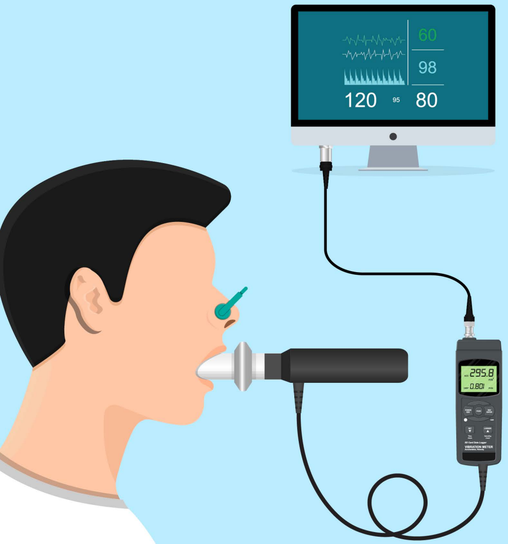
Modifying the Differential Fick Method for Extending Its Use to Spontaneously Breathing Individuals



The differential Fick method measures pulmonary blood flow and cardiac output, detecting embolism and heart failure

However, currently its use is restricted to patients on mechanical ventilation

Healthy subjects (N = 10)

Ensure regular breathing

Reference cardiac output (RefCO)

Echocardiography → Stroke volume × heart rate

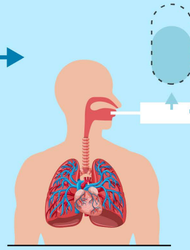
Pulse oximeter → Heart rate and arterial oxygen saturation

2x: 15 minutes apart

Arterial oxygen saturation

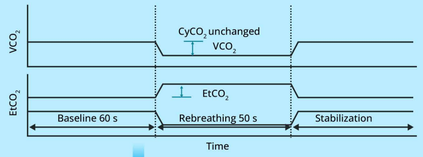
Shunted blood flow fraction

FickCO



Dead space of known volume

Rebreathing alters VCO_2



End-tidal CO_2 (Pet) → Effective pulmonary blood flow

FickCO vs. RefCO by Bland-Altman analysis

Absolute accuracy similar between FickCO and RefCO

- Mean bias = 0.03 l/min
- Limits of agreement (LoA)* +1.43 to –1.37 l/min
- Percentage error (PE) = 0.25

Mean of repeated observations improves precision

- Mean bias = –0.04 l/min
- LoA* = +0.94 to –1.01 l/min
- PE = 0.17

*as 95% confidence interval

Simple equipment and quick results

Short data collection time

Pre- and post-operative evaluations

Non-hospital settings

The differential Fick method for measuring pulmonary blood flow is non-invasive, inexpensive, and easily adaptable for use in patients breathing spontaneously

WILEY

A NEW METHOD FOR NONINVASIVE DETERMINATION OF EFFECTIVE PULMONARY BLOOD FLOW (EPBF) AND CARDIAC OUTPUT (CO) IN SPONTANEOUSLY BREATHING SUBJECTS

GEDEON *et al.* (2025) | DOI: 10.1113/EPO93079

Experimental Physiology

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