

Minimum Alveolar Concentration of I-653 and Isoflurane in Pigs: Definition of a Supramaximal Stimulus

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We determined the anesthetic potencies of a new fluorinated anesthetic, I-653, and isoflurane in pigs as a preliminary to a study of the relative cardiovascular and electroencephalographic effects of these agents. Clamps were sequentially applied to the dew claw and/or tail of each animal to determine the minimum alveolar concentration (MAC) that suppressed movement in response to each of these stimuli. MAC obtained

by clamping the tail ($8.28 \pm 1.34\%$ [mean \pm standard deviation] for I-653 and $1.65 \pm 0.36\%$ for isoflurane) was more variable and lower than MAC obtained by clamping the dew claw ($10.00 \pm 0.94\%$ for I-653 and $2.04 \pm 0.19\%$ for isoflurane). We conclude that the type of stimulus applied affects the MAC value obtained for I-653 and isoflurane. Clamping the tail is not a supramaximal stimulus in pigs; a greater stimulus is provided by clamping the dew claw.

Key Words: ANESTHETICS, VOLATILE—I-653, isoflurane. POTENCY, ANESTHETIC—I-653, isoflurane.

The compound I-653 is a new fluorinated inhaled anesthetic whose low solubility (blood/gas partition coefficient of 0.42 in humans) (1) produces a more rapid recovery than that obtained with other potent inhaled anesthetics (2). I-653 is more stable in soda lime (3) and is less metabolized (4) than other anesthetics, including isoflurane. It is nontoxic when administered repeatedly (5), and no more toxic than isoflurane in hypoxic rats whose hepatic microsomal enzymes have been induced by administration of phenobarbital (6).

The favorable characteristics of I-653 led us to consider undertaking a study of the cardiovascular and electroencephalographic effects of I-653 in pigs, and a comparison of these effects with those produced by isoflurane. As a preliminary, we first had to determine the MAC of I-653 and isoflurane in the pigs to be studied. We now present the data from these MAC studies for the following reasons: MAC values

of I-653 have not been previously reported for swine; our results for isoflurane differ from those presented by other investigators (7); and our data confirm (7) that different stimuli can result in different MAC values in pigs.

Materials and Methods

Our study of 13 juvenile domestic pigs weighing 14 to 22 kg and aged 3 to 4 months was approved by the UCSF Committee on Animal Research. Anesthesia was induced using I-653 in oxygen given via a mask. Once induction was complete (as defined by absence of movement and lash reflex), succinylcholine, 2 mg/kg, was given i.v. and a cuffed endotracheal tube placed. Ventilation was controlled to maintain end-tidal carbon dioxide levels between 5 and 5.2%. Pulmonary artery blood temperature was maintained between 38.0°C and 39.5°C. (Average $38.7 \pm 0.3^\circ\text{C}$). On a separate day, nine of these pigs were anesthetized using isoflurane in oxygen given via a mask, and the same protocol maintained.

A MAC of I-653 and isoflurane was determined as previously described (8), using infrared analysis for

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