

Exploratory Analysis of Uterine Electromyographic Data from Pregnant Sheep

Gaj Vidmar¹, Krešimir Matković², Branimir Leskošek¹, and Drago Rudel^{1,3}

¹ IBMI, Faculty of Medicine, University of Ljubljana,
Vrazov trg 2, SI-1000 Ljubljana, Slovenia

² VRVis Research Center for Virtual Reality and Visualization, Ltd.,
Donau-City-Strasse 1, A-1220 Vienna, Austria

³ MKS Electronic Systems Ltd.,
Rožna dolina c. XVII/22b, SI-1111 Ljubljana, Slovenia

Abstract. We present an overview of analyses of data from ten years of research (Rudel, 2002; Leskošek, Pajntar & Rudel, 1998) on uterine smooth-muscle activity in pregnant sheep as a model for humans. Electromyography (EMG) was performed at the horn and the cervix of the uterus in 35 sheep. The signals were processed in time and frequency domain yielding root-mean-square (RMS) and median frequency (MF) over one-minute periods as the data for further analyses. Research setup and addressed issues comprised normal course of EMG activity with approaching labor, effects of mild electric stimulation, effects of labor accelerating or decelerating medication, and EMG activity during and shortly before and after labor. The gathered data were difficult to analyze because of interrupted time series, large amounts of data from small number of subjects, huge intra- and inter-subject variability, low signal-to-noise ratio and lack of experimental control over potentially relevant factors. We employed various methods including pixelization-based (Levy, 2004) visualization of data quality and chronology of the entire research, 3D spectral plots (over time), robust descriptive graphics (boxplots of raw and aggregated data, local regression smoothing), linear modeling of transformed data (with mixed-model ANOVAs) and interactive visualization of large datasets (with the ComVis tool).

References

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Keywords

EMG, LABOR, SHEEP, EDA, VISUALIZATION