BREAKING ADVANCES

4209 Highlights from Recent Cancer Literature

REVIEWS

4211 Immunogenetic Studies of Chronic Lymphocytic Leukemia: Revelations and Speculations about Ontogeny and Clinical Evolution
Anna Vardi, Andreas Agathangelidis, Lesley-Ann Sutton, Paolo Ghia, Richard Rosenquist, and Kostas Stamatopoulos

4217 Harnessing the Intestinal Microbiome for Optimal Therapeutic Immunomodulation

PRIORITY REPORT

4222 MYC Synergizes with Activated BRAFV600E in Mouse Lung Tumor Development by Suppressing Senescence
Vedrana Tabor, Matteo Bocci, Nyosha Alikhani, Raoul Kuiper, and Lars-Gunnar Larsson

4239 Capillary-Wall Collagen as a Biophysical Marker of Nanotherapeutic Permeability into the Tumor Microenvironment
Kenji Yokoi, Milos Kojic, Miljan Milosevic, Tomonori Tanei, Mauro Ferrari, and Arturas Ziemys

PRÉCIS: Determining the level of blood vessel collagen in different tumor types may help guide efforts to optimize the delivery routes for nanotherapeutics.


PRÉCIS: This study describes a novel noninvasive imaging method that can inform the status of metabolic reprogramming in tumors.

CLINICAL STUDIES

4230 Pentraxin 3: A Novel Biomarker for Predicting Progression from Prostatic Inflammation to Prostate Cancer
Giovanni Stallone, Luigi Cormio, Giuseppe Stefano Netti, Barbara Infante, Oscar Selvaggio, Giuseppe D. Fino, Elena Ranieri, Francesca Bruno, Clelia Prattichizzo, Francesca Sanguedolce, Simona Tortorella, Pantaleo Bufo, Giuseppe Grandalino, and Giuseppe Carrié

PRÉCIS: These findings encourage further evaluation of an innate immune regulator as a noninvasive biomarker that discriminates cancer from benign hyperplasia in the prostate, perhaps reducing the need for a biopsy to diagnose prostate cancer in the primary care setting.

MICROENVIRONMENT AND IMMUNOLOGY

4258 Transient Ablation of Regulatory T cells Improves Antitumor Immunity in Colitis-Associated Colon Cancer
Eva Pastille, Katrin Bardini, Diana Fleissner, Alexandra Adamczyk, Annika Frede, Munich Wadwa, Dohre von Smolinski, Stefan Kasper, Tim Sparwasser, Achim D. Gruber, Martin Schuler, Shimon Sakaguchi, Axel Roers, Werner Müller, Wiebke Hansen, Jan Buer, and Astrid M. Westendorf

PRÉCIS: This study addresses the controversy concerning whether T-regulatory cells promote or retard the formation of colon cancers driven by chronic intestinal inflammation, with implications for how to use cancer immunotherapies that ablate T-regulatory cells in this setting.

MOLECULAR AND CELLULAR PATHOBIOLOGY

4270 Cancer Affects microRNA Expression, Release, and Function in Cardiac and Skeletal Muscle
Daohong Chen, Chirayu P. Goswami, Riesa M. Burnett, Manishree Anjanappa, Poornima Bhat-Nakshatri, William Müller, and Harikrishna Nakshatri

PRÉCIS: This study offers evidence that a circulating microRNA could serve as a surrogate of the effects of cancer on microRNA expression in distant organs.
Germline Mutations in BAP1 Impair Its Function in DNA Double-Strand Break Repair
Ismail Hassan Ismail, Riley Davidson, Jean-Philippe Gagné, Zhi Zhong Xu, Guy G. Poirier, and Michael J. Hendzel

Précis: This study provides a missing link in the DNA damage response and provides a mechanistic explanation for how BAP1 functions as a tumor suppressor gene.

PME-1 Modulates Protein Phosphatase 2A Activity to Promote the Malignant Phenotype of Endometrial Cancer Cells
Ewa Wandzioch, Michelle Pusey, Amy Werda, Sophie Bail, Aishwarya Bhaskar, Mariya Nestor, Jing-Jing Yang, and Lyndi M. Rice

Précis: These findings identify a methyltransferase for the protein phosphatase PP2A as a modifier of cancer development and a theranostic target in endometrial tumors.

AR-Regulated TWEAK-FN14 Pathway Promotes Prostate Cancer Bone Metastasis
Juanjuan Yin, Yen-Nien Liu, Heather Tillman, Ben Barrett, Stephen Hewitt, Kris Yaya, Lei Fang, Ross Lake, Eva Corey, Colm Morrissey, Robert Vessella, and Kathleen M. Rice

Précis: These findings identify a TNF receptor family member as a candidate therapeutic agent and imaging target in castrate-resistant prostate cancer.

