

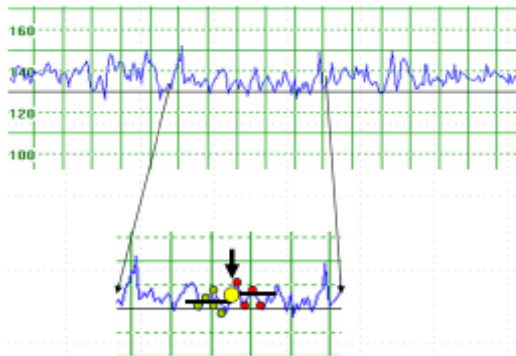
Hintergrund

- Neue Methode zur Überwachung des autonomen NS: Phasengleichgerichtete Signalmittelung (PRSA)
- Erwachsenenkardiologie: Prädiktion der Mortalität von Myokardinfarkt-Überlebenden
- **PRSA** extrahiert Bereiche die von Interesse sind, eliminiert Störsignale, Artefakte, Signalrauschen aus einem (quasi-)periodischen Signal, z.B. EKG oder CTG

THE LANCET



PRSA-Methode, Anwendung durch unsere Studiengruppe ERSTMALS in der GBH



Filter: Bsp. HF-Anstieg für die Berechnung der Akzelerationskapazität

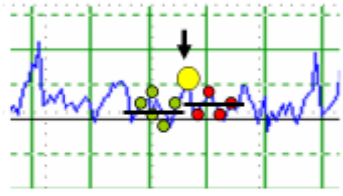
Vergleich von Herzfrequenzintervallen vor und nach einem Ankerpunktkandidaten

Ankerpunkt

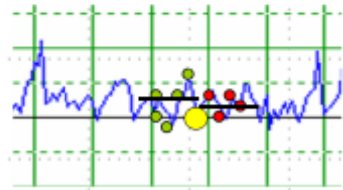
$T = 5$ (In unseren Studien: $T = 10$ samples)



PRSA-Methode, Berechnung der Akzelerationskapazität



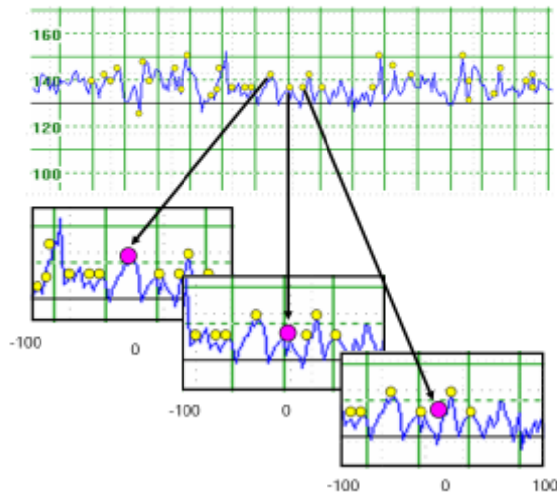
Ankerpunkt



KEIN Ankerpunkt



PRSA-Methode, Berechnung der Akzelerationskapazität



Ankerpunktdefinition:

HF-Anstieg <5%

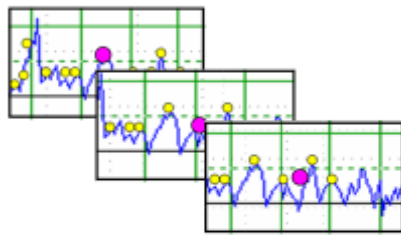
Definition Tachogramme:

Zeitfenster um jeden Ankerpunkt

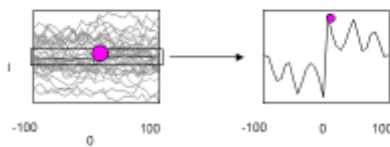
$L = 100$ samples



PRSA-Methode, Berechnung der Akzelerationskapazität



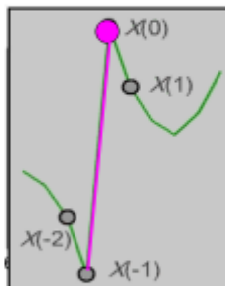
Phasen-Gleichrichtung
Tachogramme werden übereinander gelegt und am Ankerpunkt ausgerichtet



Signalmittelung:
Artefakte und Signalrauschen werden ausgelöscht



PRSA-Methode, Berechnung der Akzelerationskapazität



Quantifizierung → Mittlere Akzelerationskapazität (Average Acceleration Capacity - AAC):

