



# Response to Tetsumoto et al. regarding the use of fluorinated gases in retinal detachment surgery. The environmental impact of fluorinated gases

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## To the Editor:

Tetsumoto et al. [1] describe that the surgical results of air tamponade were not inferior to SF<sub>6</sub> tamponade in 27 gauge Pars Plana Vitrectomy (PPV) for rhegmatogenous retinal detachments (RRD) in their study. A further consideration in the use of fluorinated gases during retinal surgery should be the environmental impact of these gases.

Fluorinated gases such as SF<sub>6</sub> are controlled by the European Union with the aim of reducing their use by two-thirds by 2030 (compared to 2014) due to their greenhouse effect [2] (SF<sub>6</sub> is the most potent greenhouse gas regulated by the Kyoto protocol [3] with a Global warming potential of 22,800 relative to CO<sub>2</sub> [4]).

The fluorinated gas used in vitreoretinal (VR) surgery is either released into the atmosphere during gas exchange, expelled from the body via the bloodstream and respiration or remains within the canisters which are disposed of as medical waste. It would not be unreasonable to expect that all the remaining fluorinated gas in the canister is eventually released into the atmosphere.

In our tertiary regional referral centre for VR surgery a total of 18 single use canisters (30 ml) of SF<sub>6</sub> and 34 canisters (30 ml) of C<sub>2</sub>F<sub>6</sub> were used during the month of September 2019 (across all VR procedures). Using figures provided by the manufacturer Arcadophta (Toulouse, France) and an online calculator (United States Environmental Protection Agency [5]) this would equate to 6.48 L (62.6616 g) of SF<sub>6</sub> and 12.24 L (106.1208 g) of C<sub>2</sub>F<sub>6</sub> for our unit in 1 year. This is equivalent to a total

of 2.7 metric tons of CO<sub>2</sub> emissions per year in our one unit.

Whilst this is only a small contribution to the total environmental impact of the health sector, we should be aware of the global warming potential of these gases and ensure we minimise their use. If there is evidence that air tamponade is not inferior to fluorinated gas tamponade for some RRDs then the environmental considerations should be act as an impetus for further research.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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## References

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