

Supplemental Details on the Methodology.

1. The rTHb was detected at 805 nm, which is isosbestic to oxy- and deoxyhemoglobin, using $1 - (\text{optical density } A)$ from the NIRS output to obtain a surrogate measure of cerebral blood volume (9).

2. For the wavelet hemoglobin volume index (wHVx) calculation, we used a wavelet transform coherence threshold of 0.46 to identify reliable phase shift data and reject unreliable data according to our published methods (26). Individual phase shift values with coherence higher than 0.46 were analyzed, and data points with coherence lower than 0.46 were excluded.

3. The edge effect of the morlet wavelet is $2s\sqrt{2}$, where s equals $1/f$ (28,29). In our study, we used the frequency range of 0.007-0.05 Hz, resulting in an edge effect of $2\sqrt{2} * (1/0.05)$ to $2\sqrt{2} * (1/0.007)$ seconds, or an edge effect of approximately 56 to 404 s.

Supplemental Table 1. Perinatal insult score

Parameter	2 points	1 point	0 points
Emergency delivery ^a		Yes	No
Apgar score at 10 min ^b		≤ 5	>5
pH from the umbilical cord or arterial blood gas from 1 st hour of life	≤7.00	7.01 to ≤7.15	>7.15
Base deficit from the umbilical cord or arterial blood gas from the 1 st hour of life	≤ -16	-15 to ≤ -10	> -10
Sarnat stage	3	2	1
Mechanical ventilation		Yes	No

^a Emergency delivery refers to unscheduled deliveries (e.g., delivery for fetal distress).

^b If the Apgar score was not available, the baby received 1 point if mechanical ventilation was provided.

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