

Urine Amino Acids by LC-MS/MS Normal Reference Ranges

Order Code	Test Code	Order Name	Units	New Age Range	New Normal Range	Old Age Range	Old Normal Range	
MSAAUP	MS1MHU	1-Methylhistidine (Urine)	µmol/g creatinine	0-2M	10-286	0-3M	10-286	
			µmol/g creatinine	3M-5M	0-1400	≥4M	<1401	
			µmol/g creatinine	6M-11M				
			µmol/g creatinine	1Y-2Y				
			µmol/g creatinine	3Y-5Y				
			µmol/g creatinine	6Y-11Y				
			µmol/g creatinine	≥12Y				
	MS3MHU	3-Methylhistidine (Urine)	µmol/g creatinine	0-2M	20-271	0-3M	20-271	
			µmol/g creatinine	3M-5M	90-400	≥4M	90-400	
			µmol/g creatinine	6M-11M				
			µmol/g creatinine	1Y-2Y				
			µmol/g creatinine	3Y-5Y				
			µmol/g creatinine	6Y-11Y				
			µmol/g creatinine	≥12Y				
	MSALAU	Alanine (Urine)	µmol/g creatinine	0-2M	475-3330	0-3M	170-2262	
			µmol/g creatinine	3M-5M	270-3020	≥4M	50-1150	
			µmol/g creatinine	6M-11M				
			µmol/g creatinine	1Y-2Y	170-1750			
			µmol/g creatinine	3Y-5Y	100-1000			
			µmol/g creatinine	6Y-11Y	80-930			
			µmol/g creatinine	≥12Y	60-500			
	MSAILU	Allo-Isoleucine (Urine)	µmol/g creatinine	0-2M	<1			0-3M
			µmol/g creatinine	3M-5M		≥4M	<1	
			µmol/g creatinine	6M-11M				
			µmol/g creatinine	1Y-2Y				
			µmol/g creatinine	3Y-5Y				
			µmol/g creatinine	6Y-11Y				
			µmol/g creatinine	≥12Y				
	MSAABU	Alpha-Aminobutyric Acid (Urine)	µmol/g creatinine	0-2M	0-120	0-3M	<135	
			µmol/g creatinine	3M-5M	0-80	≥4M	<61	
			µmol/g creatinine	6M-11M				
			µmol/g creatinine	1Y-2Y				0-70
			µmol/g creatinine	3Y-5Y				0-60
			µmol/g creatinine	6Y-11Y				0-50
			µmol/g creatinine	≥12Y				0-25
	MSAADU	Alpha-Aminoadipic Acid (Urine)	µmol/g creatinine	0-2M	0-700			0-3M
µmol/g creatinine			3M-5M	0-520	≥4M			
µmol/g creatinine			6M-11M					
µmol/g creatinine			1Y-2Y			0-470		
µmol/g creatinine			3Y-5Y			0-200		
µmol/g creatinine			6Y-11Y			0-125		
µmol/g creatinine			≥12Y			0-100		
MSARGU	Arginine (Urine)	µmol/g creatinine	0-2M	0-470		0-3M	<145	
		µmol/g creatinine	3M-5M	0-340	≥4M	5-74		
		µmol/g creatinine	6M-11M					
		µmol/g creatinine	1Y-2Y				0-390	
		µmol/g creatinine	3Y-5Y				0-270	
		µmol/g creatinine	6Y-11Y				0-160	
		µmol/g creatinine	≥12Y				0-100	

