American Association for Cancer Research

AACR and Its Vital Role in Leading Cancer Science and Medicine

Tyler Jacks, Ph.D.

President, AACR

AACR Report to the
National Cancer Advisory Board
Bethesda, MD
December 1, 2009

Today's Presentation

- Give an overview of the AACR and its scientific scope and impact on cancer research
- Offer perspectives on today's scientific opportunities and challenges

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AACR Mission

To prevent and cure cancer through:

- Research
- Education
- Communications
- Collaborations

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Profile of the AACR Membership

- The first and largest cancer research organization in the world dedicated to conquering cancer
- 30,000 members working in 89 countries
- Senior and junior cancer researchers, physician-scientists, other healthcare professionals
- Undergraduate and high school students
- Cancer survivors and patient advocates
- Organizations and corporations that support our mission
- Over 80,000 non-members who are an integral part of the AACR's worldwide network

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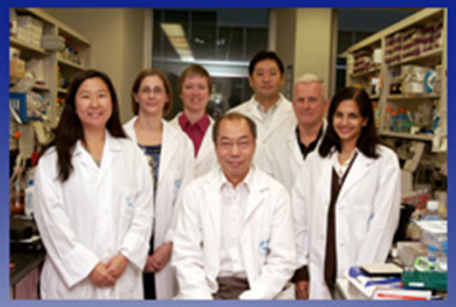
AACR's Leadership in Cancer Science and Medicine



CTRC–AACR SAN ANTONIO BREAST CANCER SYMPOSIUM

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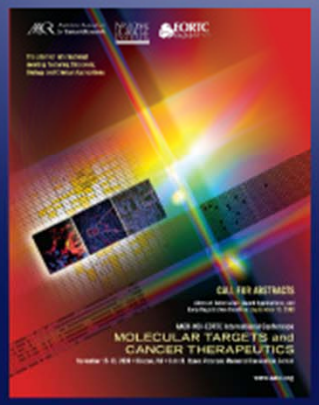
STAND UP TO CANCER™



army of women
LOVE/AVON Going Beyond a Cure

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AACR's Unique Niche: Integration of All Fields Relevant to Cancer Research

- Angiogenesis
- Animal models
- Behavioral science
- Bioinformatics
- Biomarkers
- Carcinogenesis
- Cell death and
- [illegible]putational biology
- Drug design
- Early detection
- Engineering
- Epigenetics and epigenomics
- Genetics
- Genomics and other 'omics
- Imaging
- Immunology
- Infection
- Infl[illegible]
- [illegible]ironment
- microRNAs
- Molecular diagnostics
- Molecular and genetic epidemiology
- Nanoscience
- Nutritional science
- Pathology
- Pharmacology
- Pharmacogenetics
- Pharmacogenomics
- Ph[illegible]
- [illegible]rapies
- Signal transduction
- Stem cells
- Systems biology
- Vaccines
- Virology
- And many more. . .

Creates a ripe environment for cross-disciplinary interactions, translational cancer research, and team science

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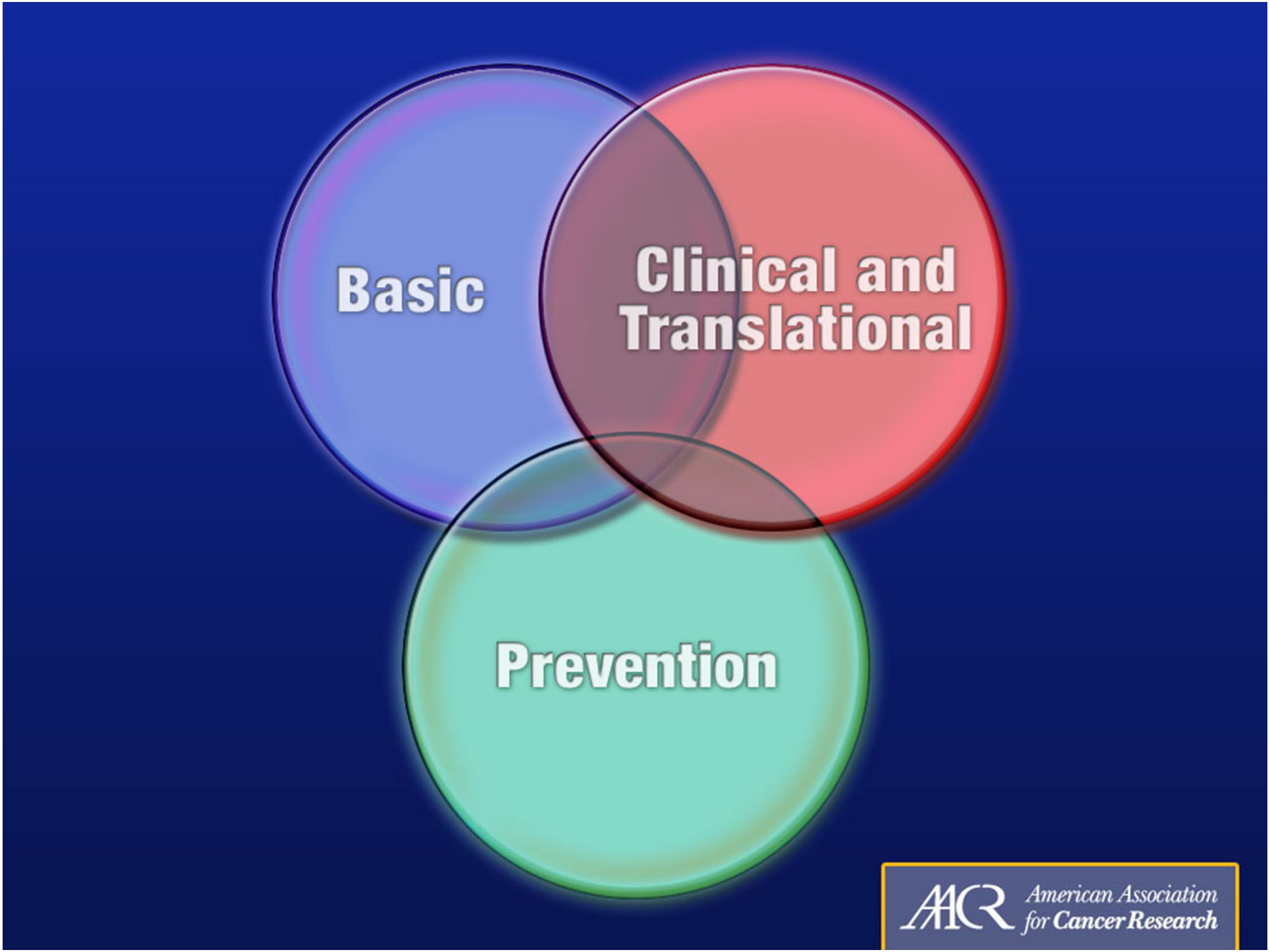
Basic
Clinical and Translational
Prevention
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Cancer Research

