CANCER RESEARCH HIGHLIGHTS

4577 Monitoring Oxygenation Levels Deep in the Tumor Core: Noninvasive Imaging of Hypoxia, Now in Real-Time 3D
Alexander L. Klibanov and Song Hu
See related article, p. 4767

4580 Unsuspected Protumorigenic Signaling Role for the Oncometabolite GABA in Advanced Prostate Cancer
Renea A. Taylor and Matthew J. Watt
See related article, p. 4638

CONTROVERSY AND CONSENSUS

4582 Studying Cancer Evolution and Therapeutic Responses in Different Organs: The Pros and Cons of a Broad Focus
Catherine Pham-Danis and James DeGregori

PRIORITY REPORT

4585 Selective Targeting of Myoblast Fusogenic Signaling and Differentiation-Arrest Antagonizes Rhabdomyosarcoma Cells
Valerie A. Granados, Usha Avimeni-Vadlamudi, Pooja Dalal, Samuel R. Scarborough, Kathleen A. Galindo, Priya Mahajan, and Rene L. Galindo
Significance: EGFR and its downstream signaling mediator AKT1 play a role in the fusion and differentiation processes of rhabdomyosarcoma cells, representing a therapeutic vulnerability of rhabdomyosarcoma.

GENOME AND EPIGENOME

4592 Analysis of Over 140,000 European Descendants Identifies Genetically Predicted Blood Protein Biomarkers Associated with Prostate Cancer Risk
Lang Wu, Xiang Shu, Jiandong Bao, Xingyi Guo; the PRACTICAL, CRUK, BPC3, CAPS, PEGASUS Consortia, Zsofia Kote-Jarai, Christopher A. Haiman, Rosalind A. Eeles, and Wei Zheng
Significance: Integration of genomics and proteomics data identifies biomarkers associated with prostate cancer risk.

4599 Chemotherapy-Induced Distal Enhancers Drive Transcriptional Programs to Maintain the Chemoresistant State in Ovarian Cancer
Significance: Integrative genome-wide epigenomic and transcriptomic analyses of platinum-sensitive and -resistant ovarian lines identify key distal regulatory regions and associated master regulator transcription factors that can be targeted by small-molecule epigenetic inhibitors.

4612 Long Noncoding RNA FAM225A Promotes Nasopharyngeal Carcinoma Tumorigenesis and Metastasis by Acting as ceRNA to Sponge miR-590-3p/miR-1275 and Upregulate ITGB3
Zi-Qi Zheng, Zhi-Xuan Li, Guan-Qin Zhou, Li Lin, Lu-Lu Zhang, Jia-Wei Lv, Xiao-Dan Huang, Rui-Qi Liu, Fu-Ping Chen, Xiao-Jun He, Jia Kou, Jian Zhang, Xin Wen, Ying-Qin Li, Jun Ma, Na Liu, and Ying Sun
Significance: These findings demonstrate the clinical significance of the lncRNA FAM225A in nasopharyngeal carcinoma (NPC) and the regulatory mechanism involved in NPC development and progression, providing a novel prognostic indicator and promising therapeutic target.
METABOLISM AND CHEMICAL BIOLOGY

4627 Radiolabeled Oligonucleotides Targeting the RNA Subunit of Telomerase Inhibit Telomerase and Induce DNA Damage in Telomerase-Positive Cancer Cells
Mark R. Jackson, Bas M. Bavelaar, Philip A. Waghorn, Martin R. Gill, Afaf H. El-Sagheer, Tom Brown, Madalena Tarsounas, and Katherine A. Vallis

Significance: These findings present a novel radiolabeled oligonucleotide for targeting telomerase-positive cancer cells that exhibits dual activity by simultaneously inhibiting telomerase and promoting radiation-induced genomic DNA damage.