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MSAAUP	MSASAU	Argininosuccinic Acid (Urine)	µmol/g creatinine	0-2M	Qualitative Only	0-3M	Previously not reported
			µmol/g creatinine	3M-5M		≥4M	
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	≥12Y			
	MSANHU	ASA Anhydrides (Urine)	µmol/g creatinine	0-2M	Qualitative Only		0-3M
			µmol/g creatinine	3M-5M		≥4M	
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	≥12Y			
	MSASNU	Asparagine (Urine)	µmol/g creatinine	0-2M	39-1012		≥4M
			µmol/g creatinine	3M-5M	32-637		
			µmol/g creatinine	6M-11M	56-473		
			µmol/g creatinine	1Y-2Y	35-242		
			µmol/g creatinine	3Y-5Y	28-273		
			µmol/g creatinine	≥12Y	18-126		
	MSASPU	Aspartic Acid (Urine)	µmol/g creatinine	0-2M	0-370	≥4M	<223
			µmol/g creatinine	3M-5M	0-160		
			µmol/g creatinine	6M-11M	0-65		
			µmol/g creatinine	1Y-2Y	0-25		
			µmol/g creatinine	3Y-5Y	0-25		
			µmol/g creatinine	≥12Y	0-25		
	MSBALU	Beta-Alanine (Urine)	µmol/g creatinine	0-2M	0-250	≥4M	<35
			µmol/g creatinine	3M-5M	0-125		
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	≥12Y			
MSAIBU	Beta-Aminoisobutyric Acid (Urine)	µmol/g creatinine	0-2M	0-6780		≥4M	<1301
		µmol/g creatinine	3M-5M	0-6000			
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y				
		µmol/g creatinine	3Y-5Y				
		µmol/g creatinine	≥12Y				
MSCITU	Citrulline (Urine)	µmol/g creatinine	0-2M		0-145	≥4M	<143
		µmol/g creatinine	3M-5M	0-75			
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y				
		µmol/g creatinine	3Y-5Y				
		µmol/g creatinine	≥12Y				

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MSAAUP	MSCTHU	Cystathionine (Urine)	µmol/g creatinine	0-2M	0-235	0-3M	<95
			µmol/g creatinine	3M-5M	0-60	≥4M	<29
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y	0-75		
			µmol/g creatinine	3Y-5Y	0-35		
			µmol/g creatinine	6Y-11Y	0-25		
			µmol/g creatinine	≥12Y	0-60		
	MSCYSU	Cystine (Urine)	µmol/g creatinine	0-2M	0-870		
			µmol/g creatinine	3M-5M	0-300	≥4M	5-90
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y	0-150		
			µmol/g creatinine	3Y-5Y	0-125		
			µmol/g creatinine	6Y-11Y	0-100		
			µmol/g creatinine	≥12Y	0-150		
	MSETHU	Ethanolamine (Urine)	µmol/g creatinine	0-2M	156-2624		
			µmol/g creatinine	3M-5M	128-564	≥4M	300-1100
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y	108-464		
			µmol/g creatinine	3Y-5Y	98-330		
			µmol/g creatinine	6Y-11Y	52-308		
			µmol/g creatinine	≥12Y	40-204		
	MSGABU	Gamma-Aminobutyric Acid (Urine)	µmol/g creatinine	0-2M	0-60		
			µmol/g creatinine	3M-5M	0-50	≥4M	<43
			µmol/g creatinine	6M-11M	0-25		
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	6Y-11Y			
			µmol/g creatinine	≥12Y			
	MSGLUU	Glutamic Acid (Urine)	µmol/g creatinine	0-2M	0-560		
			µmol/g creatinine	3M-5M	0-360	≥4M	<61
µmol/g creatinine			6M-11M				
µmol/g creatinine			1Y-2Y	0-190			
µmol/g creatinine			3Y-5Y	0-80			
µmol/g creatinine			6Y-11Y	0-70			
µmol/g creatinine			≥12Y	0-52			
MSGLNU	Glutamine (Urine)	µmol/g creatinine	0-2M	380-3860	0-3M		
		µmol/g creatinine	3M-5M	310-3240	≥4M	200-1700	
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y	340-2225			
		µmol/g creatinine	3Y-5Y	300-1525			
		µmol/g creatinine	6Y-11Y	165-1530			
		µmol/g creatinine	≥12Y	100-665			
MSGLYU	Glycine (Urine)	µmol/g creatinine	0-2M	1620-19725			0-3M
		µmol/g creatinine	3M-5M	915-10220	≥4M	80-3300	
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y	775-6600			
		µmol/g creatinine	3Y-5Y	600-4600			
		µmol/g creatinine	6Y-11Y	310-5700			
		µmol/g creatinine	≥12Y	230-3510			

