

SUMMARY

LITHIUM: Effects on excitable cell membranes. Lithium salts have been used in the treatment of manic-depressive psychosis for many years but their mechanism of action is not well understood. Many workers assume that the action of lithium on catecholamine metabolism and/or on electrolyte distribution is in some way related with its therapeutic effect. Because lithium closely resembles sodium and potassium, we have studied the effect of lithium on phenomena which are controlled by sodium and potassium.

The results of these investigations are presented in this thesis. They suggest that therapeutic concentrations of lithium

- a) do not affect the ionic distribution and resting potential of striated muscle fibre
- b) inhibit the Na/K transport mechanism of the rat vagus nerve membrane
- c) compete with potassium outside and with sodium inside the membrane for an active site on the nerve membrane
- d) decrease the conduction velocity of an action potential, but only when the nerves are stimulated at high frequencies
- e) inhibit the Na/K ATP-ase of the vagus nerve membrane of rats after long-term treatment of the animals with LiCl, or when the nerves are stimulated at high frequencies.

On the basis of these results a model on the mechanism of action of lithium is proposed. The model supposes that the carrier normally transporting potassium into the nerve fibre can also transport lithium into it. Because the lithium-carrier complex inside the nerve membrane dissociates very slowly, the subsequent outward transport of sodium ions by the same carrier is inhibited. Such a mechanism could be responsible for the therapeutic action of lithium salts.

INTRODUCTION

History.

In 1818 the Swedish chemist discovered the element. Because of its name lithium (Greek name lithium) (Grew) that lithium closely resembles sodium. Soon lithium was introduced into medicine for the treatment of manic-depressive disorders, because of this spa water element. In later years it was found to have a sedative effect. In 1948 it was found to have a therapeutic effect in manic-depressive disorders. In 1948 NaCl for patients with a number of deaths those with renal failure. An Australian psychiatrist in his search for a better method of treatment noted that the anion of lithium protected against manic-depressive symptoms. This observation led to the use of lithium salts in the treatment of manic-depressive disorders. In his work of Schou (1957) lithium is now accepted as a treatment of the manic phase of manic-depressive and ma-

Chemistry and dis

Lithium is a mono-valent alkali-metal. It is found in plankton and mollusks. Its concentration in liver is 0.02%. It is not known if lithium has any physiological function.