amino acid concentrations is an interesting issue for further study on umbilical flux analysis. We are developing a system that allows analysing amino acids with much smaller amounts of samples.

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Comparison of peripheral and cerebral tissue oxygenation index in neonates

Near-infrared spectroscopy (NIRS) is a non-invasive method to measure haemoglobin and tissue oxygenation continuously. Measurement of "cerebral tissue oxygenation index" (c-TOI)[1] and "peripheral tissue oxygenation index" (p-TOI)[2] is based on spatially resolved spectroscopy (SRS). SRS is realised with one light detector having sensors at different distances. The aim of the present study was to measure c-TOI and p-TOI simultaneously to compare the two values.

NIRS measurements were carried out in 20 term and preterm infants (gestational age >29 weeks and birth weight >1200 g) within the first 8 weeks after birth. At time of measurements the infants had to be clinically stable, without any cardiorespiratory support. The measurements were carried out with the NIRO-300 (Hamamatsu, Japan). Near-infrared light was transmitted through the left frontoparietal side of the head (interoptode distance of 4 cm) and the left lateral calf (interoptode distance of 3 cm). Measurements were performed during undisturbed daytime sleep after a feed. The infants were lying in a horizontal position with the calf positioned just above the mid-sternum. To increase the precision[1] the optodes were reapplied five times. After each application there was a rest period of at least 3 min and repeated measurements lasting 20 s each were performed five times.

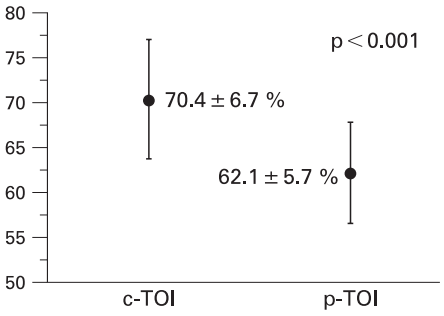

Figure 1 Comparison of cerebral and peripheral "tissue oxygenation index" (c-TOI and p-TOI) in 20 healthy newborn infants.

Heart rate and arterial oxygen saturation were measured by pulse oximetry. Central and peripheral temperatures and mean blood pressure were measured before and after NIRS measurements. Diameter of calf and subcutaneous adipose tissue were measured with ultrasound. c-TOI and p-TOI were determined as mean values of the repeated measurements in each newborn and compared using paired t test. Data are presented as mean (SD).

Demographic and clinical characteristics of the infants at time of measurements are presented in table 1. At time of measurement all infants had a weight >2000 g. Of the 500 measurements (25 in each neonate) 135 measurements were excluded because of body movements causing artefacts. c-TOI was significantly higher than p-TOI (70.4% (6.7) vs 62.1% (5.7), respectively; $p<0.001$) (fig 1). The c-TOI/p-TOI ratio was 1.14 ± 0.14.

This is the first report of comparison of simultaneously measured c-TOI and p-TOI in healthy term and preterm infants, and therefore, the present study is the first to introduce an index (c-TOI/p-TOI ratio).

We found that our values for c-TOI and p-TOI were similar to recent studies.[1 2] There may be several reasons for differences between c-TOI and p-TOI. Differences in the ratio of the three vascular compartments (arterial:capillary:venous) in muscle and brain can influence the results. Within the muscle, the estimated ratio is 10%:20%:70%, respectively.[3] In the brain, the mean arterial:venous ratio is thought to be 16:84.[4] Furthermore, cerebral autoregulation of oxygen delivery may also have an important role.

Simultaneous measurements and comparisons of c-TOI and p-TOI might help in future to detect early disturbances in circulation and oxygenation, especially in states of shock. Further studies should address comparison of c-TOI and p-TOI in compromised infants.

Table 1 Demographic and clinical characteristics of the 20 infants at time of measurement*

Neonates	20
Male to female ratio	13/7
Gestational age (weeks)	35 (3.8)
Age (days)	16 (18)
Actual weight (g)	2418 (616)
Mean arterial pressure (mm Hg)	46.1 (8.5)
Heart rate/min	133 (13)
Arterial oxygen saturation (%)	96.0 (2.5)
Haemoglobin concentration (g/l)	129 (20)
Temperature rectal (°C)	36.8 (0.5)
Temperature peripheral (°C)	34.5 (0.9)
Calf circumference (cm)	9.4 (1.1)
Thigh circumference (cm)	12.5 (1.9)
Calf diameter (cm)	3.1 (0.3)
Calf subcutaneous adipose tissue (cm)	0.3 (0.1)

*Values are mean (SD) except number of neonates and the male to female ratio.

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CORRECTION

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