- Evolved from oldest English language cancer journal in the world (1916)
- Broad spectrum of subfields in cancer research
- Most frequently cited oncology journal in the world (>125,000 citations in 2008)
- 4,888 submissions projected for 2009
  77% increase since 2002
- Editor-in-Chief until December 2009:
  Frank J. Rauscher, III, Ph.D.
- Editor-in-Chief in 2010:
  George C. Prendergast, Ph.D.

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Evolution of the AACR Publications Program

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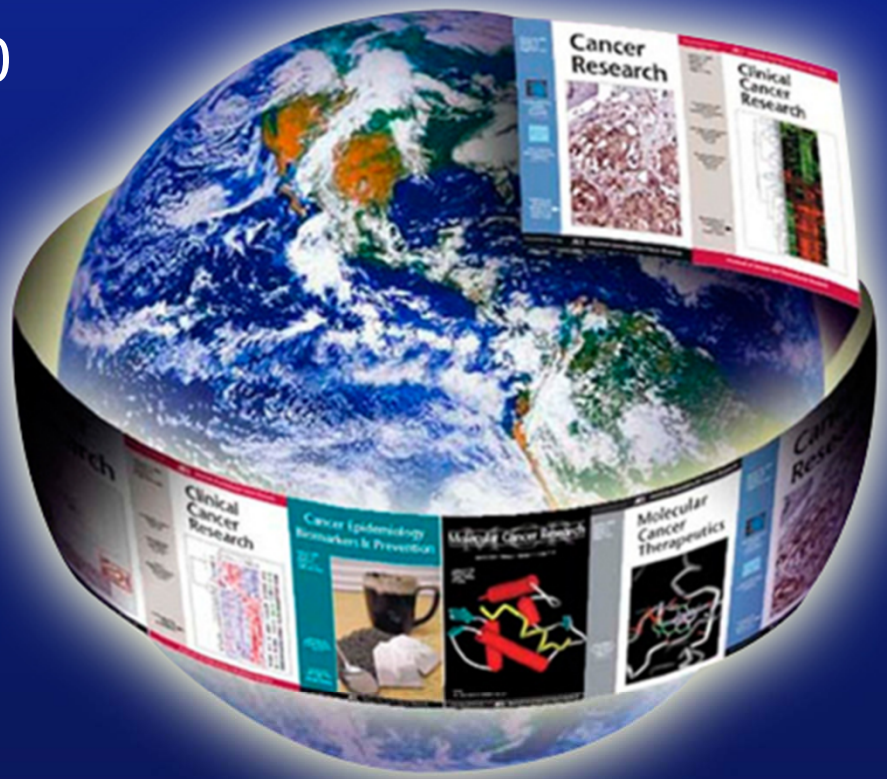
Impact of AACR Journals in the Field of Cancer Research

AACR journals receive >11,000 submissions annually

Published >3,500 articles in 2008

AACR journals received 20% of the total oncology citations in 2008

37 million PDF downloads to our journal articles in 2009 (projected)



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101st Annual Meeting Program

