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Title : REGIONAL VASCULAR EFFECTS OF HALOTHANE IN AGING

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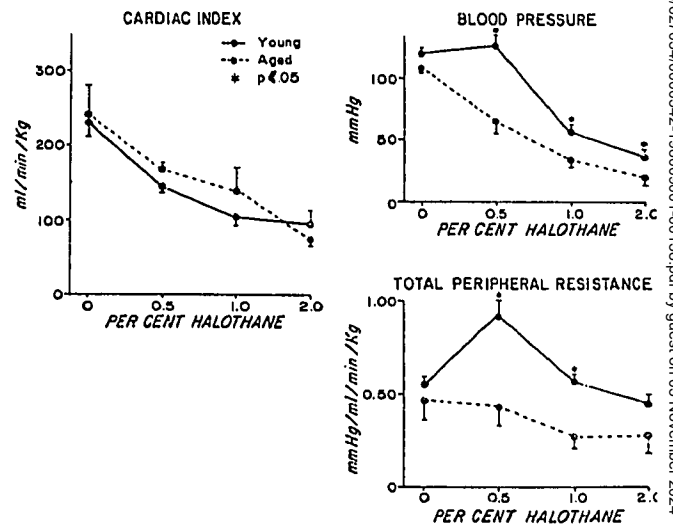
**Introduction.** Maintenance of homeostasis of the cardiovascular system during anesthesia is a major concern in geriatric surgery. This is becoming a more common problem for the anesthesiologist with the increased longevity of the population and increased operations involving aged patients. Experiments reported here provide the first report of regional vascular effects of halothane anesthesia in the aged rat.

**Methods.** Male F344 rats, 4 and 29 months old were used in these experiments. Rats were tested under 2 separate conditions, in an unanesthetized control state and during mechanical ventilation using halothane as the anesthetic. Unanesthetized young and aged rats were implanted with chronic femoral artery and vein catheters and a chronic left ventricular catheter. Halothane anesthetized rats were mechanically ventilated throughout the experiment by a tracheostomy tube. Arterial pCO<sub>2</sub> of ventilated rats was adjusted to 38 torr. Rats were tested for cardiovascular and regional hemodynamic changes with radioactive microspheres in an unanesthetized condition or during anesthesia with 0.5, 1 and 2% halothane in 100% oxygen. Statistical tests included unpaired t-tests and a repeated measures analysis of variance.

**Results.** Results indicate that in an unanesthetized state aged rats have similar blood pressures, cardiac index and total peripheral resistance compared to young rats. Renal and heart blood flow were reduced in aged rats under control conditions. Halothane decreased blood pressure and total peripheral resistance less in young than in aged rats (see fig). Halothane increased cerebral blood flow in young rats and decreased flow in aged rats. Flow to other vital organs, kidney and heart, were higher in young rats during halothane than in aged rats. Vascular resistance of non-vital organs (skin, muscle, intestine) were

higher in younger rats than in aged during halothane anesthesia. Young rats survived all halothane anesthetic exposures while 44% of aged rats died before testing with 2% halothane.

**Discussion.** These results indicate that aged rats have similar blood pressure and cardiac index compared to young rats under control conditions. Blood pressure had reached shock levels in aged rats by 1-2% halothane concentrations, due mainly to decreases in peripheral resistance. Young rats maintained higher blood pressures during halothane. Decreased blood flow in brain and heart tissues during halothane may explain the high mortality rates observed in aged rats. It is apparent that the ability of young rats to maintain increased peripheral resistance, blood pressure and perfusion to vital organs during halothane is the key to their ability to survive halothane anesthesia.



**Figure Legend.** Cardiovascular changes in halothane in young and aged rats. Unanesthetized rats (0% halothane) were tested under separate conditions (12 young, 8 aged.) Ventilated rats. (10 young, 9 aged) were tested to all 3 doses of halothane (0.5, 1, and 2%). Asterisks indicated difference between young and aged rats at each data point.