INTRODUCTION: Sevoflurane(S) is a new volatile anesthetic soon to be marketed in Japan. The MAC of S in humans has been determined to be 1.71%(1). However, this value is much lower than would be predicted based upon its oil/gas solubility coefficient. We have also determined the MAC of S in rabbits. Because our results differed substantially from the earlier determination, we also determined MAC in the rabbit. A comparison of the MAC ratios of S to other volatile agents in both the human and the rabbit suggest that the MAC of S in humans may be higher than 1.71.%

METHODS: Human MAC was determined in 20 adult ASA I or II patients undergoing a variety of surgical procedures using the up and down method(2). Anesthesia was induced by mask with S in oxygen. Endotracheal intubation was done without the aid of muscle relaxants and gas for the determination of end tidal ET S concentration was obtained from the distal end of the endotracheal tube and analyzed with a calibrated infrared analyzer. The target ET S concentration was selected based upon the response of the previous patient. Once the target ET level was achieved, at least 15 min passed before skin incision. Dress, purposeful movement in response to incision was taken as a positive response.MAC was determined using the quantal analysis of Waud(3).

Rabbit MAC was determined in 5 New Zealand white rabbits. Following induction with S, the tracheas were intubated and the animals ventilated to maintain PaCO2 normal. Following a 15 min equilibration period at a given ET level, a tail clamp was applied and the presence or absence of movement noted. ET S was then altered by 10% and the sequence repeated. The point halfway between the concentrations at which the animal moved and did not move was taken as MAC for that animal. The MACs were averaged for the group as a whole.

RESULTS: 16 of the patients were between the ages of 30 and 55(Table 1). MAC for this group was 2.05±0.08%(Mean±S.E.). The ratios of MAC to halothane(H), isoFlurane(I) and enFlurane(E) MAC in humans were 2.78, 1.84 and 1.20 respectively and in the rabbit 2.66, 1.01 and 1.29 respectively(Table 2).

DISCUSSION: All technical errors were made in our human MAC study or that of Katoh et al(1), it is unclear why there should be a discrepancy in our MAC results. It is possible that MAC is different in the populations we studied(Japan vs. United States). However, Drummond has pointed out that at least empirically, the MAC ratio for any given pair of volatile anesthetics is nearly identical from species to species(4). Comparisons of the MAC ratios for the various pairs of agents in the human and the rabbit indicate much better agreement between our human and rabbit data than between the human data of Katoh et al and our rabbit data(Table 2). However, both human values are considerably lower than would be predicted(about 3%) based upon the oil/gas solubility ratio of S.