<table>
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<tr>
<th>Neurotransmitter</th>
<th>Functions</th>
<th>Deficiency Signs</th>
<th>Excess Signs</th>
<th>Supplemental Treatment</th>
<th>Contraindications/Cautions</th>
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<tbody>
<tr>
<td>Adenosine</td>
<td>Sleep initiation  One of the main sleep molecules  Inhibits the release of glutamic acid and aspartic acid</td>
<td>Poor sleep initiation  Insomnia  Anxiety  Irritability  Overactive mind</td>
<td>Unlikely to occur</td>
<td>Deficiency:  Acetyl-L-Carnitine, Choline, B1, B5, B12, Folinic acid and/or Brahmi, Gingko, Lemonbalm, Withania, Alpha lipoic acid</td>
<td>N/A</td>
</tr>
<tr>
<td>Acetylcholine</td>
<td>Parasympathetic nervous system  Memory  Learning attention span  REM sleep  Release gastric acid and digestive enzymes  Peristaltic action</td>
<td>Sympathetic dominance  Short-term memory problems  Age-related cognitive decline  Constipation/digestive dysfunction  Poor sleep maintenance and initiation  Muscle tension</td>
<td>Unlikely to happen</td>
<td>Deficiency:  Tyrosine, Phenylalanine, Cacao, Siberian Ginseng, Rhodiola  Excess:  Alpha Lipoic acid</td>
<td>Anti-coagulant medications  Acetylcholinesterase inhibitors</td>
</tr>
<tr>
<td>Noradrenalin</td>
<td>Arousal  REM sleep  Attention, concentration, memory formation, storage &amp; retrieval  Stimulates release of hormones that stimulate thymus gland  Modulate serotonergic &amp; dopaminergic neurons</td>
<td>Chronic stress/fatigue/pain  Poor long term memory  Depression  Stress urinary incontinence</td>
<td>Panic disorder</td>
<td>Deficiency:  Tyrosine, Phenylalanine, Theobroma Cacao, Siberian Ginseng, Rhodiola, Licorice, Selenium, P-5-P  Excess:  Betacarotene, vitamin A, C &amp; E and/or Glutamine, Taurine, Zinc &amp; P-5-P</td>
<td>Antidepressants  Thyroid medications  ACE inhibitors  Lithium  Diabetic medication</td>
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<td>Adrenalin</td>
<td>Fight或flight response-sympathetic nervous system  Constricts blood vessels  Dilates air passages  Increases heart rate</td>
<td>Hypotension  Hypoglycaemia  Chronic stress &amp; exhaustion  Short attention span  Low pain tolerance</td>
<td>Panic disorder</td>
<td>Deficiency:  Tyrosine, Phenylalanine, Glutamine, Zinc &amp; Magnesium and/or Tyrosine, Phenylalanine, Theobroma Cacao, Siberian Ginseng, Rhodiola, Licorice, Selenium, P-5-P  Excess:  Glutamine, Taurine, Zinc &amp; P-5-P</td>
<td>Antidepressants  Thyroid medications  ACE inhibitors  Lithium  Diabetic medication</td>
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<td>Phenylethylamine</td>
<td>Alertness  Mental activity  Inhibit breakdown of endogenous opioids  Release of norepinephrine and dopamine</td>
<td>Depression  ADD  Fatigue  Anxiety  Low pain tolerance</td>
<td>Insomnia  Hypertension  Migraine</td>
<td>Deficiency:  Phenylalanine, Glutamine, Zinc &amp; Magnesium  Excess:  Glutamine, Taurine, Zinc &amp; P-5-P</td>
<td>PKU</td>
</tr>
<tr>
<td>Endogenous Opioids</td>
<td>Release/modulation of dopamine: inhibit transmission of excitatory pathways  Decrease pain sensation  Reinforcement and reward  Euphoria</td>
<td>Low pain tolerance  Addictive tendencies  Carbohydrate cravings  Tension/Anxiety/Stress  Dwell over major life events  Depression  Alcohol cravings</td>
<td>Unlikely to happen</td>
<td>Deficiency:  DL- Phenylalanine, Glutamine, Zinc &amp; Magnesium  Excess:  Glutamine, Taurine, Zinc &amp; P-5-P</td>
<td>PKU  Antidepressants  Benzodiazepines  Anti-epileptics</td>
</tr>
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<th>Neurotransmitter</th>
<th>FUNCTIONS</th>
<th>DEFICIENCY SIGNS</th>
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<th>EXCESS SIGNS</th>
<th>SUPPLEMENTAL TREATMENT</th>
<th>CONTRAINDICATIONS/CAUTIONS</th>
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<td>Serotonin</td>
<td>Control of eating/appetite, regulation of pain, regulation of mood, pain control, correct functioning digestion</td>
<td>Depression-worse during winter, anxiety/social anxiety, aggression, OCD tendencies, carbohydrate cravings, frequent constipation, low pain intolerance, poor dream recall, insomnia, impulsive tendencies, low self-esteem</td>
<td>Confusion, extreme agitation, muscle twitching, GI distress/nausea</td>
<td>May be due to cannabis use, aggression, schizophrenia</td>
<td>Tryptophan, Ornithine, Glycine, Serine, B3, Magnesium and/or HTP, and/or St John’s Wort, Saffron, Withania, Rhodiola</td>
<td>Antidepressants, OCP, OCP, Antidepressants, Bipolar disorder</td>
</tr>
<tr>
<td>Melatonin</td>
<td>Regulation of circadian rhythms, sleep promotion, regulation of GABA receptors</td>
<td>Insomnia, frequent migraines / headaches, fibromyalgia / chronic pain, hypertension, tension / anxiety</td>
<td>Insomnia, frequent migraines / headaches, fibromyalgia / chronic pain, hypertension, tension / anxiety</td>
<td>May be due to cannabis use</td>
<td>Tryptophan, Ornithine, Glycine, Serine, Magnesium and/or HTP, and/or SAMe and/or St John’s Wort, Saffron, Withania, Rhodiola</td>
<td>Antidepressants, OCP, OCP, Antidepressants, Bipolar disorder</td>
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<tr>
<td>Dopamine</td>
<td>Motivation, mood, memory, movement</td>
<td>Addictive tendencies, tremors/restless legs, low libido, lack of motivation, depression mental exhaustion, dull, boring dreams, forgetfulness</td>
<td>Addictive tendencies, tremors/restless legs, low libido, lack of motivation, depression mental exhaustion, dull, boring dreams, forgetfulness</td>
<td>Unlikely to happen</td>
<td>Tyrosine, Phenylalanine, Theobroma, Cacao, Siberian Ginseng, Rhodiola, Licorice, Selenium, P-S-P</td>
<td>Antidepressants, Lithium, ACE inhibitors, benzodiazepines, anti-epileptic medication</td>
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<tr>
<td>GABA</td>
<td>Main inhibitory neurotransmitter, role in sleep maintenance, vision, and motor control</td>
<td>Anxiety/panic attacks, alcohol craving, insomnia, seizures, dwell over stressful situations</td>
<td>Anxiety/panic attacks, alcohol craving, insomnia, seizures, dwell over stressful situations</td>
<td>Unlikely to happen</td>
<td>Kava Kava, Zizyphus, Magnolia, Passionflower, Lemonbalm, and/or Glutamine, Taurine, Zinc &amp; P-S-P</td>
<td>Antidepressants, Lithium, ACE inhibitors, benzodiazepines, anti-epileptic medication</td>
</tr>
<tr>
<td>Glutamate</td>
<td>Main excitatory neurotransmitter, memory, learning attention and concentration</td>
<td>Low stomach acid, food allergies, chemical/medicinal sensitivities, free-floating anxiety, always wants more sleep, schizophrenia, depression, binge eating/drinking, fatigue, brain fog, low libido, social phobia</td>
<td>Low stomach acid, food allergies, chemical/medicinal sensitivities, free-floating anxiety, always wants more sleep, schizophrenia, depression, binge eating/drinking, fatigue, brain fog, low libido, social phobia</td>
<td>Seasonal allergies, tolerant to pharmaceuticals, low sleep requirement, schizophrenia, anxiety/depression, chronic alcoholism, headaches, paranoia</td>
<td>SAMe, Vitamin C, vitamin A, C, E, beta-carotene</td>
<td>Antidepressants, Lithium, ACE inhibitors, benzodiazepines, anti-epileptic medication</td>
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<tr>
<td>Histamine</td>
<td>Arousal and wakefulness, HCl production, appetite, drinking and eating behaviour, may modulate other neurotransmitters, promotes brain alpha wave activity</td>
<td>Low self-esteem, low sleep requirement, schizophrenia, bipolar disorder</td>
<td>Low self-esteem, low sleep requirement, schizophrenia, bipolar disorder</td>
<td>Seasonal allergies, tolerant to pharmaceuticals, low sleep requirement, schizophrenia, anxiety/depression, chronic alcoholism, headaches, paranoia</td>
<td>Histidine &amp; P-S-P, Green Tea, and/or Magnesium, and/or Potassium</td>
<td>Antioxidants, anti-inflammatory medication</td>
</tr>
</tbody>
</table>