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Order Code	Test Code	Order Name	Units	New Age Range	New Normal Range	Old Age Range	Old Normal Range
MSAAUP	MSHISU	Histidine (Urine)	µmol/g creatinine	0-2M	325-4940	0-3M	300-2683
			µmol/g creatinine	3M-5M	290-4850		
			µmol/g creatinine	6M-11M		≥4M	<2701
			µmol/g creatinine	1Y-2Y	340-4420		
			µmol/g creatinine	3Y-5Y	315-2460		
			µmol/g creatinine	6Y-11Y	160-2380		
			µmol/g creatinine	≥12Y	80-1130		
	MSHCTU	Homocitrulline (Urine)	µmol/g creatinine	0-2M	0-675	0-3M	Previously not reported
			µmol/g creatinine	3M-5M	0-220		
			µmol/g creatinine	6M-11M		≥4M	
			µmol/g creatinine	1Y-2Y	0-150		
			µmol/g creatinine	3Y-5Y	0-100		
			µmol/g creatinine	6Y-11Y	0-70		
			µmol/g creatinine	≥12Y	0-40		
	MSHCYU	Homocystine (Urine)	µmol/g creatinine	0-2M	0-40	0-3M	<41
			µmol/g creatinine	3M-5M		≥4M	<41
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	6Y-11Y			
			µmol/g creatinine	≥12Y			
	MSHLYU	Hydroxylysine (Urine)	µmol/g creatinine	0-2M	0-510	0-3M	10-143
			µmol/g creatinine	3M-5M	0-240	≥4M	<56
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y	0-85		
			µmol/g creatinine	3Y-5Y	0-50		
			µmol/g creatinine	6Y-11Y	0-40		
			µmol/g creatinine	≥12Y	0-30		
	MSHYPU	Hydroxyproline (Urine)	µmol/g creatinine	0-2M	0-6100		
			µmol/g creatinine	3M-5M	0-1270	≥4M	<91
µmol/g creatinine			6M-11M				
µmol/g creatinine			1Y-2Y	0-100			
µmol/g creatinine			3Y-5Y	0-35			
µmol/g creatinine			6Y-11Y	0-20			
µmol/g creatinine			≥12Y	0-30			
MSILEU	Isoleucine (Urine)	µmol/g creatinine	0-2M	0-360	0-3M		
		µmol/g creatinine	3M-5M	0-140	≥4M	<51	
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y	0-100			
		µmol/g creatinine	3Y-5Y	0-70			
		µmol/g creatinine	6Y-11Y	0-60			
		µmol/g creatinine	≥12Y	0-45			
MSLEUU	Leucine (Urine)	µmol/g creatinine	0-2M	20-420			0-3M
		µmol/g creatinine	3M-5M	20-195	≥4M	5-120	
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y	20-190			
		µmol/g creatinine	3Y-5Y	20-110			
		µmol/g creatinine	6Y-11Y	20-100			
		µmol/g creatinine	≥12Y	0-45			

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Order Code	Test Code	Order Name	Units	New Age Range	New Normal Range	Old Age Range	Old Normal Range		
MSAAUP	MSLYSU	Lysine (Urine)	µmol/g creatinine	0-2M	120-2270	0-3M	40-1382		
			µmol/g creatinine	3M-5M	55-1260				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	45-930			≥4M	<731
			µmol/g creatinine	3Y-5Y	40-475				
			µmol/g creatinine	6Y-11Y	25-440				
			µmol/g creatinine	≥12Y	0-355				
	MSMETU	Methionine (Urine)	µmol/g creatinine	0-2M	0-100	0-3M	5-324		
			µmol/g creatinine	3M-5M	0-60				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	0-50			≥4M	4-140
			µmol/g creatinine	3Y-5Y	0-30				
			µmol/g creatinine	6Y-11Y	0-20				
			µmol/g creatinine	≥12Y	0-20				
	MSORNU	Ornithine (Urine)	µmol/g creatinine	0-2M	0-475	0-3M	<251		
			µmol/g creatinine	3M-5M	0-150				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	0-70			≥4M	<69
			µmol/g creatinine	3Y-5Y	0-30				
			µmol/g creatinine	6Y-11Y					
			µmol/g creatinine	≥12Y					
	MSPHEU	Phenylalanine (Urine)	µmol/g creatinine	0-2M	45-360	0-3M	5-185		
			µmol/g creatinine	3M-5M	65-370				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	50-350			≥4M	22-200
			µmol/g creatinine	3Y-5Y	35-170				
			µmol/g creatinine	6Y-11Y	30-140				
			µmol/g creatinine	≥12Y	15-85				
	MSPROU	Proline (Urine)	µmol/g creatinine	0-2M	130-2340	0-3M	10-1014		
			µmol/g creatinine	3M-5M	0-1190				
µmol/g creatinine			6M-11M						
µmol/g creatinine			1Y-2Y	0-170	≥4M			<143	
µmol/g creatinine			3Y-5Y	0-60					
µmol/g creatinine			6Y-11Y	0-40					
µmol/g creatinine			≥12Y	0-35					
MSSARU	Sarcosine (Urine)	µmol/g creatinine	0-2M	0-300	0-3M	<551			
		µmol/g creatinine	3M-5M	0-75					
		µmol/g creatinine	6M-11M						
		µmol/g creatinine	1Y-2Y	0-25			≥4M	<1426	
		µmol/g creatinine	3Y-5Y						
		µmol/g creatinine	6Y-11Y						
		µmol/g creatinine	≥12Y						

