BREAKING ADVANCES
3173 Highlights from Recent Cancer Literature

REVIEW
3175 Considerations for the Clinical Application of Chimeric Antigen Receptor T Cells: Observations from a Recombinant DNA Advisory Committee Symposium Held June 15, 2010
Hildegund C.J. Ertl, John Zaia, Steven A. Rosenberg, Carl H. June, Gianpietro Dotti, Jeffrey Kahn, Laurence J.N. Cooper, Jacqueline Corrigan-Curay, and Scott E. Strome

PRIORITY REPORTS
3182 STAT3 Inhibition Is a Therapeutic Strategy for ABC-like Diffuse Large B-Cell Lymphoma
Précis: Findings establish that STAT3 is essential to maintain the pathophysiology of an aggressive form of B cell lymphoma and they offer a preclinical proof of concept for STAT3 inhibition as a therapeutic approach to treat this cancer.

3189 The ABL Switch Control Inhibitor DCC-2036 Is Active against the Chronic Myeloid Leukemia Mutant BCR-ABL T315I and Exhibits a Narrow Resistance Profile
Christopher A. Eide, Lauren T. Adrian, Jeffrey W. Tyner, Mary Mac Partlin, David J. Anderson, Scott C. Wise, Bryan D. Smith, Peter A. Petillo, Daniel L. Flynn, Michael W.N. Deininger, Thomas O’Hare, and Brian J. Druker
Précis: A third generation drug can overcome an acquired mutation in BCR-ABL that confers resistance to all currently approved targeted therapies for CML, addressing a critical unmet need to control drug resistance in this disease.

Metformin Decreases the Dose of Chemotherapy for Prolonging Tumor Remission in Mouse Xenografts Involving Multiple Cancer Cell Types
Dimitrios Iliopoulos, Heather A. Hirsch, and Kevin Struhl
Précis: Preclinical findings suggest that combining the diabetes drug metformin with standard chemotherapy prolongs remission in multiple contexts, and may allow chemotherapy doses to be lowered in patients.

CLINICAL STUDIES
3202 Ribonucleotide Reductase Small Subunit M2B Prognoses Better Survival in Colorectal Cancer
Xiyong Liu, Lily Liu, Xiao Chen Wang, Lijun Xue, Sofia Leora, Jun Wu, Shuyi Hu, Keqiang Zhang, Mei-Ling Kuo, Lun Zhou, Hang Zhang, Yafan Wang, Yan Wang, Binghe Zhou, Rebecca A. Nelson, Shu Zheng, Suzhan Zhang, Peiguo Chu, and Yun Yen
Précis: This study defines a simple immunohistochemical marker the presence of which strongly prognoses better survival outcomes in colorectal cancer patients.

MICROENVIRONMENT AND IMMUNOLOGY
3214 Adjuvant Combination and Antigen Targeting as a Strategy to Induce Polyfunctional and High-Avidity T-Cell Responses against Poorly Immunogenic Tumors
Fernando Aranda, Diana Llopiz, Nancy Diaz-Valdés, José Ignacio Riezu-Boj, Jaione Bezunartea, Marta Ruiz, Marta Martínez, Maika Durantez, Cristina Mansilla, Jesús Prieto, Juan José Lasarte, Francisco Borrás-Cuesta, and Pablo Sarobe
Précis: Findings show how enhancing innate immunity with multiple adjuvant combination and improving T cell responses by targeted antigen strategies can elicit an effective immunotherapeutic response against poorly immunogenic tumors.
Aurora A is a Repressed Effector Target of the Chromatin Remodeling Protein INI1/hSNF5 Required for Rhabdoid Tumor Cell Survival
SeungJae Lee, Velasco Cimica, Nandini Ramachandra, David Zzagaz, and Ganjam V. Kalpana

Précis: High expression of the mitotic kinase Aurora A may underlie the aggressive behavior of rhabdoid tumors and findings suggest that targeting Aurora A may offer a rational therapeutic strategy to inhibit these tumors.

