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The Discovery of Vitamin B12

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Abstract

The discovery of vitamin B_{12}, the elucidation of its role in metabolism, and the effects and treatment of its deficiency occurred in distinct phases over more than 100 years, and it was the subject of two separate Nobel Prizes. The valuable contribution of clinical reports and studies of patients with pernicious anemia throughout the 19th century resulted in enough clinical definition to allow Minot and Murphy to put together the first hallmark study on treatment of the condition, leading them to a Nobel Prize. These researchers were not the first to suggest that an inadequacy of nutrients was the cause of pernicious anemia, but their particular input was a carefully designed intervention in well-characterized pernicious anemia patients, of a special diet containing large amounts of liver. They found consistent improvement in the clinical and blood status of all subjects, most of whom remained on remission indefinitely. After the successful intervention studies, the next advance was made by Castle who discovered that a gastric component, which he called intrinsic factor, was missing in pernicious anemia. Many years later, intrinsic factor was found to be a glycoprotein that formed a complex with vitamin B_{12}, promoting its absorption through ileal receptors. The vitamin was isolated by two groups simultaneously and was crystallized and characterized in the laboratory of Dorothy Hodgkin, contributing to her Nobel Prize in 1964. Subsequently, the various biochemical roles of vitamin B_{12} were elucidated, including its important interaction with folate and their common link with megaloblastic anemia. Many of the early clinical studies recognized that vitamin B_{12} deficiency also caused a severe neuropathy leading to paralysis and death, while post mortem analysis demonstrated spinal cord demyelination. Vitamin B_{12} is still the subject of intense research and, in particular, its role in preventing these irreversible neurological lesions remains unclear.

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The Discovery of Vitamin B_{12}

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Introduction

The long journey from the earliest description of the fatal disease that was eventually shown to be caused by deficiency of vitamin B_{12} to isolation and characterization of what has been described as 'nature's most beautiful cofactor' [1] took more than 100 years and heralded

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