April 17-21, 2010
Washington Convention Center
Washington, DC

Frank McCormick, Ph.D.
Program Chairperson
Director, UCSF Cancer Center

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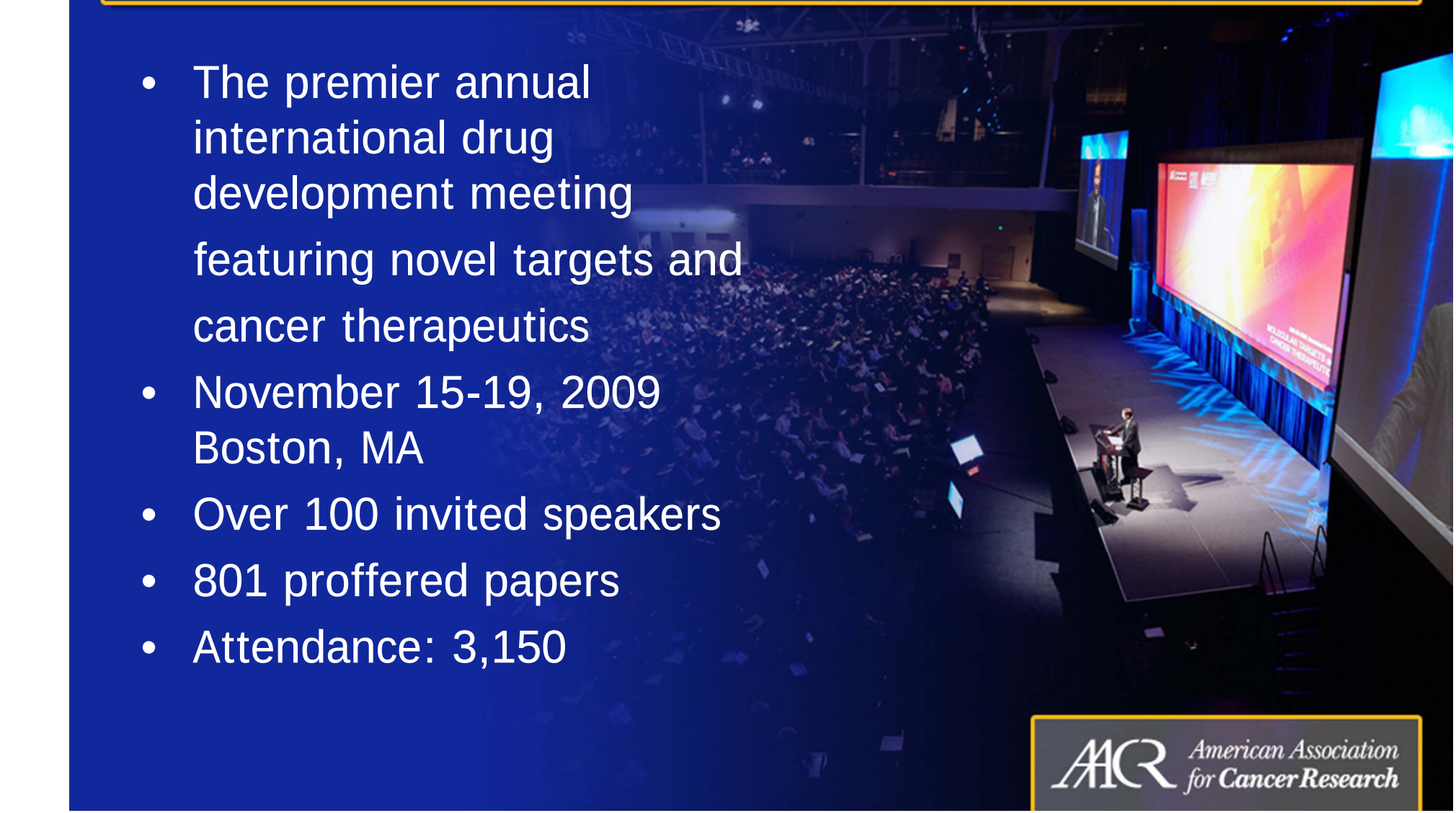
AACR-NCI-EORTC Molecular Targets and Cancer Therapeutics Meeting



- The premier annual international drug development meeting featuring novel targets and cancer therapeutics
- November 15-19, 2009
  Boston, MA
- Over 100 invited speakers
- 801 proffered papers
- Attendance: 3,150

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2009 New Frontiers in Basic Cancer Research Meeting

- October 8-11, Boston, MA
- Arnold J. Levine, Ph.D., Elizabeth H. Blackburn, Ph.D., Joan S. Brugge, Ph.D., and Robert A. Weinberg, Ph.D., Chairpersons
- First conference in a new series on the latest advances in basic cancer research
- Focus – to provide opportunities for early-career basic scientists to interact with outstanding leaders in the field
- Presentations on high-priority topics
- Attendance: Over 560 scientists
- 230 proffered papers

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2009 Frontiers in Cancer Prevention Research Meeting

- December 6-9
- Houston, TX
- Eighth Annual Meeting
- The world's most comprehensive, transdisciplinary meeting focused on cancer prevention research
- Projected attendance: 600+
- 300 Abstracts accepted

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2009 AACR Special Conferences

- **Mouse Models of Cancer**
  San Francisco, January 12-15
- **Advances in Prostate Cancer Research**
  San Diego, January 21-24
- **Translation of the Cancer Genome**
  Boston, February 7-9
- **Chemistry in Cancer Research**
  New Orleans, February 8-11
- **Metabolism & Cancer**
  San Diego, September 13-16
- **Advances in Breast Cancer Research**
  San Diego, October 13-16
- **Genetics and Biology of Brain Cancer**
  San Diego, December 13-15

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2010 AACR Special Conferences

- **Cancer Epigenetics**
  San Juan, February 1-4
- **Cell Death Mechanisms and Cancer Therapy**
  San Diego, February 3-6
- **Protein Translation and Cancer**
  Coronado, February 5-9
- **The Role of Telomeres and Telomerase in Cancer**
  Fort Worth, February 28-March 2
- **EMT and Cancer Progression and Treatment**
  Arlington, March 7-10

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The Science of Cancer Health Disparities Meeting Series

- Was held February 3-6, 2009, Carefree, AZ
- Cheryl L. Willman, M.D., Maria Elena Martinez, M.P.H., Ph.D., and John D. Carpten, Ph.D., Chairpersons
- Second meeting of its type through a generous grant from the NCI and Susan G. Komen for the Cure
- Goals: To bring together scientists from diverse disciplines to discuss the latest findings, foster interdisciplinary interactions, and stimulate the development of new research in this area
- Attendance: 360 scientists in various fields

AACR CENTENNIAL 1907 - 2007 American Association for Cancer Research

AACR Goals in Science Policy and Legislative Affairs

- Educate legislators, policymakers, and members of the media about cancer and the value of cancer research
- Communicate the economic opportunities in cancer research
- Advocate for increased funding
- Work with the U.S. FDA to accelerate drug approval
- Emphasize the economic and human cost of cancer

AACR Annual Progress Report on Cancer

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Survivor and Patient Advocacy

- Educate and inform survivors and patient advocates about the value of cancer research
- Engage survivors and family members in all aspects of AACR's mission and integrate this segment of the cancer community into AACR's work
- Bring the survivor and family perspective, experience, and expertise to the AACR
- Facilitate access to accurate cancer information for members of the public who are touched by cancer

