Comprehensive Neurotransmitter; urine

Order: SAMPLE REPORT HOR17
Test: U123456-7890 **Client #:** 12345
Doctor: Regenerus Laboratories
Aero 14 Redhill Aerodrome
Kings Mill Lane, Redhill
Surrey RH1 5yJ

Patient: Sample Patient
Age: 10
Sex: Female
Body Mass Index (BMI): 20.0
Body Mass Index (BMI): N/A

Sample Collection	Date/Time
Date Collected	03/02/2022
Wake Up Time	07:30
Collection Period	1st morning void
Date Received	03/03/2022
Date Reported	03/04/2022

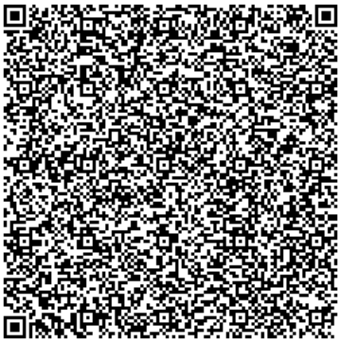
Analyte	Result	Unit per Creatinine	L	WRI	H	Reference Interval
Phenethylamine (PEA)	20	nmol/g				42 – 160
Tyrosine	48	µmol/g				70 – 180
Tyramine	3.4	µmol/g				2.8 – 8.5
Dopamine	258	µg/g				175 – 500
3,4-Dihydroxyphenylacetic acid (DOPAC)	1520	µg/g				540 – 1850
3-Methoxytyramine (3-MT)	151	nmol/g				122 – 278
Norepinephrine	17.6	µg/g				29 – 69
Normetanephrine	195	µg/g				112 – 400
Epinephrine	1.9	µg/g				2.1 – 14.5
Metanephrine	84	µg/g				60 – 158
Norepinephrine / Epinephrine ratio	9.3					< 13
Tryptamine	0.4	µmol/g				0.65 – 1.6
Serotonin	84.4	µg/g				79 – 235
5-Hydroxyindoleacetic acid (5-HIAA)	5913	µg/g				2500 – 9000
Glutamate	23	nmol/g				18.0 – 70.0
Gamma-aminobutyrate (GABA)	5	nmol/g				2.6 – 8.0
Glycine	966	nmol/g				700 – 2500
Histamine	12	µg/g				14 – 51
Taurine	428	µmol/g				420 – 1400
Creatinine	73.1	mg/dL				25 – 180

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. Neurotransmitters are secreted all through the body, in neurons of both the central and peripheral nervous systems. 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.
- Low phenethylamine (PEA) may be associated with depression, attention deficits and hyperactivity (ADHD), and bipolar disorder. Phenylalanine is the precursor amino acid to PEA, and vitamin B6 is a required co-factor in the conversion to this primary trace amine.

Notes:
Results are creatinine corrected to account for urine dilution variations. Creatinine is not meant to be used as an indicator of renal function.
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, Creatinine by Jaffe Reaction

- 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).
- Low norepinephrine and low epinephrine 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 niacin (B3). L-tyrosine, L-theanine and Mucuna pruriens influence this pathway.
- Tryptamine is a trace amine derived directly from tryptophan by a B6-dependent enzyme. Decreased tryptamine levels may be associated with depression. Low levels of tryptamine may simply be associated with insufficient intake/assimilation of the essential amino acid tryptophan. Low levels of tryptamine, but high levels of tryptophan, may suggest a vitamin B6 deficiency. Tryptamine is metabolized by MAO; its activity may be increased by oxidative stress. Antioxidants (selenium, pycnogenol, curcumin, berberine), and Vitamin B12 may normalize MAO activity levels.
- Low range serotonin may contribute to mood concerns including anxiety, OCD, depression, anger and a sense of discontentment. Low range 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.
- Upper range GABA may contribute to difficulty concentrating, diminished memory, dampened mood and decreased cognitive processing as well as fatigue, decreased exercise endurance, sleepiness and an inability to feel alert. L-theanine may modulate the effects of GABA.Upper range levels of GABA may be associated with bacterial overgrowth (i.e. urinary tract infection or gastrointestinal dysbiosis).
- Low histamine may affect digestion, learning, memory, mood and skin health. Low histamine may also result in decreased wakefulness and increased sleepiness. Histamine levels may be supported by consumption of high-protein foods and whole grains, as well as L-histidine supplementation. Vitamin B6 influences histamine synthesis.
- Reference ranges are pertinent to pediatric population.