Die zentrale Amplitude spiegelt die Fähigkeit des gesamten Systems zur Beschleunigung wider: HF-Beschleunigung wird durch das autonome Nervensystem (ANS) gesteuert -> AAC = Kapazität des fetalen ANS

$$\sum_{i=0}^{X-1} y(i) - \sum_{i=-X}^{<0} y(i) = AAC$$



Fetales autonomes Nervensystem - Präsentation

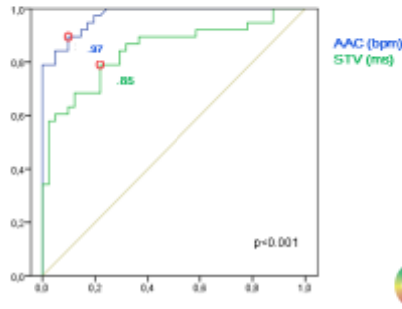
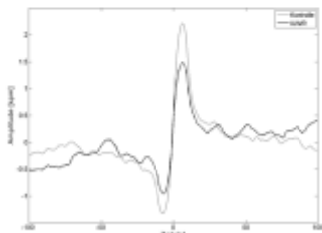


PRSA-Methode, Anwendung durch unsere Studiengruppe ERSTMALS in der GBH



ORIGINAL ARTICLE
Phase-rectified signal averaging as a new method for surveillance of growth restricted fetuses
S. M. Geierling, J. A. Huber, S. Pflüger von Steinhilber, A. Müller, T. Schwan, J. G. Grell,
G. Schneider, A. G. Schneider
Frauenklinik, Technische Universität München, Munich, Germany; Frauenklinik, Universitätsklinikum Bonn, Bonn, Germany; Frauenklinik, Technische Universität München, Munich, Germany; and Institute for Medical Statistics and Epidemiology, Technische Universität München, Munich, Germany

Prospektive Fall-Kontrollstudie



Seitdem: PRSA in Pränatalmedizin

Average acceleration and deceleration capacity of fetal heart rate in normal pregnancy and in pregnancies complicated by fetal growth restriction
S. M. Geierling, J. A. Huber, S. Pflüger von Steinhilber, A. Müller, T. Schwan, J. G. Grell,
G. Schneider, A. G. Schneider
Technische Universität München, Frauenklinik, München, Germany; Frauenklinik, Universitätsklinikum Bonn, Bonn, Germany; Frauenklinik, Technische Universität München, München, Germany; and Institute for Medical Statistics and Epidemiology, Technische Universität München, München, Germany

Assessment of Coupling between Trans-Abdominally Acquired Fetal ECG and Uterine Activity by Bivariate Phase-Rectified Signal Averaging Analysis
Daniela Casati^{1,2}, Tamara Stampalija^{1,2}, Kerstin Bressan^{1,2}, Enrico Ferrazzi^{1,2}, Cristina Mastroianni^{1,2}, Eleonora Rizzo^{2,3}, Mariachiara Gagliardi-Ruggieri⁴, Axel Bauer^{1,2}
¹Department of Women, Maternal and Fetal Medicine, Obstetrics and Gynecology, University of Turin, Italy; ²Unit of Fetal Program, Institute for Maternal and Fetal Health, IRCCS San Carlo, Turin, Italy; ³Department of Cardiology, Bambino Gesù University, Rome, Italy; ⁴Women Center for Evidence-Based Research, Ludwig-Maximilians-University, Munich, Germany

Quantitative Assessment of Fetal Well-Being Through CTG Recordings: A New Parameter Based on Phase-Rectified Signal Average
Ariella Finelli, Giovanni Magenes, Maria Campanile, and Maria G. Sigurdottir

BJOG An International Journal of Obstetrics and Gynaecology

Brain sparing effect in growth-restricted fetuses is associated with decreased cardiac acceleration and deceleration capacities: a case-control study
T. Stampalija, R. Casati, M. Mastroianni, E. Ferrazzi, M. Rizzo, M. Gagliardi-Ruggieri, A. Bauer, E. Rizzo

Intrapartum care
Phase-rectified signal averaging for intrapartum electronic fetal heart rate monitoring is related to acidemia at birth
A. Georgieva, A. T. Papageorgiou, S. Fayni, M. Moulder, C. W. Redman
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Acceleration and Deceleration Capacity of Fetal Heart Rate in an *In-Vivo* Sheep Model
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European Journal of Obstetrics & Gynaecology and Reproductive Biology
journal homepage: www.elsevier.com/locate/ejog

Parameters influence on acceleration and deceleration capacity based on trans-abdominal ECG in early fetal growth restriction at different gestational age epochs
Tamara Stampalija^{1,2}, Daniela Casati^{1,2}, Mariachiara Gagliardi-Ruggieri^{1,2}, Roberto Sassi¹, Massimo W. Riboldi^{1,2}, Valeria Maggi^{1,2}, Axel Bauer^{1,2}, Enrico Ferrazzi^{1,2}

