**TREND DETECTION IN TIME-SERIES DATA OF PROPOFOL CONCENTRATION IN BREATH**

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**Introduction:** Various groups have verified that the intravenous anesthetic drug Propofol can be detected in exhaled gas, both in humans and in animals [1], [2].

For the clinical routine, the indication of increasing and decreasing concentrations of Propofol in breathing gas may provide a potential benefit. Therefore online trend algorithms will be needed.

**Methods:** With approval of ethics committee and informed consent 4 ASA I+II patients were continuously monitored during induction- and awakening-phase by analyzing samples of breathing gas with an IMR-MS. A clinical study protocol has been written to gain further insight into trend analysis of Propofol breath monitoring data. TIVA was performed with Propofol and Remifentanil by using a TCI pump with plasma-concentration as target. Two different methods of data evaluation were compared.

1) Evaluation of the first derivative and filtering of the time-series data.
2) Evaluation by means of regression and statistical analyses.

Both algorithms were applied to data sets where the infusion of Propofol was stopped.

**Results:** After setting the plasma-target concentration from 2µg/ml to 0µg/ml the change in trend was observed. The times between event, detection of a decreasing trend and patient awaking were determined and compared.

1) The evaluation of the first derivative to indicate a trend is promising. The design of an appropriate filter is essential for noise treatment.
2) The detection of significant increasing/decreasing concentrations in exhaled gas is possible. Signal level dependency of noise can be considered.

**Conclusion:** First evaluations show that the data analysis of the continuously sampled breathing gas by an IMR-MS can be used to provide a trend indicator for the Propofol concentration. Statistics provide a confidence interval based indicator. An interpretation of the trend is necessary to relate a negative slope to an infusion stop.

**References:**
1. A. Hengstenberg et al., „Continuous Real-Time Monitoring of Propofol in Breathing Gas during Anesthesia“, Anesthesiology 2006; 105: A577