

The value of "17.0" vol per cent that Goldberg *et al.* quoted coincided with "17.0" mg in the gas phase, as shown above. Of course, 17.0 mg of fluroxene is not equivalent to a vapor concentration of 17.0 vol per cent.

The discrepancy between our data and those of Goldberg *et al.* and others remains. It needs to be investigated further.

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Humidity and Ciliary Activity

To the Editor:—The interesting article by Lichtiger, Landa, and Hirsch (ANESTHESIOLOGY 42:753–756, 1975, "Velocity of Tracheal Mucus in Anesthetized Women Undergoing Gynecologic Surgery") would have been even more valuable if, instead of calculating relative humidity (R.H.), the authors had measured and controlled it, in view of the important role humidity may play in determining ciliary activity. They calculated R.H. on the basis of data reported in two other articles,[1,2] reporting it to be 60 to 89 per cent at 28 to 31 C at the entrance to the endotracheal tube with 5 l/min fresh gas flow. In one of the two articles cited, Déry *et al.*[1] reported an average R.H. of 82.7 per cent at the outer end of the endotracheal tube but at an average temperature of 26.7 C. They used a semiclosed circle and a fresh gas flow of 4 l/min. In the other article, Shanks and Sara,[2] utilizing a partial rebreathing system and a fresh gas flow of 6 l/min, reported a R.H. of 73 per cent at the Y junction of the circle, with a temperature of 24.5 C. In neither of the two articles was the temperature of inspired gases reported to be as high as 28 to 31 C at the entrance of the endotracheal tube or the inspiratory limb of the anesthesia circle. On the other hand, the average temperature was as high as 30.6 C within the trachea[1] and as high as 29.5 C at the bevel of the endotracheal tube within the trachea,[2] and at those two points, R.H. values were 86 and 73 per cent, respectively. I believe that

Lichtiger *et al.* incorrectly interpreted or extrapolated from the data in those two articles.

There is some controversy over the humidity needed in inspired air. In rats, Dalhamn found that ciliary function remained normal following exposure for one hour to 70 per cent R.H. and following more than two hours of exposure to 100 per cent R.H. at ambient temperatures (approximately 15 to 22 mg/l).[3] Forbes found in dogs that at least a 75 per cent R.H. at 37 C (approximately 33 mg/l) was necessary to maintain mucous flow.[4] Since the duration of the Lichtiger study was less than two hours, the effect of humdity on ciliary activity may not have been a factor,[3,4] but it could have been controlled to minimize the variables of the study.

Furthermore, although all patients studied by Lichtiger *et al.* were given atropine, a drug known to alter ciliary function, the possible effect of this on the results was not discussed. Burton and Lond, for example, have reported that atropine given intramuscularly one hour before operation influences ciliary propulsion for at least two hours.[5] Further, Han and Lowe have reported an increase in expired water loss during an experiment using atropine.[6] Again, use of atropine may not have influenced the results or conclusions in the Lichtiger article, but it is another factor affecting ciliary function that could have been controlled, or at least a factor the effect of which should have been considered.

Lichtiger, Landa and Hirsch are to be congratulated on the technique that they have reported for measuring ciliary motility, since the clinical protection of ciliary morphology and function during anesthesia needs more exacting methods to establish requirements of humidification of anesthetic gases as well as the detrimental effects of various drugs used in the course of anesthesia. I hope that they will repeat their work with more controls, since such information is needed.

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Perinatology

PLACENTA-TO-INFANT TRANSFUSION An accurate method for measuring residual placental blood volume (RPBV) has been developed. This method was used in 33 normal vaginal deliveries and 18 cesarean section deliveries in which the umbilical cord was clamped 5 to 118 seconds after delivery. Infants born vaginally received 10 to 20 ml/kg body weight of placental transfusion when the umbilical cord was not clamped until 30 seconds or more after delivery. Equivalent delay of umbilical cord clamping in cesarean section infants produced no placental transfusion. *(Kleinberg F, Dong L, Phibbs RH: Cesarean Section Prevents Placenta-to-infant Transfusion Despite Delayed Cord Clamping. Am J Obstet Gynecol 121: 66–70, 1975.)*