Title: INFRARED-PARAMAGNETIC VS. MASS SPECTROMETER MEASUREMENT OF ANESTHETIC AND RESPIRATORY GAS VALUES

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Introduction. New single-room gas monitors measure CO_2, halogenated anesthetic agents, N_2O, and O_2. These newer devices challenge the multiplexed mass spectrometer (MS), a current standard in measurement[1,2]. This study compares two single-room monitors with a conventional mass spectrometer.

Materials and Methods. Two units were selected for study: 1) a Puritan-Bennett/Datex 222 Anesthetic Agent Analyzer which measures halogenated agents by infrared (IR) analysis, and 2) a Puritan-Bennett/Datex 254 analyzer which measures O_2 by paramagnetic (PM) analysis and other gases by infrared analysis. These units were compared to a multiplexed Perkin-Elmer MGA-1100 mass spectrometer used in a non-multiplexed laboratory setting with a single sampling catheter. Five studies compared measurements of halothane, isoflurane, N_2O, O_2, and CO_2. The study monitors (222 and 254) and the mass spectrometer each were calibrated with the same calibration gases.

Results. Regression lines and intercepts for the single-room analyzers vs. the mass spectrometer are as follows:

Halothane	IR = 0.9997(MS) - 0.0535
Isoflurane	IR = 1.0136(MS) - 0.0053
N_2O	IR = 0.9994(MS) - 0.0534
CO_2	IR = 0.9943(MS) - 0.0148
O_2	PM = 0.9998(MS) + 0.1039

Graphs of the data for isoflurane, N_2O, and O_2 are in Figures 1 through 3.

Discussion. The graphic data from the single-room analyzers show excellent correlation within the resolution of their displays. These data are within the manufacturer's specifications for the instruments, which are approximately ±2% for O_2 and N_2O, ±0.2% for CO_2, and ±0.1% for the halogenated agents. This accuracy is well within that required for clinical purposes. Thus, the Puritan-Bennett/Datex 222 Anesthetic Agent Analyzer and the Puritan-Bennett/Datex 254 analyzer provide anesthetic and respiratory gas data that correlate well with data from a conventional mass spectrometer. These single-room units are acceptable alternatives to mass spectrometer systems for clinical management.

References.
1. Gillbe CE, Heneghan CP, Branthwaite MA. Respiratory mass spectrometry during general anaesthesia. Br J Anaesth 53:103-109, 1981
2. Lin CY. Assessment of vaporizer performance in low-flow and closed-circuit anesthesia. Anesth Analg 59:359-366, 1980

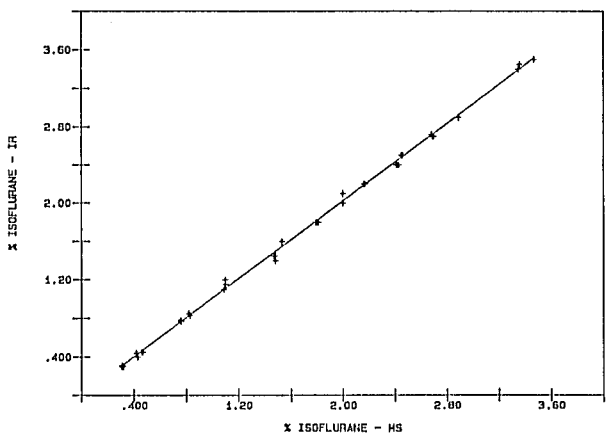

Figure 1. Infrared vs. mass spectrometer analysis for Isoflurane.

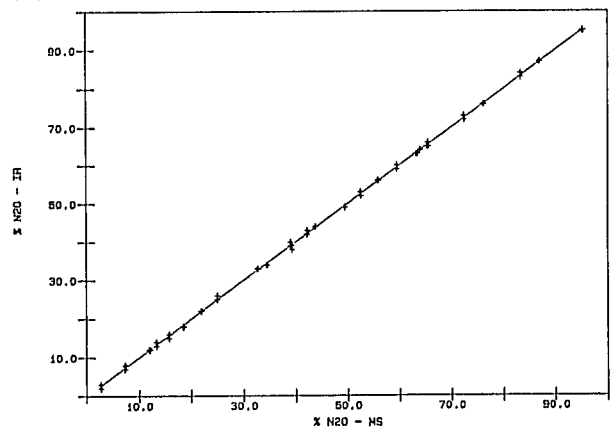

Figure 2. Infrared vs. mass spectrometer analysis for N_2O.

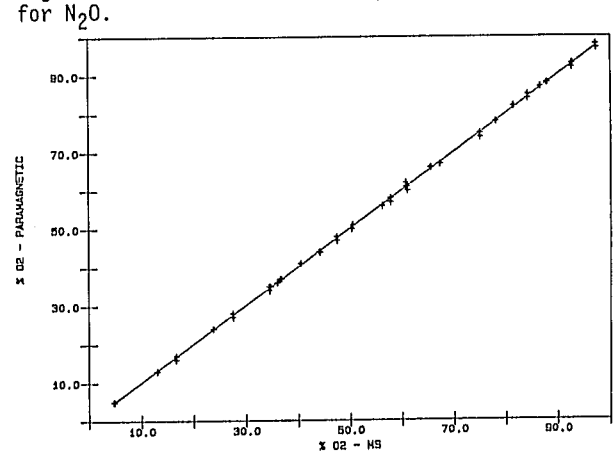

Figure 3. Paramagnetic vs. mass spectrometer analysis for O_2.