

Low frequency cerebral arterial and venous flow oscillations in healthy neonates measured by NeoDoppler

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Introduction

- Low frequency cerebral oscillations (LFO) has been suggested to have a cerebroprotective effect, and has been linked to a healthy autoregulation in adults
- The significance of such LFO in preterm and other sick neonates is not known
- NeoDoppler is a non-invasive transfontanellar ultrasound system base on plane wave transmission, for continuously monitoring of cerebral blood flow

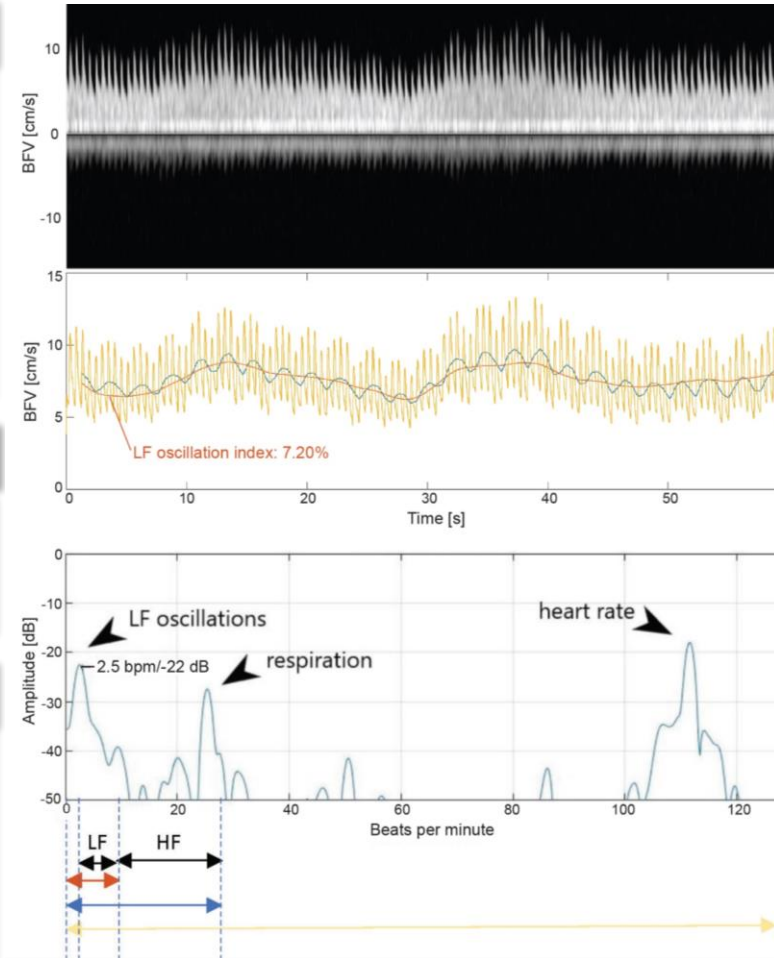


Purpose

- We aimed to map cerebral hemodynamics with NeoDoppler on the first two days of life in healthy term born neonates and describe the effect of postnatal age (PNA) and behavioral state

Methods and Materials

- The NeoDoppler system displays a high frame rate color M-mode and Doppler spectrogram
- Data was collected for two hours the first two days of life in 36 healthy term born neonates
- Behavioral state was categorized as asleep or awake
- We propose a LFO index, where the magnitude is given in percent of the mean value
- Separate analyses were done for arterial and venous signals



Upper panel: the Doppler spectrum with LF oscillations (2,5 cycles per min)
 Middle panel: the Doppler velocity curve (yellow). The blue curve is the sum of the Doppler velocity mean value, LF- and high frequency (HF) oscillations. The red curve is the sum of the mean value and LF oscillations
 Lower panel: The frequency spectrum of the velocity curve

Results

- The arterial LFO index decrease with higher PNA ($p < 0.001$), but the venous LFO index did not ($p = 0.624$)
- There was no significant association between the arterial and venous LFO index and behavioral state

LFO index (%) Mean (SD)	Day 1		Day 2	
	Asleep	Awake	Asleep	Awake
Arterial	5.73 (2.34)	6.10 (2.46)	5.00 (1.67)	5.00 (1.94)
Venous	3.91 (2.57)	3.74 (1.99)	3.08 (1.64)	4.76 (3.31)

Conclusions

- NeoDoppler successfully captured LF oscillations in healthy neonates born at term
- The LFO index change during the first days of life
- The clinical significance of monitoring the LFO index in sick neonates remains to be studied