**FUNCTIONS**
- Control of eating/appetite
- Regulation of pain
- Regulation of mood
- Pain control
- Correct functioning digestion

**DEFICIENCY SIGNS**
- Depression-worse during winter
- Anxiety/social anxiety
- Aggression
- OCD tendencies
- Carbohydrate cravings
- Frequent constipation
- Low pain intolerance
- Poor dream recall
- Insomnia
- Impulsive tendencies
- Low self-esteem

**EXCESS SIGNS**
- Confusion
- Extreme agitation
- Muscle twitching
- GI distress/nausea

**SUPPLEMENTAL TREATMENT**
- Tryptophan, Ornithine, Glycine, Serine, B3, Magnesium and/or HTP, and/or St John’s Wort, Saffron, Withania, Rhodiola
- Tryptophan, Ornithine, Glycine, Serine, Magnesium and/or HTP, and/or SAMe and/or St John’s Wort, Saffron, Withania, Rhodiola
- Tyrosine, Phenylalanine, Theobroma, Cacao, Siberian Ginseng, Rhodiola, Licorice, Selenium, P-S-P
- Glutamine, Taurine, Zinc & P-S-P
- Kava Kava, Zizyphus, Magnolia, Passionflower, Lemonbalm, and/or Glutamine, Taurine, Zinc & P-S-P
- Green Tea, and/or Magnesium, and/or Potassium
- Histidine & P-S-P

**CONTRAINDICATIONS/CAUTIONS**
- Antidepressants
- OCP
- OCP
- Antidepressants
- Bipolar disorder
- Antidepressants
- Lithium
- ACE inhibitors
- Benzodiazepines
- Antiepileptic medication
- Barbiturates
- Benzodiazepines
- Anticoagulant
- Antihistamines
- Bipolar disorder

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