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Introduction

The objective of this work is to compare different methods for predicting responsiveness to nociceptive stimulation based on different approaches:

- **qNOX** → An EEG based indicator [1] (Quantum Medical, Spain): Figure 1 shows the device used for qNOX computation.
- **Remifentanil predicted effect site concentration** → CeRemi estimated from a pharmacokinetic-dynamic model (Minto et al)
- **Baseline pupil size** → An indicator based on variation of pupil diameter (iDMed, France)

These indicators are assessed as predictors of movement as a response to the tetanic stimulus:

- **Ulnar nerve: 100Hz, 60 mA , 5 sec** → performed with AlgiScan Pupillometer

Methods

- Data recorded from 93 female patients (Figure 2)
- General anaesthesia under propofol-remifentanil TCI Gynecologic surgery.
- Patients with opalescent cataract, iris surgery or blindness and women with BMI>35 were excluded from the study.
- Intentional movement as a response to tetanic stimuli was considered a positive response.
- The responses to the tetanic stimuli from each patient were classified as movers (MOV) or non-movers (NMOV).

Statistical analysis

The average values in the three seconds prior to tetanus of qNOX, CeRemi and the baseline pupil size (PS) (Figure 3) obtained for MOV and NMOV were compared through:

- t-student test
- prediction probability assessed by means of the pk statistic [2].

qNOX values with signal quality index (SQI) below 55 were not included in the analysis.

