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Opinion

Hybridoma Technology: An Overview

Arman Nayak

Department of Biomedical Engineering, Utkal University, Bhubaneswar, Odisha, India

OPINION

Hybridoma technology is a technique for mass-producing identical antibodies (also called monoclonal antibodies). This procedure begins with injecting an antigen into a mouse (or other mammal) to elicit an immunological response. The B cell, a type of white blood cell, creates antibodies that attach to the antigen delivered. These antibody-producing B-cells are then extracted from the mouse and united with immortal B cell cancer cells, known as myeloma, to create a hybrid cell line known as a hybridoma, which possesses both the antibody-producing capabilities of the B-cell and the lifespan and reproductivity of the myeloma.

The hybridomas can be grown in culture, with each culture starting with one healthy hybridoma cell, resulting in cultures containing genetically identical hybridomas that produce only one antibody per culture (monoclonal) rather than a combination of various antibodies (polyclonal). The myeloma cell line employed in this procedure was chosen because of its capacity to thrive in tissue culture and the lack of antibody production. The monoclonal antibodies produced by each hybridoma line are all chemically similar, unlike polyclonal antibodies, which are combinations of several distinct antibody molecules. During his sabbatical in César Milstein's laboratory in 1976–1977, Leonard Herzenberg invented the term hybridoma. The antigen against which an antibody is to be created is first exposed to laboratory animals (mammals, such as mice).

This is usually accomplished by administering a series of antigen injections over a period of many weeks. In most cases, these injections are followed by in vivo electroporation, which dramatically boosts the immune response. The B cells are united with immortalised myeloma cells when splenocytes from the mammal's spleen are extracted.

Electrofusion is a technique for fusing B lymphocytes with myeloma cells. With the introduction of an electric field, electrofusion causes B cells and myeloma cells to align and fuse. Chemical treatments, most commonly employing polyethylene glycol, can also be used to fuse B-cells and myelomas. The myeloma cells are pre-selected to ensure that they do not secrete antibody and do not have the hypoxanthine-guanine phosphoribosyltransferase (HGPRT) gene, which makes them susceptible to the HAT media. For 10 to 14 days, fused cells are incubated in HAT media (hypoxanthine-aminopterin- thymidine medium). Aminopterin prevents nucleotide synthesis by blocking the route. As a result, unfused myeloma cells perish because they lack HGPRT, which prevents them from producing nucleotides through the de novo or salvage routes.

Correspondence to: Arman Nayak, Department of Biomedical Engineering, Utkal University, Bhubaneswar, Odisha, India, E-mail: nayakamy@gmail.com

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