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Science 26 May 2006:

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INTRODUCTION TO SPECIAL ISSUE

Celebrating a Glass Half-Full

Paula A. Kiberstis and John Travis

An examination of the annual statistical data compiled by the American Cancer Society quickly reveals that the rate of mortality from cancer has changed very little over the past 50 years. And, at last check, the annual Race for the Cure is being scheduled well into the future. So why has *Science* chosen this particular moment to celebrate the cancer research field?

In part, it's because targeted cancer therapies, cancer biomarkers, and genomic medicine are in the midst of a transition from hype to clinical reality. As articulated by Varmus in the opening Perspective of our special section (p. [1162](#)), "... a description of cancer in molecular terms seems increasingly likely to improve the ways in which human cancers are detected, classified, monitored, and (especially) treated." To help nonspecialist readers understand how the molecular description of cancer might one day form the basis of a new patient-centered model of cancer care, *Science* has prepared a [foldout poster](#) illustrating the concept and how it might be implemented. Several Perspectives expand on topics covered in the poster but also point out important obstacles to that vision. Varmus, for example, emphasizes the need for changes in the "culture" of oncology, including the formation of stronger collaborations among researchers, clinical oncologists, industry, and regulatory agencies. The pressing need for new working partnerships is a theme echoed by Dalton and Friend (p. [1165](#)), who discuss the limitations of current efforts to identify and validate molecularly based biomarkers for cancer diagnosis and treatment, and by Weissleder (p. [1168](#)), who outlines how new molecular imaging technologies might contribute to future models of cancer care.

Two additional Perspectives focus on new molecularly targeted drugs that have shown promise in the clinic. Kerbel (p. [1171](#)) discusses several mechanistic models that might explain why antiangiogenesis drugs are most effective in cancer patients when delivered in combination with conventional chemotherapy, and Baselga (p. [1175](#)) reviews the history and clinical activity of small-molecule and antibody-based drugs that inhibit protein tyrosine kinases.

Two News stories discuss emerging research areas that may one day occupy a prominent position on a revised version of our poster. Garber (p. [1158](#)) describes how an old discredited idea--that tumor cells rely on glycolysis for energy--has been resurrected and is driving the development of new anticancer drugs. Exploring another contentious topic, Marx (p. [1160](#)) details the debate over whether the cellular recycling process called autophagy is a tumor suppressor or promoter.

In [related online resources](#), *Science's* Signal Transduction Knowledge Environment (STKE) (stke.sciencemag.org) features a Perspective by Garcia that explores the role of hypoxia-inducible factor signaling in cancer progression and another by Harms and Chen that discusses a splice variant of the c-H-rasoncogene with potential tumor-suppressor activity. In Perspectives in *Science's*

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Science of Aging Knowledge Environment (SAGE) (sageke.sciencemag.org), Fuller discusses the relationship between stem cell aging and cancer, and Medrano *et al.* examine why older men are at a greater risk for melanoma than are older women.

We hope that after perusing these articles, readers will come away feeling that in cancer research, the glass is indeed (at least) half-full.

The editors suggest the following Related Resources on *Science* sites:

In *Science* Magazine

NEWS

Energy Deregulation: Licensing Tumors to Grow

Ken Garber (26 May 2006)

Science **312** (5777), 1158. [DOI: 10.1126/science.312.5777.1158]

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NEWS

Autophagy: Is It Cancer's Friend or Foe?

Jean Marx (26 May 2006)

Science **312** (5777), 1160. [DOI: 10.1126/science.312.5777.1160]

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PERSPECTIVE

The New Era in Cancer Research

Harold Varmus (26 May 2006)

Science **312** (5777), 1162. [DOI: 10.1126/science.1126758]

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PERSPECTIVE

Cancer Biomarkers—An Invitation to the Table

William S. Dalton and Stephen H. Friend (26 May 2006)

Science **312** (5777), 1165. [DOI: 10.1126/science.1125948]

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PERSPECTIVE

Molecular Imaging in Cancer

Ralph Weissleder (26 May 2006)

Science **312** (5777), 1168. [DOI: 10.1126/science.1125949]

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Antiangiogenic Therapy: A Universal Chemosensitization Strategy for Cancer?

Robert S. Kerbel (26 May 2006)

Science **312** (5777), 1171. [DOI: 10.1126/science.1125950]

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PERSPECTIVE

Targeting Tyrosine Kinases in Cancer: The Second Wave

Jose Baselga (26 May 2006)

Science **312** (5777), 1175. [DOI: 10.1126/science.1125951]

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