4 Eikermann M, Gerwig M, Hasselmann C, *et al.* Impaired neuromuscular transmission after recovery of the train-of-four ratio. *Acta Anaesthesiol Scand* 2007; **51**:226–234.
5 Kotake Y, Ochiai R, Suzuki T, *et al.* Reversal with sugammadex in the absence of monitoring did not preclude residual neuromuscular block. *Anesth Analg* 2013; **117**:345–351.
6 Mraovic B, Timko NJ, Choma TJ. Comparison of recovery after sugammadex or neostigmine reversal of rocuronium in geriatric patients undergoing spine surgery: a randomized controlled trial. *Croat Med J* 2021; **62**:606–613.

DOI:10.1097/EJA.0000000000001635

Reply to: should we use earlier and lower dose administration of sugammadex?

Olivier Duranteau, Wendy Fernandez, Turgay Tuna, Edgard Engelman, Luc Van Obbergh and Ionut Tabolcea

From the Anesthesiology Department, Erasmus Hospital, Anderlecht, Belgium (OD, WF, TT, EE, LVO, IT)

Correspondence to Olivier Duranteau, Anesthesiology Department, Erasmus Hospital, Route de Lennik, 808, 1070 Anderlecht, Belgium
Tel: +32 25553919; e-mail: Olivier.duranteau@erasme.ulb.ac.be

Editor,

We read with interest the letter written by Mr Timko and Dr Mraovic.[1] Several limitations to the article we had previously written in your journal[2] have been highlighted and are very relevant.

Concerning the power of the study, safety studies indeed do require large numbers of patients to detect adverse events. However, our study was not a safety study but a pharmacodynamic study. Therefore, we did not recruit the large number of patients required for a safety study. Accordingly, regarding adverse events resulting from inadequate assessment of neuromuscular blockade in the recovery room, a register of unexpected life-threatening events was considered more relevant. Furthermore, the implementation of a randomised double-blind study based on a large number of patients would require significant human and logistic organisation and require, of course, very significant financial support.

The use of a train of four (TOF) ratio of less than 0.7 to define residual paralysis is indeed questionable. A threshold of less than 0.9 is indeed more stringent and provides greater safety.[3] Unfortunately, we do not have the data to determine whether patients had TOFs less than 0.9 and greater than 0.7. The definition of complete neuromuscular blockade reversal is subject to recent changes both in the definition of thresholds (0.9 or 0.95) and in the modalities of measurement, for example, use of TOF vs. central neuromuscular monitoring.[4]

The use of a lower dose of sugammadex is common practice in Belgium at the end of the procedure because of two main factors.

The first is that the use of sugammadex is fully charged to the patient regardless of the reasons for its use. By reducing the doses, we could reduce the cost to the patient. The syringes might be prepared by the pharmacy or the manufacturer could modify its packaging.

The second is the undesirable effects of neostigmine, which can be significant for some patients (cardiac, bronchoconstriction or allergic effects).[5] For these reasons, some practitioners prefer to use sugammadex.

Finally, we can only support the recommendations made by the authors concerning the need for reliable, objective and reproducible neuromuscular monitoring. Many places still perform procedures without monitoring.[6,7] It is a basic safety feature that should be regarded as essential as oxygen saturation or heart rate measurement.

Acknowledgements relating to this article

Assistance with the letter: none.

Financial support and sponsorship: Erasme Anesthesiology Department.

Conflicts of interest: none.

References

1 Timko NJ, Mraovic B. Should we use earlier and lower dose administration of sugammadex? *Eur J Anaesthesiol* 2022; **39**:292–294.
2 Duranteau O, Fernandez W, Tuna T, *et al.* Earlier and lower dose administration of sugammadex: a randomised placebo-controlled trial. *Eur J Anaesthesiol* 2021; **38**:865–871.
3 Martinez-Ubieto J, Ortega-Lucea S, Pascual-Bellosta A, *et al.* Prospective study of residual neuromuscular block and postoperative respiratory complications in patients reversed with neostigmine versus sugammadex. *Minerva Anestesiol* 2016; **82**:735–742.
4 Murphy GS. Neuromuscular monitoring in the perioperative period. *Anesth Analgesia* 2018; **126**:464–468.
5 Hristovska A-M, Duch P, Allingstrup M, *et al.* Efficacy and safety of sugammadex versus neostigmine in reversing neuromuscular blockade in adults. *Cochrane Database Syst Rev* 2017; **8**:CD012763.
6 Kim JS, Han JW, Lee JH, *et al.* Current use of neuromuscular blocking agents and antagonists in Korea: a 2018 survey. *Anesth Pain Med (Seoul)* 2019; **14**:441–448.
7 Lin XF, Yong CYK, Mok MUS, *et al.* Survey of neuromuscular monitoring and assessment of postoperative residual neuromuscular block in a postoperative anaesthetic care unit. *Singapore Med J* 2020; **61**:591–597.