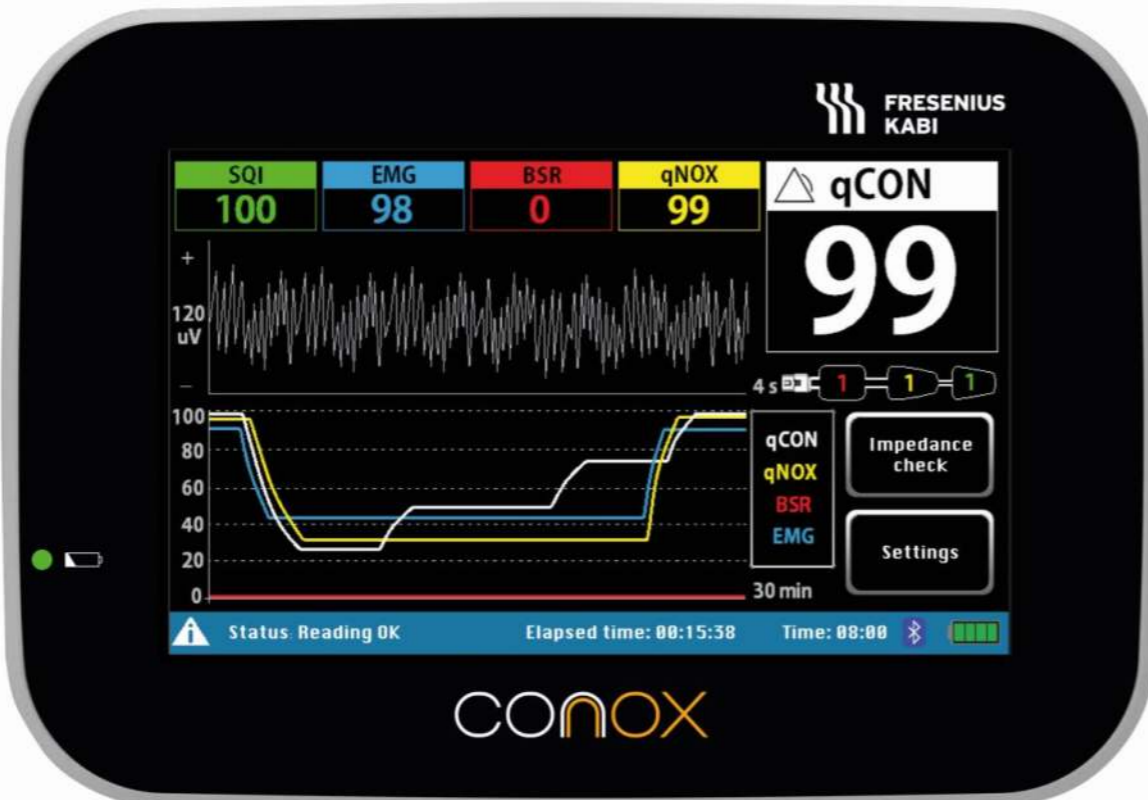


Figure 1 : The CONOX device used for qNOX computation

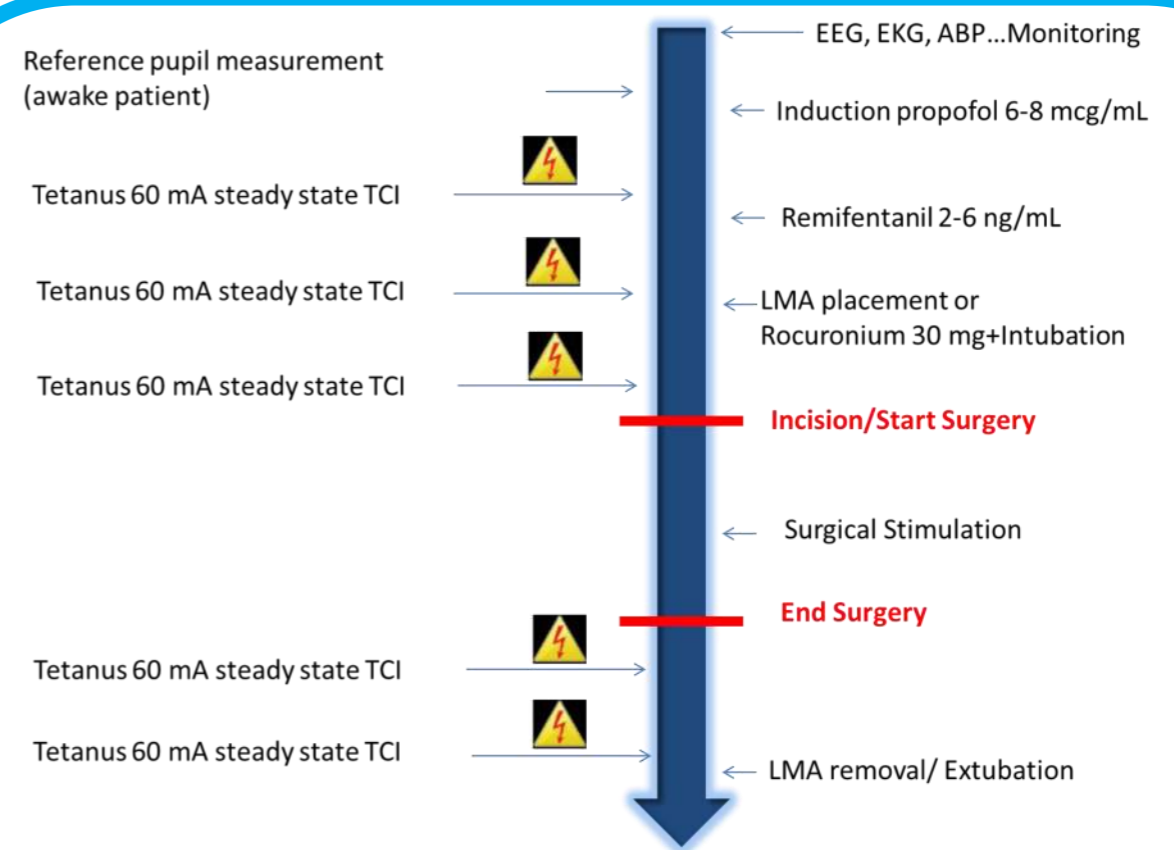


Figure 2 : Flowchart of the data recording method

Results and Discussion

A total of 384 tetanic stimuli were obtained from 84 female patients that could finally be included in data analysis. Results (Table 1) show that all indicators present statistically significant differences between MOV and NMOV and prediction probabilities above 0.75. CeRemi appeared to be the one with better prediction probability, significantly larger than all other options. PS showed a slightly higher pk value than qNOX, but not statistically significant as they present some overlap when considering the pk standard error (SE).