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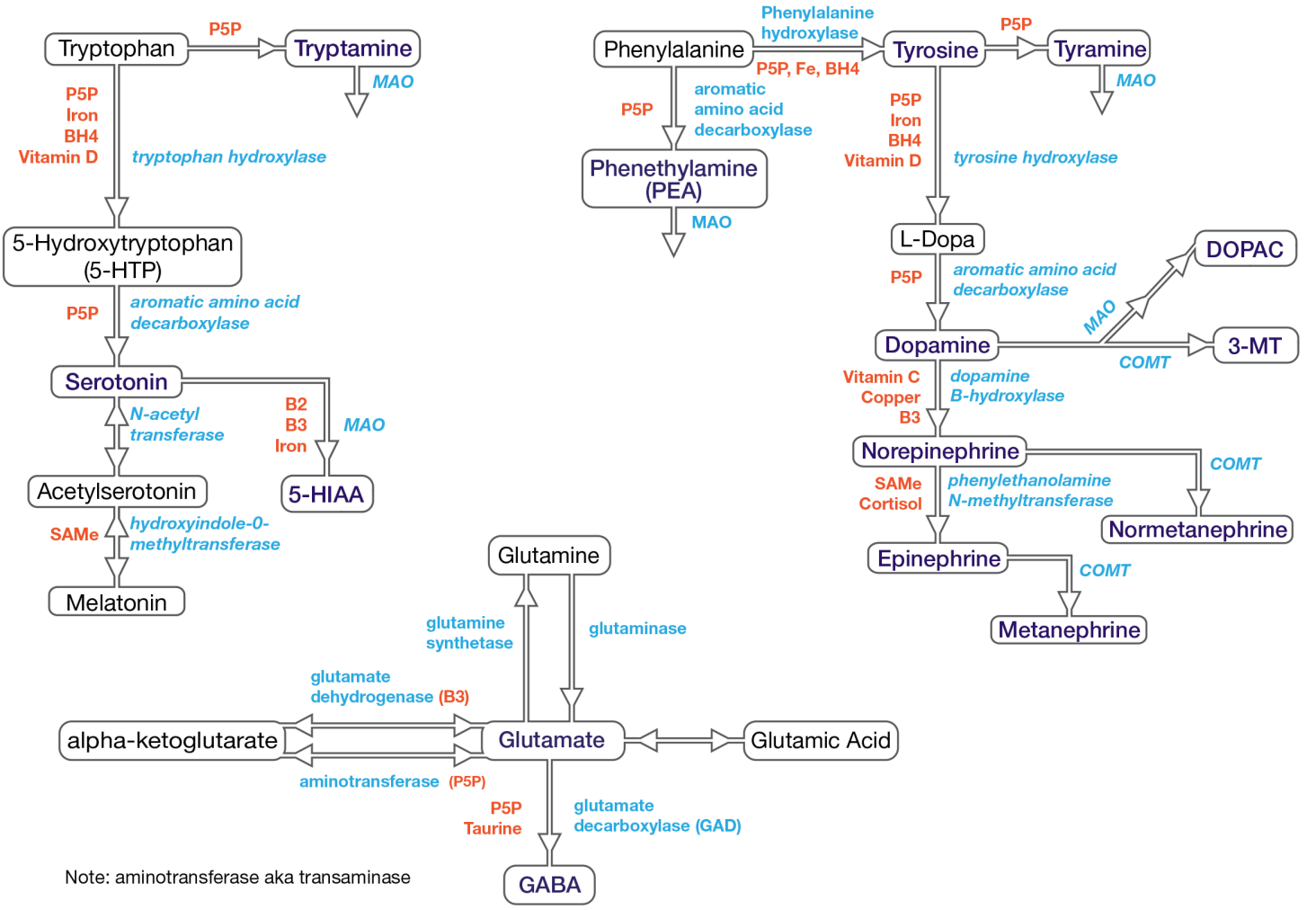
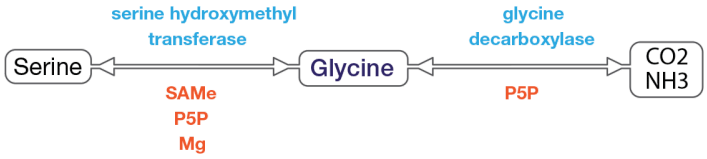
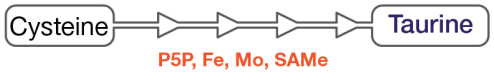
Neurotransmitter Pathways



"glycine cleavage system"





KEY

MAO = monoamine oxidase
Cofactors for *MAO*: **B2, B3, P5P, Fe, Mg**
COMT = catechol-o-methyl-transferase
Cofactors for *COMT*: **SAMe, Mg**
P5P = (pyridoxal-5-phosphate) activated form of vitamin B6
BH4 = (tetrahydrobiopterin)
Endogenous levels can be supported with SAMe, vitamin B3, C, Mo, Zn
MTHF = (methyltetrahydrofolate) active form of folate.
SAMe = endogenous levels can be supported with Mg, MTHF, and methylcobalamin supplementation.

Cofactors = Enzymes =