Error in Measurement of Oxygen Uptake due to Anesthetic Gases when Using a Mass Spectrometer

To the Editor:—In order to avoid errors referred to by Aukburg et al. in the measurement of oxygen uptake using the carbon dioxide excretion method, we expect that many workers will use a mass spectrometer, as did the original authors of the method. However, the failure to allow for anesthetic gases excreted in the postoperative period, which leads to the errors described by Aukburg et al., also may lead to comparable errors if a mass spectrometer is used.

Normally a mass spectrometer will only be prepared for the number of gases required to make a particular measurement—in the case of respiratory measurements, carbon dioxide, nitrogen, and oxygen. The number of gases to be measured has to be limited because of the necessity to use an automatic sensitivity control (ASC) to correct for viscosity effects in the sample chamber of the mass spectrometer. In addition to an ASC, there is normally a spectrum overlap eraser (SOE) that removes the effect of any overlap occurring in the cracking patterns of gases in the mixture being sampled. If a mass spectrometer is used to make oxygen uptake measurements in the postoperative period, using the methods discussed by Aukburg et al., an extra source of error may arise if the SOE is not set up to eliminate the effects of cracking pattern overlaps due to traces of anesthetics in the expired gases.

A method has been described that allows the extent of errors in measurement of gases in a mixture to be determined, with any configuration of SOE for a respiratory mass spectrometer. Using this technique, we have calculated the degree of error in measurement of $\text{FE}_{\text{CO}_2}$ if expired gas contains nitrous oxide or halothane, and the SOE is not set to eliminate subsequent overlaps. Using the equations presented by Aukburg et al., this calculated error of measurement can be converted into an error in $\dot{V}_{\text{O}_2}$ measurement as shown in table 1.

Thus, a wide range of error may be expected, comparable in extent to those described by Aukburg et al. if assumptions about negligible quantities of anesthetic gases being present are extended to the setting up of the mass spectrometer used for the measurement.

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Mass Spectrometer Monitoring of Patients with Regional Anesthesia

To the Editor:—A simple modification of the terminal line of the mass spectrometer and the use of a disposable nasal oxygen cannula provides a useful adaptor to monitor ventilatory exchange during regional anesthesia and other local standby procedures.

The mass spectrometer sampling catheter is cut at its
end immediately proximal to the connector for the patient's circuit, and it is attached to nasal cannulae in the manner shown in figure 1. A small opening is made opposite one of the nasal prongs of the cannulae with a regular scalpel blade or large-bore needle, and the tip of the catheter is passed through it so it rests just before the end of the prong.

The catheter itself will occlude the terminal lumen of the prong and will prevent mixture of expired and inspired gases. This monitoring technique, however, presumes bilateral patency of the nasal passages. This easily can be confirmed clinically by asking the patient to breathe through each nostril while occluding the other. The same monitoring technique can be used with the more readily available infrared capnograph. This simple arrangement allows simultaneous oxygen supplementation and continuous monitoring of ventilatory patterns and exchange.

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