Comprehensive Neurotransmitter; urine

LABRIX

Order: 999999-9999
Client #: 12345
Doctor: Sample Doctor, MD
Doctors Data Inc.
3755 Illinois Ave.
St. Charles, IL 60174

Patient: Sample Report
Age: 32 **DOB:** 04/02/1986
Sex: Female
Body Mass Index (BMI): 25.3

Sample Collection	Date/Time
Date Collected	07/22/2018
Wake Up Time	0600
Collection Time	0730
Collection Period	Second Morning
Date Received	07/23/2018
Date Reported	07/23/2018

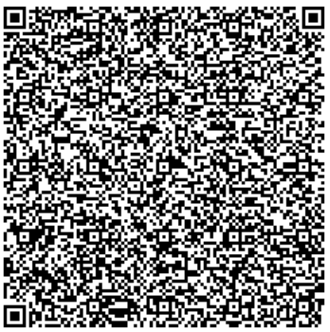
Analyte	Result	Unit per Creatinine	L	WRI	H	Reference Interval
Phenethylamine (PEA)	40	nmol/g				32 - 84
Tyrosine	28	µmol/g				32 - 80
Tyramine	5.2	µmol/g				2.0 - 4.0
Dopamine	100	µg/g				125 - 250
3,4-Dihydroxyphenylacetic acid (DOPAC)	359	µg/g				390 - 1500
3-Methoxytyramine (3-MT)	212	nmol/g				90 - 210
Norepinephrine	18.2	µg/g				22 - 50
Normetanephrine	66	µg/g				85 - 300
Epinephrine	13	µg/g				1.6 - 8.3
Metanephrine	115	µg/g				45 - 119
Norepinephrine / Epinephrine ratio	1.4					< 13
Tryptamine	5.3	µmol/g				0.20 - 0.90
Serotonin	49	µg/g				60 - 125
5-Hydroxyindolacetic acid (5-HIAA)	1689	µg/g				2000 - 8000
Glutamate	12	nmol/g				12.0 - 45.0
Gamma-aminobutyrate (GABA)	2.7	nmol/g				2.0 - 5.6
Glycine	1080	nmol/g				450 - 2200
Histamine	15	µg/g				14 - 44
Taurine	216	µmol/g				320 - 1000

Neurotransmitter Comments:

- Urinary neurotransmitter levels provide an overall assessment of the body's ability to make and break down neurotransmitters and are representative of whole body levels. They are required for neurotransmission throughout the body. Direct assessment of neurotransmitter levels and metabolism in the central nervous system is not clinically feasible and approximately twenty percent of the total urinary levels are derived from the brain. The enzymes, cofactors and precursors in neurotransmitter metabolism in general are the same in the periphery and in the central nervous system. Therefore, alterations in urinary neurotransmitter levels assessed in urine provide important clinical information, and may be associated with many symptoms including cognitive and mood concerns, diminished drive, fatigue and sleep difficulties, cravings, addictions and pain.
- Tyrosine is the non-essential amino acid precursor for dopamine, norepinephrine and epinephrine. Tyrosine is derived from essential phenylalanine. Low tyrosine levels may increase irritability, and affect mood, mental performance, energy levels, body temperature and thyroid function. Low levels of the precursor amino acid phenylalanine may result in low levels of tyrosine and phenylethylamine (PEA). Chronic tyrosine deficiency may decrease catecholamine levels. An elevated phenylalanine, but low tyrosine level may indicate either inherited phenylketonuria (rare) or a lack of iron and/or tetrahydrobiopterin (BH4). BH4 regeneration may be supported by folates, vitamins B3 and C, molybdenum and zinc. Selenium deficiency may increase the conversion of tyrosine to L-DOPA (dopamine precursor).

Notes:
RI= Reference Interval, L (blue)= Low (below RI), WRI (green)= Within RI (optimal), WRI (yellow)= Within RI (not optimal), H (red)= High (above RI)
Methodology: LCMS QQQ

