BREAKING ADVANCES

2455 Highlights from Recent Cancer Literature

REVIEWS

2457 A Comprehensive Survey of Ras Mutations in Cancer
Ian A. Prior, Paul D. Lewis, and Carla Mattos

2468 SIRT3 Is a Mitochondrial Tumor Suppressor: A Scientific Tale That Connects Aberrant Cellular ROS, the Warburg Effect, and Carcinogenesis
Marcia C. Haigis, Chu-Xia Deng, Lydia W.S. Finley, Hyun-Seok Kim, and David Gius

MEETING REPORT

2473 Tumor Microenvironment Complexity: Emerging Roles in Cancer Therapy
Melody A. Swartz, Noriho Iida, Edward W. Roberts, Sabina Sangaletti, Melissa H. Wong, Fiona E. Yull, Lisa M. Coussens, and Yves A. DeClerck

CLINICAL STUDIES

2481 Identification of Serum Biomarker Signatures Associated with Pancreatic Cancer
Christer Wingren, Anna Sandström, Ralf Segersvärd, Anders Carlsson, Roland Andersson, Matthias Löhr, and Carl A. K. Borrebaeck

2491 Real-time Raman Spectroscopy for In Vivo Skin Cancer Diagnosis
Harvey Lui, Jianhua Zhao, David McLean, and Haishan Zeng

INTEGRATED SYSTEMS AND TECHNOLOGIES

2501 Phosphoproteomics Identifies Driver Tyrosine Kinases in Sarcoma Cell Lines and Tumors
Yun Bai, Jianmeng Li, Bin Fang, Arthur Edwards, Guodin Zhang, Marilyn Bui, Steven Eschrich, Soemer Altiok, John Koomen, and Eric B. Haura

Précis: Global assessment of tyrosine phosphorylation, coupled with functional screens, is used to identify tyrosine kinases driving cell growth and survival in sarcoma, thereby offering insight into new therapeutic strategies for these deadly tumors.

2512 AMPKα Modulation in Cancer Progression: Multilayer Integrative Analysis of the Whole Transcriptome in Asian Gastric Cancer
Yon Hui Kim, Han Liang, Xiuping Liu, Ju-Seog Lee, Jae Yong Cho, Jae-Ho Cheong, Huguenn Kim, Min Li, Thomas J. Downey, Matthew D. Dyer, Yongming Sun, Jingtao Sun, Ellen M. Beasley, Hyun Cheol Chung, Sung Hoon Noh, John N. Weinstein, Chang-Gong Liu, and Garth Powis

Précis: The requirement for c-Src in tumor invasion evoked by oncogenic Ras has implications for the development of therapies to target the Ras pathway, long a goal of the field.

MICROENVIRONMENT AND IMMUNOLOGY

2522 Cyclophosphamide Creates a Receptive Microenvironment for Prostate Cancer Skeletal Metastasis
Serk In Park, Jinhui Liao, Janice E. Berry, Xin Li, Amy J. Koh, Megan E. Michalski, Matthew R. Eber, Fabiana N. Soki, David Sadler, Sudha Sud, Sandra Tisdelle, Stephanie D. Daignault, Jeffrey A. Nemeth, Linda A. Snyder, Thomas J. Wronska, Kenneth J. Pienta, and Laurie K. McCauley

Précis: The chemotherapeutic drug cyclophosphamide, used in the treatment of many kinds of cancer, is found unexpectedly to exert a prometastatic effect within bone.
Hepatocyte–Stellate Cell Cross-Talk in the Liver Engenders a Permissive Inflammatory Microenvironment That Drives Progression in Hepatocellular Carcinoma
Cédric Coulouarn, Anne Corlu, Denise Glaise, Isabelle Guénon, Snorri S. Thorgeirsson, and Bruno Clément

Precis: Molecular characterization of the cross-talk between cell types in the liver plays a major role in the progression of hepatocellular carcinoma and may offer novel therapeutic targets for epigenetic modulation.

