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# *Epinephrine-induced Premature Ventricular Contractions and Changes in Arterial Blood Pressure and Heart Rate during I-653, Isoflurane, and Halothane Anesthesia in Swine*

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**I653 is a new inhalation anesthetic having especially desirable recovery characteristics because of its very low blood and tissue solubility. Investigations of its cardiovascular and electroencephalographic effects have revealed actions similar to those of isoflurane. However, these studies did not evaluate the potential of I653 to predispose the heart to epinephrine-induced arrhythmias. In this investigation, we studied eight domestic swine to compare the effects of I653 with those of other anesthetics on the cardiac arrhythmogenic actions of intravenously infused epinephrine. I653, isoflurane, and halothane each were given, on separate days, at 0.7–0.8 and at 1.1–1.2 MAC. The rate of infusion of epinephrine needed to produce premature ventricular contractions (PVCs) when the animals were anesthetized with I653 (6.9 ± 0.7 and 6.6 ± 0.9 $\mu g \cdot kg^{-1} \cdot min^{-1}$ at 0.8 and 1.2 MAC) did not differ from that during isoflurane anesthesia (5.7 ± 1.1 and 6.0 ± 1.0 $\mu g \cdot kg^{-1} \cdot min^{-1}$ at 0.7 and 1.1 MAC), but was greater than that required during halothane anesthesia (1.3 ± 0.2 and 1.1 ± 0.3 $\mu g \cdot kg^{-1} \cdot min^{-1}$ at 0.7 and 1.1 MAC). Similar mean arterial blood pressures and heart rates resulted from like infusions of epinephrine during I653 and isoflurane anesthesia. PVCs occurred at lesser infusion rates of epinephrine and at lower mean arterial blood pressures and heart rates with halothane than with I653 or isoflurane. Anesthetic concentration, over the range studied, did not alter the infusion rate of epinephrine required to produce arrhythmias with any anesthetic. The authors conclude that I-653 and isoflurane have similar properties with respect to epinephrine-induced arrhythmias and increases in heart rate and arterial blood pressure. (Key words: Anesthetics, volatile: halothane; I653; isoflurane. Heart: arrhythmias. Hemodynamics: blood pressure; heart rate. Sympathetic nervous system, catecholamines: epinephrine.)**

I653 (DIFLUOROMETHYL 1-FLUORO 2,2,2-TRIFLUOROETHYL ETHER) is a new inhaled anesthetic with several advantageous properties, including low solubility in blood[1] and tissues (Yasuda N, personal communication), rapid recovery,[2] stability in soda lime,[3] absence of toxicity,[4] and flammability,§§ little or no metabolism,[5] and electroencephalographic depression without seizure activity during normocapnia or hypocapnia.[6] The cardiovascular actions of I653 are comparable to those of isoflurane at clinically useful concentrations.[7] Some anesthetics decrease the threshold for ventricular arrhythmias induced by exogenously administered epinephrine. Halothane and enflurane alter the cardiac rhythmic response to epinephrine, while isoflurane does not.[8–10] The investigation of the cardiovascular effects of I653 did not evaluate its potential to predispose the heart to arrhythmias following administration of epinephrine. We report here the comparative effects of I653, isoflurane, and halothane on cardiac rhythm, arterial blood pressure, and heart rate during administration of epinephrine to chronically instrumented domestic swine.

## Materials and Methods

Chronically indwelling aortic arterial cannulae were inserted as previously described[7] in eight young (weight 16.6 ± 0.7 kg, mean ± SE) female domestic swine. Each animal was anesthetized with I653, isoflurane, and halothane on separate days, except that one animal was given only halothane, and one only I653 and isoflurane. Studies in each animal were separated by 3–8 days. Anesthesia was induced with inhaled anesthetic in oxygen *via* a mask. After induction of anesthesia, succinylcholine, 2 mg/kg, was administered intravenously to facilitate tracheal intubation. No drugs other than epinephrine were given. Body temperature was maintained within 0.5° C of the awake value by circulating-heated water pads. Animals' lungs were ventilated with tidal volumes of approximately 20 ml/kg, with frequency adjusted to maintain normocapnia ($P_{CO_2}$ 42.7 ± 0.9 mmHg). Aortic blood pressure (transduced by a Statham® 23Db transducer), lead $V_5$ of the electrocardiogram, and partial pressure of carbon dioxide at the endotracheal tube orifice (measured by an infra-red analyzer, Beckman® LB-2, Beckman Instru-

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§§ Hazards Research Corporation, Rockaway, NJ, unpublished report #6395 to Anaquest.