

# Comparing Intrauterine Transfer Rates and Maternal Plasma Levels of Carotenoids In Maternal-Infant Pairs Between Gestational Age Groups

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## BACKGROUND

- Approximately 10.5% of babies in Nebraska are born preterm, with 7.8% born late pre-term.<sup>1</sup>
- Fat-soluble nutrients, such as carotenoids, can be protective against oxidative stress and can prevent pathologies brought on by oxidative stress.<sup>2,3</sup>
- Carotenoid levels of the newborn are generally lower than maternal values.<sup>2,3</sup>
- The objective of this study is to identify differences in carotenoid intrauterine transfer rates between gestational age groups.

## EXPERIMENTAL DESIGN

- An IRB-approved study enrolled mother-infant pairs (n=308) at the time of birth.
- Maternal blood samples and umbilical cord samples were analyzed for carotenoid concentration.
- Calculation for transfer rate:  $\frac{\text{umbilical cord blood nutrient level}}{\text{maternal serum level}} \times 100\%$
- Descriptive statistics were generated and the Kruskal-Willis test and post-hoc pairwise comparisons were used to assess the relationship between carotenoid transfer rates and gestational age. A p-value of <0.05 was considered significant.

Group	Gestational Age
Extremely preterm	<28 weeks
Very preterm	28 to <32 weeks
Moderately to late preterm	32 to <37 weeks
Early term	37 to <39 weeks
Term	≥39 weeks

## DEMOGRAPHICS

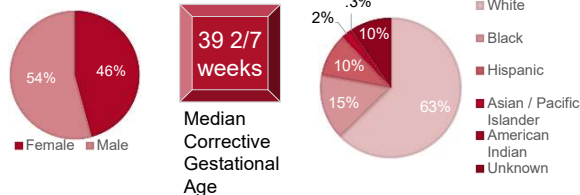


Table 1. Distribution of Infants Across Gestational Age Groups

Group	N	Percentage
Extremely preterm	3	1%
Very preterm	9	2.9%
Moderately to late preterm	33	10.7%
Early term	70	22.7%
Term	193	62.7%

## RESULTS

Table 2. Comparison of Median Intrauterine Transfer Rates Between Gestational Age Groups

Variable	Median Transfer Rate	Significance
Lutein + Zeaxanthin	15.6%	0.001
β-cryptoxanthin	11%	0.112
Total-Lycopene	4.4%	0.070
α-carotene	8.6%	0.030
Total β-carotene	6.1%	0.037

- The distribution of L+Z transfer rate varied significantly different between Term-Moderately preterm (11 vs. 20%, p=0.016) and Term-Extremely preterm (11 vs. 32%, p=0.041)
- The distribution of α-carotene transfer rate varied significantly different between Term-Moderately preterm (8 vs. 13%, p=0.003)

Table 3. Comparison of Median Maternal Plasma Levels in Maternal-Infant Pairs Between Gestational Age Groups

Variable	Median Maternal Plasma Levels (mcg/L)	Significance
Lutein + Zeaxanthin	197.37	0.000
β-cryptoxanthin	107.44	0.000
Total-Lycopene	498.96	0.013
α-carotene	36.93	0.039
Total β-carotene	167.86	0.053

- The distribution of L+Z maternal plasma levels varied significantly different between Very preterm-Term (107 vs. 219 mcg/L, p=0.009), Moderately preterm-Term (132 vs. 219 mcg/L, p=0.000), Early term-Term (184 vs. 219 mcg/L, p=0.045)
- The distribution of β-cryptoxanthin maternal plasma levels varied significantly different between moderately preterm-term (78 vs. 119 mcg/L, p=0.000)

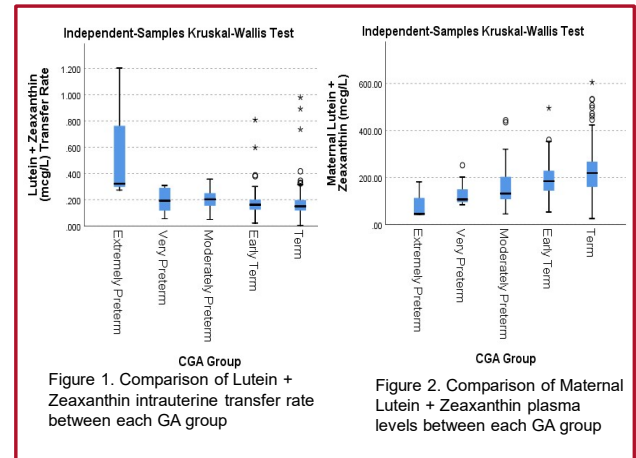


Figure 1. Comparison of Lutein + Zeaxanthin intrauterine transfer rate between each GA group

Figure 2. Comparison of Maternal Lutein + Zeaxanthin plasma levels between each GA group

## CONCLUSION

- Approximately 14.6% of our cohort was born preterm and the carotenoid levels in infants were generally lower than maternal values.
- There was a significant difference between the intrauterine transfer rates and gestational ages for L+Z, α-carotene, and total β-carotene.
- In general, the intrauterine transfer rates decreased as gestational age progressed, whereas maternal plasma levels increased with advancing gestational age.
- Further investigation is needed to fully grasp the clinical significance of this observed difference between intrauterine transfer rates of carotenoid and gestational age.

## REFERENCES

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2. Ziełńska, M. A., Wesolowska, A., Pawlus, B., & Hamuika, J. (2017). Health effects of carotenoids during pregnancy and lactation. *Nutrients*, 9(8), 838. doi: 10.3390/nu9080838.
3. Kiely, M., Cogan, P., Kearney, P., & Morrissey, P. (1999). Concentrations of tocopherols and carotenoids in maternal and cord blood plasma. *European Journal of Clinical Nutrition*, 53(9), 711-715.