

BIOLOGICAL PARALLELS AND OPPOSITES OF LITHIUM AND FLUORIDE

¹Strunecka A., ²Sarek M., ³Patocka J.


¹Department of Physiology and Developmental Biology, Faculty of Sciences, Charles University in Prague, Prague 2, Vinicna 7, Czech Republic.

e-mail: strun@natur.cuni.cz


²Psychiatric Department, First Faculty of Medicine, Charles University in Prague, Prague 2, Czech Republic.

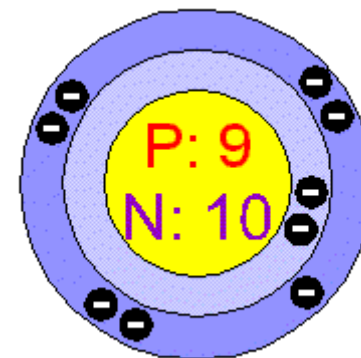
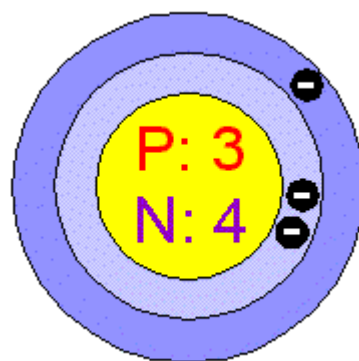
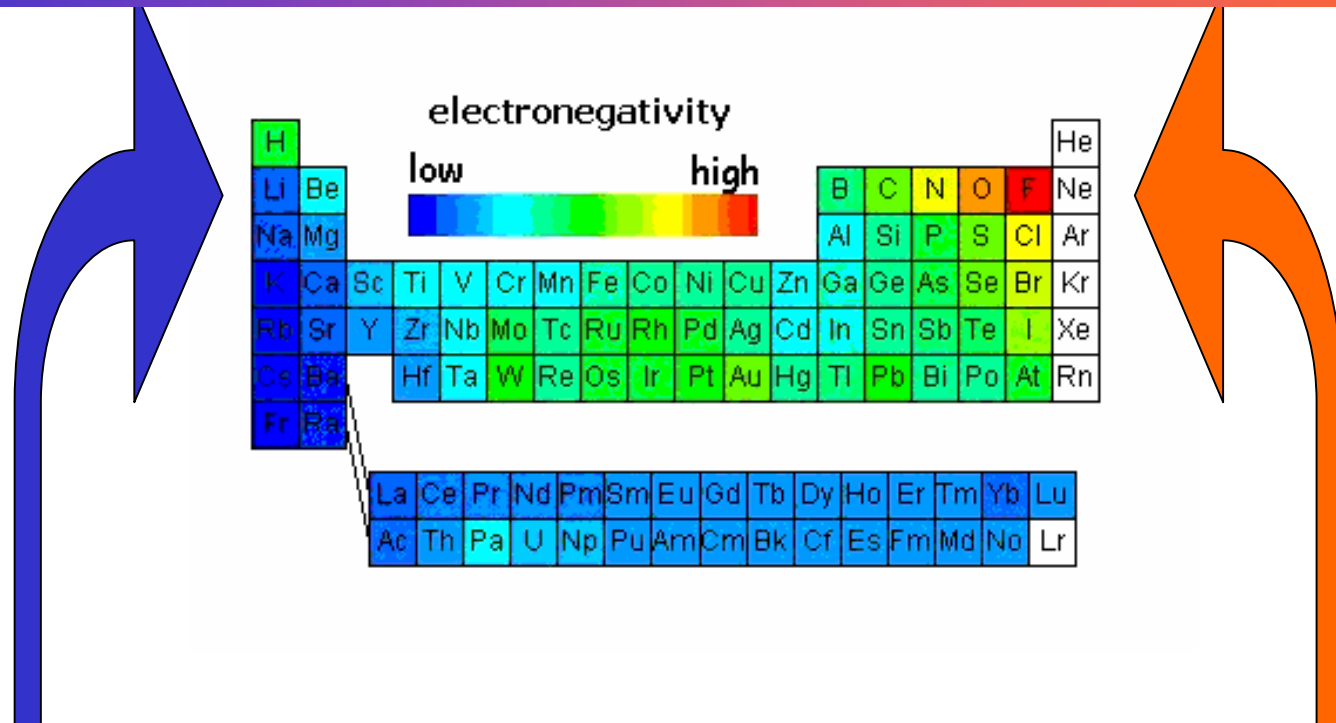
³Department of Radiology and Toxicology, Faculty of Health and Social Studies, University of South Bohemia, Ceske Budejovice, Czech Republic





