




MEMORANDUM

DATE: December 4, 2023

TO: South Carolina Newborn Screening Community

FROM: Ona O. Adair, PhD, Assistant Laboratory Director
SC DHEC Public Health Laboratory (PHL) 

SUBJECT: Changes to the South Carolina (SC) Newborn Screening (NBS) Program's Expected Ranges for the Amino Acid (AA), Succinyl acetone (SA) and Acylcarnitine (AC) Analytes

Effective December 11, 2023, the expected ranges for the AA, SA, and AC analytes will change. These analytes are collectively used to screen for Amino Acid and Fatty Acid Oxidation disorders and Organic Acid conditions on the SC NBS test panel.

In our efforts for continual improvement, the SC NBS Program will implement a new testing platform and test kit for the AA, SA, and AC analytes. These changes are based on the evaluation of population data using the new platform and kit.

The current and new AA, SA and AC expected ranges are listed in the chart enclosed with this memo.

Please direct any questions to Beth Bair, MS, Chemistry Division Director at bairea@dhec.sc.gov; 803-896-0991 or Tanya Spells, MS, MT(ASCP), NBS Follow up Program Director at spellsty@dhec.sc.gov; 803-898-0619.

Thank you to all our providers and collaborators for your attention to this important update.

Analyte	Current Expected Range (µmol/L)	New Expected Range (µmol/L)
AA and SA analytes		
Citrulline	< 60.00	< 60.00
Leucine + Isoleucine	< 316.00	< 275.00
Methionine	< 65.00	< 50.00
Phenylalanine	< 130.00	< 120.00
Tyrosine	< 330.00	< 300.00
Valine	< 300.00	< 250.00
SA	< 1.50	< 1.00
AC analytes		
Free carnitine	> 8.0	> 11.4
	< 60.00	< 70.00
C2 (Acetyl carnitine)	> 5.30	> 6.50
C3 (Propionyl carnitine)	*	> 0.15
	< 5.30	< 7.00
C4 (Butyryl carnitine)	< 1.30	< 1.20
C3DC (Malonyl carnitine)+C4OH (3-Hydroxy-butyryl carnitine)	< 0.40	< 0.40
C4DC (Methylmalonyl carnitine)+C5OH (3-Hydroxy-isovaleryl carnitine)	< 1.00	< 0.70
C5 (Isovaleryl carnitine)	< 0.72	< 0.50
C5:1 (Tiglyl carnitine)	< 0.18	< 0.13
C5DC (Glutaryl carnitine)+C6OH (3-Hydroxy-hexanoyl carnitine)	< 0.45	< 0.25
C6 (Hexanoyl carnitine)	< 0.30	< 0.17
C6DC (Adipyl carnitine)	< 0.38	< 0.35
C8 (Octanoyl carnitine)	< 0.52	< 0.30
C10 (Decanoyl carnitine)	< 0.43	< 0.40
C10:1 (Decenoyl carnitine)	< 0.15	< 0.10
C10:2 (Decadienoyl carnitine)	< 0.10	< 0.10
C12 (Dodecanoyl carnitine)	< 0.65	< 0.40
C12:1 (Dodecenoyl carnitine)	< 0.43	< 0.25
C14 (Myristoyl carnitine)	< 0.58	< 0.58
C14:1 (Tetradecenoyl carnitine)**	< 0.75	< 0.70
	< 0.50	< 0.58
C14:2 (Tetradecadienoyl carnitine)	< 0.08	< 0.08
C16 (Palmitoyl carnitine)	> 0.85	> 1.10
	< 7.70	< 8.00
C16OH (3-Hydroxyl-palmitoyl carnitine)	< 0.08	< 0.12
C18 (Octadecanoyl carnitine)	> 0.25	> 0.30
	< 1.97	< 2.00
C18:1 (Olelyl carnitine)	*	> 0.40
	< 3.00	< 3.00
	> 0.08	*
C18:2 (Linoleyl carnitine)	< 0.70	< 0.70
C18:1OH (3-Hydroxyl-olelyl carnitine)	< 0.06	< 0.15
AA and AC ratios		
Leucine + Isoleucine/Phenylalanine	< 4.00	< 4.00
Methionine/Phenylalanine	< 1.00	< 1.00
Valine/Phenylalanine	< 3.52	< 4.50
Phenylalanine/Tyrosine	< 2.40	< 2.00
C0/(C16+C18)	< 30.00	< 30.00
(C3DC+C4OH)/C10	< 5.00	< 5.00
C3/C2	< 0.32	< 0.27
C3/C16	*	> 0.17
	< 2.40	< 3.00
C3+C16	> 2.00	> 2.00
C8/C10	< 1.80	< 2.25
C14:1/C2	< 0.02	< 0.04

*Indicates no expected range

** When the C14:1/C2 value is $\geq 0.04 \mu\text{M}$, the C14:1 expected range is $< 0.58 \mu\text{M}$; C14:1 values $\geq 0.70 \mu\text{M}$ are abnormal, regardless of the C14:1/C2 value.

Please direct any questions to Beth Bair, MS, Chemistry Division Director at bairea@dhec.sc.gov; 803-896-0991 or Tanya Spells, MS, MT(ASCP), NBS Follow up Program Director at spellsty@dhec.sc.gov; 803-898-0619.