MOLECULAR AND CELLULAR PATHOBIOLOGY

Parkin Pathway Activation Mitigates Glioma Cell Proliferation and Predicts Patient Survival

Precis: This study provides mechanistic insight into the tumor suppressor function of parkin, a gene that is often mutated in genetic Parkinson disease, but is shown here to play a role in the pathogenesis of gliomas.

KRas Induces a Src/PEAK1/ErbB2 Kinase Amplification Loop That Drives Metastatic Growth and Therapy Resistance in Pancreatic Cancer
Jonathan A. Kelber, Theresa Reno, Sharmeeza Kauhal, Cristina Metildi, Tracy Wright, Konstantin Stoletor, Jessica M. Weems, Frederick D. Park, Evangeline Mose, Yingchun Wang, Robert M. Hoffman, Andrew M. Lowy, Michael Bouvet, and Richard L. Klemke

Precis: In serving as a novel diagnostic and prognostic biomarker in pancreatic ductal carcinoma, the novel tyrosine kinase PEAK1 may mediate cancer progression and multiple therapy-resistant phenotypes and thus represents an important new therapeutic target.

Mitochondrial Bcl-2 Family Dynamics Define Therapy Response and Resistance in Neuroblastoma
Kelly C. Goldsmith, Michelle Gross, Susan Peirce, Dema Luyindula, Xueyuan Liu, Annette Vu, Michael Sloozberg, Bong Guo, Huaqing Zhao, C. Patrick Reynolds, and Michael D. Hogarty

Precis: Mitochondrial profiling reveals that acquired therapy resistance in neuroblastoma is due to repression at the level of Bak/Bax-mediated apoptosis, and this may offer a basis to stratify patients who could benefit most from treatment with Bcl-2/Bcl-xL antagonists.

Loss of Cell-Surface Laminin Anchoring Promotes Tumor Growth and Is Associated with Poor Clinical Outcomes
Armin Akhavan, Obi L. Griffith, Liliana Soroceanu, Dmitri Leonoudakis, Maria Gloria Luciani-Torres, Anneleen Daemen, Joe W. Gray, and John L. Muschler

Precis: Defects in the cell surface anchoring of laminin in cancer cells of diverse origin is common and strongly associated with aggressive phenotypes, suggesting a common tethering point to understand how laminins in the tumor microenvironment direct malignant progression, as well as how novel generalized therapies might be directed to this aspect.

Interleukin-17 Promotes Formation and Growth of Prostate Adenocarcinoma in Mouse Models
Quyang Zhang, Sen Liu, Dongxia Ge, Qingsong Zhang, Yun Xue, Zhenggang Xiong, Asim B. Abdel-Mageed, Leann Myers, Steven M. Hill, Brian G. Rowan, Oliver Sartor, Jonathan Melamed, Zhenbang Chen, and Zonghing You

Precis: Findings in a mouse model of prostate cancer indicate that proinflammatory cytokine IL-17 drives the transition of premalignant lesions to frank adenocarcinoma, suggesting a molecular mechanism to underpin the concept that reducing prostate inflammation could help prevent emergence of this disease.

Dinitroazetidines Are a Novel Class of Anticancer Agents and Hypoxia-Activated Radiation Sensitizers Developed from Highly Energetic Materials
Shoucheng Ning, Mark Bednarski, Bryan Oronsky, Jan Scicinski, Gordon Saul, and Susan J. Knox

Precis: Findings characterize a novel compound based on a highly energetic chemical scaffold that selectively targets hypoxic tumors and enhances the effects of radiotherapy.

