

FETAL AND NEONATAL FACTORS INFLUENCING FREE CARNITINE

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Background: Free Carnitine (FC) is now measured routinely in newborns in Indiana. Studies with small numbers have suggested that FC may be dependent on fetal and neonatal factors.

Objective: Our objective was to compare FC levels with various fetal and neonatal factors. Our goal was to establish normative data by gestation in a very large cohort (Indiana State) and to use these carnitine values to develop hypotheses about FC in fetal life and disease.

Design/Methods: Indiana State Health Department FC values (tandem mass spec) and demographic variables were obtained for the years 2005-2010. Gender, race, birth weight, gestation, NICU admission, age at collection information was also evaluated. Multivariate fixed effect models were used to compare carnitine values with independent variables.

Results: The number of newborns analyzed was 459,932. FC levels were lowest in babies with gestational age 37-40 weeks and higher in both preterm and post-term babies (Table 1).

Gestation	FC mean	SE mean	Gestation	FC mean	SE mean
23	40.88	1.00	33	39.81	0.28
24	39.86	0.73	34	38.28	0.22
25	42.61	0.69	35	37.14	0.19
26	42.77	0.64	36	36.37	0.17
27	42.65	0.63	37	35.76	0.20
28	42.47	0.57	38	35.11	0.22
29	43.51	0.53	39	35.04	0.19
30	40.4	0.46	40	35.36	0.07
31	41.96	0.41	41	38.58	0.48
32	40.65	0.34	42	40.96	1.52

FC levels were lowest in babies with birth weights between 3150-4050g (34.39 ± 0.07) and higher in groups with both lower ($<2500\text{g}; 39.54 \pm 0.08^{**}$, $2500-2850\text{g}; 35.82 \pm 0.08^{**}$, $2850-3150\text{g}; 34.89 \pm 0.08$) and higher weights ($>4500\text{g}; 35.66 \pm 0.1^{**}$). FC levels were lowest when collected between 24-48 hours (34.29 ± 0.05) and higher either before ($36.93 \pm 0.1^{**}$) or after that time ($2-3, 3-4, 4-5, >5\text{days}; 34.96 \pm 0.06^{**}, 36.21 \pm 0.11^{**}, 37.32 \pm 0.15^{**}, 36.8 \pm 0.14^{**}$). Female, white, non singleton and non NICU babies had significantly lower FC levels (Table 2).

Table 2. Free Carnitine vs. Demographics

Category	FC mean	SE mean
Male	39.40	0.08
Female	36.60	0.08**
White	37.16	0.06
Black	37.34	0.08*
Asian	39.12	0.18**
Other	38.39	0.1**
Singleton	38.30	0.06
Multiple	37.70	0.11**
NICU	40.46	0.09
Non-NICU	35.55	0.07**

* & ** are $p < 0.05$ & < 0.01 vs. comp group

Conclusions: FC values are significantly influenced by gestation, gender, race, time of collection, NICU admission, multiple birth and birth weight. Generally, factors which increased mortality and morbidity (immaturity, post maturity, low birth weight, male gender, black race) were associated with higher FC values. These data will be used to construct normative curves and may be useful in predicting neonatal outcomes (Figure 1).

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