B-cell Expansion and Lymphomagenesis Induced by Chronic CD40 Signaling Is Strictly Dependent on CD19
Caroline Hofer, Samantha Frankenberger, Lothar J. Strobl, Samantha Feicht, Kristina Djerzmanovic, Franziska Jagdhuber, Cornelia Homig-Holzel, Uta Fcher, Jürgen Ruland, Klaus Rajewsky, and Ursula Zimber-Strobl

Précis: CD19 acts as a coreceptor not only for the B-cell receptor but also for CD40, mediating critical survival and proliferation signals in B-cell tumors.

IL4 Receptor ILR4 Regulates Metastatic Colonization by Mammary Tumors through Multiple Signaling Pathways
Katherine T. Venmar, Kathy J. Carter, Daniel G. Hwang, E. Ashley Dozier, and Barbara Fingleton

Précis: Although the IL4 receptor is usually associated with immune cells, it has a significant role in controlling the metastatic capabilities of breast tumor cells, with immediate implications for targeting this receptor as a strategy to treat advanced breast cancer.

miR-21 Induces Myofibroblast Differentiation and Promotes the Malignant Progression of Breast Phyllodes Tumors
Chang Gong, Yan Nie, Shaohua Qu, Jian-You Liao, Xiuying Cui, Herui Yao, Yunjie Zeng, Fengxi Su, Erwei Song, and Qiang Liu

Précis: The perspective afforded by this study confirms the suspicion that prospects for effective immunotherapy are far more likely to emerge from targeting multiple tumor antigens than single tumor antigens.

Snail Recruits Ring1B to Mediate Transcriptional Repression and Cell Migration in Pancreatic Cancer Cells
Jiangzhong Chen, Hong Xu, Xiqun Zou, Jiamin Wang, Yi Zhu, Hao Chen, Baiyong Shen, Xiaoxing Deng, Aiwu Zhou, Y. Eugene Chin, Frank J. Rauscher, III, Chenghong Peng, and Zhaozhen Hou

Précis: This study unravels an epigenetic mechanism underlying transcriptional repression by a core regulator of EMT in pancreatic cancer, suggesting new candidate theranostic targets in this disease.

AEG-1 Regulates Retinoid X Receptor and Inhibits Retinoid Signaling

Précis: This article presents evidence of a functional biomarker in cancer cell responses to retinoic acids used for therapy, with implications for screening procedures before these agents are prescribed for patients.

In Vivo Regulation of Human Glutathione Transferase GSTP by Chemopreventive Agents
Colin J. Henderson, Aileen W. McLaren, and C. Roland Wolf

Précis: These findings suggest how dietary components modulate an enzyme that is critical for determining cancer susceptibility and the outcome of chemotherapy treatments.
Germline Mutation of Bap1 Accelerates Development of Asbestos-Induced Malignant Mesothelioma

Jinfei Xu, Yuwaraj Kadariya, Mitchell Cheung, Jianming Pei, Jacqueline Talarchek, Eleonora Sementino, Yinfeng Tan, Craig W. Menges, Kathy Q. Cai, Samuel Litvin, Hongzhuan Peng, Jayashree Karar, Frank J. Rauscher, and Joseph R. Testa

Précis: Unbiased genetic findings demonstrate that BAP1 mutation carriers are predisposed to asbestos-induced mesothelioma, a hazard of certain domiciles and workplaces, where asbestos exposure would greatly synergize with inherited mutations of BAP1 in elevating risk.

PREVENTION AND EPIDEMIOLOGY

Increased Dietary Vitamin D Suppresses MAPK Signaling, Colitis, and Colon Cancer

Stacey Meeker, Audrey Seamons, Jisun Paik, Piper M. Treuting, Thea Brabb, William M. Grady, and Lillian Maggio-Price

Précis: In a mouse model of colitis and colon cancer, increasing dietary vitamin D prevented inflammatory responses involved in early stages of carcinogenesis, with potential clinical implications for chemoprevention by vitamin D.

THERAPEUTICS, TARGETS, AND CHEMICAL BIOLOGY

Inhibition of miR17 and miR20a by Oridonin Triggers Apoptosis and Reverses Chemoresistance by Derepressing BM-S

Hengyou Weng, Huilin Huang, Bowen Dong, Panpan Zhao, Hui Zhou, and Lianghu Qu

Précis: These results suggest the combined use of chemotherapy drugs with a natural microRNA-targeting agent to reverse cancer chemoresistance.

ASC-J9 Suppresses Renal Cell Carcinoma Progression by Targeting an Androgen Receptor–Dependent HIF2α/VEGF Signaling Pathway

Dalin He, Lei Li, Guodong Zhu, Liang Liang, Zhenfeng Guan, Luke Chang, Yuan Chen, Shuyuan Yeh, and Chawnshang Chang

Précis: These findings may explain why men have a higher incidence of kidney cancer than women, by revealing contributions of the androgen receptor that offers a new candidate target in this disease.

