# Contents

## BREAKING ADVANCES

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3191</td>
<td>Highlights from Recent Cancer Literature</td>
<td></td>
</tr>
</tbody>
</table>

## REVIEWS

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3193</td>
<td>The MET Oncogene in Glioblastoma Stem Cells: Implications as a Diagnostic Marker and a Therapeutic Target</td>
<td>Carla Boccaccio and Paolo M. Comoglio</td>
</tr>
<tr>
<td>3200</td>
<td>Vesicle Trafficking and RNA Transfer Add Complexity and Connectivity to Cell–Cell Communication</td>
<td>Charles T. Roberts Jr and Peter Kurre</td>
</tr>
</tbody>
</table>

## INTEGRATED SYSTEMS AND TECHNOLOGIES

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3216</td>
<td>Manganese-Enhanced MRI Reveals Early-Phase Radiation-Induced Cell Alterations <em>In Vivo</em></td>
<td>Shigeo Saito, Sumitaka Hasegawa, Aiko Sekita, Rumiana Bakalova, Takako Furukawa, Kenya Murase, Tsuneo Saga, and Ichio Aoki</td>
</tr>
</tbody>
</table>

## MICROENVIRONMENT AND IMMUNOLOGY

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3225</td>
<td>The Endogenous Tryptophan Metabolite and NAD+ Precursor Quinolinic Acid Confers Resistance of Gliomas to Oxidative Stress</td>
<td>Felix Sahm, Iris Oezen, Christiane A. Opitz, Bernhard Radlwimmer, Andreas von Deimling, Tilman Ahrendt, Seray Adams, Helge Bode, Gilles J. Guillumin, Wolfgang Wick, and Michael Platten</td>
</tr>
<tr>
<td></td>
<td><em>Précis:</em> A downstream catabolite of the tryptophan degradation pathway of IDO- and TDO-dependent immune escape, which is elevated in the majority of human cancers, is found to be a key element in their therapeutic resistance, with implications to improve treatment.</td>
<td></td>
</tr>
</tbody>
</table>

## MOLECULAR AND CELLULAR PATHOBIOLOGY

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3248</td>
<td>Single Copies of Mutant KRAS and Mutant PIK3CA Cooperate in Immortalized Human Epithelial Cells to Induce Tumor Formation</td>
<td>Grace M. Wang, Hong Yuen Wong, Hiroyuki Konishi, Brian G. Blair, Abde M. Abukhdeir, John P. Gustin, D. Marc Rosen, Samuel Ray Denmeade, Zeshaan Rasheed, William Matsui, Joseph P. Garay, Morassa Mohseni, Michaela J. Higgins, Justin Cidado, Danijela Jelovac, Sarah Croessimann, Rory L. Cochran, Sivasundaram Karnan, Yuko Konishi, Akinobu Ota, Yoshitaka Hosokawa, Pedram Argani, Josh Lauring, and Ben Ho Park</td>
</tr>
</tbody>
</table>

*Précis:* These findings suggest a paradigm that helps to explain how a single mutant KRAS allele can cooperate with mutant PIK3CA to impart a transformed phenotype.
PREVENTION AND EPIDEMIOLOGY

Colorectal Cancer Risk Associated with Hormone Use Varies by Expression of Estrogen Receptor-β
Anja Rudolph, Csaba Toth, Michael Hoffmeister, Wilfried Roth, Esther Herpel, Peter Schirmacher, Hermann Brenner, and Jenny Chang-Claude

PRÉCIS: Expression of estrogen receptor β, the predominant estrogen receptor in colon tissue, appears to be involved in the reduction of colorectal cancer risk that may arise with use of oral contraceptives or menopausal hormone therapy.

THERAPEUTICS, TARGETS, AND CHEMICAL BIOLOGY

Inhibition of Tumor Cell Migration by LD22-4, an N-Terminal Fragment of 24-kDa FGFR2, Is Mediated by Neurophin 1
Ling Zhang, Graham C. Parry, and Eugene G. Levin

PRÉCIS: Definition of a cell surface receptor for an inhibitor of cancer cell migration suggests a novel approach to tumor suppression.

