3) The tank was then pressurized with nitrogen to achieve the desired concentration

b. A volumetric flask was then prepared to yield a known concentration of anesthetic

1) Anesthetic concentration (per cent)

$$= \frac{\frac{\text{ml vapor}}{\text{ml liquid anesthetic}} \times \text{ml liquid anesthetic placed in closed flask} \times 100}{\text{volume of flask (ml)}}$$

c. A sample of the gas from the flask was injected into the gas chromatograph and the appropriate peak height ± 1 per cent could be reproduced two or more times. At least five different concentrations were prepared by this manner and a straight line plotted. The concentration of the calibration tank was then determined by injecting a sample of the gas into the chromatograph and compared with the concentrations of the flasks. Injections were always repeated to yield identical peak heights (± 1 per cent)

d. At each attenuation, the chromatograph was calibrated and checked for linearity. When determinations were made at the lowest concentration, the chromatograph was calibrated with a known anesthetic concentration

6. The same operating conditions and procedures were then used for all studies

B. Derivation of the formula to calculate blood halothane concentrations

The blood drawn for analysis was diluted by a small amount of heparin used to prevent coagulation. This dilution amounted to less than 5 per cent, but is accounted for in the calculation of concentration. The original volume of blood was approximately 8 ml. This amount was reduced to an exactly determined 5 ml by ejecting excess blood plus heparin diluent. The volume of halothane remaining, therefore, equalled the original concentration of halothane in blood (C) times the volume of blood remaining after ejection (V_b). The blood plus heparin remaining after ejection of the excess was then diluted with an exactly determined volume of nitrogen and the blood plus heparin plus nitrogen mixture was tonometered for 45 minutes. The initial volume of halothane in the blood plus heparin; that is, C times V_b, equalled the sum of the volume of halothane in the separate components of heparin, blood and nitrogen; that is, C times V_b equalled the concentration of halothane in the blood times the volume of blood plus the concentration of halothane in the heparin times the volume of heparin plus the concentration of halothane in the gas phase times the volume of the gas phase. The concentration of halothane in the gas phase was immediately determined as described. The concentrations in the heparin and blood phases could be obtained from this concentration through the blood/gas and the heparin/gas partition coefficients. This equation would read $C\ V_b = C_g(\lambda_{b/g}V_b + \lambda_{h/g}V_h + V_g)$ where C_g = the concentration of halothane in the gas phase (*i.e.*, the analyzed halothane), $\lambda_{b/g}$ = the blood gas partition coefficient for halothane at 37 C (2.3),[17] $\lambda_{h/g}$ = the heparin/gas partition coefficient, assumed to be the saline/gas coefficient (0.70),[17] V_h = the volume of heparin in the remaining liquid aliquot and V_g = the volume of the gas phase. Since all the variables were known or easily calculated from the initial volume measurements, C, or the original concentration, could be determined.

Anesthesia

PNEUMOENCEPHALOGRAPHY No fatal complications occurred during the making of 202 pneumoencephalograms (PEG) of children under general anesthesia. Mild reactions, such as pleocytosis of the cerebrospinal fluid (58 per cent), febrile reactions (60 per cent), and vomiting (55 per cent) were frequently observed. There were three severe complications. Two patients had respiratory arrest during PEG studies, probably from the combined effects of anesthesia and the pre-existing brain tumors. In another case, the child's condition deteriorated when the endotracheal tube became dislodged accidentally. None of the examinations had to be discontinued because of complications, and all untoward effects were transient. *(Ilvanainen, M., Collan, R., and Donner, M.: Adverse Effects of Pneumoencephalography Performed under General Anesthesia in Children, Ann. Clin. Res. 2: 71 (March) 1970.)*