INTRODUCTION

Celebrating an Anniversary

In this issue of Science, we commemorate the 40th anniversary of the U.S. National Cancer Act, which provided a massive stimulus for cancer research. At the start of this “Cancer Crusade,” researchers were already tackling some tough questions, as reflected in papers published by Science in 1971. Among them: How do abnormalities in chromosome number arise in tumor cells? Can tissue-specific markers be used to determine the epithelial versus mesenchymal origin of a solid tumor? Can the immune system be manipulated so that it recognizes tumor cells as foreign invaders that must be eliminated from the body? Do viruses play a role in human cancer?

Skeptics might argue that 40 years later, cancer researchers continue to grapple with the same questions. Perhaps there’s some truth in this. But our hope is that the selection of articles in this special section of Science will explain why many of these questions have proved so challenging and, more importantly, how contemporary cancer research is providing a clearer view of the biology that will lead to answers. Stratton (p. 1553) discusses international efforts to sequence the complete genomes of a wide range of human tumor types and the impact that this sequence information is anticipated to have on our understanding of cancer biology as well as our ability to detect, diagnose, and treat the disease. A working model for cancer cell metastasis is presented by Chaffer and Weinberg (p. 1559), who highlight the important role of cancer stem cells and a developmental process called the epithelial-mesenchymal transition. Schreiber et al. (p. 1565) describe “cancer immunoediting,” a conceptual framework that integrates the immune system’s dual roles in inhibiting and promoting cancer growth.

News reports examine other significant challenges for the field: Jocelyn Kaiser (p. 1542) describes how even the best new drugs eventually seem to fail and how they might be made more effective. David Malakoff (p. 1545) outlines a key social issue: the fast-rising cost of care. Martin Enserink (p. 1548) reports on efforts to close the huge disparity between cancer treatment in rich and developing countries. And Mitch Leslie (p. 1551) describes how researchers are taking a new look at the role of p53 and the related proteins p63 and p73 in tumors.

A video report by Robert Frederick appears online at www.sciencemag.org/special/cancer2011/, along with links to additional reading material. Science Careers features an article on cancer clinical trials training (http://scim.ag/cancertrialstraining) and a Q&A with Memorial Sloan-Kettering clinician-investigator David Solit (http://scim.ag/solitqanda).

It is worth noting that at least one of the questions that concerned cancer researchers writing in Science back in 1971 has been definitively answered. We now know that viruses do in fact play a causal role in certain human cancers, and, thanks to decades of tumor virology research, vaccines against these viruses have been developed into successful cancer-preventive agents. That’s something to celebrate.

— PAULA KIBERSTIS AND ELIOT MARSHALL

Cancer Crusade at 40

CONTENTS

News

1540 Cancer Research and the $90 Billion Metaphor
U.S. Cancer Trends
1542 Combining Targeted Drugs to Stop Resistant Tumors
1545 Can Treatment Costs Be Tamed
1548 A Push to Fight Cancer in the Developing World
1551 Brothers in Arms Against Cancer

Reviews

1553 Exploring the Genomes of Cancer Cells: Progress and Promise
M. R. Stratton
1559 A Perspective on Cancer Cell Metastasis
C. L. Chaffer and R. A. Weinberg
1565 Cancer Immunoediting: Integrating Immunity’s Roles in Cancer Suppression and Promotion
R. D. Schreiber et al.

Celebrating an Anniversary
Paula Kiberstis and Eliot Marshall

*Science* 331 (6024), 1539.
DOI: 10.1126/science.331.6024.1539-a