Fetal Sympathetic Nervous Activity during the Second Trimester of Pregnancy: Preliminary Results

Published in:

Published: 01/01/2010

Document Version
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

• A submitted manuscript is the author’s version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

Link to publication

Citation for published version (APA):

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 27. Dec. 2018
Introduction
Spectral analysis of fetal heart rate variability may offer valuable additional information that can be used to assess fetal wellbeing. However, more insight in spectral estimates of heart rate variability is required. In literature, spectral analysis of fetal heart rate has been reported only for pregnancies >20 weeks of gestation. The development of a non-invasive fetal ECG device has enabled the recording of the beat-to-beat fetal heart rate in pregnancies of 18 weeks of gestational age (GA) and higher. To investigate fetal sympathetic nervous activity in the second trimester of pregnancy, the beat-to-beat fetal heart rate was recorded in pregnancies of 18-27 weeks of gestation and spectrally analysed.

Methods
Recordings were performed in 5 healthy pregnancies and a total of 14 recordings of 45 minutes were acquired. Measurements were performed with a prototype non-invasive fetal ECG device (NEMO, developed in cooperation with Maastricht Instruments BV) that records electrical activity on the maternal abdomen. From these recordings, fetal ECG traces were extracted, from which R-R interval series were obtained. 5-minute segments of sufficient signal quality were analysed by fast Fourier transform with appropriate pre and post processing. Spectral powers were calculated in the very low frequency (VLF) band (<0.04 Hz), the low frequency (LF) band (0.04-0.15 Hz), and the high frequency (HF) band (0.4-1.5 Hz). In addition, normalised low (LFn) and high (HFn) frequency powers were calculated, as these may reflect autonomic nervous activity more objectively.

Results
77 segments of 5 minutes were analysed. Figure 1 shows the LFn powers that were calculated. In the period before 20 weeks of gestation, LFn is found to be significantly lower than in the period after 20 weeks of gestation (<20 weeks GA: LFn = 0.39 ± 0.20, >20 weeks GA: LFn = 0.74 ± 0.15, p<0.001).

Discussion and Conclusion
The significantly lower normalised LF power for gestational ages <20 weeks might indicate that functional development of the fetal sympathetic nervous system does not take place earlier than 20 weeks of gestation. However, additional measurements are necessary to further investigate this hypothesis. In particular, results at 20 weeks of gestation are very interesting, as the preliminary results suggest that at this gestational age a transition might occur.