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## New Clinical Bymixer for Fast-Response, Adjustable Measurement of Mixed Expired Gas Fractions in the Anesthesia Circle Circuit

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### BACKGROUND

The volume of O<sub>2</sub> consumption (VO<sub>2</sub>) and the volume of CO<sub>2</sub> production (VCO<sub>2</sub>) can give vital information about a patient under anesthesia. For example, monitoring VO<sub>2</sub> can detect non-steady state critical events and changes in tissue metabolism in anesthetized patients. However, VO<sub>2</sub> and VCO<sub>2</sub> are typically NOT measured during anesthesia because collection of mixed expired gas is nearly impossible in the circle circuit. Instead, an inline bypass mixing chamber, or bymixer measures mixed VO<sub>2</sub> and VCO<sub>2</sub> fractions. However, the response time is long using this system, and the mixing chamber is difficult to fabricate, clean and sterilize.

### TECHNOLOGY DESCRIPTION

University of California, Irvine researchers have developed a new bymixer from common components that solves these problems. The technology incorporates a novel, parallel design into a new clinical bymixer, which by-passes a constant fraction of total flow through a mixing chamber. The bymixer provides accurate measurement of mixed expired gas fractions in the anesthesia circle circuit, over a wide range of tidal volume (300-1200 ml), frequency (6-20 breaths/mm), and partial pressure of carbon dioxide (PCO<sub>2</sub>, 6-50 mm Hg). Simple changes in mixing chamber volume provide adjustable bymixer response time. Fast bymixer response will allow VO<sub>2</sub> and CO<sub>2</sub> elimination measurements to be updated in less than 1 min (bymixer time constant of 12 sec allows 95% bymixer response by 36 sec).

### APPLICATIONS

The new clinical bymixer is constructed from standard anesthesia circuit components, attaches easily to the anesthesia machine's inspired outlet and expired inlet ports, is simple to clean and sterilize, and has no reservoir to trap condensed water vapor from expired gas. Introduction of this new clinical bymixer will facilitate indirect calorimetry during anesthesia and the non-invasive detection of metabolic upset (e.g. onset of anaerobic metabolism) and critical events (e.g. onset of pulmonary embolism).

### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,793,659	09/14/2010	2003-124

### CONTACT

Alvin Viray  
aviray@uci.edu  
tel: 949-824-3104.



### OTHER INFORMATION

#### CATEGORIZED AS

- » **Medical**
- » **Devices**

#### RELATED CASES

2003-124-0

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5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



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