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Introduction

Sevoflurane is an inhalation halogenated anaesthetic widely used in operating theatres. Sevoflurane allows rapid induction of anaesthesia, and is an ideal choice for mask induction in children [1].

Solid-phase microextraction (SPME) technique has demonstrated to be a reliable mean of sampling VOC's in air

Operating room personnel can be therefore exposed to low levels of this volatile anaesthetic. This exposure can be increased during gaseous induction [2].

Currently, SPME is also being applied, as passive sampler, to determine the time-weighted average (TWA) exposure of VOC's at work atmospheres

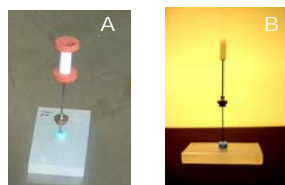
Objectives

To develop a method, based on the SPME technique, that allows both personal and environmental monitoring of low levels of sevoflurane concentrations as well as short peak exposures monitoring

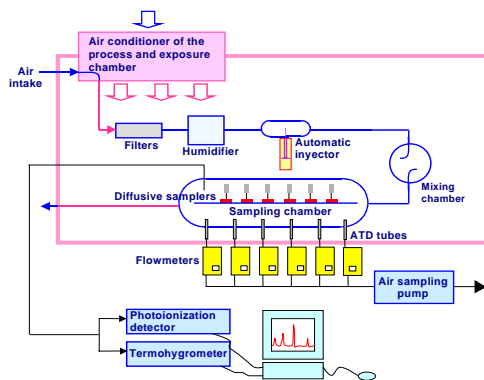
Experimental

Diffusive sampling device

- SPME fiber assembly, short, 23 GA, metal
- 80 μm Carboxen/PDMS
- Diffusion cell: hydrophobic PE cylinder, 7-12 μm porosity, 1.7 wall thickness, 17.4 mm length and capped with holed septa (A)
- The diffusion cell is replaced by a teflon cap after sampling (B)

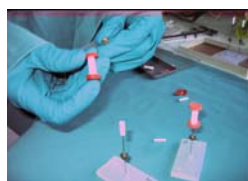


Evaluation of SPME-passive sampler performance



Determination of diffusive uptake rate

- Sevoflurane concentration: 0.86 – 5.05 mg/m^3
 - Exposure time: 10 min
 - T : 20 $^{\circ}\text{C} \pm 2$ $^{\circ}\text{C}$
 - HR : 50 \pm 5%
- The atmosphere concentration was checked by dynamic sampling with ATD tubes (Tenax)



Chromatographic analysis

- HP 6890 GC, HP 5973 MS
- Splitless mode
- SPME desorption at 280 $^{\circ}\text{C}$, 2 min.
- HP-1, 60 m x 0.32 mm, 1 μm
- Oven 35 $^{\circ}\text{C}$ hold for 5 min, 25 $^{\circ}\text{C}/\text{min}$ to 150 $^{\circ}\text{C}$, hold 10 min.
- Carrier gas Helium at 1.2 ml/min
- SIM mode m/z 131 ion

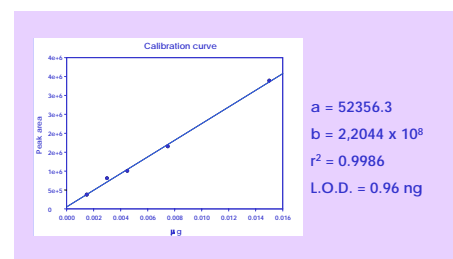
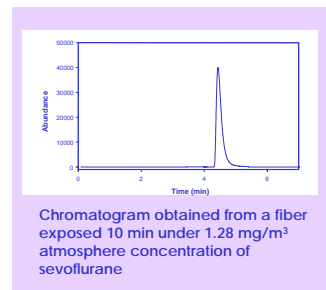


Results and Discussion

Concentration (mg/m^3)	U (ml/min)
0.86	1.45 1.21 1.49 1.8
1.28	1.25 1.11 0.94 1.5
1.71	1.28 1.18 1.26 1.37
5.05	1.17 1.18 1.07 1.33

Mean diffusive uptake rate, U = 1.29 mL / min
Standard deviation = 0.2047

No statistical significant effect of concentration on uptake rate were observed under the studied conditions



The preliminary results shows that SPME diffusive sampler prototype can be used to measure low sevoflurane concentrations during short exposure periods

Future work is needed to check the fiber capacity under higher sevoflurane concentrations and longer exposure times.

References

- [1] A. Accorsi, B. Morrone, I. Domenichini, S. Valenti, G. Raffi, F. Violante. Int. Arch. Occup. Environ. Health 78 (2005) 369.
- [2] P. Sanabria Carretero, E. Rodríguez Pérez, E. Jiménez Mateos, M. A. Palomero Rodríguez, L. Goldman Tarlousky, F. Gilsanz Rodríguez, J. García Caballero. Rev. Esp. Anestesiol. Reanim. 53 (2006) 618.

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