

TABLE 6.1 — SUMMARY OF ABNORMALITIES FOR ORGANIC ACIDS IN URINE

Name		Potential Intervention	Metabolic Pathway
<b>Fatty Acid Oxidation</b>			
Adipate	H	L-Carnitine, 500–1000 mg TID;	Fatty acid oxidation
Suberate	H	L-Lysine (if low), 500 mg TID; B <sub>2</sub> , 100mg BID	
Ethylmalonate	H	See text for other interventions in genetic disorders	
<b>Carbohydrate Metabolism</b>			
Pyruvate	H	B <sub>1</sub> , up to 100mg TID with B complex support; For concurrent H Lactate: lipoic acid, 500mg TID	Aerobic/anaerobic energy production
Lactate	H	Coenzyme Q <sub>10</sub> , 50 mg TID	
β-Hydroxybutyrate	H	Chromium picolinate, 200 µg BID	Balance of fat and CHO metab.
<b>Energy Production (Citric Acid Cycle)</b>			
Citrate	H	Arginine, 1–3 gm/day	Citric Acid Cycle Intermediates
	L	Aspartic acid, 500 mg	
Cis-aconitate	H	Cysteine, 1000 mg BID; Check for iron deficiency	
Isocitrate	H	Lipoic acid, 25 mg/kg/day Magnesium, 400 mg; manganese, 20 mg	
α-Ketoglutarate	L	α-KG, 300 mg; arginine, 1000 mg; glutamine, 1–5 g	
	H	B-complex, 1 TID; lipoic acid 100 mg	
Succinate	L	Isoleucine, 1000 mg TID; valine, 1000 mg TID	
	H	CoQ <sub>10</sub> , 50 mg TID, Magnesium, 500 mg	
Fumarate	L	Tyrosine, 1000 mg BID; phenylalanine, 500 mg BID	
Malate	H	CoQ <sub>10</sub> , 50 mg TID, B <sub>3</sub> , 100 mg TID	
Hyoxymethylglutarate	LH	CoQ <sub>10</sub> , 50 mg TID	(L) Substrate-limited CoQ <sub>10</sub> synthesis (H) HMG-CoA reductase inhibition
<b>B-Complex Vitamin Markers</b>			
α-Ketoisovalerate	H	B-complex, 1 TID; lipoic acid 100 mg	Valine catabolism
α-Ketoisocaproate	H		Leucine catabolism
α-Keto-β-methylvalerate	H		Isoleucine catabolism
Xanthurenate	H	Vitamin B <sub>6</sub> , 100 mg/d	Tryptophan catabolism (hepatic)
β-Hydroxyisovalerate	H	Biotin, 5 mg/day; Magnesium, 100 mg BID	Isoleucine catabolism
Methylmalonate or Propionate	H	B <sub>12</sub> , 1000 µg TID	Valine or odd-chain fatty acid catabolism
Formiminoglutamate	H	Folic acid, 400 µg/d	Histidine catabolism
<b>Neurotransmitter Metabolism</b>			
Vanilmandelate	LH	Tyrosine, 1000 mg BID-TID, between meals and phenylalanine hydroxylase cofactors as needed	(L) Tyrosine-limited or (H) Tyrosine-depleting epinephrine & norepinephrine catabolism
Homovanillate	LH	Contraindicated for patients taking MAO inhibitors	(L) Tyrosine-limited or (H) Tyrosine-depleting DOPA catabolism
5-Hydroxyindolacetate	LH	5-hydroxytryptophan, 50–100 mg TID; magnesium, 300 mg; vitamin B <sub>6</sub> , 100 mg (5-HTP may be contraindicated with SSRI's)	(L) Tryptophan-limited or (H) Tryptophan-depleting Serotonin catabolism
Kynurenate	H	B <sub>6</sub> , 100 mg; magnesium, 300 mg	Inflammation-stimulated macrophage and astrocyte kynurenine pathway activity
Quinolate	H	Magnesium, 300 mg	

Table 6.1 continued on following page...