4638 Glutamate Decarboxylase 65 Signals through the Androgen Receptor to Promote Castration Resistance in Prostate Cancer
Yi Gao, Lu Chen, ZunGuo Du, WenChao Gao, ZhengHeng Wu, XiaQiu Yan, Hai Huang, DanFeng Xu, and QingQuan Li

See related commentary, p. 4580

Significance: This study reports metabolic alterations that could be responsible for the development of CRPC and identifies the GABA-producing enzyme GAD65 as a potential new therapeutic target.

MOLECULAR CELL BIOLOGY

4650 Cell-Cycle–Dependent Phosphorylation of PRPS1 Fuels Nucleotide Synthesis and Promotes Tumorigenesis
Xiaoqian Jing, Xiong-jun Wang, Tao Zhang, Wencheng Zhu, Yi Fang, Haoyuan Wu, Xinyu Liu, Ding Ma, Xiaopin Ji, Yimei Jiang, Kun Liu, Xianze Chen, Yi Shi, Yaqi Zhang, Minmin Shi, Weihua Qiu, and Ren Zhao

Significance: These findings show that the enzymatic activity of PRPS1 is crucial for cell-cycle regulation and suggest PRPS1 phosphorylation at S103 as a direct therapeutic target and diagnostic biomarker for colorectal cancer.

4665 Targeting Mechanoresponsive Proteins in Pancreatic Cancer: 4-Hydroxyacetophenone Blocks Dissemination and Invasion by Activating MYH14
Alexandra Surcel, Eric S. Schifferhauer, Dustin G. Thomas, Qingfeng Zhu, Kathleen T. DiNapoli, Maik Herbig, Oliver Otto, Hoku West-Goyle, Angela Jacoby, Martin Kräger, Katarzyna Plak, Jochen Cuck, Elizabeth M. Jaffe, Pablo A. Iglesias, Robert A. Anders, and Douglas N. Robinson

Significance: This study demonstrates that mechanoresponsive proteins become upregulated with pancreatic cancer progression and that this system of proteins can be pharmacologically targeted to inhibit the metastatic potential of pancreatic cancer cells.

TUMOR BIOLOGY AND IMMUNOLOGY

4679 IL6 Promotes a STAT3-PRL3 Feedforward Loop via SHP2 Repression in Multiple Myeloma
Phyllis S.Y. Chong, Jianbiao Zhou, Julia S.L. Lim, Yan Ting Hse, Jing-Yuan Chooy, Tae-Hoon Chung, Zee Tian Tan, Qiz Reng, Daniel D. Waller, Michael Sebag, and Wee-Joo Chung

Significance: IL6 promotes STAT3-dependent transcriptional upregulation of PRL-3, which in turn rephosphorylates STAT3 and aberrantly activates STAT3 target genes, leading to bortezomib resistance in multiple myeloma.

4689 Metastasis Suppressors NME1 and NME2 Promote Dynamin 2 Oligomerization and Regulate Tumor Cell Endocytosis, Motility, and Metastasis
Imran Khan, Brunilde Geil, and Patricia S. Steeg

Significance: NME1 suppresses metastasis via changes in tumor endocytosis and motility, mediated by dynamin (Dnm2) GTPase activity.

4703 Gene Editing of α6 Integrin Inhibits Muscle Invasive Networks and Increases Cell–Cell Biophysical Properties in Prostate Cancer

Significance: This study shows an innovative strategy to block prostate cancer metastasis and invasion in the muscle through gene editing of a specific α6 integrin extracellular region.