3236

Novel Theranostic Opportunities Offered by Characterization of Altered Membrane Lipid Metabolism in Breast Cancer Progression

Précis: This is the first study to describe the global changes in lipids that occur during breast cancer progression, highlighting new candidate prognostic markers and therapeutic targets in this important metabolic arena.

mTORC1 and mTORC2 Regulate EMT, Motility, and Metastasis of Colorectal Cancer via RhoA and Rac1 Signaling Pathways
Pat Gulhati, Kanika A. Bowen, Jianyu Liu, Payton D. Stevens, Piotr G. Rychahou, Min Chen, Eun Y. Lee, Heidi L. Weiss, Kathleen L. O’Connor, Tianyan Gao, and B. Mark Evers

Précis: mTOR kinases regulate cell proliferation and survival but new connections to metastasis revealed here for the first time offer a mechanistic rationale for certain uses of dual mTOR inhibitors in settings of advanced cancer.

FOXO1 Inhibits Runx2 Transcriptional Activity and Prostate Cancer Cell Migration and Invasion
Haijun Zhang, Yunqian Pan, Li Zheng, Chungyoul Choe, Bruce Lindgren, Eric D. Jensen, Jennifer J. Westendorf, Liang Cheng, and Haojie Huang

Précis: Mechanistic findings suggest a basis for understanding how prostate cancers metastasize to bone, a major site for disease progression in many patients.

The IL-8–Regulated Chemokine Receptor CXCR7 Stimulates EGFR Signaling to Promote Prostate Cancer Growth
Rajendra Kumar Singh and Bal L. Lokeshwar

Précis: Findings suggest that pro-inflammatory cytokine IL-8, which is elevated in the microenvironment of many tumors, may stimulate tumor cell growth in part through increasing expression of a chemokine receptor that colocalizes with EGFR and activates EGFR signaling.

Association of Specific Genotypes in Metastatic Suppressor HTPAP with Tumor Metastasis and Clinical Prognosis in Hepatocellular Carcinoma
Ning Ben, Jin-Cai Wu, Qiong-Zhu Dong, Hai-Jing Sun, Hu-Liang Jia, Guo-Cai Li, Bing-Sheng Sun, Chan Dai, Jiong Shi, Jin-Wang Wei, Yuan-Yuan Sheng, Hai-Jun Zhou, Qing-Hai Ye, and Lun-Xiu Qin

Précis: Findings identify an HTPAP genotype and associated gene expression pattern that favors metastasis progression and that could be used to predict tumor metastasis and prognosis in HCC patients.

Large-scale Exploration of Gene–Gene Interactions in Prostate Cancer Using a Multistage Genome-wide Association Study
Julia Ciampa, Meredith Yeager, Laufey Amundadottir, Kevin Jacobs, Peter Kraft, Charles Chung, Sholom Wacholder, Kai Yu, William Wheeler, Michael J. Thun, W. Ryan Divers, Susan Capistran, Demetrios Albanes, Jarmo Virtamo, Stephanie Weinstein, Edward Giovannucci, Walter C. Willett, Geraldine Cancel-Tassin, Olivier Cussenot, Antoine Valeri, David Hunter, Robert Hoover, Gilles Thomas, Stephen Chanock, and Nilanjan Chatterjee

Précis: A large genome-wide study that incorporated modern analytic methods highlights some provocative genetic interactions with established susceptibility loci that may help elucidate roots of prostate cancer susceptibility.
A Simple Approach to Cancer Therapy Afforded by Multivalent Pseudopeptides That Target Cell-Surface Nucleoproteins
Damien Destouches, Nicolas Page, Yamina Hamma-Kourbali, Valérie Machi, Olivier Chaloin, Sophie Frechault, Charalampos Birmpas, Panagiotis Katsoris, Julien Beyrath, Patricia Albanese, Marie Maurer, Gilles Carpentier, Jean-Marc Strub, Alain Van Dorselaer, Sylviane Muller, Dominique Bagnard, Jean Paul Briand, and José Courty

Précis: This interesting study defines a non-cytotoxic molecule that can efficiently localize to tumors, exert an antiangiogenesis activity, and selectively induce cancer cell death.

Inhibition of HIF Prolyl Hydroxylase-2 Blocks Tumor Growth in Mice through the Antiproliferative Activity of TGFβ
Anne Klotzsche-von Ameln, Antje Muschter, Soulafa Mamlouk, Joanna Kalucka, Ina Prade, Kristin Franke, Maryam Rezaei, David M. Poitz, Georg Breier, and Ben Wielockx

Précis: Mechanistic findings deepen understanding of the anti-proliferative effects of TGFβ, offering new insights into the interaction of several crucial growth signaling pathways and suggesting possible therapeutic targets.

