

# Rubidium in Psychiatry: Research Implications

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MALEK-AHMADI, P AND J A WILLIAMS *Rubidium in psychiatry Research implications* PHARMACOL BIOCHEM BEHAV 21: Suppl 1, 49-50, 1984 —A brief overview of the use of rubidium in affective disorders and schizophrenia is presented. Although antidepressant action of rubidium has not been supported by adequate number of controlled studies, its potential contribution to psychiatry warrants further investigations. Endogenous rubidium may be a useful research tool in the future psychopharmacological studies of affective disorders.

Affective disorders      Antidepressant      Lithium      Rubidium      Schizophrenia

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THE introduction of antidepressant drugs represents a major advance in psychiatry. However, the search for new antidepressant agents continues and new drugs have been or are being introduced. Some naturally occurring substances also have been claimed to have antidepressant activity and implicated in the pathogenesis of major affective disorders. Among such substances, rubidium has been investigated in a number of studies. It is the purpose of this brief review to re-examine the role of rubidium as a potential antidepressant and a research tool in the psychopharmacology of affective disorders and schizophrenia.

Rubidium is one of the alkali metals of the group IA in the periodic table of the elements. It is widespread in nature, found in plant, animal and human tissues. Among the food items soybeans are quite rich in rubidium [9]. In the United States, the mean dietary daily intake of rubidium for adult male and female subjects is about 2.53 and 1.8 mg respectively [19,20]. Trace amounts of rubidium have not been found to be toxic in animals [10]. Moreover, it has been proposed that rubidium may be an essential dietary factor [9]. Siegers *et al* [14] have suggested that rubidium content in rats is genetically determined and is not affected by the nutritional status. There is also evidence to suggest that the skin content of rubidium in humans is negatively correlated with age [15].

Rubidium salts have no clinical use in medicine. They, however, have been administered to patients with affective and schizophrenic disorders in a number of studies.

## RUBIDIUM AND AFFECTIVE DISORDERS

Lithium and rubidium have some contrasting neurochemical, neurophysiological, pharmacological and behavioral effects in laboratory animals.

In 1971, Fieve *et al*. [7] hypothesized that rubidium may have some application in the treatment of affective disorders. The researchers conducted the first metabolically con-

trolled study in which rubidium chloride was administered to healthy subjects and affective disorder patients. Although no definite conclusion regarding the antidepressant properties of rubidium could be reached, the study provided a groundwork for subsequent trials and a number of studies have been conducted. Fieve and Jamison [8] have recently reviewed these studies and have alluded to the methodological problems.

The role of rubidium as a potential antidepressant obviously requires further investigation. Rubidium, however, may have some relevance to the treatment of affective disorders with lithium. It has been suggested that rubidium may affect the response of bipolar patients to lithium. McClure *et al* [12] have hypothesized that high serum rubidium levels are found in bipolar patients who respond favorably to lithium. This is an intriguing hypothesis when one considers the contrasting effects of rubidium and lithium and the inconsistent results with the other potential biological predictors [14]. There are several studies concerning blood rubidium levels in patients with affective disorders and normal subjects [1, 5, 6, 18, 19, 20, 21]. Aside from methodological problems associated with the techniques, large variabilities in plasma rubidium and its urinary excretion have been noted [13,19].

In a recent study, Zizolfi *et al* [22] have measured basal rubidium blood levels in patients with affective disorders, schizophrenia and normal subjects. The researchers have not found a significant difference between the rubidium levels of the patients population and those of normal controls. No significant differences were found between males and females. Furthermore, the age did not appear to have any effect on the basal rubidium blood levels. The above study, although the first in its kind, has some limitations since there were only two patients diagnosed as having bipolar disorder. The role of rubidium as a predictor of lithium response would have to be investigated in future studies involving a larger number of patients.

## RUBIDIUM AND SCHIZOPHRENIA

The reported antidepressant activity of rubidium in patients with affective disorders led Chouinard and Annable to hypothesize that the agent may be of some therapeutic value in improving affective symptoms of patients suffering from chronic schizophrenia [2]. In 1977 Chouinard and Annable [2] in a double-blind, placebo-controlled study lasting for nine weeks investigated the effects of rubidium chloride in eighteen hospitalized chronic schizophrenic patients. Rubidium improved the negative symptoms of the patients but had no effect on the positive symptoms. In a subsequent study lasting for twelve weeks, rubidium chloride was administered to twenty four patients. Once again, there was an improvement in the negative symptoms but it was preceded by an exacerbation of the positive symptoms [4]. These findings are best explained by desensitization of supersensitive dopamine receptors. Rubidium may increase the availability of dopamine at the receptor sites (initial exacerbation) and this is followed by desensitization of dopamine receptors which accounts for the improvement of the negative symptoms. The effects of rubidium in chronic schizophrenia are also consistent with the dopamine-deficiency hypothesis of schizophrenia proposed by Chouinard and Jones [3].

Zizolfi *et al* [22] have measured basal blood rubidium in schizophrenic patients and once again no significant difference was found between schizophrenic patients and normal subjects.

In conclusion, rubidium, a naturally occurring alkali metal, is reported to have antidepressant activities. The effects of rubidium on the affective symptoms of patients with affective and schizophrenic disorders have been investigated in a number of studies but the results are not conclusive. Measurements of rubidium levels also may predict the response of bipolar patients to lithium treatment. Whether an antidepressant or a predictor of lithium response, the role of rubidium has not been adequately investigated and warrant future controlled studies involving a large number of patients.

## ACKNOWLEDGEMENT

The authors thank Ms Cynthia Rosenblatt for typing the manuscript and her secretarial assistance.

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