DOI:10.1097/EJA.0000000000001654

Stress levels in anaesthesiologists: explaining the extremes

Raymond A.B. van der Wal, Erik Bijleveld, Antonius E. van Herwaarden, Martin J.L. Bucx, Judith B. Prins and GJS Scheffer

From the Department of Anaesthesiology, Pain and Palliative Medicine, Radboud University Medical Center (RABvdW, MJLB, GS), Behavioural Science Institute, Radboud University (EB), Department of Laboratory Medicine (AEvH) and Department of Medical Psychology, Radboud University Medical Center, Nijmegen, the Netherlands (JBP)

Correspondence to Raymond A.B. van der Wal, MD, Radboud University Nijmegen Medical Center, Department of Anaesthesiology, Pain and Palliative Medicine, Internal Postal Code 717, P.O. Box 9101, 6500 HB Nijmegen, the Netherlands
Tel: +31 24 361 4406; e-mail: Raymond.vanderwal@radboudumc.nl

Editor,

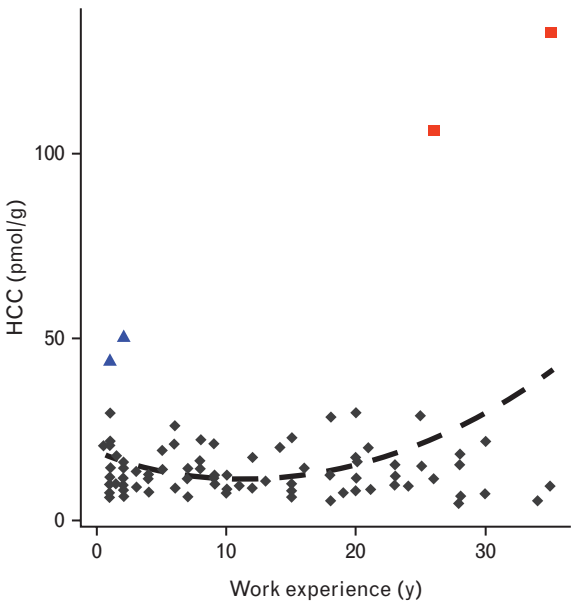
We thank Bhakta *et al.* for showing interest in our article 'Chronic stress indicated by hair cortisol concentration in anaesthesiologists and its relationship to work experience

and emotional intelligence'[1] and for acknowledging the importance of occupational wellbeing of anaesthesiologists. In their letter,[2] Bhakta *et al.* wondered whether extreme forms of physical exercise or the use of relaxation techniques, such as yoga or mindfulness, were characteristic of the respective high and low values of hair cortisol concentration (HCC) that we observed.

In our study, we did neither collect data on participants' physical activity habits nor on other leisure-time activities. So, we cannot answer Bhakta *et al.*'s question directly. However, we agree that a more detailed look into the extreme values in our sample could be informative. We did not observe extremely low values of HCC; in fact, most participants displayed low HCC. However, two early-career consultants and two late-career consultants showed relatively high HCC values (>40 pmol g^{-1}; Fig. 1).

Both early-career consultants, who displayed high HCC, were under 40 and women. Both worked 80–90% of a fulltime job in a general or community hospital. They spent at least 80% of their worktime doing clinical work. Both had a partner and had children living at home. They reported a modest amount of negative home-work interference; nevertheless, for both, home–work interference was high compared with other consultants in our cohort (≥87th percentile). Both were part of the 13% minority of our sample that did not work night shifts.

Fig. 1 Hair cortisol concentration as a function of years of experience as a consultant anaesthesiologist



Blue triangles indicate the two early-career consultants described in this letter; red squares indicate the two late-career consultants.

Both late-career consultants, who displayed high HCC, were over 60, one male, one female. Both worked fulltime in a general hospital and spent at least 80% of their worktime doing clinical work. Both had a partner; neither had children living at home. They reported small amounts of negative home–work interference (23–68th percentile). Both worked night shifts.

Although these characterisations are not uncommon for others in their age group, they are consistent with the possibility that high HCC levels in our sample stemmed from an intersection of work characteristics, home situation, career phase and physiological characteristics (e.g. sensitivity of the hypothalamic–pituitary–adrenal axis). That said, we cannot rule out Bhakta *et al.*'s novel hypothesis that high HCC values may also be linked to extreme forms of physical activity.

In their letter, Bhakta *et al.* suggest that a culture of extreme physical activity seems to be deeply embedded in the anaesthesia community. Perhaps they are correct: though we work in a different region than Bhakta *et al.*, we too know many anecdotes of anesthesiologists who engage in extreme activities, such as scuba diving, skydiving, (para)gliding, kitesurfing, racing or martial arts. Another example would be our Australian colleague Richard Harris: an experienced cave diver, who played a pivotal role in the 2018 Thailand cave rescue.[3] As these are anecdotes, rather than evidence of a pattern, we agree with Bhakta *et al.* that more research in this area is needed, to benefit anaesthesiologists' well being, which is important for patients as well.

Acknowledgements relating to this article

Assistance with the letter: all authors were involved in writing or editing the reply.

Financial support and sponsorship: none.

Conflicts of interest: none.

References

1. van der Wal RAB, Bijleveld E, Herwaarden A, *et al.* Chronic stress indicated by hair cortisol concentration in anaesthesiologists and its relationship to work experience and emotional intelligence: a cross-sectional biomarker and survey study. *Eur J Anaesthesiol* 2022; **39**:26–32.
2. Bhakta P, O'Brien B, Desarkar P, Karim HMR. Stress levels in anaesthesiologists: Explaining the extremes. *Eur J Anaesthesiol* 2022; **39**:187–188.
3. Lawthaweesawat C, Harris R, Isara W, *et al.* Prehospital care of the 13 hypothermic, anesthetized patients in the Thailand cave rescue. *N Engl J Med* 2019; **380**:1372–1373.

DOI:10.1097/EJA.0000000000001629