ACVR1 Mutations in DIPG: Lessons Learned from FOP
Kathryn R. Taylor, Maria Vinci, Alex N. Bullock, and Chris Jones

Toward Decoding the Principles of Cancer Metastasis Circuits
Mingyang Lu, Mohit Kumar Jolly, Jose’ Onuchic, and Eshel Ben-Jacob

Modeling Contact Guidance and Invasion by Cancer Cells
Leonard M. Sander

Force Engages Vinculin and Promotes Tumor Progression by Enhancing PI3K Activation of Phosphatidylinositol (3,4,5)-Triphosphate
Matthew G. Rubashkin, Luke Cassereau, Russell Bainer, Christopher C. DuFort, Yoshihiro Yui, Guanqing Ou, Matthew J. Paszek, Michael W. Davidson, Yunn-Yi Chen, and Valerie M. Weaver

Using High-Throughput Transcriptomic Data for Prognosis: A Critical Overview and Perspectives
Eytan Domany

Advanced Magnetic Resonance Imaging of the Physical Processes in Human Glioblastoma
Jayashree Kalpathy-Cramer, Elizabeth R. Gerstner, Kyrre E. Emblem, Ovidiu C. Andronesi, and Bruce Rosen

Diffusion-Weighted Imaging in Cancer: Physical Foundations and Applications of Restriction Spectrum Imaging

Therapies with Diverse Mechanisms of Action Kill Cells by a Similar Exponential Process in Advanced Cancers
Krastan B. Blagoev, Julia Wilkerson, Wilfred D. Stein, James Yang, Susan E. Bates, and Tito Fojo

Resistance to Chemotherapy: Patient Variability and Cellular Heterogeneity
David A. Kessler, Robert H. Austin, and Herbert Levine

Mouse Models of Human Cancer
Barbara C. Böck, Ulrike Stein, Clemens A. Schmitt, and Hellmut G. Augustin

Kinase Domain Activation of FGFR2 Yields High-Grade Lung Adenocarcinoma Sensitive to a Pan-FGFR Inhibitor in a Mouse Model of NSCLC

Précis: In developing a unique mouse model of lung adenocarcinoma, this study may improve what have been limited opportunities for preclinical drug discovery and development in this setting.
INTEGRATED SYSTEMS AND TECHNOLOGIES

4685 Polarization-Sensitive Multimodal Imaging for Detecting Breast Cancer
Rakesh Patel, Ashraf Khan, Robert Quinlan, and Anna N. Yaroslavsky
Précis: This study describes a novel noninvasive imaging method that allows for rapid and accurate intraoperative detection of breast cancer margins.

4694 A Search for Novel Cancer/Testis Antigens in Lung Cancer Identifies Vcx/Y Genes, Expanding the Repertoire of Potential Immunotherapeutic Targets
Ayumu Taguchi, Allen D. Taylor, Jaime Rodriguez, Muğe Celiktas, Hui Liu, Xiaotu Ma, Qing Zhang, Chee-Hong Wong, Alice Chin, Luc Girard, Carmen Behrens, Wan L. Lam, Stephen Lam, John D. Minna, Ignacio I. Wistuba, and Andrie G.M. Jurisicova
Précis: These results offer preclinical proof-of-concept for an Hsp70 regulatory complex as an appealing anticancer target for the generalized treatment of human malignancy.

MOLECULAR AND CELLULAR PATHOBIOLOGY

4731 Hsp70–Bag3 Interactions Regulate Cancer-Related Signaling Networks
Précis: These results offer preclinical proof-of-concept for an Hsp70 regulatory complex as an appealing anticancer target for the generalized treatment of human malignancy.

MICROENVIRONMENT AND IMMUNOLOGY

4760 Osteopontin Shapes Immunosuppression in the Metastatic Niche
Sabina Sangaletti, Claudio Tripodo, Sara Sandri, Ilaria Torselli, Caterina Vitali, Chiara Ratti, Laura Botti, Alessia Burocchi, Rossana Porcasi, Andrea Tomirotti, Mario P. Comolato, and Claudia Chiocioni
Précis: Activities of a prometastatic molecule appear to differ to some extent when produced by tumor cells versus host immune cells; however, from either source it helps establish local immunosuppression within metastatic sites.

THERAPEUTICS, TARGETS, AND CHEMICAL BIOLOGY

4792 Antitumor Effects in Hepatocarcinoma of Isoform-Selective Inhibition of HDAC2
Yun-Han Lee, Dae-Kwan Seo, Kyung-Ju Choi, Jesper B. Andersen, Min-Ah Won, Mitsuteru Kitade, Luis E. Gomez-Quiroz, Adam D. Judge, Jens U. Marquardt, Chiara Raggi, Elizabeth A. Conner, Ian MacLachlan, Valentina M. Factor, and Snorri S. Thorgeirsson
Précis: Systemic inactivation of a disease-specific HDAC isoform can achieve therapeutic efficacy, as shown by this preclinical proof-of-concept study for treatment of liver cancer.

4803 Combined SFK/mTOR Inhibition Prevents Rapamycin-Induced Feedback Activation of AKT and Elicits Efficient Tumor Regression
Jennifer L. Yori, Kristen L. Lozada, Darcie D. Seachrist, Jonathan D. Mosley, Fadi W. Abdul-Karim, Christine N. Booth, Chris A. Flask, and Ruth A. Keri
Précis: Results from this combination therapy study may help improve the mainly inefficacious effects of mTOR inhibitors in clinical trials, addressing the weaknesses of an erstwhile general approach to cancer cell eradication.
**Précis:** This article provides an excellent illustration of polypharmacology discovery by tapping the existing armamentarium of approved drugs to identify immediately tractable new experimental therapies for clinical evaluation.