Lithium and **fluoride** have been used in medicine for over 50 years. Yet, despite their abundance in the earth's crust, these elements have not been involved in the evolution of life on Earth as components of organic compounds in living organisms. **The question of their biogenic role has not been fully explored.** Despite intensive laboratory and clinical research investigating the mechanism of the therapeutic action of both fluoride and lithium, it is still a mystery **how these simple ions exert such profound biological and pharmacological effects.**






	Lithium	Fluoride
apoptosis	decrease	increase
embryonic development	teratogenesis	teratogenesis
glucose metabolism	glycogen synthesis	glycogen breakdown
bone	decreased density	cell proliferation, fluorosis
brain	prevention of amyloidosis and NFT reduces swings of mood	amyloid and NFT formation behavioral changes, decline in mental activity and IQ
cardiovascular system	arrhythmia, hypertension	damage
gastrointestinal system	anorexia, nausea	damage
kidney	damage	damage
endocrine glands	parathyroidea	thyroidea, pineal, testes
fertility	damage - reduction	damage - reduction



The use of **lithium** in medicine


Lithium represents one of the psychiatry's effective drugs for both treatment and prophylaxis of **bipolar disorder**.

The discoveries of the pluripotent role of **GSK-3** led to the suggestion of the therapeutic use of lithium in other maladies including **Alzheimer's disease, type 2 diabetes, and stroke**.

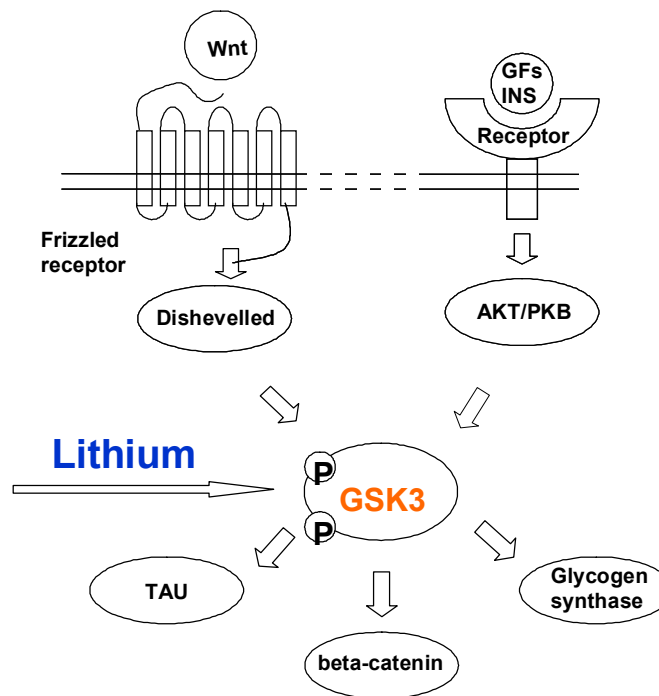




The use of **fluoride** in medicine

- Dental treatment and products - reduction of dental caries
 - Osteoporosis
 - Fluorine-containing drugs are used in medicine as anesthetics, antibiotics, anti-cancer, and anti-inflammatory agents, psychopharmaceuticals
 - Water fluoridation has been described as “**one of the top ten public health achievements of the twentieth century**”
 - Large groups of people, including neonates, infants, children, and ill patients serve as the subjects of pharmacological and clinical research.
- 

