A method for the collection of end-tidal gas samples from small animals

A.S. CLANACHAN, J.S. GILLESPIE, R.A. MILLAR & T.C. MUIR

University Department of Anaesthesia, Glasgow Royal Infirmary and Department of Pharmacology, Glasgow University, Scotland

The collection of end-tidal gas samples has been carried out successfully in larger animals including human subjects (Rahn & Otis, 1949), but the procedure is more difficult in small species due to the low tidal volumes and high respiratory rates. While samples might be obtained from rapidly-breathing small animals by fast manual withdrawal (White, Johnston & Eger, 1974), this is subject to operator error.

A semi-automated end-tidal gas sample collector is demonstrated for use with tracheostomized pithed rats (Gillespie & Muir, 1967), mechanically ventilated at 60/minute. It includes a sampling pump (Watson Marlow, M.H.R.E.) which is operated for 200 ms during each respiratory cycle. In this period a sample (about 0.3 ml) is withdrawn automatically from the tracheal cannula into a 10 ml glass syringe. The pump is controlled by a timer (Devices Digitimer 3840) which is triggered from the positive inspiratory pressure by means of a simple diaphragm pressure switch. The withdrawal of end-tidal samples, is achieved by introducing a timed delay between inspiration and the sample period of the pump. Subsequent analysis of the carbon-dioxide concentration verified the end-tidal nature of the sample. The collection of about 30 samples provides an adequate volume for subsequent gas analysis.

The method, which may be applied to other small animals such as guinea-pigs and rabbits, has been used to measure alveolar anaesthetic concentrations.

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The quantitative assay of prostaglandin E_2 and prostaglandin $F_{2\alpha}$ in biological extracts using a Finnigan 3000D quadrupole mass spectrometer

C.N. HENSBY & B. NAYLOR (introduced by E.W. HORTON)

Department of Pharmacology, University of Edinburgh

The use of a multiple ion detection system that enables the quantitative assay of prostaglandins E_2 and $F_{2\alpha}$ either separately or in parallel is described. The method is based on the addition of a known amount of the corresponding d_4 deuterium isotopes to the biological samples immediately before extraction.

The ratio of protium to deuterium peaks (after derivatization) are then obtained by means of an accelerating voltage alternator. A calibration curve is obtained by plotting the ratio of protium to deuterium peak heights over the range 1 to 1,000 ng of protium.

The PGE_2 and $PGF_{2\alpha}$ are prepared as the methyl ester/methoxime/TMS and methyl ester/TMS derivatives respectively as described previously (Thompson, Los & Horton, 1970; Blatchley, Donovan, Horton & Poyser, 1972). These derivatives produce ions at m/e of 295 (M − (199 + 45)) for PGE_2 and 423 (M − (90 + 71)) for $PGF_{2\alpha}$. The corresponding deuterium ions are at m/e values of 299 and 427.

This method has been compared in two instances with results obtained by alternative methods and found to be in good agreement.

In the first example adult virgin female guinea-pigs were killed on day 7 of the cycle and the uteri removed and weighed. The uteri were homogenized and incubated, and the prostaglandins produced were extracted by solvents and purified by silicic acid column chromatography as described previously (Poyser, 1972). After chromatography the samples containing $PGF_{2\alpha}$ were assayed biologically on the rat fundal strip or by GCMS as described above. The amounts of $PGF_{2\alpha}$ produced (ng/100 mg tissue ± s.e. mean) were 45.8 ± 3.4 ($n = 5$) by bioassay, and