

# A REVIEW OF VOLATILE INDUCTION AND MAINTENANCE ANESTHESIA

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## ABSTRACT

VIMA as a technique is safe, precise, that uses mainly a volatile agent, without negative effects on long-term use, in the respiratory system, cardiovascular, cerebral but also on the immunologic system, for all sectors of age, both children and adults, along with TIVA. VIMA technique is based on the induction and maintenance of anesthesia, of the anesthetic gas ( Sevoflurane, Isoflurane, Desflurane).

**Keywords:** volatile induction and maintenance of anesthesia (VIMA), anesthetic gas, total intravenous anesthesia (TIVA)

## INTRODUCTION

**VIMA** – Volatile Induction and Maintenance Anesthesia, it is that way of anesthesia that is using the volatile agent for induction but also for maintenance of anesthesia.

In anesthesia there are three main types:

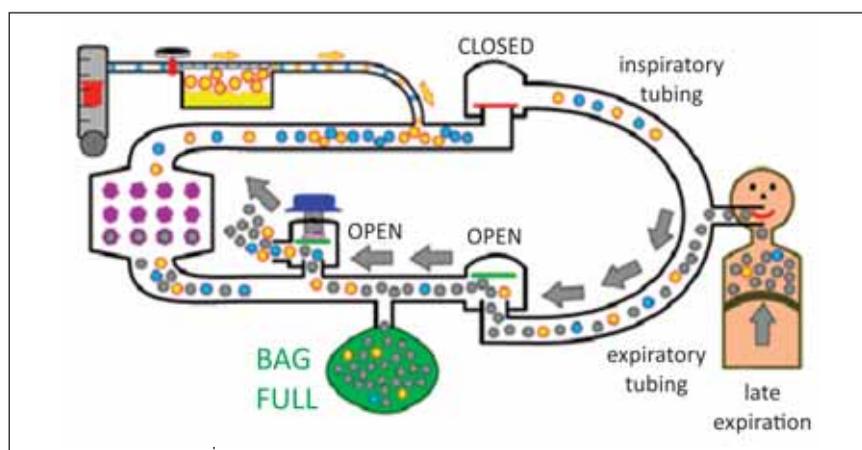
1. Volatile Induction and Maintenance Anesthesia (VIMA).
2. Total intravenous anesthesia (TIVA).
3. The general type of anesthesia which combine de first two, using the volatile agent, the opioid (Fentanyl, Remifentanyl, Sufentanyl, etc.) and a curare (Atracrium, Rocuronium, Cistracurium).

All methods for anesthesia must give an adequate hypnosis, perfect analgesia, motor block and a good sympathetic responses in spinal cord and for peripheral nerves too.

Volatile agent most often used today is SEVOFLURANE. In the past in they were eligible for use DESFLURANE, ISOFLURANE, HALOTANE.

Xenon has useful properties but is expensive to extract from the atmosphere, which currently limits its clinical use.

Sevoflurane is halogenated with fluorine, combines a solubility in blood slightly greater than Desflurane (1).



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He has a pleasant odor, which makes him a good volatile anesthetic for children. His MAC is (1.8) – and is minimum alveolar concentration that prevents response at the surgical stimuli, in skin incision at 50% of patients (Fig. 1).

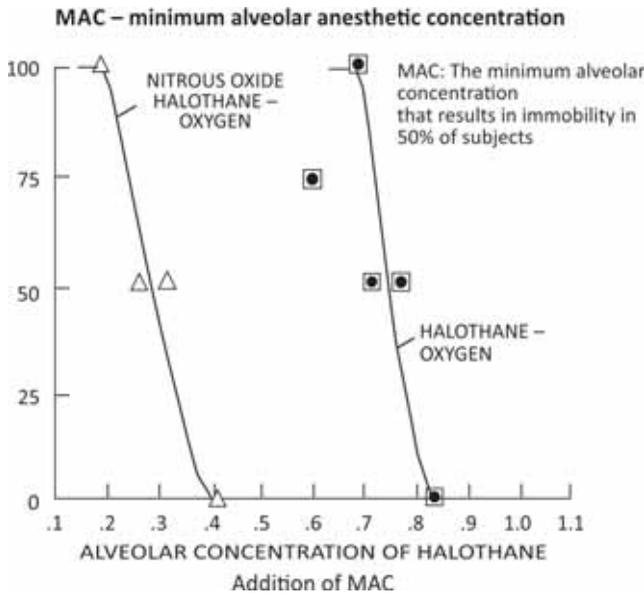
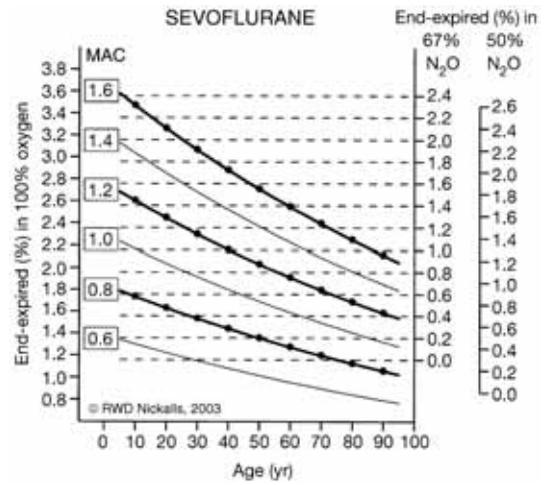


