

Updated Reference Values for Amino Acids in Plasma, CSF and Urine as of 01.07.2023

Dear Sir or Madam,

We would like to inform you that starting from July 1, 2023, we will be implementing changes to the reference values used for evaluating amino acid profiles. These changes will include the introduction of age-dependent reference ranges. The values will now be expressed in $\mu\text{mol/l}$ for plasma and cerebrospinal fluid and in $\mu\text{mol/g}$ creatinine for urine.

As a part of these revisions, we will no longer be reporting the value for homocystine.

We have provided the updated reference ranges in the following tables:

1. Reference Ranges for Amino Acids in Plasma
2. Reference Ranges for Amino Acids in Urine
3. Reference Ranges for Amino Acids in Cerebrospinal Fluid

We apologize for the inconvenience and thank you for your understanding. If you have any questions, please do not hesitate to contact us.

Please contact:

Ms. Helene Derksen
Tel.: +49 6221 3432-681
E-Mail: helene.derksen@labor-limbach.de

Geschäftsleitung

Dr. med. Martina Fliser
Dr. med. Martin Holfelder
Joachim Halbig

Fachärzte

Dr. med. Dörte Beier
Carmen Black.
Dr. Irena Crnkovic-Mertens
Helene Derksen
Prof. Dr. med. Peter Findeisen
Dr. med. Martina Fliser*
Dr. med.
Gabriele Genthner-Grimm
Roya Karbaf
Dr. med. Hans-Jakob Limbach*
Dr. med. Cyrill Müller
Joachim Singer
Dr. med. Stefan Walch
Fachärzte für
Laboratoriumsmedizin
Prof. Dr. med. Herbert Hof
Dr. med. Klaus Oberdorfer
Fachärzte für Mikrobiologie,
Virologie und Infektions-
epidemiologie/Hygiene
und Umweltmedizin/Labora-
toriumsmedizin
Dr. med. Annemarie Fahr
Dr. med. Martin Holfelder*
Fachärzte für Laboratoriums-
medizin/Mikrobiologie,
Virologie und Infektions-
epidemiologie
Dr. med. univ. Ilka Steiner
Fachärztin für Laboratoriums-
medizin / Mikrobiologie, Virolo-
gie und Infektionsepidemio-
logie / Klinische Pharmakologie
Dr. med. Konrad Bode
Dr. med.
Torsten Schmidt-Wieland
Sabine Singer
Fachärzte für
Mikrobiologie, Virologie und
Infektionsepidemiologie
Dr. med. Sabine Schütt
Prof. Dr. med.
Constanze Wendt
Fachärztinnen für
Mikrobiologie, Virologie und
Infektionsepidemiologie/
Hygiene und Umweltmedizin
Dr. med. Gabriele Porsch
Fachärztin für Hygiene
PD Dr. med. Karin Janetzko
Fachärztin für Transfusions-
medizin / Laboratoriums-
medizin

*Ärztliche Leitung

Reference Ranges for Amino Acids in Plasma

Amino Acids	Reference Ranges [$\mu\text{mol/l}$]		
	<24 months	2-17 years	<24 months
1-Methylhistidin	<11	<20	<28
3-Methylhistidin	<1	<1	2-9
α -Aminoadipinsäure	<4	<3	<3
α -Aminobuttersäure	7-28	7-31	9-37
Alanin	139-474	144-557	200-579
Arginin	29-134	31-132	32-120
Asparagin	25-91	29-87	37-92
Asparaginsäure	2.-20	<11	<7
β -Aminoisobuttersäure	<9	<5	<5
β -Alanin	<28	<27	<29
Carnosin	<13	<1	<1
Citrullin	9-38	11-45	17-46
Cystathionin	<2	<2	<2
Cystin	2-32	2-36	3-95
Ethanolamin	<70	<64	<67
γ -Aminobuttersäure	<4	<3	<2
Glutamin	316-1020	329-976	371-957
Glutaminsäure	31-202	22-131	13-113
Glycin	111-426	149-417	126-490
Histidin	10-116	12-132	39-123
Homocitrullin	<5	<2	<2
Isoleucin	31-105	30-111	36-107
Leucin	48-175	51-196	68-183
Lysin	49-204	59-240	103-255
Methionin	11-35	11-37	4-44
Hydroxylysin	<4	<3	<2
Hydroxyprolin	8-61	7-35	4-29
Ornithin	20-130	22-97	38-130
Phenylalanin	28-80	30-95	35-80
Phosphoethanolamin	<6	<5	<12
Phosphoserin	<109	<95	<18
Prolin	85-303	80-357	97-368
Sarcosin	<5	<5	<5
Serin	69-271	71-208	63-187
Taurin	37-177	38-153	42-156
Threonin	47-237	58-195	85-231
Tryptophan	17-75	23-80	29-77
Tyrosin	26-115	31-106	31-90
Valin	83-300	106-320	136-309

Quelle: Mayo Clinic Laboratories; Blau N, Duran M, Gibson KM, Hrsg. Laboratory Guide to the Methods in Biochemical Genetics. Springer-Verlag; 2008:53-89.

