TITLE: **EFFECT OF FRESH GAS FLOW ON INSPIRED AND EXPIRED CONCENTRATIONS OF ANESTHETICS IN MAN.**

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INTRODUCTION : In rebreathing systems inspired (F_i) and expired (F_E) anesthetic concentrations vary with many factors : concentration delivered by the vaporizer (F_V), fresh gas flow ($\dot{V}_{FG}$), circle system volume, minute ventilation ($\dot{V}_E$), anesthetic uptake. Each factor has been studied with models. The aim of this study was to provide such data from anesthetized man for clinical use.

METHODS : 90 ASA I-II adult patients gave informed consent and were randomly distributed into 18 groups of 5 patients, according to the volatile agent (halothane, enflurane or isoflurane), and to $\dot{V}_{FG}$: in subgroups a: $\dot{V}_{FG} = \dot{V}O_2 \times 2$; b: $\dot{V}O_2 \times 4$; c : $\dot{V}_E/4$; d : $\dot{V}_E/2$; e : $\dot{V}_E$; f : $\dot{V}_E \times 2$. Measurements were recorded from : Icor® Caloximeter for oxygen uptake ($\dot{V}O_2$), Dräger® flowmeters for $\dot{V}_E$ and for $\dot{V}_{FG}$, Datex® Capnomac for CO_2 and vapor concentrations. Flunitrazepam, fentanyl and pancuronium were used for induction of anesthesia and given on demand for maintenance. Ventilation was controlled with a Dräger® SA_1 circle system without nitrous oxide. $\dot{V}_E$ was adjusted to have a $P_{ET}CO_2$ in a 32-34 mmHg range. $\dot{V}O_2$ was measured 10 min after induction. F_i and F_E were recorded every 5 min up to 30 min. Vaporizers (Dräger® Vapor 19) were calibrated before each procedure, with a direct measure of F_V. For each patient, F_V was holded at a preset level expected to induce a .5 MAC F_E within 30 min. Results are expressed as mean ± sem.

RESULTS: F_E/F_i ratios at 30 min are shown in tab.1: they do not depend on $\dot{V}_{FG}$. Time-course of F_i/F_V and F_E/F_V for isoflurane is shown in fig.1: the change in F_i is slight after 15 min whatever the $\dot{V}_{FG}$. It is the same for halothane and enflurane. F_i/F_V ratio is linearly related to $\dot{V}_{FG}/\dot{V}_E$ on a semilogarithmic scale (fig.2): r=.95, n=90.

To obtain a given F_E, a preset F_V can be easily computed from $\dot{V}_{FG}$ and $\dot{V}_E$.

Tab. 1: F_E/F_i ratio at 30 min

$\dot{V}_{FG}$	a $\dot{V}O_2 \times 2$	b $\dot{V}O_2 \times 4$	c $\dot{V}_E/4$	d $\dot{V}_E/2$	e $\dot{V}_E$	f $\dot{V}_E \times 2$
Hal.	.68±.01	.70±.04	.64±.02	.70±04	.66±.02	.61±.03
Enf.	.64±.04	.64±.03	.65±.01	.65±.02	.59±.05	.61±.03
Iso.	.66±.03	.69±.03	.68±.03	.69±.01	.70±.01	.66±.01

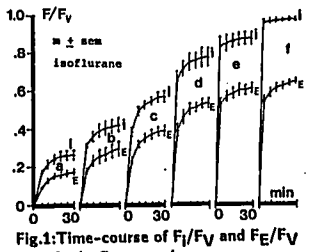

Fig.1:Time-course of F_i/F_V and F_E/F_V for isoflurane subgroups

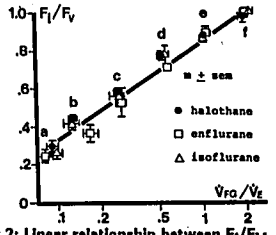

Fig.2: Linear relationship between F_i/F_V and $\dot{V}_{FG}/\dot{V}_E$ ratios at 30 min on a semilogarithmic scale

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TITLE : **Pulsatile flow during cardiopulmonary bypass for coronary surgery fail to influence plasma atrial natriuretic factor concentration.**

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In 1978 Taylors studies demonstrate lower vascular resistance during and after cardiopulmonary bypass (CPB) when the CPB flow was pulsatile owing to a less stimulated Renine Angiotensine System (1). In a posterior study Frater et Coll (2) did not observe any influence of the CPB pulsatile flow (PF) on hormonal secretion or haemodynamics parameters Plasma concentration of ANF (pANF) is known to be elevated during non pulsatile (NPF) CPB (3). The aim of our study is to specify if pulsatile flow do influence the ANF secretion.

We studied 12 patients (with informed oral consent and approval by our local hospital ethical committee) NYHA I or II and free of renal disease. admitted for coronary surgery. Anaesthesia was performed by high doses of fentanyl. flunitrazepam and pancuronium For 6 patients. CPB flow was pulsatile (centrifugal Delphin pump system. 3M). with a difference between systolic and diastolic arterial pressure (Δ AP) at 12 ± 5 mmHg. and non pulsatile for the others. Blood samples were drawn at: T0. after induction of anaesthesia and before surgery: T1. at the pericardotomy: T2. during steady CPB: T3. just after cardiac recovery before stoping CPB. T4. 20 mn after the end of CPB At these times were measured ANF. vasopressin (AVP) plasma renin activity (PRA). epinephrine (E) and norepinephrine (NE) Haemodynamics parameters were measured with a Swan Ganz catheter.

Results (mean (m) and standard error (se)) are shown in the table I. In both groups AVP reached a very high levels at T2. plasma concentration of ANF and of the others hormones increased at T3. In contrast vasculars resistances were stable during all the procedure Cardiac filling pressure before and after CPB were not statistically different. We did not observe any correlation between none of these parameters and the pulsatility

The concomitant elevation of vasoconstrictor and vasodilatator hormones and the high doses of fentanyl and flunitrazepam may account for this vascular resistance stability. An insuffisant Δ AP. or a no suitable systole diastole duration ratio have to be considered in order to explain the fail of pulsatile CPB influence on hormonal and haemodynamic parameters

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1 - J Thorac Cardiovasc Surg 1978 (75). 575-579
2 - Circulation 1980 (62). 1-19. 1-25
3 - J.Thorac Cardiovasc Surg 1988 (96). 267-270

m(se)	ANF	AVP	PRA	E	NE	SVR
T2	pg / ml	pg / ml	ng/ml/h	pg / ml.	pg / ml	dyn/cm5/sec/m2
PF	59(5)	35(15)	1.7(.8)	654 (404)	880 (290)	2259(376)
NPF	74(20)	25(9.3)	1.5(.5)	177 (92)	329 (50)	2236(116)
T3						
PF	202(61)	14.6(2.5)	1.8(.4)	469 (232)	1250 (357)	
NPF	192(48)	18(4.7)	2.3(.6)	138 (38)	621 (134)	
T4						
PF	253(106)	13(5.2)	2.2(.5)	168 (85)	741 (425)	2103(228)
NPF	188(43)	11(2.5)	1.2(.4)	63 (23)	432 (141)	2060(140)