TITLE: EVALUATION OF POET II (CRITICARE) MULTIGAS INFRARED ANALYZER

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Infrared analyzers used for monitoring anesthetic agents are limited by their inability to automatically identify anesthetic agents and mixture of anesthetic agents.

Errors in filling anesthetic vaporizers can lead to the delivery of a wrong agent or a mixture of anesthetic agents at inappropriate concentrations.[1,2]

We evaluated POET II (Criticare), an infrared analyzer capable of automatically identifying individual anesthetic agents and anesthetic agent mixtures by using calibration gas standards, and an anesthesia machine. For single agents 1% isoflurane, 1% enflurane or 1% halothane in nitrogen were used.

All the agents were identified automatically within 3.3 $\pm$ 0.3 seconds and the time to reach highest concentration was 7.29 $\pm$ 0.75 seconds. The accuracy for all agents was better than 0.08%.

To identify a mixture of anesthetic agents, a calibration gas consisting of 1% halothane, 1% isoflurane, 1% enflurane, 5% CO_2, 50 N_2O with balance O_2 used. All three agents were identified and displayed simultaneously on the monitor and the highest concentration was reached in an average of 32.7 $\pm$ 2.34 seconds. The accuracy for simultaneous identification of all agents was better than 0.1%.

In comparing the POET II analyzer to a mass spectrometer (Perkin Elmer) in identifying a single or a mixture of agents at various concentrations (0.2% to 5% delivered from an anesthesia machine) with unpaired T-test, no significant difference ($P < 0.05$) was found.

The POET II analyzer is able to identify specific anesthetic agents by utilizing the 7-16 micron infrared wavelength range where there is a differentiation between anesthetic agents. Compensations are made for temperature, pressure and N_2O interference. The response time of the unit is 500 mseconds.

In addition to the anesthetic agent monitoring, the POET II analyzer also measures inspired and expired concentrations of oxygen, nitrous oxide and carbon dioxide, performs pulse oximetry and displays up to 2 waveforms including capnogram.

POET II is an infrared anesthetic gas analyzer with the unique capability of automatically selecting and identifying individual anesthetic agents and anesthetic agent mixtures.

References

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2. Calkins J. Reduced risk with gas analysis. J Clin Mon., April 1986; 2:2, 77-78.

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TITLE: SENSITIVITY OF FEF END TIDAL CO_2 DETECTOR

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The FEF end-tidal CO_2 detector (pH sensitive chemical indicator) depends on the color change to detect the presence of CO_2 in expired gas. Whether the color change in the indicator depends on the number of CO_2 molecules flowing past the indicator or the number of CO_2 molecules in contact with the indicator have not been investigated. The aim of this study was to determine the color changes observed with different concentrations and volumes of CO_2 when injected through FEF CO_2 detectors.

Methods. Different concentrations of CO_2 (0.5 to 2.5%) in oxygen were mixed in a 20 L. Douglas bag. Volumes of 40 ml. to 1000 ml. (dead space of detector 38 ml.) of the five concentrations of CO_2 were injected in 1 to 2 sec. through the FEF detector in a random fashion, with a new detector used for each CO_2 concentration. Eight volunteers were asked to match the color of the indicator with the color chart provided by the manufacturer. The FEF detector was flushed with 1.0 L. of atmospheric air following the color match to return the original color.

Results. Injection of same volumes and concentrations of CO_2 through the indicator did not give the same color change with each detector as observed by the volunteers. The color change observed depended on CO_2 concentration rather than the volumes injected through the detectors. The table shows percentage of each color range with different concentrations of CO_2 as indicated by the volunteers.

	Concentration of CO_2 (%)				
Color Range	0.5	1.0	1.5	2.0	2.5
A	23	5	0	0	0
B	71	80	60	47	19
C	6	15	40	53	81

Discussion. This study indicates that color change in FEF CO_2 detector would primarily be influenced by the concentration rather than volume of CO_2 in the expired gas, i.e. the color change is dependent on the number of CO_2 molecules in contact with indicator. One disadvantage of the FEF CO2 detector was the variability in color change observed by the volunteers. How this variability will affect the performance of this detector in clinical situations, e.g. CPR where the expired CO_2 is low, needs to be evaluated further.