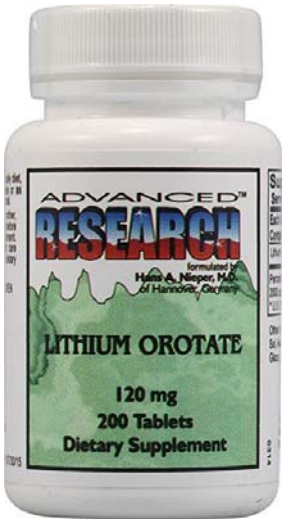

How Does Lithium Orotate Correct Imbalances in Brain Chemistry?

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1. Lithium orotate provides trace amounts of lithium to the body delivered in the form of lithium orotate. Each lithium orotate 120mg tablet contains 4.6mg of elemental lithium. This is about 4 ½ times less elemental lithium by weight than an equivalent weight of lithium carbonate. Basically, lithium orotate is a supplement that effectively delivers lithium into the brain without having to increase blood levels of lithium to high levels. In fact blood levels of lithium usually remain very low when lithium orotate is taken. Lithium orotate works by actively transporting lithium out of the blood stream into the brain unlike lithium drugs that must elevate blood lithium levels to near toxic levels before enough lithium is able to passively diffuse through the blood brain barrier into the brain.
2. Lithium use has been found to regulate the protein kinase C signaling cascade (Manji and Chen, 2002).
3. Lithium inhibits 5HT autoreceptors (a serotonin effect), which seems to be related to lithium's antidepressant effects and lithium exerts an action that protects brain cells from programmed cell death (Shaldubina et al., 2001).
4. Lithium increases the levels of an enzyme tyrosine hydroxylase, which is involved in the production of the neurotransmitter dopamine (Chen et al., 1998).
5. Norepinephrine is overabundant during mania. Norepinephrine is a neurotransmitter that increases alertness and elevates mood, but when it is extremely elevated it can lead to agitation, mania and even psychosis. To control mania antimanic drugs must reduce excessive norepinephrine activity in the brain (Myers, 2001). When lithium enters the brain one of its first actions is to reduce the sensitivity of the postsynaptic norepinephrine receptor. When postsynaptic norepinephrine receptors are made less sensitive, norepinephrine stimulation decreases. Less norpinephrine stimulation reduces mania (Van Praag, 1977).
6. Lithium has multiple actions on the brain that appear to work together to correct abnormalities associated with bipolar disorder. Trying to point out one effect is impossible. "Since its discovery, lithium has been shown to act upon various neurotransmitter systems at multiple levels of signaling in the brain. Lithium, affecting each neurotransmitter system within complex interactive neuronal networks, is suggested to restore the balance among aberrant signaling pathways in critical regions of the brain. Recent molecular studies have revealed the action of lithium on signal transduction mechanisms, such as

phosphoinositide hydrolysis, adenylyl cyclase, G protein, glycogen synthase kinase-3beta, protein kinase C, and its substrate myristoylated alanine-rich C kinase substrate. Such effects are thought to trigger long-term changes in neuronal signaling patterns that account for the prophylactic properties of lithium in the treatment of bipolar disorder. Through its effects on glycogen synthase kinase-3beta and protein kinase C, lithium may alter the level of phosphorylation of cytoskeletal proteins, which leads to neuroplastic changes associated with mood stabilization. Chronic lithium regulates transcriptional factors, which in turn may modulate the expression of a variety of genes that compensate for aberrant signaling associated with the pathophysiology of bipolar disorder (Lenox and Hahn, 2000)."

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2. Lenox RH, Hahn CG. Overview of the mechanism of action of lithium in the brain: fifty-year update. J Clin Psychiatry 2000;61 Suppl 9:5-15.
3. Manji HK, Chen G. PKC, MAP kinases and the bcl-2 family of proteins as long-term targets for mood stabilizers. Mol Psychiatry 2002;7 Suppl 1:S46-56.
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5. Shaldubina A, Agam G, Belmaker RH. The mechanism of lithium action: state of the art, ten years later. Prog Neuropsychopharmacol Biol Psychiatry 2001 May;25(4):855-66
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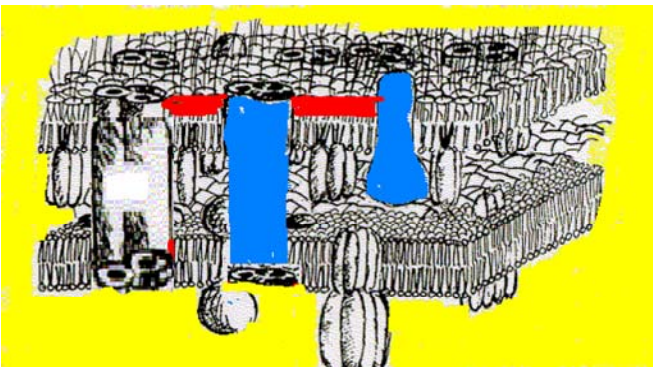
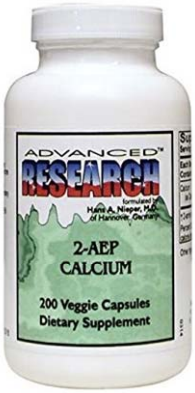
Lithium Orotate Side Effects