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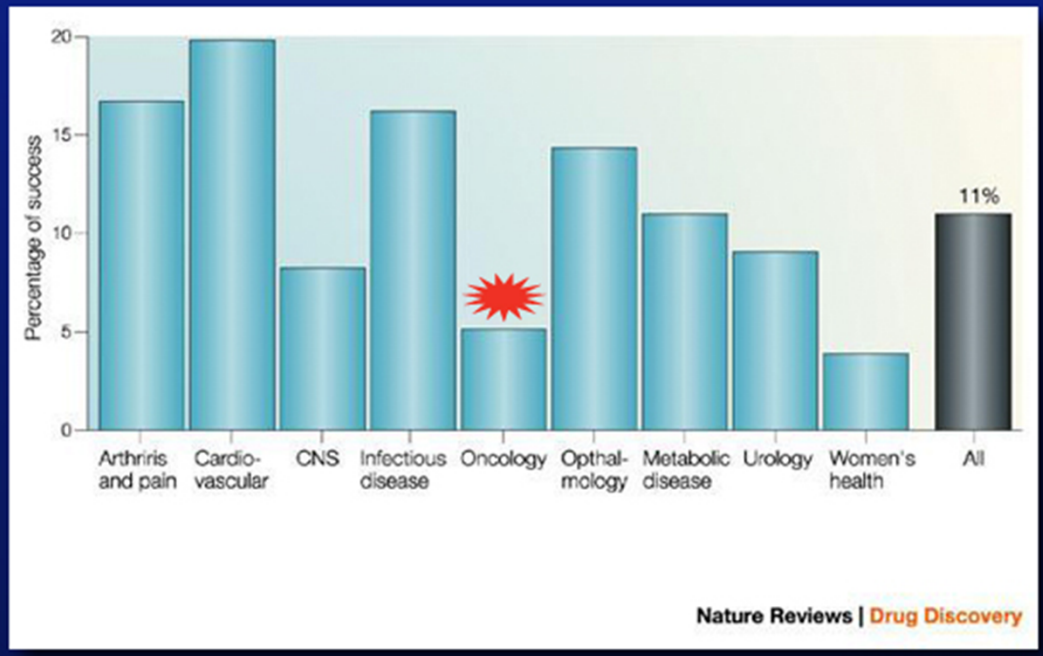
Current Challenges in Drug Development

- Inability to consistently deliver highly effective drugs to patients
  - The process is slow, expensive, and inefficient
  - Many new drugs provide incremental benefit at non-incremental costs
  - The model is unsustainable

Low Success Rate for Oncology Drugs Entering Phase 1 Trials



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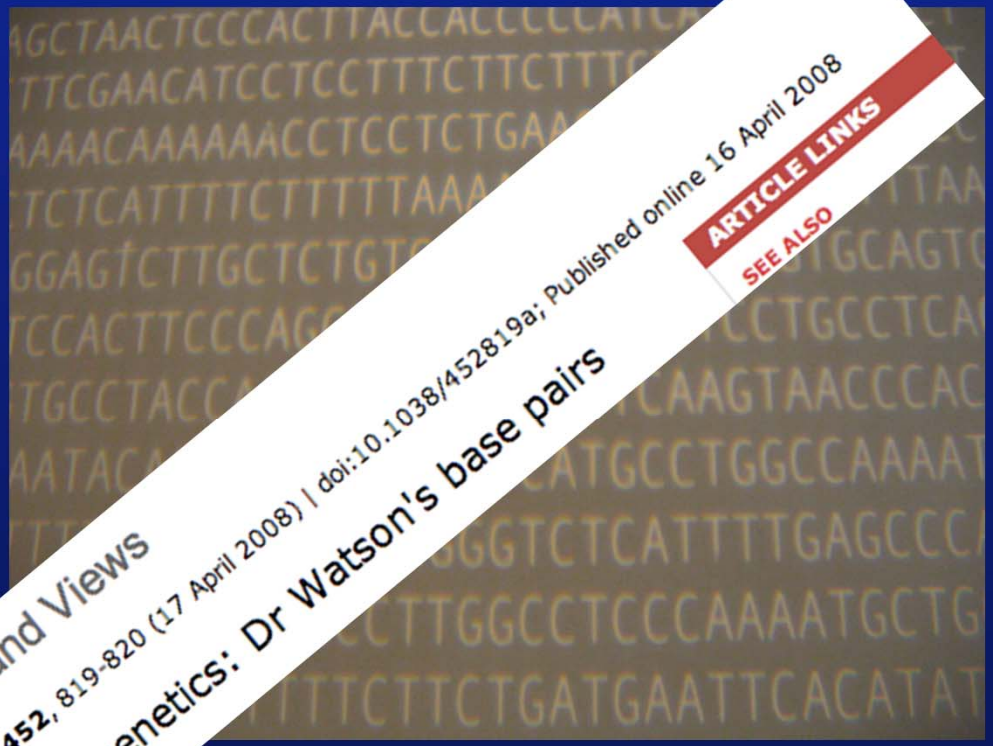
Revolution in Genomics

1953



2008

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The Emerging Era of Cancer Genomics

Gene expression–based survival prediction in lung adenocarcinoma: a multi-site, blinded validation study

Director's Challenge Consortium for the Molecular Classification of Lung Adenocarcinoma:*[1]
Kerby Shedden[2,3,17], Jeremy M G Taylor[3,4,17], Steven A Enkemann[5,17], Ming-Sound Tsao[6,17],
Timothy J Yeatman[5,17], William L Gerald[7,17], Steven
David E Misek[3,9], Andrew C Chang[3,9], Chang Qi Zhu
Keyue Ding[10], Lesley Seymour[10], Katsuhiko Naoki[11],
Christine Ladd-Acosta[12], Todd Golub[12], Michael Grui
Valerie Rusch[7], Mark Kris[7], Agnes Viale[7], Noriko Mo
Venkatraman E Seshan[14,17], Matthew Meyerson[11,12,17]
James W Jacobson[16,17] & David G Beer[3,9,17]

