Halothane is a well known cerebral vasodilator that can produce dangerous raised intracranial pressure (ICP) in certain neurosurgical patients. It has been suggested that isoflurane may be a less potent cerebral vasodilator.

Desflurane (Des)–is a modern inhalation anaesthetic available in Russia since August, 2013. Des is a halogenated ether; its chemical structure is 2-difluoromethoxy-1-1-1-2-tetrafluoroethane (C3H2F6O). Special thermocompensated evaporators are used for Des dosing. Low solubility in blood and tissues of an organism causes fast absorption and elimination of Des. Blood/gas distribution ratio of Des is 0.42. Des distinctive properties are high saturated vapor pressure, super short duration of action and average power. Furthermore it is characterized by the minimal metabolism and lack of interaction with soda lime. Des is used for general anesthesia in a cardiac surgery neurosurgery, out-patient surgery, pediatric practice and other areas of surgery. Des has more positive qualities and fewer limitations, than other inhalation anaesthetics (halothane, isoflurane, sevoflurane). High cost of the anaesthetic is compensated by quality and controllability of anaesthesia and reduction of stay time in recovery unit. Fast elimination of the anaesthetic from a body allows reducing a frequency of complications connected with violation of upper airway and hypoxemia, promotes early discontinuation of artificial ventilation, reducing somnolence, earlier restoring a muscular tone in the postoperative period [1)]

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Todd et al therefore undertook a direct comparison of the effects of halothane and isoflurane on cerebral blood flow (CBF), cerebral vascular resistance (CVR), intracranial pressure, and cerebral metabolic rate for oxygen (CMRO2). Studies were carried out in normocarbic mechanically ventilated cats, using the intracarotid 133Xe injection technique to measure CBF. The effects of three doses were examined: 0.5, 1.0, and 1.5 MAC, studied in the continued presence of 75% N2O. Autoregulation also was tested at 1.0 MAC (plus 75% N2O) by recording CBF and CVR before and after elevation of blood pressure with angiotensin. Both agents had similar effects on blood pressure and ICP. However, while halothane produced significant increases in CBF at all doses, with values of 61 +/- 5 ml X 100 g-1 X min-1 (123 +/- 8% of control, mean +/- SE) at 1.0 MAC, isoflurane anesthesia caused no significant changes in CBF at any level, (e.g., 48 +/- 8 ml X 100 g-1 X min-1 or 94 +/- 12% of control at 1.0 MAC). Both drugs produced dose-related decreases in CVR, but the changes were greater with halothane, e.g., CVR at 1.0 MAC halothane = 1.46 +/- 0.20 mmHg X ml-1 X 100 g X min (47 +/- 7% of control) compared with 2.23 +/- 0.40 mmHg X ml-1 X 100 g X min (72 +/- 9% of control) [2)].

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A study was carried out to compare the cerebral and systemic circulatory effect of halothane and isoflurane. Six mongrel dogs were anesthetized with 1.3 minimal alveolar concentration (MAC) (1%) halothane and were compared with six mongrel dogs anesthetized with 1.3 MAC (1.5%) isoflurane. Likewise, 6 dogs anesthetized with 1.7 MAC (1.3%) halothane were compared with 6 dogs anesthetized with 1.7 MAC (2%) isoflurane. Blood flow (using the radioactive microsphere technique) and cardiovascular measurements were obtained 2 hours after the induction of anesthesia and were repeated 5 more times at hourly intervals. The heart rate was similar in all groups of dogs, except that it was significantly lower with 1.7 MAC halothane. The mean arterial pressure was statistically higher with isoflurane at both concentrations than with halothane. The cardiac index was similar in all groups, except with 1.7 MAC isoflurane, when it was higher. At the early measurements, total cerebral blood flow (CBF) was above “normal” levels in all groups. At 1.3 MAC, the total CBF tended to be lower with isoflurane, but did not reach statistically significant levels. Blood flow decreased over time in all groups. The cerebral vascular resistance (CVR) mirrored the changes in blood flow, showing no difference between agents at 1.7 MAC, but the CVR with isoflurane was significantly higher at 1.3 MAC

than it was with halothane. Regional cerebral blood flow showed marked differences. Regional flow to the hemispheres and the cortical gray matter showed that isoflurane tended to produce lower blood flow, particularly at the 1.3 MAC concentration. The reverse was true in the posterior fossa structures, with the brain stem and cerebellum showing higher blood flows with isoflurane, particularly at 1.7 MAC. Isoflurane may have several advantages over halothane for neurosurgical procedures [3].

1)
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