

APPLICATION OF THE WAVELET-ANALYSIS TO THE STUDY OF FETAL HEART RATE

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Wavelet-analysis is applied at the study of the fetal heart rate. One of the most studied characteristics detecting by the cardiotocography method is the heart rate variability of a fetal (see e.g. [1]. In our preliminary analysis [2] we have shown the developing of the fetal distress in an intrapartum period leads to nonsystematic changes of the heart rate variability (this, in particular, clarifies the presence of different estimations of accelerations and decelerations appeared in the literature [3-6]. Hence we restrict our study only on cardiotocograms recorded in an antepartum period.

We propose a new diagnostic model based on wavelet analysis [7]. The later analysis firstly appeared as a method of signal processing (see [8] becomes recently a well-developed inter-disciplinary science. Mainly it is due to different kind of applications developed on the base of its main ideas [9].

The obtained mathematical model for estimation of the fetal well-being in the antepartum period is a result of an analysis of the fetal heart rate presented in the form of cardiotocograms. The diagnostic formula was obtained by the study of the gain-frequency characteristics for a number of frequency bands. Decomposition of the signal was made by applying the discrete wavelet transforms. In the creation of the formula the most influent characteristics were applied, namely MAD_{II} and SD_I . Both characteristics corresponds to higher frequency

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bands. The gain-frequency characteristics of lower bands appeared to be statistically inessential. The obtained model quantitatively describes a decreasing of the variability of the fetal heart rate between higher frequency bands and its increasing inside a band in the case of hypoxia developing.

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