## Interpretive Guide for Bloodspot Amino Acids

<table>
<thead>
<tr>
<th>Intervention Options</th>
<th>Amino Acids</th>
<th>LOW</th>
<th>HIGH</th>
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</thead>
<tbody>
<tr>
<td>Balanced or custom mixtures of all essential amino acids are recommended for repletion of low levels. Other specific options are shown below.</td>
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<tr>
<td>Arginine (Arg)</td>
<td>Arg, 500 mg BID</td>
<td>Mn, 15 mg</td>
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<tr>
<td>Histidine (His)</td>
<td>Folate 800 mcg; His, 500 mg TID</td>
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<tr>
<td>Isoleucine (Ile)</td>
<td>B6, 100 mg; Check for insulin insensitivity</td>
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<tr>
<td>Leucine (Leu)</td>
<td>B6, 100 mg; Check for insulin insensitivity</td>
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<tr>
<td>Lysine (Lys)</td>
<td>Carnitine, 1-2 g</td>
<td>Vitamin C, 1 g BID; Niacin, 50 mg; B6, 100 mg; Iron, 15 mg; α-KG, 300 mg TID</td>
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<tr>
<td>Methionine (Met)</td>
<td>B6, 100 mg; α-KG, 600 mg BID; Mg, 200 mg BID; SAM, 200 mg BID</td>
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<tr>
<td>Phenylalanine (Phe)</td>
<td>Iron, 30 mg; Vitamin C, 1 gm TID; Niacin, 50 mg; Low Phe diet</td>
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<tr>
<td>Taurine (Tau)</td>
<td>Tau, 300 mg BID; B6, 100 mg</td>
<td>Vit. E, 800 IU; Vit. C, 1 gm TID; -Carotene, 25,000 IU; CoQ10, 30 mg; Lipoate</td>
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<td>Threonine (Thr)</td>
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<tr>
<td>Tryptophan (Trp)</td>
<td>5HTP, 50 mg TID</td>
<td>Niacin, 50 mg; B6, 100 mg BID</td>
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<tr>
<td>Valine (Val)</td>
<td>B6, 100 mg; Check for insulin insensitivity</td>
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### Arginine
**Low** - often reflects a diet poor in high quality protein, causing arginine to be poorly absorbed. Because arginine is required for nitric oxide production, deficiencies have wide-ranging effects on cardiovascular and other systems.  
**High** - may indicate a functional block in the urea cycle. Manganese activates an arginase enzyme, so supplementing with manganese may help.

### Histidine
**Low** - check dietary protein, or malabsorption if other essential AAs are low. Low histidine is associated with rheumatoid arthritis and folate deficiency.  
**High** - may indicate excessive protein intake.

### Isoleucine
**Low** - a chronic deficiency of this AA can cause hypoglycemia and related problems and loss of muscle mass or inability to build muscle.  
**High** - non-fasting specimen, large intake of this AA or incomplete metabolism of it. If other BCAAs are high, add vitamin B6 to aid metabolism.

### Leucine
**Low** - potential catabolism of skeletal muscle.  
**High** - see isoleucine

### Lysine
**Low** - either poor dietary intake or too high intake of arginine. Low levels can inhibit transamination of collagen synthesis. If concurrent weakness or high triglycerides, add carnitine.  
**High** - impaired metabolism of lysine. Add vitamin C, niacin, α-KG, vitamin B6, and iron to enhance utilization of lysine.

### Methionine
**Low**- possible poor-quality protein diet. Adverse effects on sulfur metabolism. Improve dietary methionine intake or supplement.  
**High** - excessive intake of methionine-rich protein or inefficient metabolism. If other sulfur-containing AAs are low, then enhance methionine utilization by adding the necessary cofactors, magnesium and vitamin B6.

*Continued on the next page*
Phenylalanine
Low - can result in altered thyroid function and catecholamine deficits including symptoms of depression, cognitive disorders, memory loss, fatigue, and autonomic dysfunction. Reduce lifestyle stressors and supplement phenylalanine.
High - high protein intake or a block in the conversion of phenylalanine to tyrosine. Iron, vitamin C, and niacin are necessary for this enzymatic step. Check tyrosine level and, if low, supplement tyrosine and iron.

Taurine
Low - may increase risk for oxidative stress, fat malabsorption, high cholesterol, atherosclerosis, angina, arrhythmias, and seizure disorders. Supplement taurine or cysteine and vitamin B6, even if fresh fish or lean meat is eaten. Females do not synthesize taurine as easily as males.
High - may be due to excessive inflammation in the body or to supplementation of other amino acids.

Threonine
Low - associated with the increased catabolic state of diabetes or hyperinsulinemia. Supplement threonine and BCAAs.
High - excessive dietary intake or possible insufficient metabolism of threonine. The initial step here requires (vitamin B6) and zinc is needed to phosphorylate vitamin B6 to its active coenzyme form, so supplementation with vitamin B6 and zinc can be helpful.

Tryptophan
Low - commonly correlated with depression, insomnia, and schizophrenia. Supplementation with L-tryptophan or 5-hydroxy-tryptophan (5-HP) may help. 5-HP is only one enzymatic step away from serotonin.
High - possibly inadequate metabolism of tryptophan. Required nutrients for this process include niacin and vitamin B6.

References: