

INTEREST OF DETERMINATION OF UNBOUND BILIRUBIN IN NEWBORNS: EXPERIENCE OF CNRHP

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BACKGROUND

The unbound bilirubin (UBB) concentration is probably the most critical parameter in establishing the risk for bilirubin encephalopathy. This parameter takes in consideration 3 biological risk factors for kernicterus in newborns: hyperbilirubinaemia, hypoalbuminaemia and competitors of bilirubin-albumin bond. It also identifies risk situations which cannot be detected with individual testing of either bilirubin and albumin. In CNRHP, the UBB analysis has been routinely performed since 1987 on a dedicated instrument, the UB Analyser (Arrows, Co, Ltd. Osaka, Japan), a non-automated assay) with the peroxidase method until transfer of the assay to open biochemistry systems: DXC800, CX4-CE (Beckman-Coulter) and then Indiko (Thermofisher). CNRHP laboratory performs on routine basis dosage of UBB for each demand of Total bilirubin Concentration (TBC) to allow clinicians to make a more accurate approach of hyperbilirubinemia treatment.

UBB TESTING BY PEROXYDASE METHOD - MECHANISM

The principle of this assay is a rapid deterioration of the UBB into a leuco derived compound by the action of a peroxidase in the presence of hydrogen peroxide. The UBB concentration is calculated from the oxidation kinetics.

RETROSPECTIVE STUDY

In a retrospective study, we have analyzed two month's results of sick newborns within the first week of life (n=1524).

The threshold value of UBB from which a risk of kernicterus is present is set at 0.80 µg/dl for preterm neonates (or with a weight < 1500 g) and 1.20 µg/dl for term newborns. These threshold values are used to identify children at risk for neurological toxicity despite a total bilirubin < 350 µmol/l.

RESULTS

Total bilirubin concentration ranged from 98 to 510 µmol/l and UBB concentrations ranged from 0.08 to 1.57 µg/dl. (figure 1)

1- The mean UBB concentration in 17 newborns with total bilirubin concentrations exceeding 350 µmol/l was 0.97 +/- 0.2 µg/dl.

2- 44 infants with total bilirubin concentration ranging from 177 to 348 µmol/l had UBB concentration within this range, emphasizing the wide variation in binding among infants.

3- All babies with value of UBB higher than threshold had aggravating factors of bilirubin toxicity: prematurity, dehydration, hypotrophy which illustrates the interest of the determination of UBB.

CONCLUSION

In conclusion unbound bilirubin dosage (UBB) rather than total bilirubin is a critical serum factor involved in brain uptake of bilirubin and subsequent neurotoxicity, but unfortunately these biological parameters are not available everywhere. UBB dosages may impact clinical practices by giving more insights on bilirubin tolerance, thus guiding the use of albumin when phototherapy reaches limits

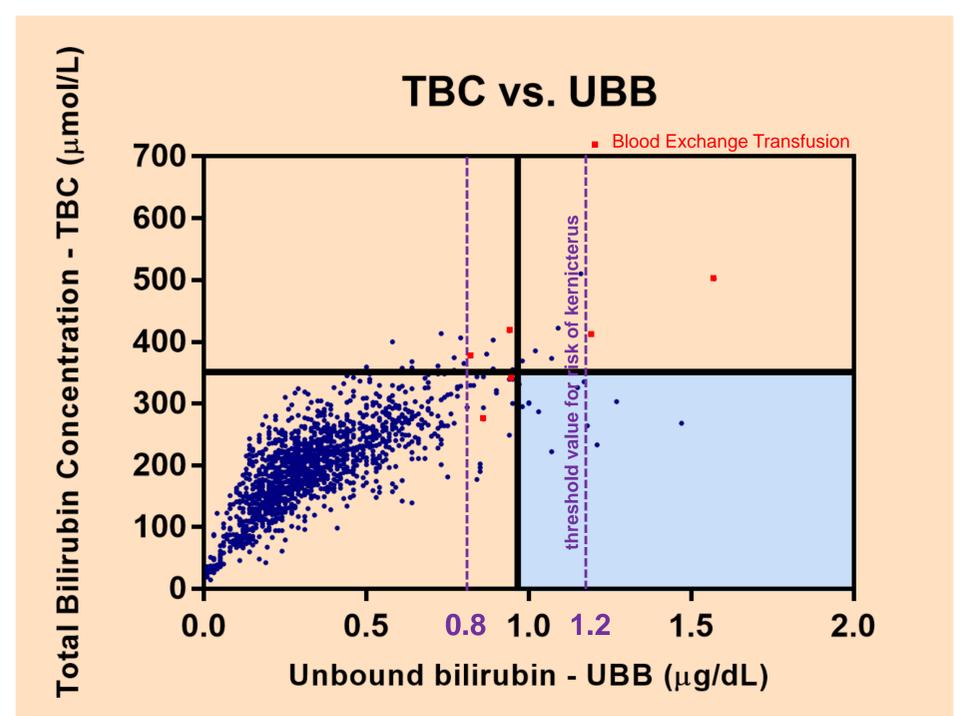
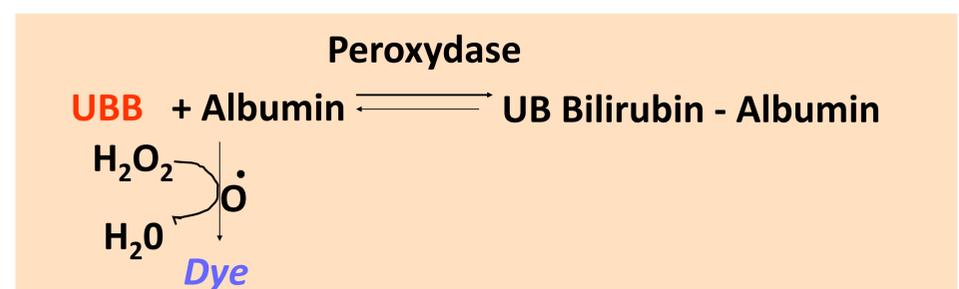


Figure 1