TUMOR BIOLOGY AND IMMUNOLOGY

4715 Melanoma Extracellular Vesicles Generate Immunosuppressive Myeloid Cells by Upregulating PD-L1 via TLR4 Signaling
Victor Fleming, Xiaoying Hu, Celine Weller, Rebekka Weber, Christopher Groth, Zeno Riester, Laura Huser, Qian Sun, Vasyl Naghin, Carsten Kirschning, Vincenzo Borne, Jochen Utikal, Peter Altevogt, and Viktor Umansky

Significance: These findings validate the importance of TLR4 signaling in reprogramming normal myeloid cells into functional myeloid-derived suppressor cells.
SET Domain–Containing Protein 4 Epigenetically Controls Breast Cancer Stem Cell Quiescence
Sen Ye, Yan-Fu Ding, Wen-Huan Jia, Xiao-Li Liu, Jing-Yi Feng, Qian Zhu, Sun-Li Cai, Yao-Shun Yang, Qian-Yun Lu, Xue-Ting Huang, Jin-Shu Yang, Sheng-Nan Jia, Guo-Ping Ding, Yue-Hong Wang, Jiao-Jiao Zhou, Yi-Ding Chen, and Wei-Jun Yang

Significance: These findings advance our knowledge on the epigenetic determinants of quiescence in cancer stem cell populations and pave the way for future pharmacologic developments aimed at targeting drug-resistant quiescent stem cells.

TRANSLATIONAL SCIENCE

Targeting BCR-ABL1 in Chronic Myeloid Leukemia by PROTAC-Mediated Targeted Protein Degradation
George M. Burslem, Anna Reister Schultz, Daniel P. Bondeson, Christopher A. Eide, Samantha L. Savage Stevens, Brian J. Druker, and Craig M. Crews

Significance: Small-molecule–induced degradation of BCR-ABL1 in CML provides an advantage over inhibition and provides insights into CML stem cell biology.

Therapeutic Targeting of Aldolase A Interactions Inhibits Lung Cancer Metastasis and Prolongs Survival
Yu-Chan Chang, Jean Chiou, Yi-Fang Yang, Chia-Yi Su, Yuan-Feng Lin, Chia-Ning Yang, Pei-Jung Lu, Ming-Shyan Huang, Chih-Jen Yang, and Michael Hsiao

Significance: This study demonstrates the role of aldolase A and its interaction with γ-actin in the metastasis of non–small cell lung cancer and that blocking this interaction could be an effective cancer treatment.

CONVERGENCE AND TECHNOLOGIES

Volumetric Optoacoustic Imaging Unveils High-Resolution Patterns of Acute and Cyclic Hypoxia in a Murine Model of Breast Cancer
Avihai Ron, Xosé Luís Deán-Bení, Sven Gottschalk, and Daniel Razansky

See related commentary, p. 4577

Significance: vMSOT provides quantitative measures of volumetric hypoxic fraction and cyclic hypoxia in a label-free and noninvasive manner, providing new readouts to aid tumor staging and treatment decisions.

Time-Resolved MRI Assessment of Convection-Enhanced Delivery by Targeted and Nontargeted Nanoparticles in a Human Glioblastoma Mouse Model
Zachary R. Stephen, Peter A. Chiarelli, Richard A. Revia, Kui Wang, Forrest Kievit, Chris Dayringer, Mike Jeon, Richard Ellenbogen, and Miqin Zhang

Significance: MRI is used to monitor convection-enhanced delivery in real time using a nanoparticle-based contrast agent, and glioma-specific targeting significantly improves the volume of distribution in tumors.

A Near-Infrared Phosphorescent Nanoprobe Enables Quantitative, Longitudinal Imaging of Tumor Hypoxia Dynamics during Radiotherapy
Xianchuang Zheng, Liyang Cui, Min Chen, Luis A. Soto, Edward E. Graves, and Jianghong Rao

Significance: This study presents a novel nanoagent for the visualization and quantification of tumor hypoxia.
 ABOUT THE COVER

Breast cancer xenograft imaged in vivo by volumetric multispectral optoacoustic tomography (vMSOT). Fine vasculature patterns in the superficial epidermal layer are visible along with the larger feeding vessels and the necrotic core. The unique spectral differentiation capacity of vMSOT grants label-free measures of the blood oxygenation at high resolution across the entire tumor volume, while hypoxic fraction and cyclic hypoxia can further be dynamically quantified during oxygen challenge. For details, see article by Ron and colleagues on page 4767.
Cancer Research

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