1. Some people have used lithium orotate for decades without difficulty.
2. Any type of lithium preparation whether it is a drug or nutritional supplement when used chronically can slow the production of thyroid hormone in some people (Lazarus, 1998).
3. Lazarus explained the mechanisms by which lithium induces hypothyroidism in his 1998 article on the effects of lithium on the thyroid gland. Lithium can impair iodine uptake by the thyroid gland, impair the iodination of tyrosine, alter thyroglobulin structure and impair the release of thyroxine from the thyroid gland (Lazarus, 1998).
4. Lithium however is used by some doctors to treat patients with hyperthyroid conditions that do not respond to other forms of therapy (Dickstein et al., 1997).
5. I recommend all people who use lithium orotate to have periodic checks of their thyroid function, blood chemistries and blood counts every 6-12 months. Any type of mineral containing drug or mineral supplement when taken long term can alter blood chemistries in some people.
6. Since lithium orotate contains significantly lower amounts of elemental lithium than does drug forms of lithium, lithium orotate is less likely to produce side effects associated with high dose lithium use.
7. About one in fifty people will experience fatigue and weakness when taking lithium orotate. If fatigue occurs reduce the dosage by ½. If fatigue occurs on only one pill a day reduce use to one pill twice a week. If fatigue remains a problem even on these reduced doses discontinue use of lithium orotate. Note people with severe fatigue reactions are likely to have dysfunction of their thyroid, pituitary or adrenal glands and they should have their doctor check for glandular dysfunctions.

References:

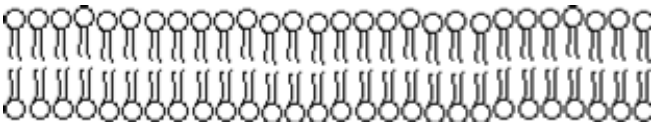
1. Dickstein G, Shechner C, Adawi F et al. Lithium treatment in amiodarone-induced thyrotoxicosis. Am J Med 1997;102(5):454-458.
2. Lazarus JH. The effects of lithium therapy on thyroid and thyrotrophin-releasing hormone. Thyroid 1998;8(10):909-913





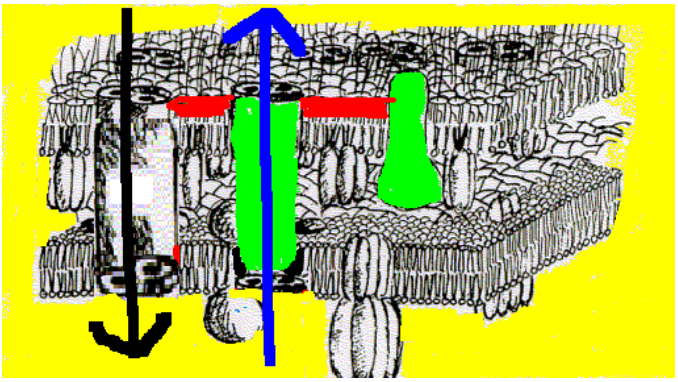
How can 2-AEP seal cell walls preventing the entry of toxins and viruses, but not interfere with the entry of nutrients and cell release of toxins?

1. Cell membranes are made of double layers of lipids that have proteins that are attached on the surfaces as well as other proteins called integral membrane proteins that are inserted all the way through the membrane with portions sticking out on both sides. Cells are constantly rebuilding their cell membranes and require a continuous supply of raw materials to use in membrane construction.



2. Nutrients enter the cell through membrane protein channels and one method that toxins leave the cell is through other channels. Viruses and toxins enter the cell in places where the membrane does not form a tight seal between the protein channels.

3. 2-AEP seals the protein channels to the membrane (see part of graph marked in red) without blocking movement of nutrients in or toxins out through these channels. Cells do not normally take in toxins through protein channels, but they do have built in mechanisms that help move toxins out of the cell. 2-AEP is beneficial to the health of cell membranes, since it is a natural membrane repair material.



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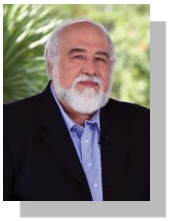

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