- Tyramine is a trace amine derived directly from tyrosine by a B6-dependent enzyme. Elevated levels of tyrosine may increase tyramine levels, especially when metabolism to dopamine is compromised. Trace amines (tryptamine, tyramine, PEA) may have stimulant effects at high levels. Foodstuffs such as hard cheeses and red wines contain large amounts of tyramine. If tyramine is high, but dopamine is low, the enzymes of dopamine synthesis (folates, vitamins B3, D, zinc, molybdenum, iron cofactors) may be inhibited. Tyramine is normally metabolized by MAO; low enzyme activity may increase tyramine levels. Vitamin B2 may increase the activity of MAO enzymes.
- Low dopamine may be associated with anxiety/depression, difficulty concentrating, decreased libido and obesity, and may be associated with increased addiction and other stimulation seeking activities. Failure to regenerate tetrahydrobiopterin [BH4], an essential cofactor for dopamine synthesis, may decrease dopamine levels, and could be reflected in urine. BH4 regeneration may be supported by folates, vitamin B3, C, molybdenum and zinc. Additionally, production of dopamine requires vitamin D, iron and vitamin B6. L-tyrosine, L-theanine and Mucuna pruriens may influence dopamine signaling.
- DOPAC levels may be low simply if dopamine levels are low. DOPAC is the primary metabolite of dopamine formed by MAO activity. Alternatively low levels of DOPAC may be associated with medications such as adrenergic antagonists, monoamine or norepinephrine reuptake inhibitors. Low DOPAC levels may also indicate low activity of MAO-A. Vitamins B2, B3, B6, and iron are required for optimal dopamine metabolism. Although a low level of urinary DOPAC is absolutely not diagnostic, low DOPAC levels in cerebral spinal fluid have been associated with Parkinson's disease.
- 3-MT may be increased if dopamine is high; rule out use of L-DOPA. 3-MT is formed by direct metabolism of dopamine by COMT. Very high levels of 3-MT may have stimulatory effects. 3-MT levels may increase during acute stress. Herbicides, such as paraquat, have been shown to increase 3-MT levels in animals. Consumption of foods rich in catecholamines (bananas, pineapple, walnuts) may acutely increase urinary levels of 3-MT. Deficiency or inhibition of MAO may increase 3-MT levels. MAO may be inhibited by cigarette smoke or medications such as monoamine oxidase inhibitors. Vitamins C, B2, B3, SAMe, magnesium, copper and iron are required for optimal dopamine metabolism.
- Low norepinephrine may be associated with depression and mood changes as well as fatigue, difficulty concentrating, decreased ability to stay focused on tasks and diminished sense of personal/professional drive. Norepinephrine is converted from dopamine requiring vitamin C, copper and B3, and L-tyrosine is an amino acid precursor. L-theanine and Mucuna pruriens may modulate norepinephrine effects.
- Normetanephrine may simply be low if precursor norepinephrine is low. Alternatively, normetanephrine may be low due to compromised COMT activity. Vitamins B2, B3, SAMe, magnesium and iron support the COMT enzyme; normal methylation by methyl donor SAM is required for COMT activity. The Plasma Methylation Profile might be considered to evaluate the methylation index (SAM:SAH). Medications that may lower norepinephrine and normetanephrine include antihypertensives, serotonin reuptake inhibitors, and lithium carbonate.
- Elevated epinephrine may be associated with stress response and contributory to anxiety, agitation, irritability, insomnia and hypertension. Epinephrine levels may be elevated in patients in association with exercise prior to the urine collection. Metabolism of epinephrine requires vitamins B2, B3, SAMe, magnesium, and iron. L-theanine may modulate epinephrine effects.
- Tryptamine is a trace amine derived directly from tryptophan by a B6-dependent enzyme. Trace amines (tryptamine, tyramine, PEA) may have stimulant effects at high levels. Tryptophan supplementation may increase tryptamine levels, especially when conversion of tryptophan to 5-HTP and serotonin is compromised by nutrient insufficiencies (BH4, iron, B6, D). Such might be the case if tryptamine is high, but serotonin is low. Tryptamine is normally metabolized by MAO; low enzyme activity may increase tryptamine levels. Vitamin B2 may increase the expression of MAO enzymes.
- Low serotonin may contribute to mood concerns including anxiety, OCD, depression, anger and a sense of discontentment. Low serotonin may also be associated with poor sleep quality and appetite changes, as well as chronic fatigue, rheumatoid arthritis, and over-all lassitude. Failure to regenerate tetrahydrobiopterin [BH4], an essential cofactor for serotonin synthesis, may decrease serotonin levels, and could be reflected in urine. BH4 regeneration may be supported by folates, vitamin B3, C, molybdenum and zinc. Additionally, production of serotonin requires vitamin D, iron and vitamin B6. Tryptophan is the essential precursor of serotonin. 5-HTP may increase serotonin, and L-theanine may affect serotonin function.
- Low 5-HIAA may be associated with mood concerns including depression and anxiety, sleep changes, and poor concentration. Low 5-HIAA may be associated with low precursor serotonin, or compromised metabolism of serotonin by MAO-A. Some medications, including aspirin, MAO-inhibitors, levodopa, and tricyclic antidepressants may decrease 5-HIAA levels. MAO may be inhibited by cigarette smoke. Vitamins B2, B3, B6, magnesium and iron are required for optimal serotonin metabolism. If MAO-A enzyme function is inhibited, serotonin may be elevated and 5-HIAA will be low.
- Low range glutamate may be associated with depression, increased addictive tendencies including food seeking behaviors, and can contribute to mental fatigue and diminished mental stimulation. L-glutamine is a precursor amino acid.
- Taurine is an essential amino acid that may have an inhibitory effect on the firing rate of neurons in the CNS. Decreased CNS taurine synthesis has been reported in individuals with autoimmune and neurodegenerative diseases, including rheumatoid arthritis, Parkinson's disease, Alzheimer's disease, and motor neuron diseases such as amyotrophic lateral sclerosis (ALS). Cells with low taurine levels may not retain magnesium or other minerals. Naïve vegetarians or individuals with digestion or malabsorption disorders may have low taurine levels. Taurine does not cross the blood brain barrier (BBB) easily and must be synthesized within the CNS, which requires a functional methylation pathway. Taurine synthesis requires cysteine, vitamin B6, iron, and molybdenum.
- Note: The reported low to low range monoamine neurotransmitters may be associated with genetic disruptions in methylation and/or suboptimal quantities of required co-factors. Further testing may be warranted.
- Considerations to address the demonstrated imbalances beyond the identified co-factors and amino acid precursors may include dosage adjustments if indicated, as well as nervine and adaptogenic herbs, methylation support, vitamin D, and gastrointestinal health optimization.



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