

MILESTONES IN BIOLOGICAL TRACE ELEMENT RESEARCH

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ABSTRACT

Over 100 years ago, macro-scale analytical techniques were used to discover the roles of special compounds (especially of metallic elements) in living organisms, and investigations were focussed on selected proteins and pigments suspected of containing percentage quantities of metals. In contrast, present-day analytical techniques are capable of detecting extremely small quantities and have become routine ultra-trace measurement tools to probe elemental interactions at cellular levels. The scientific achievements connecting these two boundaries are punctuated with an array of analytical developments; some highlighting the phenomenal advances in the measurement technology and others reflecting the exceptional bioanalytical perception and the multi-disciplinary outlook of trace element investigators. An account of the events that contributed to the overall progress in biological trace element research is the essence of this communication.

INTRODUCTION

Trace elements and myth!

Almost 2300 years ago Hippocrates advocated the notion of "you are what you eat". Then there are stories of prescribing rusty water to restore vigor to pale looking persons, embedding iron nails in apples for several days before recommending those apples for consumption by pregnant women and persons who were weak, and using burned sponges (later proven to contain iodine) to cure goiter. Thus, the ancient Greeks were unwittingly exploring a whole new area of science. They have also confirmed that the healing power of trace quantities was an antique phenomenon!

Nature's signatures

Tracking down historical notes reveals that nature's signatures, which were sometimes subtle and often poignant, were waiting to be linked to what are now termed as trace element disorders. These hints were specific in certain geographic locations. The use of seaweeds as a source of iodine, and linking iodine to the incidence of goitre during the 18th century and consolidating these findings in the 19th century, is an outstanding example [2]. Similarly, selenium toxicity linked to livestock through a condition known as alkali-