



## Tools Enabling EEG Signals Analysis and Extraction of Depth of Anesthesia Index in Veterinary Practice

Yoann Flück<sup>1</sup>, Alena Simalatsar<sup>1</sup>, Alessandro Mirra<sup>2</sup>, Darren Hight<sup>3</sup>, Olivier Levionnois<sup>2</sup>

<sup>1</sup> Industrial Systems, HES-SO Valais-Wallis, Sion, Switzerland

<sup>2</sup> Vetsuisse Faculty, University of Bern, Switzerland

<sup>3</sup> Inselspital, Bern, Switzerland

The provision of correct depth of anaesthesia (DoA) is mandatory not only to veterinary patients (e.g., dogs, cats, horses etc.) but also for pigs undergoing experimental procedures, in order to ensure both their welfare and the repeatability of the results obtained. Inhalant anaesthesia is often avoided in veterinary practice due to the imposed technical constraints, while injectable drugs (e.g., propofol, an anaesthetic widely used also for humans) are preferred instead. However, there is a lack of technologies to guide injectable anaesthetic administration in animals. Therefore, injectable drugs are provided without other means for individualized titration than *subjective clinical observation or human-based depth of anaesthesia monitoring strategies*.

Anaesthesia individualization can be performed based on objective *point-of-care (POC)* measures of DoA like electroencephalogram (EEG)-based bispectral index (BIS) and Patient State Index (PSI). However, the algorithms computing these DoA indices are proprietary and developed for humans, and thus, cannot be applied or adapted to veterinary practice. Therefore, there is a need to develop novel EEG based DoA index for pigs.

We have developed Matlab tools enabling EEG signal analysis collected from pigs undergoing general anaesthesia with propofol. In particular, we have: 1) developed signal processing algorithms to extract features suitable for construction of induced DoA index, e.g., such as burst-suppression ratio's (BSR), spectral edge frequency (SEF), power spectrum for various frequency bands, etc.; 2) developed graphical user interface facilitating comprehensive analysis of extracted features; 3) constructed first generation DoA index for pigs.

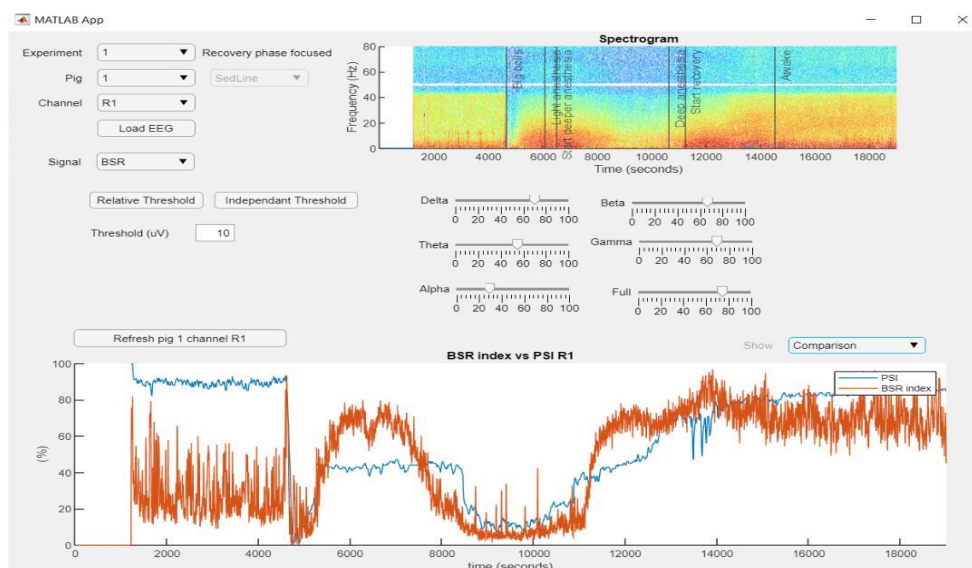


Figure. Tool for EEG signal analysis and construction of novel DoA index for pigs