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**Background.**  $\beta$ -carotene is one of the few carotenoids that can be endogenously converted to vitamin A, a nutrient essential for inner ear development. While previous studies have identified a protective effect of carotenoids on hearing in adults, the impact of  $\beta$ -carotene on hearing outcomes in neonates is not well understood. The purpose of this study is to investigate the relationship between maternal  $\beta$ -carotene intake, maternal plasma, and umbilical cord plasma  $\beta$ -carotene levels and abnormal Newborn Hearing Screen (NHS) results.

**Significance of Problem.** The prenatal period is critical for auditory development; thus, effectors of auditory development may significantly impact long-term hearing ability. Because maternal nutrition is modifiable, an improved understanding of the relationship between  $\beta$ -carotene levels and hearing outcomes may be relevant for prenatal care recommendations.

**Hypothesis.** We hypothesize that higher levels of  $\beta$ -carotene will be associated with decreased risk of abnormal NHS results.

**Experimental Design.** An IRB-approved study enrolled mother-infant pairs (n=541) at the time of delivery.  $\beta$ -carotene plasma levels were analyzed with HPLC. Maternal intake of  $\beta$ -carotene over the past year was quantified using the validated Harvard Food Frequency Questionnaire. NHS results were obtained from the Electronic Medical Record. Statistical analysis was done using the Mann-Whitney U and logistic regression tests, with  $p < 0.05$  considered statistically significant.

**Results.** Of the 541 participants, 8.5% of infants had abnormal NHS results. Higher median maternal  $\beta$ -carotene intake was observed in infants who failed their NHS compared to those who passed (5924 vs. 4722 mcg/day,  $p = 0.019$ ). Higher median maternal plasma levels of both trans- (206 vs. 149 mcg/L,  $p = 0.021$ ) and cis- $\beta$ -carotene (15.9 vs. 11.2 mcg/L,  $p = 0.015$ ) were observed in infants who failed their NHS. Higher median cord plasma trans  $\beta$ -carotene was observed in infants who failed their NHS (15.5 vs. 8.0 mcg/L,  $p = 0.04$ ). Associations between failed NHS and log-transformed  $\beta$ -carotene intake and serum levels remained in a logistic regression model after adjustment for NICU admission, race/ethnicity, smoking status, maternal age, corrected gestational age, infant sex, and log transformed maternal caloric intake.

**Conclusion.** The observed relationship between higher  $\beta$ -carotene levels and abnormal NHS was unexpected. While other studies suggest both deficient and excessive levels of vitamin A can impact inner ear development,  $\beta$ -carotene levels in our study were not exceptionally high. One possible explanation is that higher maternal  $\beta$ -carotene levels may be indicative of impaired transfer of  $\beta$ -carotene to the fetus. Further study is warranted to better understand the relationship between  $\beta$ -carotene and NHS results.