Abstract

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Nutritional requirements for growth of human lymphocytes.

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BACKGROUND: Mammalian cell culture has become an important avenue for the study of biochemical, nutritional, and developmental processes. The determination of specific growth requirements for cells in culture has been an area of intense investigation over the past several decades. A distinction can be made between nutritional requirements for cells, other essentials for cell growth (e.g. oxygen, carbon dioxide, pH, temperature control), hormonal interactions (e.g. insulin), specific growth factors (e.g.. nerve growth factor, epidermal growth factor), and mitogens. The human peripheral blood lymphocyte provides an excellent system for exploring biochemical and nutritional aspects of cell growth. This cell type is readily available, is in a resting state in terms of cell division, and can be stimulated to proliferate by exposure to a suitable stimulus (mitogens, antibodies, antigen, etc.)

OBJECTIVE: Lymphocytes have many metabolic pathways in common with other cells as well as a variety of cell surface receptors. Determination of cellular requirements for proliferation requires increased definition of the components of culture medium, both in type and amount. The unknown composition and variability of commonly used serum supplements introduce a number of complexities into experimental design that can be avoided with a defined medium. In addition, many experiments cannot be executed without knowledge of all components in the medium. The development of a minimal medium that supports the proliferation of human peripheral blood lymphocytes provides a means not only to assess requirements for lymphocyte cell growth, but also to carry out individualized studies in nutrition and metabolism using lymphocytes.

SUMMARY: The purpose of this review is to survey the development of chemically defined media for growth of human lymphocytes and to indicate applications that are now possible with such media. It must be noted, however, that the requirements for activation and short-term growth of lymphocytes described herein may differ from those for long-term culture of cells over many generations.

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