Characterizing the cancer genome in lung adenocarcinoma

Barbara A. Weir[1,2]*, Michele S. Woo[1]*, Gad Getz[2]*, Sven Perner[3,4], Li Ding[5], Rameen Beroukhim[1,2], William M. Lin[1,2],
Michael A. Province[6], Aldi Kraja[6], Laura A. Johnson[3], Kinjal Shah[1,2], Mitsuo Sato[8], Roman K. Thomas[1,2,9,10],
Justine A. Barletta[3], Ingrid B. Borecki[6], Stephen Broderick[11,12], Andrew C. Chang[14], Derek Y. Chiang[1,2],
Lucian R. Chirieac[3,16], Jeonghee Cho[1], Yoshitaka Fujii[18], Adi F. Gazdar[8], Thomas Giordano[15], Heidi Greulich[1,2],
, Alex Lash[11], Ling Lin[5], Neal Lindeman[3,16], Elaine R. Mardis[5],
Morgan[19], Mark Nadel[1,2], Mark B. Orringer[14], John R. Osborne[5],
son[2], Jack A. Roth[21], Valerie Rusch[11], Hidefumi Sasaki[18],
Spitz[22], Ming-Sound Tsao[23], David Twomey[2],
id A. Wheeler[19], Wendy Winckler[1,2], Akihiko Yoshizawa[11],
ang[6], David G. Beer[14], Ignacio I. Wistuba[23,24], Mark A. Watson[7],
Travis[11], William Pao[11,12], Mark A. Rubin[2,3], Stacey B. Gabriel[2],
Wilson[5], Eric S. Lander[2,17,26] & Matthew Meyerson[1,2,16]

Somatic mutations affect key pathways in lung adenocarcinoma

Li Ding[1]*, Gad Getz[2]*, David A. Wheeler[3]*, Elaine R. Mardis[1], Michael D. McLellan[1], Kristian Cibulskis[2],
Carrie Sougnez[2], Heidi Greulich[2,4], Donna M. Muzny[3], Margaret B. Morgan[3], Lucinda Fulton[1], Robert S. Fulton[1],
Qunyuan Zhang[3], Michael C. Wendl[1], Michael S. Lawrence[2], David E. Larson[1], Ken Chen[1], David J. Dooling[1],
Aniko Sabo[3], Alicia C. Hawes[3], Hua Shen[3], Shalini N. Jhangiani[3], Lora R. Lewis[3], Otis Hall[3], Yiming Zhu[3],
Tittu Mathew[3], Yanru Ren[3], Jiqiang Yao[3], Steven E. Scherer[3], Kerstin Clerc[3], Ginger A. Metcalf[3], Brian Ng[3],
Aleksandar Milosavljevic[3], Manuel L. Gonzalez-Garay[3], John R. Osborne[1], Rick Meyer[1], Xiaoqi Shi[1], Yuzhu Tang[1],
Daniel C. Koboldt[1], Ling Lin[1], Rachel Abbott[1], Tracie L. Miner[1], Craig Pohl[1], Ginger Fewell[1], Carrie Haipek[1],
Heather Schmidt[1], Brian H. Dunford-Shore[1], Aldi Kraja[5], Seth D. Crosby[1], Christopher S. Sawyer[1], Tammi Vickery[1],
Sacha Sander[1], Jody Robinson[1], Wendy Winckler[2,4], Jennifer Baldwin[2], Lucian R. Chirieac[6,7], Amit Dutt[2,4],
Tim Fennell[2], Megan Hanna[2,4], Bruce E. Johnson[4], Robert C. Onofrio[2], Roman K. Thomas[8,9], Giovanni Tonon[4],
Barbara A. Weir[2,4], Xiaojun Zhao[2,4], Liuda Ziaugra[2], Michael C. Zody[2], Thomas Giordano[10], Mark B. Orringer[11],
Jack A. Roth[12], Margaret R. Spitz[13], Ignacio I. Wistuba[12,14], Bradley Ozenberger[15], Peter J. Good[15],
Andrew C. Chang[11], David G. Beer[11], Mark A. Watson[16], Marc Ladanyi[17,18], Stephen Broderick[17],
Akihiko Yoshizawa[17], William D. Travis[17], William Pao[17,18], Michael A. Province[5], George M. Weinstock[1],
Harold E. Varmus[19], Stacey B. Gabriel[2], Eric S. Lander[2], Richard A. Gibbs[3], Matthew Meyerson[2,4] & Richard K. Wilson[1]