Reference Ranges for Amino Acids in Urine

Amino Acids	Reference Ranges [µmol/g Creatinin]					
	≥12 months	13-35 months	3-6 years	7-8 years	9-17 years	≥18 years
1-Methylhistidin	17-419	18-1629	10-1476	19-1435	12-1549	23-1339
3-Methylhistidin	88-350	86-330	56-316	77-260	47-262	70-246
α-Aminoadipinsäure	10-275	15-324	10-135	<84	<76	<47
α-Aminobuttersäure	<63	<56	<38	<30	<31	<19
Alanin	93-3007	101-1500	64-1299	44-814	51-696	56-518
Arginin	10-560	20-395	14-240	<134	<153	<114
Asparagin	25-1000	62-884	28-412	38-396	22-283	25-238
Asparaginsäure	<64	<56	<30	<9	<11	<10
β-Aminoisobuttersäure	18-3137	<980	15-1039	24-511	11-286	<301
β-Alanin	<219	<92	<25	<25	<49	<52
Carnosin	27-1021	16-616	18-319	<161	<109	<35
Citrullin	<72	<57	<14	<9	<14	<12
Cystathionin	<302	<56	<26	<18	<44	<30
Cystin	12-504	11-133	<130	<56	<104	10.-98
Ethanolamin	282-3782	256-947	193-643	137-564	158-596	95-471
γ-Aminobuttersäure	<25	<13	<11	<6	<5	<5
Glutamin	139-2985	263-2979	152-1325	164-1125	188-1365	93-686
Glutaminsäure	<243	12-128	<76	<39	<62	<34
Glycin	362-18614	627-6914	412-5705	449-4492	316-4249	229-2989
Histidin	145-3833	427-3398	230-2635	268-2147	134-1983	81-1128
Homocitrullin	<295	11-158	<71	<62	<33	<30
Isoleucin	<86	<78	<62	<34	<28	<22
Leucin	<200	15-167	12-100	13-73	<62	<51
Lysin	19-1988	25-743	14-307	17-276	10-240	15-271
Methionin	<41	<41	<25	<23	<20	<16
Hydroxylysin	<150	<57	<34	<26	<31	<12
Hydroxyprolin	<2536	<89	<46	<19	<22	<15
Ornithin	<265	<70	<44	<17	<18	<25
Phenylalanin	14-280	34-254	20-150	21-106	11-111	13-70
Phosphoethanolamin	15-341	33-342	19-164	12-118	<88	<48
Phosphoserin	<1	<1	<1	<1	<1	<1
Prolin	28-2029	<119	<78	<20	<28	<26
Sarcosin	<75	<12	<9	<2	<3	<3
Serin	18-4483	284-1959	179-1285	153-765	105-846	97-540
Taurin	37-8300	64-3255	76-3519	50-2051	57-2235	24-1531
Threonin	25-1217	55-763	30-554	25-456	37-418	31-278
Tryptophan	14-315	14-315	10-303	10-303	15-229	18-114
Tyrosin	39-685	38-479	23-254	22-245	12-208	15-115
Valin	11-211	11-211	<139	16-91	<75	11-61

Quelle: Mayo Clinic Laboratories; Blau N, Duran M, Gibson KM, Hrsg. Laboratory Guide to the Methods in Biochemical Genetics. Springer-Verlag; 2008:53-89.

Reference Ranges for Amino Acids in Cerebrospinal Fluid

Amino Acids	Reference Ranges [$\mu\text{mol/l}$]			
	≤ 31 days	32 d.-23 mont.	2-18 years	≥ 19 years
a-Aminobuttersäure	<15	<6	<5	<14
Alanin	24-124	16-53	12-34	19-60
Arginin	5-39	11-35	11-27	11-32
Asparagin	8-34	5-16	<10	5-20
Asparaginsäure	<1	<1	<1	<2
Citrullin	<11	<6	<3	<9
Cystin	<2	<2	<1	<1
Ethanolamin	11-193	7-155	7-153	7-153
Glutamin	467-1832	301-1128	326-1092	380-1348
Glutaminsäure	<12	<3	<1	<4
Glycin	5-115	<33	<11	<35
Histidin	11-70	9-28	9-21	9-28
Isoleucin	<27	<13	<8	<17
Leucin	12-41	6-21	7-16	7-29
Lysin	11-63	9-33	10-25	13-42
Methionin	<43	<9	<6	<10
Ornithin	<24	<12	<6	<11
Phenylalanin	7-40	5-18	<12	7-21
Prolin	<17	<6	<2	<6
Serin	44-136	26-71	21-51	19-40
Taurin	8-48	<28	<13	<20
Threonin	32-143	11.-77	14-38	23-57
Tryptophan	<12	<6	<4	<4
Tyrosin	8-83	5-24	<17	5-17
Valin	14-61	9-28	8-20	11-40

Quelle: Mayo Clinic Laboratories; Blau N, Duran M, Gibson KM, Hrsg. Laboratory Guide to the Methods in Biochemical Genetics. Springer-Verlag; 2008:53-89.