Use of a Cord Blood F-Dex Monocyte Binding Assay to Study the Glucocorticoid Receptor in Neonates

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Abstract

Background:
Glucocorticoids play an important role in the developing fetus, the most important of which is lung maturation by increasing surfactant production and release. Glucocorticoid receptor (GR) functioning changes throughout the fetal period, especially during the transition to extrauterine life. Given the importance of glucocorticoids in lung development and functioning, studying glucocorticoid sensitivity in this population would be helpful, especially in the preterm population, to determine steroid treatment for better lung outcomes. Few groups have characterized the glucocorticoid receptor and its sensitivity using cord blood monocytes.
Objective and hypotheses:
We propose to use cord blood monocytes to characterize the GR and its sensitivity in term neonates using a Fluorescein labeled dexamethasone (F-Dex) monocyte binding assay
Method:
20 cord blood samples were collected from term neonates (37-40 week gestation) born to mothers with no pregnancy complications and no labor (scheduled C-Section). We compared the F-Dex binding in this group to 50 healthy pediatric pts (5-22 yo).
Results:
We found that the F-Dex binding of the studied neonatal population was similar (within 1 SD) to the pediatric population through the initial concentration ranges of F-Dex. However, there was an increase in binding in the neonatal population in comparison to the pediatric population at the highest concentration
Conclusion:
A cord blood F-Dex monocyte binding assay can be used to characterize the GR in neonates. It showed that there is a difference in F-Dex binding at the highest concentrations in the neonate population, as compared to our pediatric population, most likely related to changes in the GR in the process of adaptation to extrauterine life, Our future studies will use this assay to study the GR in preterm neonates to help us determine appropriate steroid dosing and better lung outcomes in these patients.

Objective

We propose to use cord blood monocytes to characterize the glucocorticoid receptor and its sensitivity in term neonates using a Fluorescein labelled dexamethasone (F-Dex) monocyte binding assay

Methods

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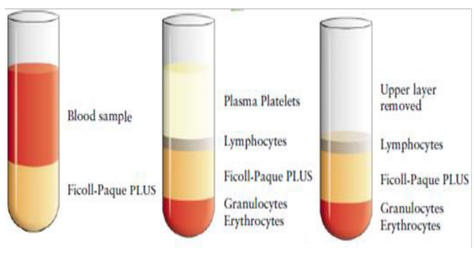

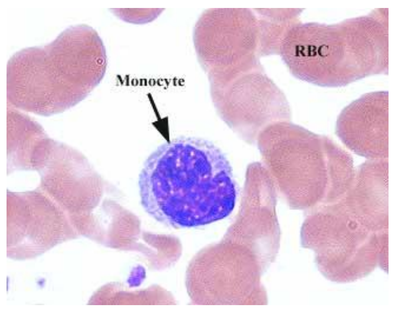

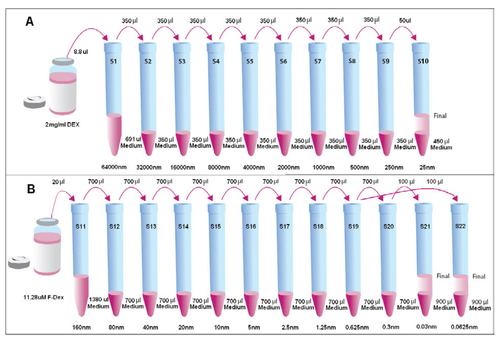

Results

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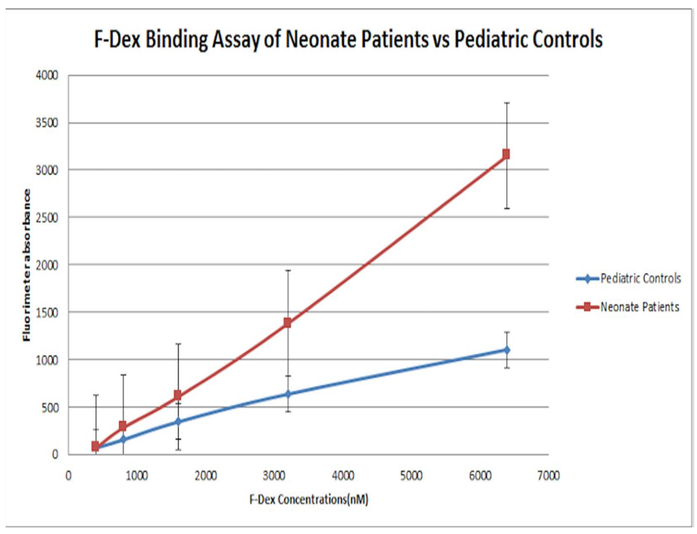

Background

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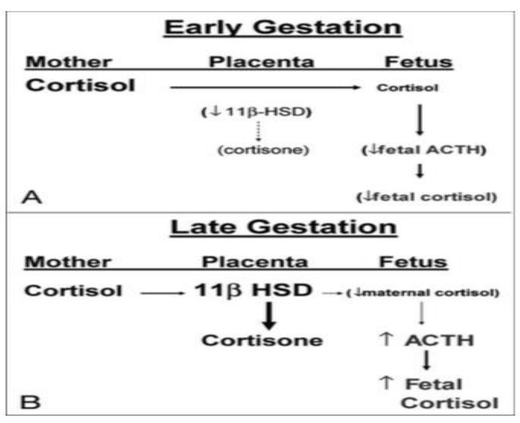

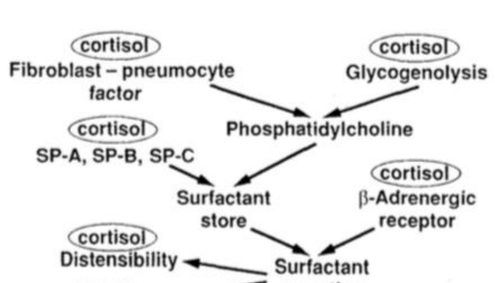

Fig. 5. Diagram illustrating multiple points of action of cortisol on the biosynthetic pathway of pulmonary surfactant.

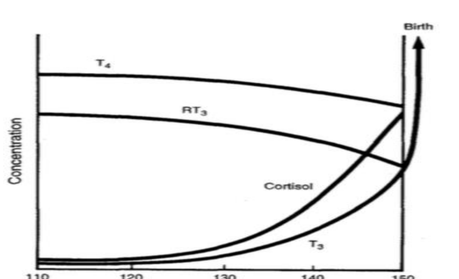

Fig. 3. Patterns of cortisol and thyroid hormones in plasma of fetal sheep in late pregnancy. T_3, tri-iodothyronine; T_4, thyroxin; RT_3, reverse T_3.

Discussion

A cord blood F-Dex monocyte binding assay can be used to characterize the GR in neonates. It showed that there is a difference in F-Dex binding at the highest concentrations in the neonate population, as compared to our pediatric population, most likely related to changes in the GR in the process of adaptation to extrauterine life, Our future studies will use this assay to study the GR in preterm neonates to help us determine appropriate steroid dosing to produce better lung outcomes in these patients with less side effects of steroid use.

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