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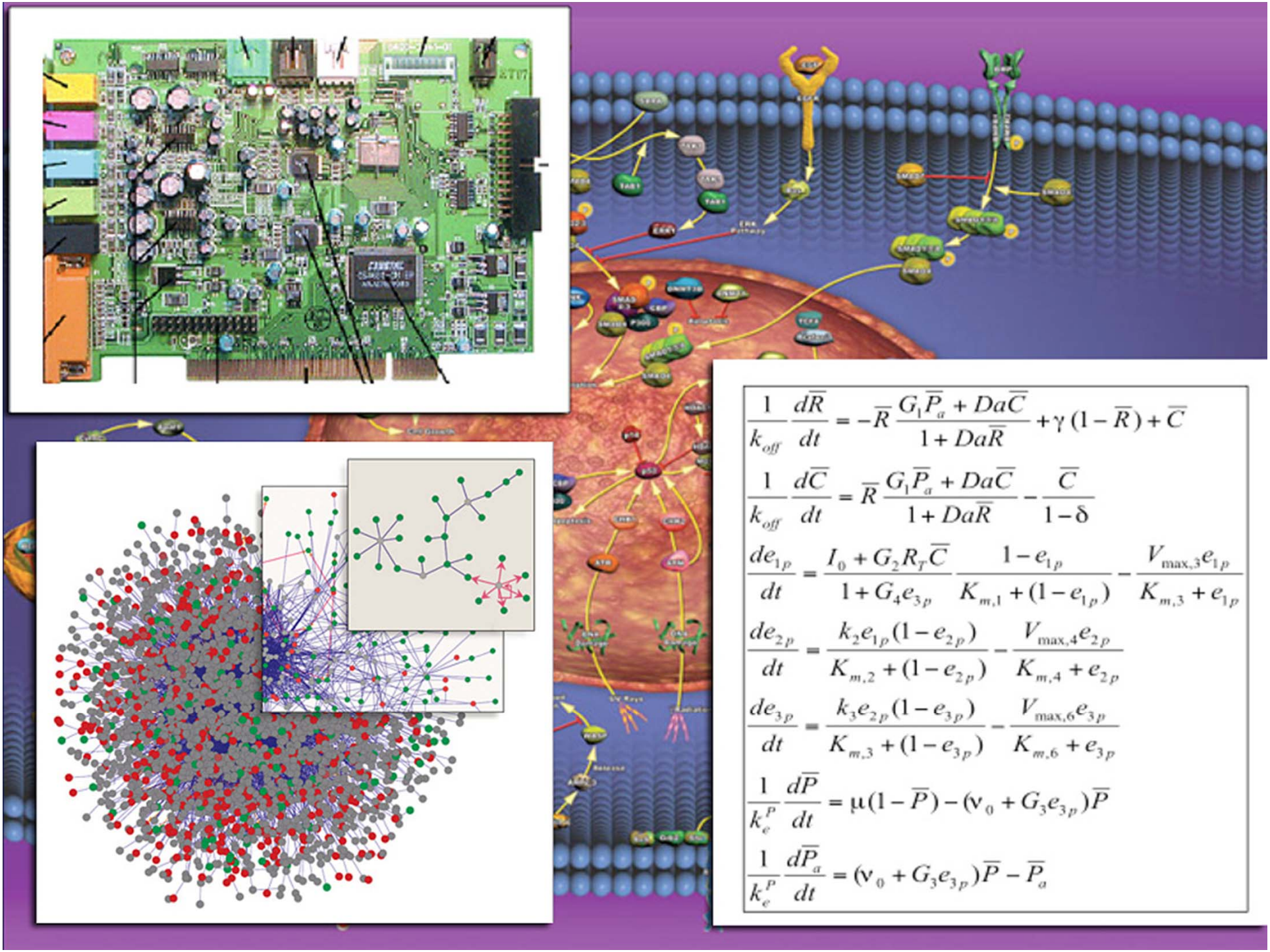


$$\frac{1}{k_{off}}\frac{d\overline{R}}{dt} = -\overline{R}\,\frac{G_1\overline{P}_a + Da\overline{C}}{1 + Da\overline{R}} + \gamma\,(1-\overline{R}) + \overline{C}$$

$$\frac{1}{k_{off}}\frac{d\overline{C}}{dt} = \overline{R}\,\frac{G_1\overline{P}_a + Da\overline{C}}{1 + Da\overline{R}} - \frac{\overline{C}}{1-\delta}$$

$$\frac{de_{1p}}{dt} = \frac{I_0 + G_2 R_T \overline{C}}{1 + G_4 e_{3p}}\,\frac{1-e_{1p}}{K_{m,1} + (1-e_{1p})} - \frac{V_{\max,3} e_{1p}}{K_{m,3} + e_{1p}}$$

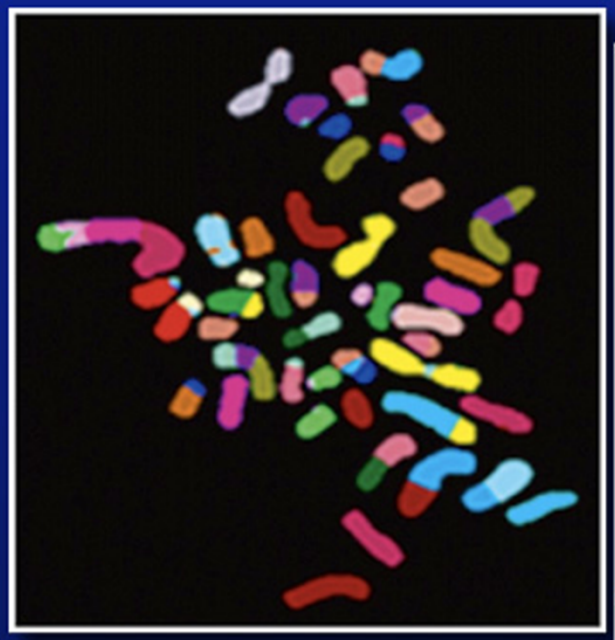
$$\frac{de_{2p}}{dt} = \frac{k_2 e_{1p}(1-e_{2p})}{K_{m,2} + (1-e_{2p})} - \frac{V_{\max,4} e_{2p}}{K_{m,4} + e_{2p}}$$