**Précis:** This work illuminates a mechanism of EMT limitation in cancer cells, along with preclinical support for a tractable therapeutic strategy to reverse mesenchymal phenotypes associated with invasion and metastasis.

**Précis:** A secreted protein exclusively studied in the context of neuronal cell function appears to act through a calcium signaling pathway to support the pathogenicity of deadly kidney cancers, with immediate implications for a possible clinical treatment strategy.

**Précis:** An FDA-approved pinworm drug with potent activity as a casein kinase-1α agonist is found to robustly inhibit Hedgehog signaling in tumors, including those resistant to existing Hedgehog pathway inhibitors, with immediate implications for clinical testing.

**Précis:** These findings define three kinases critical for growth of an aggressive subtype of breast cancer, offering a preclinical rationale to target their activity as an effective therapy.

**Précis:** Mutation of a key metabolic contributor to glioma development indirectly enhances homologous recombination-based repair of DNA damage triggered by the chemotherapy drug temozolomide, offering an explanation for the intrinsic resistance of gliomas to this drug and a rational path forward toward their eradication.

**Précis:** This timely report suggests a novel predictive biomarker for the efficacious response of melanoma patients to BRAF inhibitors, the most effective use of which has yet to be fully elucidated.

**Précis:** Chromosomal instability, a hallmark of cancer cells, permits a selection for gene copy number alternations in core regulators of proliferation that have prognostic value.
4864 Epigenetic States of Cells of Origin and Tumor Evolution Drive Tumor-Initiating Cell Phenotype and Tumor Heterogeneity
Kin-Hoe Chow, Dong-Mi Shin, Molly H. Jenkins, Emily E. Miller, David J. Shih, Seungbum Choi, Benjamin E. Low, Vivek Philip, Brad Rybinski, Roderick T. Bronson, Michael D. Taylor, and Kyuson Yun

Précis: This study probes the sources of tumor heterogeneity, a core research challenge that—despite its recognition by clinical pathologists for many years and its recent rediscovery by molecular geneticists—still represents the chief weakness of all cancer cell-targeted therapeutic strategies.

4875 TRIM29 Suppresses TWIST1 and Invasive Breast Cancer Behavior

Précis: TRIM29 exerts complex roles in cancer, but in breast cancer it appears to function as a tumor suppressor by suppressing a core regulator of the epithelial–mesenchymal transition, a pivotal step in driving invasive and metastatic behavior.

4888 TRIB1 Supports Prostate Tumorigenesis and Tumor-Propagating Cell Survival by Regulation of Endoplasmic Reticulum Chaperone Expression
Tetsuo Mashima, Taeko Soma-Nagae, Toshiro Migita, Ryoko Kinoshita, Atsushi Iwamoto, Takeshi Yuasa, Junji Yonese, Yuichi Ishikawa, and Hiroyuki Seimiya

Précis: Prostate cancer stem-like cells appear to be addicted to oncogenic signals from an endoplasmic reticulum-dependent stress response pathway, a finding with potential therapeutic implications.

4908 IL15RA Drives Antagonistic Mechanisms of Cancer Development and Immune Control in Lymphocyte-Enriched Triple-Negative Breast Cancers
Pierfrancesco Marra, Sumi Mathew, Anita Grigoriadis, Yin Wu, Fernanda Kyle-Cezar, Johnathan Watkins, Mamunur Rashid, Emanuele De Rinaldis, Sonya Hessey, Patrycja Gazinska, Adrian Hayday, and Andrew Tutt

Précis: Expression of an immune memory-inducing receptor in some triple-negative breast cancers, usually only expressed by T cells, may offer a mechanistic explanation for the paradoxical association of some of these high-grade tumors with better survival outcomes.

4922 Epigenetic Targeting of Ovarian Cancer Stem Cells
Yinu Wang, Horacio Cardenas, Fang Fang, Salvatore Condello, Pietro Taverna, Matthew Segar, Yunlong Liu, Kenneth P. Nephew, and Daniela Matei

Précis: These results suggest that epigenome-targeting strategies can reprogram residual cancer stem-like cells to a differentiated state, thereby helping prevent the development of recurrent, chemoresistant disease.

4937 Live-Cell Imaging of Invasion and Intravasation in an Artificial Microvessel Platform
Andrew D. Wong and Peter C. Searson

Précis: An artificial microvessel platform can be used to obtain striking images and mechanistic insights into how cancer cells invade the local microenvironment and enter and exit vessels, providing a new tool to help unravel the complexities of metastasis and its prevention and treatment.

LETTERS TO THE EDITOR

4946 A Synthetic Lethality-Based Strategy to Treat Cancers Harboring a Genetic Deficiency in the Chromatin Remodeling Factor BRG1—Letter
Kenneth W. Thompson, Stefanie B. Marquez, and David Reisman

4948 Proposal for a Synthetic Lethality Therapy Using the Paralog Dependence of Cancer Cells—Response
Takahiro Oike, Hideaki Ogihara, Takashi Nakano, and Takashi Kohno
CORRECTIONS

4950  Correction: The TGFβ–miR200–Mig6 Pathway Orchestrates the EMT-Associated Kinase Switch That Induces Resistance to EGFR Inhibitors

4951  Correction: Chk2 Phosphorylation of Survivin-ΔEx3 Contributes to a DNA Damage-Sensing Checkpoint in Cancer

ABOUT THE COVER

Confocal microscopy analysis for osteopontin performed on myeloid-derived suppressor cells (MDSC) shows osteopontin (red) localized under the cellular membrane but not colocalized with the ER marker concanavalin A (green) in MDSC. This picture is suggestive of the existence of an intracellular form, rather than a secreted form of osteopontin, in MDSC. For details, see article by S. Sangaletti and colleagues on page 4706.