

Authors: A. Netsanet, (M.D., SOM), S.H. Abman, M.D. (faulty sponsor), G. Seedorf, B.S.
Sponsoring Department: Department of Pediatrics, University of Colorado School of Medicine

Antenatal Betamethasone Preserves Lung Structure and Function and Prevents Pulmonary Hypertension in Chorioamnionitis-Induced Bronchopulmonary Dysplasia

Background: Bronchopulmonary dysplasia (BPD), the chronic lung disease of preterm birth, is characterized by arrested lung development, abnormal lung function, and increased risk for pulmonary hypertension (PH). Clinical studies have shown strong associations of antenatal stress from chorioamnionitis (CA) with risk for BPD. Antenatal steroids improve many complications of prematurity; however, it remains uncertain whether they reduce markers for BPD in the setting of antenatal inflammation.

Hypothesis: We hypothesize that antenatal betamethasone (BM) administration will help preserve lung alveolar and vascular growth and reduce PH in a rat model of CA-induced BPD.

Design/Methods: Intra-amniotic endotoxin (ETX; 10 µg/sac) or saline (CTL; 50ul/sac) was administered to rat pups via laparotomy of pregnant dams at embryonic day 20 (E20; term, 22 days). BM (BM; 0.2mg/kg) was administered to dams at E20. Pups were delivered by C-section at E22. Four subgroups were identified: saline (CTL), ETX, BM, and ETX+BM. Functional and morphometric analyses were performed at DOL14.

Results: In comparison with CTL, antenatal ETX impaired lung growth, increased resistance, reduced compliance, and increased RVH at DOL14. Maternal BM treatment of ETX-exposed fetal rats preserved distal lung structure and function and prevented RVH. BM treatment reduced total lung resistance by 15.3% and improved compliance by 9.5% ($p<0.05$). BM also preserved lung complexity and alveolar growth as measured by radial alveolar counts (RAC; ($p<0.05$), increased vessel density, and improved RVH by 42.3% ($p<0.05$).

Conclusion: Antenatal BM preserves lung growth and structure, restores function and prevents RVH in this BPD model. We speculate that in the subgroup of pregnancies complicated by CA, antenatal steroids can reduce the risk for BPD.