Coxsackievirus B3 Is an Oncolytic Virus with Immunostimulatory Properties That Is Active against Lung Adenocarcinoma
Shohei Miyamoto, Hiroyuki Inoue, Takahumi Nakamura, Meiko Yamada, Chika Sakamoto, Yasuo Urata, Toshihiko Okazaki, Tomotoshi Muramoto, Atsushi Takahashi, Koichi Takayama, Yoichi Nakashiji, Hiroyuki Shimizu, and Kenzaburo Tani

Precis: While oncolytic viruses have failed as yet to realize clinical potential, this study defines a potent virus that by exerting adjuvant immunostimulatory properties may yield a unique and more effective antitumor activity.
Activation of Ras/PI3K/ERK Pathway Induces c-Myc Stabilization to Upregulate Argininosuccinate Synthetase, Leading to Argininosuccinate Deiminase Resistance in Melanoma Cells

Wen-Bin Tsai, Isamu Aiba, Yan Long, Hui-Kuan Lin, Lynn Feun, Niramol Savaraj, and Macus Tien Kuo

Précis: Findings offer mechanistic insight into how resistance emerges to arginine deprivation therapy and how inhibitors of the Ras/ERK and PI3K/AKT pathways might restore therapeutic responses.

Mitochondria-Targeted Drugs Synergize with 2-Deoxyglucose to Trigger Breast Cancer Cell Death

Gang Cheng, Jacek Zielonka, Brian P. Dranka, Donna McAllister, A. Craig Mackinnon Jr, Joy Joseph, and Balaraman Kalyanaraman

Précis: This important study may crack the long-standing challenge of how to employ the glycolytic inhibitor 2-deoxyglucose for generalized anticancer therapy, by combining it with mitochondria-targeted cationic compounds that can improve cancer cell cytotoxicity without toxic liabilities to normal tissue.

Smac Mimetic LBW242 Sensitizes XIAP-Overexpressing Neuroblastoma Cells for TNF-α-Independent Apoptosis

Georg Eschenburg, Angela Egger, Alexander Schramm, Helger N. Lodé, and Patrick Hundsdoerfer

Précis: Smac mimetics offer a potential adjuvant approach to sensitize or re sensitize tumors to chemotherapy, as illustrated by this preclinical proof-of-concept study in a commonly deadly type of pediatric cancer.

Epidermal Growth Factor Receptor Variant III Contributes to Cancer Stem Cell Phenotypes in Invasive Breast Carcinoma

Catherine A. Del Vecchio, Kristin C. Jensen, Ryan T. Nitta, A. Hunter Shain, Craig P. Giacomini, and Albert J. Wong

Précis: By identifying breast cancer stem cells that express a variant EGFR receptor, this study has implications for how to improve treatment for patients who harbor this variant receptor.

HER3 is Required for HER2-Induced Preneoplastic Changes to the Breast Epithelium and Tumor Formation

David B. Vaught, Jamie C. Stanford, Christian Young, Donna J. Hicks, Frank Wheeler, Cammie Rinehart, Violeta Sánchez, John Koland, William J. Muller, Carlos L. Arteaga, and Rebecca S. Cook

Précis: Findings offer a preclinical proof-of-concept for a new strategy to treat or prevent HER2-amplified breast cancers, which represent nearly 30% of all breast cancers, by targeting an important heterodimeric partner of HER2.

Real-Time Monitoring of Rare Circulating Hepatocellular Carcinoma Cells in an Orthotopic Model by In Vivo Flow Cytometry Assesses Resection on Metastasis

Zhi-Chao Fan, Jun Yan, Guang-Da Liu, Xiao-Ying Tan, Xiao-Fu Weng, Wei-Zhong Wu, Jian Zhou, and Xun-Bin Wei

Précis: In vivo flow cytometry may offer a breakthrough technology to elucidate mechanisms of hematogenous metastasis and to monitor the efficacy of cancer therapy.

ABOUT THE COVER

Interleukin-17 (IL-17) is a key proinflammatory cytokine involved in many inflammatory and autoimmune diseases. Mice with conditional knockout of PTEN tumor suppressor gene developed invasive prostate adenocarcinomas at ages of 9 to 30 weeks. When IL-17 signaling was blocked by knockout IL-17 receptor C (IL-17RC) in the PTEN-null mice, the number and size of prostate tumors were reduced compared to mice that expressed IL-17RC, because IL-17RC knockout reduced cellular proliferation, increased apoptosis, inhibited inflammatory infiltration, and diminished expression of matrix metalloproteinase 7 in the mouse prostates. For details, see article by Zhang and colleagues on page 2589 of this issue.