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MSAAUP	MSSERU	Serine (Urine)	µmol/g creatinine	0-2M	70-4125	0-3M	100-2900		
			µmol/g creatinine	3M-5M	275-2730				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	390-1890			≥4M	75-1083
			µmol/g creatinine	3Y-5Y	260-990				
			µmol/g creatinine	6Y-11Y	130-1100				
			µmol/g creatinine	≥12Y	90-470				
	MSTAUU	Taurine (Urine)	µmol/g creatinine	0-2M	95-9800	0-3M	<5530		
			µmol/g creatinine	3M-5M	0-7400				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	0-9000			≥4M	<1751
			µmol/g creatinine	3Y-5Y	0-4400				
			µmol/g creatinine	6Y-11Y	0-3800				
			µmol/g creatinine	≥12Y	0-3200				
	MSTHRU	Threonine (Urine)	µmol/g creatinine	0-2M	125-2890	0-3M	40-1432		
			µmol/g creatinine	3M-5M	50-1300				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	85-910			≥4M	80-430
			µmol/g creatinine	3Y-5Y	50-380				
			µmol/g creatinine	6Y-11Y	40-470				
			µmol/g creatinine	≥12Y	25-250				
	MSTRPU	Tryptophan (Urine)	µmol/g creatinine	0-2M	25-395	0-3M	Previously not reported		
			µmol/g creatinine	3M-5M	45-390				
			µmol/g creatinine	6M-11M					
			µmol/g creatinine	1Y-2Y	45-325			≥4M	
			µmol/g creatinine	3Y-5Y	35-150				
			µmol/g creatinine	6Y-11Y	20-180				
			µmol/g creatinine	≥12Y	15-95				
	MSTYRU	Tyrosine (Urine)	µmol/g creatinine	0-2M	50-870	0-3M	10-456		
			µmol/g creatinine	3M-5M	70-700				
µmol/g creatinine			6M-11M						
µmol/g creatinine			1Y-2Y	65-560	≥4M			80-550	
µmol/g creatinine			3Y-5Y	40-300					
µmol/g creatinine			6Y-11Y	40-280					
µmol/g creatinine			≥12Y	15-150					
MSVALU	Valine (Urine)	µmol/g creatinine	0-2M	40-425		0-3M	30-345		
		µmol/g creatinine	3M-5M	30-250					
		µmol/g creatinine	6M-11M						
		µmol/g creatinine	1Y-2Y	40-280	≥4M			5-200	
		µmol/g creatinine	3Y-5Y	30-160					
		µmol/g creatinine	6Y-11Y	20-120					
		µmol/g creatinine	≥12Y	0-55					

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Testing no longer offered		Anserine	µmol/g creatinine	0-2M	Testing no longer offered	0-3M	<1102
			µmol/g creatinine	3M-5M		≥4M	<2151
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	6Y-11Y			
			µmol/g creatinine	≥12Y			
		Carnosine	µmol/g creatinine	0-2M	Testing no longer offered	0-3M	<1301
			µmol/g creatinine	3M-5M		≥4M	<1201
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	6Y-11Y			
			µmol/g creatinine	≥12Y			
		Phosphoethanolamine	µmol/g creatinine	0-2M	Testing no longer offered	0-3M	<581
			µmol/g creatinine	3M-5M		≥4M	<341
			µmol/g creatinine	6M-11M			
			µmol/g creatinine	1Y-2Y			
			µmol/g creatinine	3Y-5Y			
			µmol/g creatinine	6Y-11Y			
			µmol/g creatinine	≥12Y			
	Phosphoserine	µmol/g creatinine	0-2M	Testing no longer offered	0-3M	26-724	
		µmol/g creatinine	3M-5M		≥4M	<478	
		µmol/g creatinine	6M-11M				
		µmol/g creatinine	1Y-2Y				
		µmol/g creatinine	3Y-5Y				
		µmol/g creatinine	6Y-11Y				
		µmol/g creatinine	≥12Y				