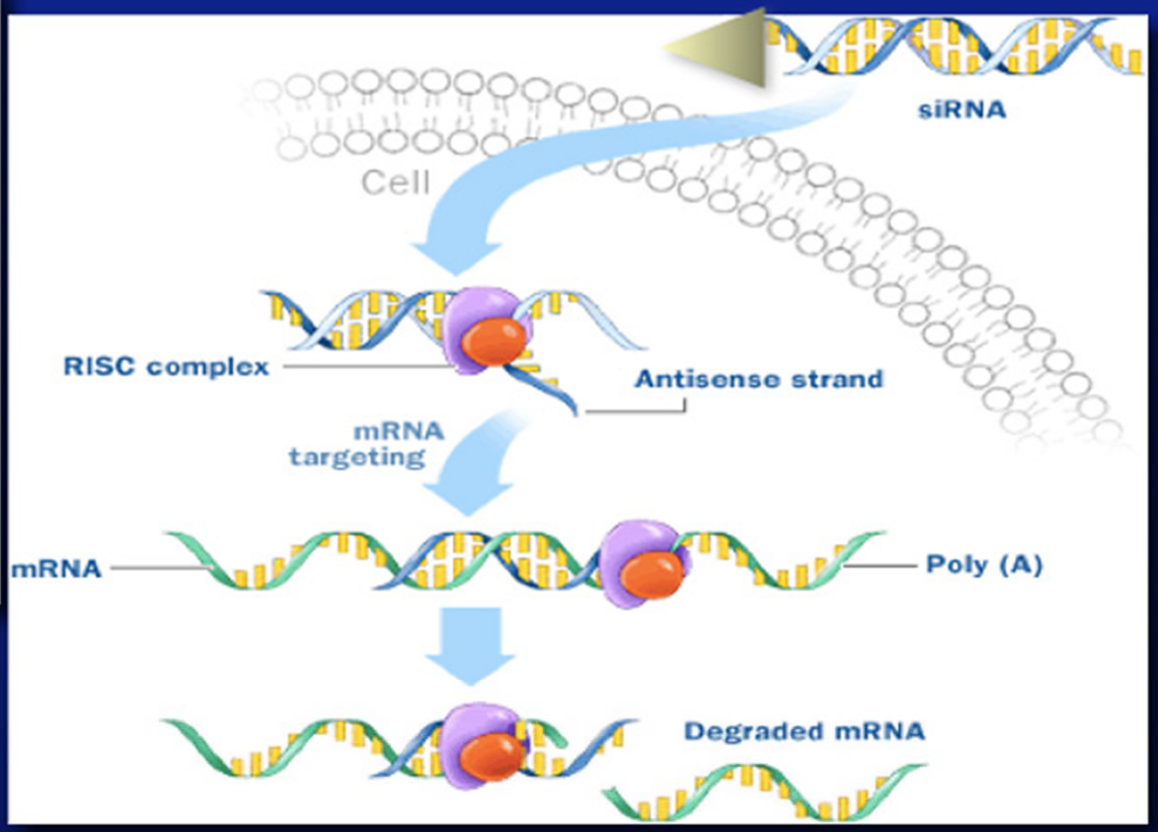
$$\frac{de_{3p}}{dt} = \frac{k_3 e_{2p}(1-e_{3p})}{K_{m,3} + (1-e_{3p})} - \frac{V_{\max,6} e_{3p}}{K_{m,6} + e_{3p}}$$

$$\frac{1}{k_e^P}\frac{d\overline{P}}{dt} = \mu(1-\overline{P}) - (\nu_0 + G_3 e_{3p})\overline{P}$$

$$\frac{1}{k_e^P}\frac{d\overline{P}_a}{dt} = (\nu_0 + G_3 e_{3p})\overline{P} - \overline{P}_a$$

Developing RNAi Therapeutics





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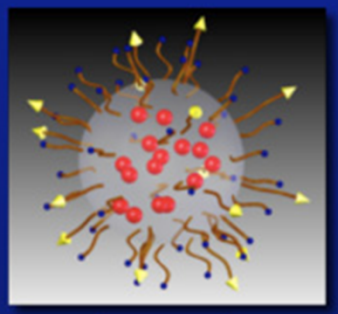
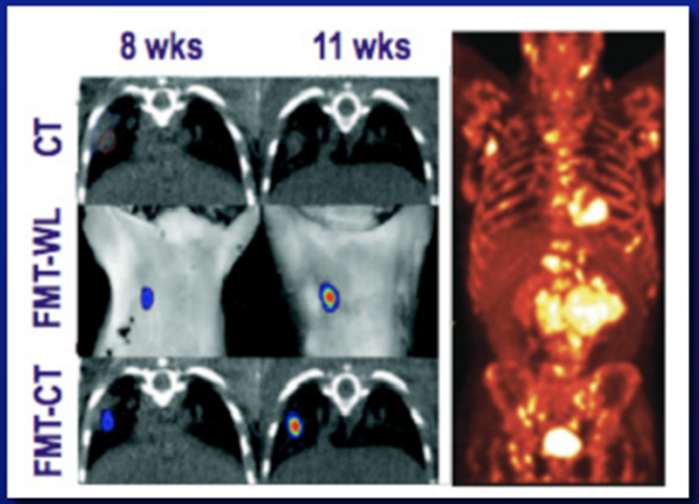
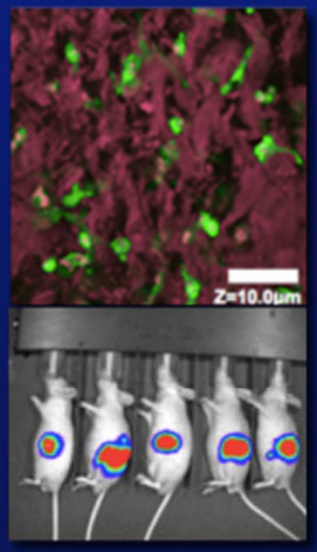
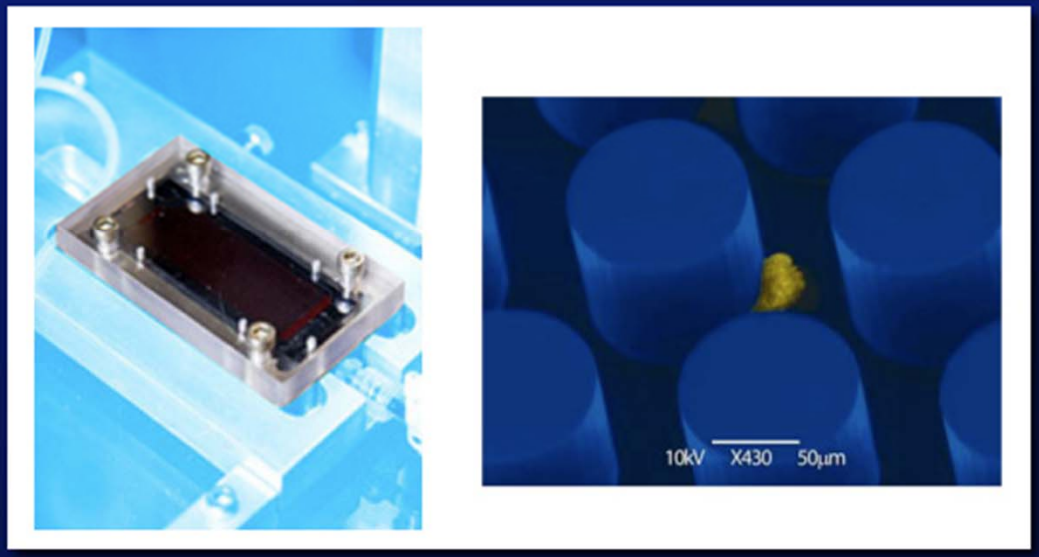
The Expanding Role of Engineering Science in Cancer Research