DNA Methylation-Mediated Repression of miR-886-3p Predicts Poor Outcome of Human Small Cell Lung Cancer
Jianzhong Cao, Yongmei Song, Nan Bi, Jie Shen, Wenyang Liu, Jing Fang, Guogui Sun, Tong Tong, Jie He, Yuankai Shi, Xun Zhang, Ning Lu, Yinghua He, Hongyu Zhang, Kelong Ma, Xiaoying Luo, Lei Lv, Hui Deng, Jing Cheng, Jingde Zhu, Luhua Wang, and Qimin Zhan

PRÉCIS: These findings identify a little-studied microRNA the epigenetic downregulation of which strongly affects clinical outcomes and malignant cell behaviors in small-cell lung cancer.

PFI-1, a Highly Selective Protein Interaction Inhibitor, Targeting BET Bromodomains
Sarah Picard, David Da Costa, Angeliki Thanasopoulou, Panagis Filippakopoulos, Paul V. Fish, Martin Philpott, Oleg Fedorov, Paul Brennan, Mark E. Bunnage, Dafydd R. Owen, James E. Bradner, Philippe Taniere, Brendan O’Sullivan, Susanne Müller, Juerg Schwaller, Tatjana Stankovic, and Stefan Knapp

PRÉCIS: This study suggests that it may be possible to target an important transcriptional regulatory domain that has been implicated in a broad number of aggressive blood cancers, as a generalizable therapeutic approach.

Bevacizumab-Induced Normalization of Blood Vessels in Tumors Hampers Antibody Uptake
Marlous Arjaans, Thijs H. Oude Munnink, Sjoekje F. Oosting, Anton G.T. Terwisscha van Scheltinga, Jourik A. Gietema, Erik T. Garbacik, Martin Philpott, Oleg Fedorov, Paul Brennan, Mark E. Bunnage, Dafydd R. Owen, Julie Timmer-Bosscha, Marjolijn N. Lub-de Hooge, Carolina P. Schroeder, and Elisabeth G.E. de Vries

PRÉCIS: Bevacizumab treatment decreases tumor uptake of antibodies by vessel normalization, and this should be taken into account in the design of clinical trials that combine bevacizumab with other antibodies.

Another article on collagen prolyl hydroxylases being essential for breast cancer metastasis.

Another article on interleukin-1β promoting skeletal colonization and progression of metastatic prostate cancer cells with neuroendocrine features.

Another article on DNA methylation-mediated repression of miR-886-3p predicting poor outcome of human small cell lung cancer.
Threshold Levels of ABL Tyrosine Kinase Inhibitors Retained in Chronic Myeloid Leukemia Cells Determine Their Commitment to Apoptosis

Thomas O'Hare, Christopher A. Eide, Anupriya Agarwal, Lauren T. Adrian, Matthew S. Zabriskie, Ryan J. Mackenzie, Dorian H. LaTocha, Kara J. Johnson, Huihong You, Jenny Luo, Steven M. Riddle, Bryan D. Marks, Kurt W. Vogel, Dennis R. Koop, John Appgar, Jeffrey W. Tyner, Michael W. Deininger, and Brian J. Drucker

Precise: By providing deeper insights into the pharmacodynamic requirements for the cytotoxic effects of the paradigm kinase inhibitor imatinib, this study may more broadly assist the development of maximally effective kinase inhibitors for cancer treatment.

Simultaneous Targeting of Tumor Antigens and the Tumor Vasculature Using T Lymphocyte Transfer Synergizes to Induce Regression of Established Tumors in Mice

Dhanalakshmi Chinnasamy, Eric Tran, Zhiya Yu, Richard A. Morgan, Nicholas P. Restifo, and Steven A. Rosenberg

Precise: This study offers proof of principle for using antiangiogenic drugs to enhance the efficacy of adoptive T-cell therapies for cancer treatment.

Hedgehog Signaling Alters Reliance on EGF Receptor Signaling and Mediates Anti-EGFR Therapeutic Resistance in Head and Neck Cancer


Precise: Preclinical results show that resistance to the widely used EGFR targeting drug cetuximab, which occurs widely in the clinic, could be prevented by administration of inhibitors of the hedgehog pathway, which appears to be emerging as a major factor in cancer drug resistance more broadly.

