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Poster Presentation

Pulmonary neuroendocrine hyperplasia in hemoglobin Bart-induced hydrops fetalis. A model for chronic intrauterine hypoxia

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ABSTRACT

The pulmonary neuroendocrine system consists of pulmonary neuroendocrine cells (PNECs) and neuroendocrine bodies (NEBs) distributed throughout the respiratory epithelium which regulate lung growth and maturation in the antenatal period. Abnormalities in this system have been linked to many hypoxia-associated pediatric pulmonary disorders. Hemoglobin (Hb) Bart disease is a severe form of α- thalassemia. Affected fetuses suffer from marked intrauterine hypoxia with subsequent hydrops fetalis (HF) and die in utero or soon after delivery. Such fetuses can serve as a naturally occurring human model for the effects of intrauterine hypoxia and we postulated these effects should include changes in the pulmonary neuroendocrine system. In this investigation, Bombesin immunostaining was used to assess PNECs and NEBs in stillborn fetuses with Hb Bart HF (n =16) and HF by other causes (n =14) in comparison to non-HF, age-matched controls. Comparing Hb Bart HF to non-HF controls, there was a significant increase in the proportion of PNECs compared to respiratory epithelial cells (0.0129 vs. 0.0045, p= 0.002), mean number of NEB nuclei (3.9 vs. 3.4, p = 0.03), and mean size of NEBs (53.1 μm2 vs. 41.5 μm^2, p= 0.002). Significant differences were not observed in HF due to other causes. The results indicate PNEC and NEB hyperplasia as well as NEB hypertrophy occurs in Hb Bart HF, presumably as an adaptive response to the hypoxic environment by enhancing differentiation from precursor cells and/or increased synthesis and storage of peptides. Hb Bart HF may provide a useful model for studying the pulmonary neuroendocrine system under chronic intrauterine hypoxic stress.

Keywords: Neuroendocrine cells, neuroepithelial bodies, bombesin, hydropsfetalis, hemoglobin Bart