

HEART RATE VARIABILITY AND SEDATION

A.L.Smith^{1,2}, K.J. Reynolds², H.Owen³, C.Fahy⁴

¹ *Flinders Biomedical Engineering, Flinders Medical Centre, Adelaide, Australia.*

² *School of Informatics and Engineering, Flinders University, Adelaide, Australia.*

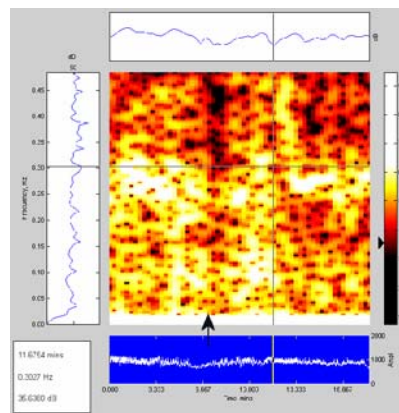
³ *School of Medicine, Flinders University, Adelaide, Australia.*

⁴ *Department of Anaesthesia, Flinders Medical Centre, Adelaide, Australia*

INTRODUCTION: This pilot study investigates the effect fentanyl has on heart rate variability (HRV) in the operating theatre. HRV uses changes in heart rate to indirectly observe changes in the activity of the autonomic nervous system and in particular, the changes in activity of the parasympathetic and sympathetic branches. Anaesthetics are known to affect the autonomic nervous system and HRV provides an indirect window on this activity. HRV indexes, such as respiratory sinus arrhythmia, have been used to provide a convenient and objective indication of lightening anaesthesia [1] (with propofol and isoflurane).

METHODS: Consenting patients scheduled for minor surgical procedures were studied in the 10 minutes before anaesthesia was induced. Baseline ECG was recorded for 5 minutes then a standard dose of midazolam was given, followed by a randomly selected bolus of fentanyl (50, 75, 100 or 150 microgram). A further 5 minutes of ECG was then recorded. The R-wave intervals were analysed with a range of techniques to elucidate information on changes caused by the sedative.

RESULTS: Procedural issues that affected the HRV were identified including intrusions by clinical staff, loud noises, and application of the oxygen mask. A reduction in all frequencies occurred when the oxygen mask was applied (arrow on figure). Fentanyl produced a short increase in the high frequency range (0.35 – 0.45 Hz) and a prolonged reduction in the sympathetic low frequency peak (0.1 – 0.15 Hz).



*Fig. 1: Time dependent frequency analysis (MatLab spectrogram)
Fentanyl administration at vertical line. Oxygen mask applied at arrow.*

DISCUSSION & CONCLUSIONS: The pilot study identified larger changes of HRV associated with procedural issues rather than with the drug being investigated. These sources of ‘noise’ will need to be minimised in subsequent studies. Fentanyl caused a reduction in the sympathetic low frequency peak in agreement with other studies of drug effects.

REFERENCES:

¹Pomfrett, C.J. (1999) *Br J Anaesth* **82** (5), 659-662