Regulation of FANCD2 by the mTOR Pathway Contributes to the Resistance of Cancer Cells to DNA Double-Strand Breaks

Changxian Shen, Duane Oswald, Doris Phelpes, Hakan Cam, Christopher E. Pelloski, Qishen Pang, and Peter J. Houghton

Precise: This study provides the basis for the sensitization of cancer cells to DNA damaging agents by targeting the mTOR pathway and gives insight into potential strategies that may enhance therapeutic activity or reduce sequelae from high-dose therapies, particularly in children.

Elevation of Receptor Tyrosine Kinases by Small Molecule AKT Inhibitors in Prostate Cancer Is Mediated by Pim-1

Bo Cen, Sandeep Mahajan, Wenxue Wang, and Andrew S. Kraft

Precise: This study provides a rationale to improve the efficacy of AKT inhibitors for cancer therapy.

CIP4 Controls CCL19-Driven Cell Steering and Chemotaxis in Chronic Lymphocytic Leukemia

Gema Malet-Engra, Julien Vialou, Loïc Ysebaert, Manon Farcé, Fanny Lafouresse, Guy Laurent, Frédérique Gait Iacovoni, Giorgio Scita, and Loïc Dupré

Precise: This study offers important new mechanistic insights into how leukemia cells migrate, with potentially important implications for understanding how to block invasive growth by these cells.

miR145 Targets the S0X9/ADAM17 Axis to Inhibit Tumor-Initiating Cells and IL-6–Mediated Paracrine Effects in Head and Neck Cancer

Cheng-Chia Yu, Lo-Lin Tsai, Mong-Lien Wang, Chuan-Hang Yu, Wen-Liang Lo, Yun-Ching Chang, Guang-Yuh Chiou, Ming-Tung Chou, and Shih-Hwa Chiou

Precise: This mechanistically extensive study reveals a core pathway of support for cancer stem-like cells in head and neck squamous carcinomas, with implications for new treatment strategies in this setting.

Cytomegalovirus Contributes to Glioblastoma in the Context of Tumor Suppressor Mutations


Precise: A virus that infects a large proportion of patients with glioblastoma provides a novel mechanism to enhance our understanding of the tumor-suppressive function of Notch signaling in cancer, with implications for new treatment strategies in this setting.

Notch3 Functions as a Tumor Suppressor by Controlling Cellular Senescence

Hang Cui, Yahui Kong, Mei Xu, and Hong Zhang

Precise: These findings offer a novel mechanism to enhance our understanding of the tumor-suppressive function of Notch signaling in cancer, with implications in many solid tumor settings.
Dual Role of the Antioxidant Enzyme Peroxiredoxin 6 in Skin Carcinogenesis

Frank Rolfs, Marcel Huber, Florian Gruber, Friederike Böhm, Herbert J. Pfister, Valery N. Bochkov, Erwin Tschachler, Reinhard Dummer, Daniel Hohl, Matthias Schäfer, and Sabine Werner

Précis: Antioxidant functions do not contribute exclusively to tumor suppression, as widely believed, but can also promote tumor development depending on the stage of the disease.

Growth of Triple-Negative Breast Cancer Cells Relies upon Coordinate Autocrine Expression of the Proinflammatory Cytokines IL-6 and IL-8


Précis: Findings offer a preclinical proof of principle to improve therapy of triple-negative breast cancer, a particularly aggressive disease subtype lacking effective mechanism-based interventions.

ABOUT THE COVER

In gliomas, constitutive metabolism of the essential amino acid tryptophan leads to the accumulation of the tryptophan metabolite quinolinic acid. Quinolinic acid is used by tumor cells to generate NAD⁺, thus contributing to the resistance towards radiotherapy and chemotherapy by replenishing depleted intracellular NAD pools. Using Western blot analyses and immunohistochemistry, it was found that the key enzyme leading to accumulation of quinolinic acid, 3-hydroxyanthranilate oxygenate (3-HAO), is expressed by tumor-infiltrating monocytes. Thus, infiltrating monocytes contribute to resistance to cytotoxic therapies in malignant gliomas. For details, see article by Sahm and colleagues on page 3225.