Monoclonal Antibodies and Functional Cell Lines

Progress and Applications

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Progress and Applications

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Preface

This volume serves as a follow-up to our previous book, *Monoclonal Antibodies—Hybridomas: A New Dimension in Biological Analyses*. We continue the theme of monoclonal antibodies and their applications, attempting to cover some of the areas not covered in the previous volume. We again include an appendix describing methods useful to those who are beginning to apply these techniques in their own laboratories.

This volume will be followed by another concentrating on the combination of monoclonal antibody techniques with molecular genetic techniques to study structure/function relationships at the level of both the gene and gene product.

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Introduction

Reflections on Nine Years of Monoclonal Antibodies from Hybridomas

ROGER H. KENNETT, KATHLEEN B. BECHTOL, AND THOMAS J. MCKEARN

I. Biotechnology's "Coming of Age"

It has been 9 years since Kohler and Milstein (1975) first reported the production of monoclonal antibodies with predefined specificity. During the intervening time, these reagents have become valuable tools in biomedical research, some have been given FDA approval, and they have been used on patients for therapy; moreover, recent biotechnology newsletters indicate that the first "over-the-counter" monoclonal antibody kit is now available.

Monoclonal antibody technology grew very rapidly after its introduction, as indicated by Figure 1, showing the citations of Kohler and Milstein's original article. The "log phase" of growth lasted for several years, and the number of citations per year continues to grow even through the seventh year after the original report. The "genealogy" of hybridoma production is pictured in Figure 2. Although somewhat simplified, it represents the two major technical advances that made hybridoma production possible—the derivation of mouse plasmacytoma cell lines (Potter, 1972) and the techniques of somatic cell hybridization (Ephrussi, 1972; Kennett, 1979). A similar wedding of enzymology and molecular biology contributed to the development of recombinant DNA techniques, and there are already signs that these two new offspring, which are the

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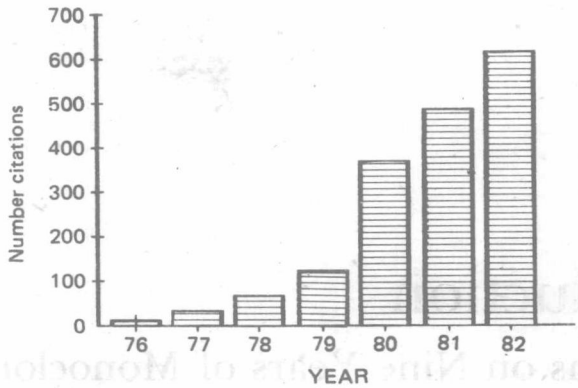

FIGURE 1. The number of publications citing Kohler and Milstein's (1975) original paper on monoclonal antibodies in the years 1976–1982 as listed in the *Science Citation Index*. This does not, of course, include every publication using monoclonal antibodies, but does provide an indication of the rapid rate with which this technology has spread.

major components of the new rapid developments in biotechnology, will be combined to produce new progeny of which we may not even be aware.

In a recent listing of 141 biotechnology companies (Dorfman, 1982), 27 were listed as using hybridoma production, 43 recombinant DNA techniques, and 35 others were actually using both of these technologies. Ways in which the techniques are being used and will be used together in the future are discussed in Chapter 12 of this volume.

During the early stages of monoclonal antibody technology, it was, in general, immunologists who were aware of the implications and could take advantage of the production of hybridomas (Melchers *et al.*, 1978). Since those early years, it has spread to nearly every aspect of biomedical science. Section II provides a general overview of the various ways in which these reagents are being applied. As monoclonal antibody techniques evolved from an observation of basic science and developed as a technology, biologists, like physicists and chemists before them, found it necessary to resolve questions about the "interface" of business and academia. This aspect of monoclonal antibody technology and the resulting issues are discussed in Section III of this chapter.

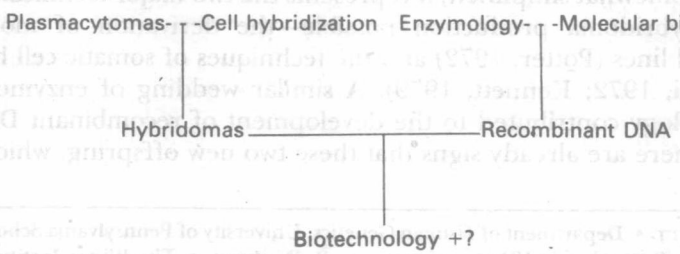

FIGURE 2. A genealogy of monoclonal antibodies. A general representation of the process by which advances in biotechnology have combined to produce new technologies.

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