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# Base deficit estimation in umbilical cord blood is influenced by gestational age, choice of fetal fluid compartment, and algorithm for calculation.

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OBJECTIVE: The purpose of this study was to explore the influences of gestational age, the choice of fetal fluid compartment, and the algorithm for calculation on the estimation of the base deficit in umbilical cord arterial blood at birth.

STUDY DESIGN: From 1995 to 2002, cord arterial blood gases and obstetric data were available for 43,551 newborn infants at 37+ weeks of gestation (cohort I). The mean base deficit in blood and the base deficit in extracellular fluid were estimated from pH and PCO2 values in 28,213 newborn infants with a 5-minute Apgar score of > or = 9 (cohort II) with the use of 3 different calculation algorithms (base deficit in blood, base deficit in extracellular fluid [A], and base deficit in extracellular fluid [B]).

RESULTS: In cohort II, the base deficit in blood, the base deficit in extracellular fluid (A), and the base deficit in extracellular fluid (B) increased with advancing gestational age (linear regression; P < .0001). The curves run almost parallel, with the base deficit in blood being higher than the base deficit in extracellular fluid (A) and (B). With the use of receiver operating characteristic curves in cohort I, the area under curve to indicate a 5-minute Apgar score of < 7 and < 4 showed the area under curve-pH to be greater than the area under curve-base deficit in extracellular fluid (A) and (B), the area under curve-base deficit in blood to be greater than the area under curve-base deficit in extracellular fluid (A) and (B) for a 5-minute Apgar score of < 7, and the area under curve-base deficit in blood to be greater than the area under curve-base deficit in extracellular fluid (A) and (B) for an Apgar score of < 4. The cutoffs with highest sensitivity and lowest false-positive rate for a 5-minute Apgar score of < 7 and < 4 were, for both scores, a pH value of 7.15, a base deficit in blood of 10 mmol/L, a base deficit in extracellular fluid (A) of 8 mmol/L, and a base deficit in extracellular fluid (B) of 6 mmol/L.

CONCLUSION: The calculated values of the base deficit in umbilical cord arterial blood are influenced decisively by gestational age, the choice of fetal fluid compartment, and the calculation algorithms that are used. The power of the base deficit to indicate neonatal distress depends on the choices of fluid compartment and the algorithm that is used to calculate the base deficit.