1
Overview of Magnesium Research: History and Current Trends

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The lore of magnesium in medicine, starting as far back as the 17th century up to the first quarter of the 20th century, covers a large span of the chemical and pharmacological fields of knowledge.

The modern period, from 1926—when the essential character of magnesium was demonstrated—up to the 1960s, laid the basis for the present development of magnesium research by opening new vistas in the epidemiological and clinical fields where magnesium was acknowledged as being involved.

Several leading ideas deserve to be mentioned: (1) magnesium concerns all areas of medical activities; (2) the main expression of chronic marginal deficit is long-term chronic magnesium deficiency; (3) the specific etiological treatment of the responsible illness is the specific therapeutic measure meant to correct secondary magnesium deficit; (4) atoxic physiological palliative oral magnesium therapy is basically different from potentially noxious pharmacological use of magnesium; (5) the importance of distinguishing between magnesium deficiency and magnesium depletion in case of magnesium deficit; and (6) the interest of studying the chronopathological forms of magnesium deficit with hyper- or hypofunction of the biological clock.

This overview on past, present, and future bears witness to the vitality of magnesium research in health and disease.

Magnesium, the second most important intracellular cation, is found in all tissues and may affect many functions in the body. Its multiple physiological actions have been discovered thanks to the numerous convergent efforts of multinational research.

The aim of this study is to sum up the history of magnesium research and to highlight the current trends with a special stress on the leading ideas developed at the XIth International Magnesium Symposium (ISE, Japan).

This overview, which first considers the early history of the subject during the 18th and 19th centuries and first quarter of the 20th century, is mainly an account of the development of chemical and pharmacological knowledge. The modern history follows, which includes an initial period ending in the 1970s, when physiological, analytical, and epidemiological data established a firm
background for the first clinical studies in the neurological and cardiovascular fields particularly.

The present period is characterized by an exponential development of magnesium research, as will be testified by the subjects of the multiple sessions at the ISE Osaka Symposium.

**History**

One may consider the recognition by N. Grew, in 1695, of magnesium sulfate as one of the essential constituents of Epsom salts, as marking the entry of magnesium into medicine. N. Grew separated the solid salt in quantity from the bitter-tasting natural water of the Epsom spring. This latter was considered as an internal remedy and purifier of the blood and used by “a great store of citizens” and especially by “persons of quality,” including Marie de Medicis in the 16th century. Other important springs also contained magnesium sulfate and Epsom salts, or sal anglicum, synonymous with Sedlitz, or Egira powder, or salt, to designate the first preparation of magnesium sulfate used in medicine, mainly as a purgative. It was considered as a typical saline cathartic.

In 1707, M.B. Valentini of Giessen processed “magnesia alba” from the mother liquors obtained in the manufacture of nitre. This by-product of the preparation of nitre was considered as “a panacea for all bodily ailments,” but then magnesia alba and “calcareous earth” were confused. In 1755, J. Black of Edinburgh distinguished between magnesia and lime chemically.

In 1808, H. Davy of London isolated magnesium. Conducting his studies on alkali, that is, earth compounds, H. Davy succeeded in producing the amalgams of calcium, barium, strontium, and magnesium. He then isolated the metals by distilling off the mercury. As in the case of the alkali metals, he named these alkali–earth metals after their oxides: baryta, strontia, chalk, and magnesia, calling them barium, strontium, calcium, and magnium. Magnium has long been forgotten, however, and magnesium has been adopted by general usage for the element derived from magnesia.

In 1828, the French chemist A.A. Bussy, by reducting anhydrous magnesium chloride with potassium, prepared the metal in a state approximating purity.

In 1833, M. Faraday of London was the first to succeed in producing metallic magnesium by electrolysis of molten magnesium chloride. Electrolytic methods entirely superseded the older ones in the industrial production of magnesium until about 1941, when the carbothermic and ferrosilicon technique employing a thermal process came into use for a small proportion of magnesium production. In industry, magnesium was first used in photography and to make incendiary bombs; now it is in great demand for alloys and structural materials. Because of its lightness and abundance (2.1% of the earth’s crust) “it has become the glamour metal of the space age.” Alumínium, the nearest rival for structural purposes, is one and a half times as heavy.