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Neonatal umbilical cord blood cardiac troponin as reflecting fetal growth, age and well being

Jayasinghe SB¹, Potter J², Kecskes Z², Nouri-Girones F², Hickman P², Koerbin G³

¹Canberra Hospital, Canberra, Australia, ²Australian National University Medical School, Canberra, Australia, ³University of Canberra, Canberra, Australia

Objectives: It has been proposed that an elevated concentration of cardiac troponin in umbilical cord blood may function as a surrogate marker of ischemic damage sustained in utero and/or during labour and delivery. The objective of this study is to document the umbilical cord blood concentrations of troponins I (cTnI) and T (cTnT) using high sensitivity assays and correlate these with maternal and fetal clinical history.

Methods: Umbilical cord blood was collected immediately following delivery from 416 babies, including 12 sets of twins. Clinical history was obtained from clinical notes. Ethics permission was obtained from ACT Health Human Research and Ethics Committee for the study and consent was obtained from mothers for their participation. Cardiac troponins were assayed using hs-cTnI on Abbott Architect (LoD 1.0 ng/L) and hs-cTnT on Roche E4111 (LoD 5.0 ng/L). Data are expressed as median and 25th and 75th percentiles.

Results: Umbilical cord blood consistently has higher median values of cTnT than cTnI such that the median ratios are 6.8 and 5.4 at <32 week gestation and 41 week babies respectively compared with T:I of 0.8 in adults. Babies of early gestation have higher concentrations of cTnT and cTnI as do babies with APGAR scores ≤ 4 at 1 min. Median cTn concentrations show a 50% decrease between babies born < 32 weeks and those at full term.

Relationship of birth weight and umbilical cord cardiac troponin concentrations. Low Birth Weight babies have ~50% higher cTn concentrations

Conclusions: These findings are consistent with a differential expression of cTnT and cTnI in utero with potential contributions from growth and re-modelling of the heart in addition to “ectopic” production in less differentiated non-cardiac muscle. The effect of intermittent ischemia which occurs as part of normal labour and delivery may superimpose on this increments.