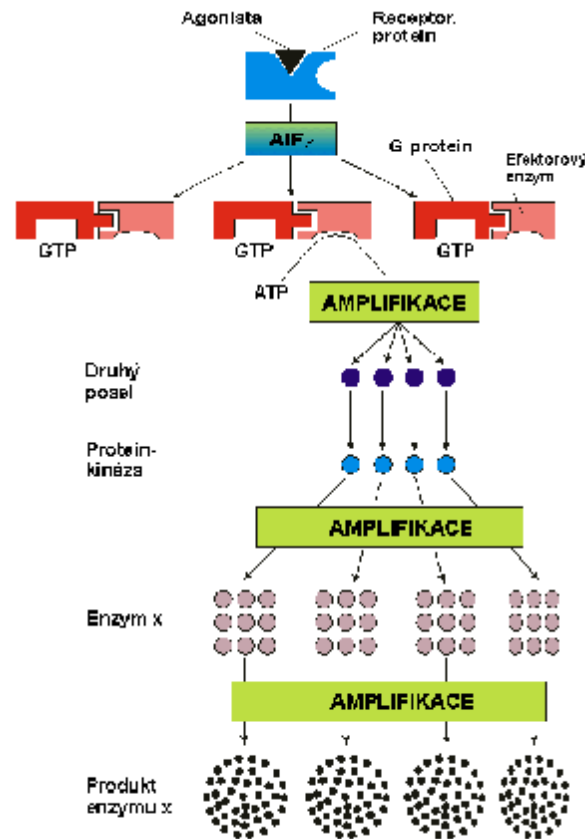
The effect of **lithium** on signaling systems



The effect of fluoride and lithium on enzymes

Enzyme	Fluoride	Lithium
glycogen synthase	↓	↑
glycogen phosphorylase	↑	↓
lactate dehydrogenase	↑	↑
pyruvate kinase	↓	↓
enolase	↓	↓
inositol –1 phosphatase	↓	↓
acetylcholinesterase	↓	↑
serin/threonin kinase	↓	↑
Phosphatase	↓	
GSK3	?	↓

The effects of fluoride on signaling systems



NaLi

- Incubation of early embryos with 0.3 mM lithium chloride resulted in the dorsalization.
- The most extreme results are embryos with radial symmetric heads, a cylindrical heart, and bands of eye pigment.
- The dramatic effects of lithium are accounted to **GSK-3 inhibition**

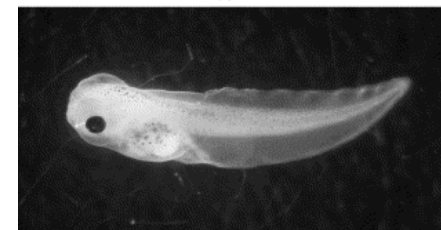


NaF

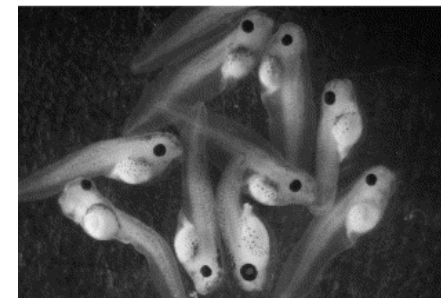
- the reduction in the head-tail lengths of tadpoles
- the pigmentation and eye diameter reduction
- the touch reflex of embryos are reduced
- neuromuscular developmental defects




(a)



(b)




(c)



Both **fluoride** and **lithium** can affect the etiopathology of **Alzheimer's disease**. Whereas **fluoride has neurotoxic effects** on the brain, **lithium has been found to be neuroprotective** and stimulating growth of neurons. On the other hand, both elements have **serious adverse effects**, which must be taken into account in their application to human. The increased burden of fluoride from many sources might evoke long-term health problems linked to this exposure.

The expected benefits might well become a hidden biological bomb for human civilization.





We can send you these papers
(No.1 and/or 2) as pdf file.
Please, write your e-mail

