

Letter to the Editor

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Received: 14 April 2015 / Accepted: 5 June 2015 / Published online: 16 June 2015
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Recently, Idris E. Ghijselings et al described the performance of a new inspired hypoxic guard [1]. We have found a theoretical risk for overdosage of vapor when working with very low fresh gas flows (FGF) in manual mode.

An O₂/air FGF of 0.3 L/min with a F_DO₂ (delivered O₂ fraction) of 67 % is a FGF-F_DO₂ combination that the hypoxic guard allows to be used [1]; this corresponds to a delivery of 200 mL O₂ plus 100 mL N₂/min. O₂ uptake (VO₂) for a patient with a body weight (BW) of 75 kg under anesthesia is 200 mL/min (calculated according to Brody's formula as $(10 \times BW^{0.75}) \times 0.8$ [2–4]. This mixture will theoretically cause a hypoxic F_IO₂ (inspired oxygen concentration) because all delivered O₂ will be consumed: nitrogen will accumulate in the circuit until the O₂ concentration reaches zero percent.

The new inspired hypoxic guard, the O₂ Guard, will intervene once the F_IO₂ decreases to 20 %, increasing any FGF below 1.0–1.0 L/min with a F_DO₂ of 60 % [1]. According to the FLOW-i manual there is no action taken to adjust the vapor concentration in accordance with the increased FGF [5]. In our scenario this means a 3.3 time increase of the amount of vapor fed to the circuit.

A Gas Man[®] simulation with an induction for 8 min with a 1 L/min FGF and 8 % sevoflurane vaporizer setting followed by a maintenance FGF of 0.3 L/min and 7 % sevoflurane vaporizer setting, shows that after 1 h of

anesthesia the end-expired sevoflurane concentration will be 2.17 %. If at that time the O₂ Guard increases the FGF from 0.3–1.0 L/min, the end-expired sevoflurane concentration will increase to 3.05 and 3.41 % after 5 and 10 min, respectively, constituting a 47 and 57 % increase after 5 and 10 min, respectively.

This simulation indicates that activation of the O₂ Guard may allow an unannounced change of the end-expired sevoflurane concentration of the order 47 % in 5 min. There may also be a risk for not detecting this as alerts and the anesthesiologist's actions probably focus on the hypoxic situation.

Conflict of interest The report has not been externally funded, and none of the authors has a conflict of interest.

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