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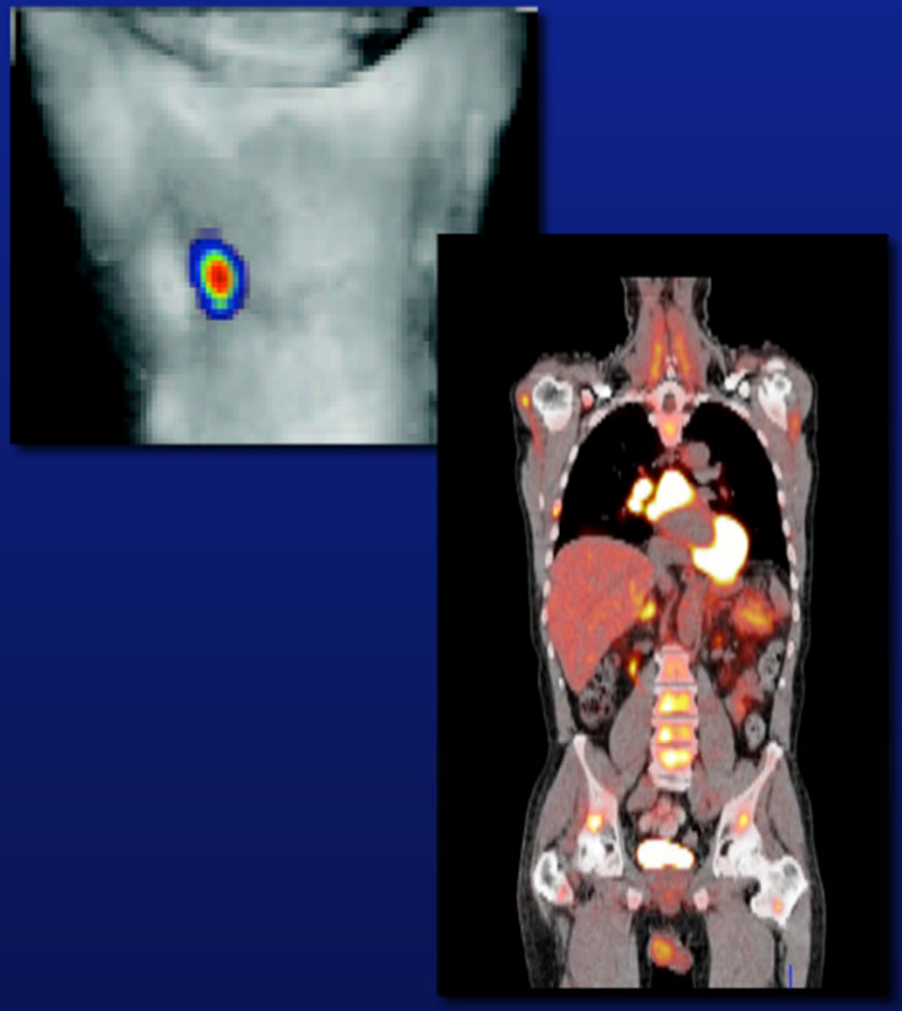
Integration of Imaging Science and Therapeutics



- Revolution in the development of non-invasive imaging agents and devices
- Use of molecular and functional imaging methods for diagnosis, treatment interventions, and the conduct of clinical trials

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In Conclusion

- Cancer research is experiencing an explosion of data related to the complexity of the tumorigenic process.
- The field is expanding to meet these challenges and to take advantage of new opportunities for therapy, diagnosis, detection, and prevention.
- The AACR plays a critical role in promoting progress in cancer research and cancer medicine by facilitating information exchange through meetings and publications; stimulating new directions and interdisciplinary interactions; representing the cancer research community related to policy and other matters; aiding in the training of the next generation of investigators.

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Questions

How can the NCI best engage the scientific community in advancing the most promising areas of cancer research?

How will cancer funding over the next five years affect the successful pursuit of key research goals?

What are the key challenges in capitalizing on fundamental cancer research discoveries for the benefit of cancer patients?

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