Afatinib Enhances the Efficacy of Conventional Chemotherapeutic Agents by Eradicating Cancer Stem–like Cells

Xiao-kun Wang, Jie-hua He, Jing-hong Xu, Sheng Ye, Fang Wang, Hui Zhang, Zhen-cong Huang, Kenneth Kin Wah To, and Li-wu Fu

Précis: These findings suggest use of an approved tyrosine kinase inhibitor to improve the efficacy of conventional chemotherapeutic drugs by improving eradication of cancer stem-like cells, with immediate clinical implications.

NSAID Use Reduces Breast Cancer Recurrence in Overweight and Obese Women: Role of Prostaglandin–Aromatase Interactions


Précis: This study deepens the potential connections between obesity-associated inflammation and breast cancer, with implications for a straightforward treatment and prevention strategy in estrogen-positive cancers, which are the most common clinically.

Selective and Potent Akt Inhibition Triggers Anti-Myeloma Activities and Enhances Fatal Endoplasmic Reticulum Stress Induced by Proteasome Inhibition


Précis: These results offer a preclinical proof of concept for the use of a novel Akt inhibitor in treating multiple myeloma, alone or in combination with proteasome inhibitors that are currently approved for this use.
## Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4470</td>
<td>Targeting EphA3 Inhibits Cancer Growth by Disrupting the Tumor Stromal Microenvironment</td>
<td>Mary E. Vail, Carmel Murone, April Tan, Linda Hii, Dequ Abebe, Peter W. Janes, Fook-Thean Lee, Mark Baer, Varghese Palath, Christopher Bebbington, Geoffrey Yarranton, Carmen Llerena, Slavisa Garic, David Abramson, Glenn Cartwright, Andrew M. Scott, and Martin Lackmann</td>
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<td></td>
<td><strong>Précis:</strong> Eph tyrosine kinases controlling cell attraction and repulsion forces involved in migration have been challenging to position for therapeutic invention, but this article suggests an approach to effectively target EphA3 in solid tumors as a novel type of generalized therapy for malignant tumors.</td>
<td></td>
</tr>
</tbody>
</table>

### TUMOR AND STEM CELL BIOLOGY

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4482</td>
<td>Crosstalk between Glioma-Initiating Cells and Endothelial Cells Drives Tumor Progression</td>
<td>Hye-Min Jeon, Sung-Hak Kim, Xun Jin, Jong Bae Park, Se Ho, Kim, Kaushal Joshi, Khiro Nakano, and Hyunggee Kim</td>
</tr>
<tr>
<td></td>
<td><strong>Précis:</strong> Targeting NOTCH and PDGF signaling mechanisms identified in this study in the perivascular microenvironment may offer a more efficacious approach to treat aggressive brain cancers.</td>
<td></td>
</tr>
<tr>
<td>4493</td>
<td>YAP-Induced Resistance of Cancer Cells to Antitubulin Drugs Is Modulated by a Hippo-Independent Pathway</td>
<td>Yulei Zhao, Prem Khanal, Paul Savage, Yi-Min She, Terry D. Cyr, and Xiaolong Yang</td>
</tr>
<tr>
<td></td>
<td><strong>Précis:</strong> Hippo signaling component YAP is a novel mediator of antitubulin drug-induced cancer cell death and may be a biomarker for predicting antitubulin drug sensitivity in cancers.</td>
<td></td>
</tr>
<tr>
<td>4504</td>
<td>Heparanase Cooperates with Ras to Drive Breast and Skin Tumorigenesis</td>
<td>Ilanit Boyango, Uri Barash, Inna Naroditsky, Jin-Ping Li, Edward Hammond, Neta Ilan, and Israel Vlodavsky</td>
</tr>
<tr>
<td></td>
<td><strong>Précis:</strong> Overexpression of an enzyme that degrades cell surface heparan sulfate is associated with malignant progression, but this study shows that it is also important at early stages of tumor development, reinforcing its candidacy as a therapeutic target.</td>
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</tr>
</tbody>
</table>

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ABOUT THE COVER

Expression of the multidrug resistance protein ABCG2 confers chemoresistance to CSC where it serves as a potential biomarker and therapeutic target. Afatinib, a small molecule inhibitor of the tyrosine kinases EGFR, HER2, and HER4, can enhance the antitumor effect of the DNA damaging drug topotecan in vitro and in vivo. Immunofluorescence microscopic analysis showed that afatinib significantly decreased the cell surface expression of ABCG2 in a concentration-dependent manner. For details, see article by X.-K. Wang and colleagues on page 4431.