FIGURE 1. MAC – minimum alveolar anesthetic concentration, www.abbot.com

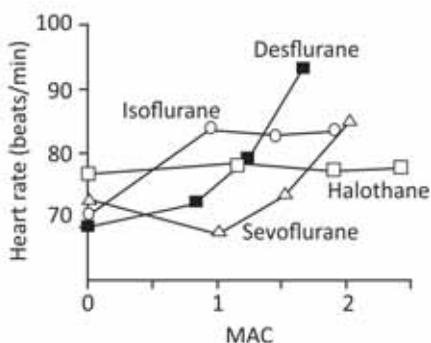
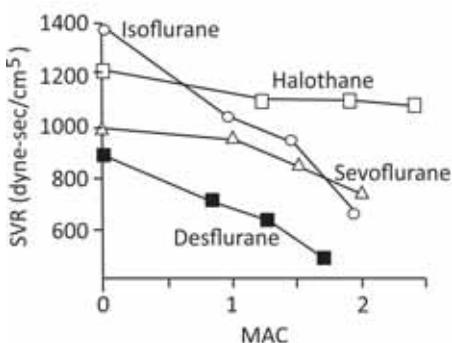
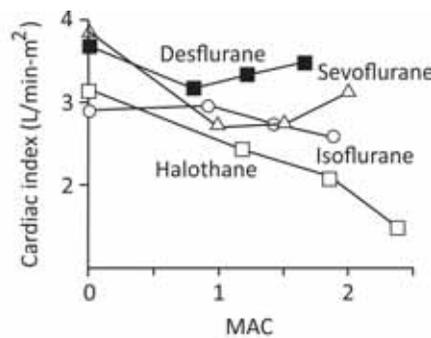
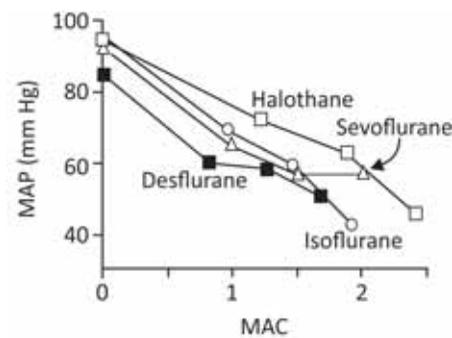
The effects of Sevoflurane are on many systems, like Respiratory, Cardiovascular, Central Nervous System and Metabolism also as it follows:

- Respiratory – increase the respiratory rate, and PaCO<sub>2</sub> and depress the ventilation. (2)



- Cardiovascular – decrease the contractility of heart, the heart rate is unchanged, decrease the vascular resistance, blood pressure. It is the first choice in cardiac surgery as a volatile anesthetic because it has no coronary steal syndrome. (3)
- Central Nervous System – increase the cerebral blood flow and children may occur agitation and delirium post-operative (4).
- Metabolism – is eliminated by lungs, and 5% is metabolised by cytochrome P450 (5).

The anesthesia is induced, by volatile anesthetics, slower than the intravenous anesthetics, that may irritate the airway. The unique characteristics of sevoflurane, including its high solubility in blood



and non-pungency, make VIMA, with this agent, specially a popular procedure. An alternative to conventional anesthetic regimes is TIVA, that consists mainly in combinations of a hypnotic and an analgesic agent, usually Propofol plus an opioid, and is thought to decrease metabolic response to surgical stress by blunting the increase in plasma catecholamines.

## METHODS OF VIMA

There are several ways to achieve this kind of anesthesia. Volatile anesthetics induce anesthesia more slowly than intravenous anesthetics and may irritate the airway. The anesthetic circuit it can be primed with 6-8% Sevoflurane in 4-6 l/min N<sub>2</sub>O and 8-10 l/min O<sub>2</sub> for 5 min. After the priming time the induction time is the next step, ventilated the patient with 8% Sevoflurane and fresh gas 6 l/min and FiO<sub>2</sub> 100% until the patient loss the eyelash reflex, after that the SEVO can be reduced at 4-5% and ventilation will be controlled for 5 min. Before LMA or IOT a minimum bolus of an curare agent can be administrated and 1 mcg/kg of Fentanyl before incision. The end-tidal of Sevoflurane after induction and the patient is intubated and ventilated controled it is preferable to keep between (3-5%).

The extubation is realized when the sponaneous respiratory rate exceed 12 breaths/min and end tidal of CO<sub>2</sub> is less than 45 mmHG.

Lately the immune sector is studied after anesthesia, and it is prove that different anesthetic techniques, may offer different immune response for the same type of surgery. In *vitro* T-Lymphocyte

were studied after the inhalation of volatile agent, and the conclusion was that there is an inhibition of T-lymphocytes. In *vivo* studies the T-lymphocytes function it is characterized by the proliferative response and increase the number of circulating T-Lymphocytes. (6)

As a comparison between anesthesia technique VIMA or TIVA, on immunological and neurohormonal response to anesthesia and the surgical intervention stress hormone, adrenaline, noradrenaline, cortisol and glucose were much lower with TIVA. (7)

During a study, the techniques of volatile induction and maintenance (VIMA) and total intravenous anaesthesia (TIVA), were compared in many aspects. Patients undergoing spontaneous respiration-general anaesthesia were randomised into two main groups (group P and group S). Group P received iv fentanyl 1 µg/kg and propofol 2 mg/kg for induction, followed by propofol 10 mg/min, as required. Group S received vital capacity induction with sevoflurane and were maintained on 66% N<sub>2</sub>O in O<sub>2</sub> with sevoflurane 2%. Induction times, complications and recovery times were recorded. Visual analogue scores for pain and satisfaction were assessed. The two groups did not differ significantly in emergence times or VAS levels for pain and satisfaction but more complications like apnea and injection pain were encountered during TIVA, compared to VIMA. Our results suggest that both techniques are comparable in efficacy for providing anaesthesia in minor gynaecological surgery with swift induction, good recovery and minimal postoperative complications.

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