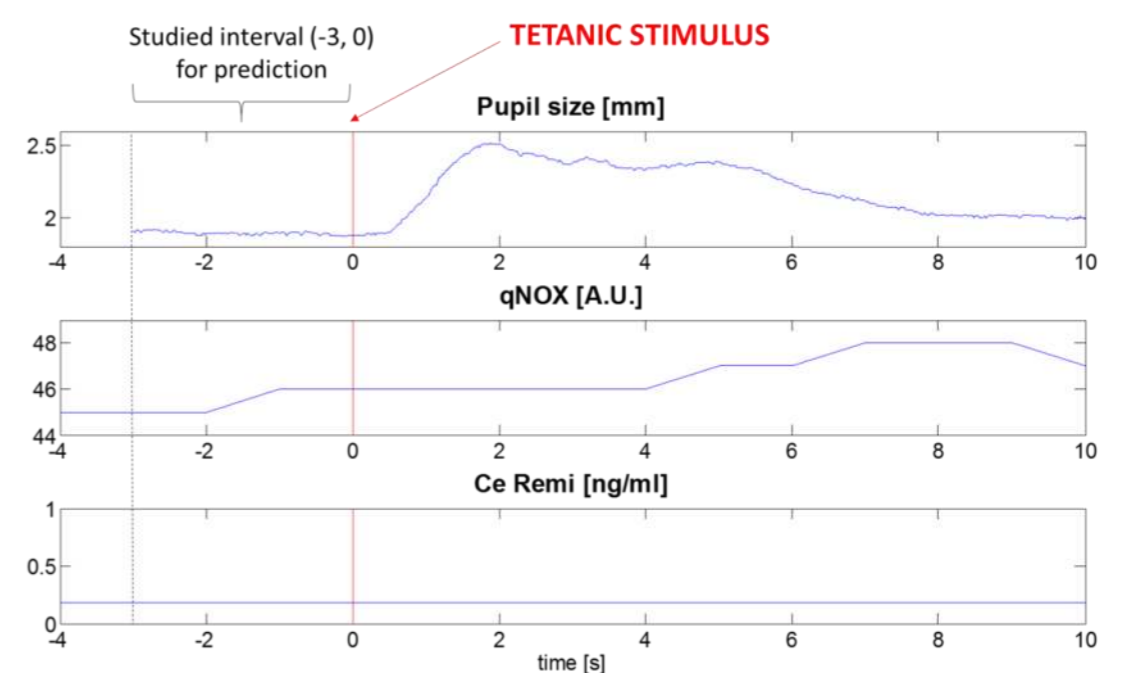


Figure 3 : Example of the performance for the three studied indicators in a single individual

Conclusion

CeRemi proved to be the best predictor of movement response after tetanic stimulation, followed by PS and qNOX which showed a good and clinical equivalent performance.

Table 1: Results obtained for the t-test and Pk values for each index.

	p	Pk	SE
qNOX (EEG)	< 0.0001	0.753	0.026
Basal Pupil Size	< 0.0001	0.763	0.024
CeRemi*	< 0.0001	0.819	0.022

*The Pk of CeRemi was originally 0.181; it is presented as (1-Pk) since the relation between CeRemi and pupil size is inverse to the other indicators.

Acknowledgment

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References

- [1]Jensen EW et al. Acta Anaesthesiol Scand. 2014 Sep; 58: 933-41
- [2]Smith WD, Dutton RC, Smith NT. Stat Med 1996; 15: 1199-215