Polo-Like Kinase Plk2 Is an Epigenetic Determinant of Chemosensitivity and Clinical Outcomes in Ovarian Cancer

Précis: Findings define a mitotic kinase as a key determinant of drug resistance in epithelial ovarian cancer, with important implications for improving the management of this often deadly disease.

High-Throughput RNAi Screening Reveals Novel Regulators of Telomerase
Maria Antonietta Cerone, Darren J Burgess, Cristina Naceur-Lombardelli, Christopher J. Lord, and Alan Ashworth

Précis: Findings point to ERK8 and other kinases that modulate telomerase activity as candidate therapeutic targets to disrupt telomere maintenance in cancer.

Aberrant Expression of OX1 Receptors for Orexins in Colon Cancers and Liver Metastases: an Openable Gate to Apoptosis
Thierry Voisin, Aalid El Firar, Magali Fasseu, Christiane Rouyer-Fessard, Véronique Descatoire, Francine Walker, Valérie Paradis, Pierre Bedossa, Dominique Henin, Thérèse Lehy, and Marc Laburthe

Précis: Findings suggest a new strategy to selectively and effectively eradicate metastatic, chemoresistant colon cancer cells.

Human Xeno-Autoantibodies against a Non-Human Sialic Acid Serve as Novel Serum Biomarkers and Immunotherapeutics in Cancer

Précis: Findings define xeno-autoantibodies against a diet-derived sialoglycan antigen that may be a cancer biomarker and an immunotherapeutic target.

Targeting Tumor Hypoxia: Suppression of Breast Tumor Growth and Metastasis by Novel Carbonic Anhydrase IX Inhibitors
Yuanmei Lou, Paul C. McDonald, Arusha Oloumi, Stephen Chia, Christina Ostlund, Ardalan Ahmadi, Alastair Kyle, Ulrich auf dem Keller, Samuel Leung, David Huntsman, Blaise Clarke, Brent W. Sutherland, Dawn Waterhouse, Marcel Bally, Calvin Roskelley, Christopher M. Overall, Andrew Minchinton, Fabio Pacchiano, Fabrizio Carta, Andrea Scozzafava, Nadia Touins, Jean-Yves Winum, Claudiu T. Supuran, and Shoukat Dedhar

Précis: Therapeutic targeting of a metabolic enzyme that promotes survival of hypoxic cancer cells may offer a mechanistically novel and effective way to block the growth of metastatic cancer cells.
TUMOR AND STEM CELL BIOLOGY

Cdk2 is Required for Breast Cancer Mediated by the Low Molecular Weight Isoform of Cyclin E
Said Akli, Carolyn S. Van Pelt, Tuyen Bui, Laurent Meijer, and Khandan Keyomarsi

Précis: Findings establish a requirement for Cdk2 in LMW-cyclin E mediated mammary tumorigenesis, arguing that human breast tumors overexpressing LMW-cyclin E are prime candidates for anti-Cdk2 therapy.

A Developmental Taxonomy of Glioblastoma Defined and Maintained by MicroRNAs
Tae-Min Kim, Wei Huang, Richard Park, Peter J. Park, and Mark D. Johnson

Précis: Findings suggest the existence of at least five distinct forms of glioblastoma that each relate to distinct stages of neural stem cell differentiation, providing an expanded framework to understand disease pathogenesis in a human neurodevelopmental context.

Phosphoglucose Isomerase/Autocrine Motility Factor Mediates Epithelial-Mesenchymal Transition Regulated by miR-200 in Breast Cancer Cells
Aamir Ahmad, Amro Aboukameel, Dejuan Kong, Zhiwei Wang, Seema Sethi, Wei Chen, Fazlul H. Sarkar, and Avraham Raz

Précis: Findings define a microRNA signaling node that links an important pathway of epithelial-mesenchyme transition to cell metabolism and survival pathways with pivotal roles in cancer.

ID4 Imparts Chemoresistance and Cancer Stemness to Glioma Cells by Derepressing miR-9*–Mediated Suppression of SOX2
Hye-Min Jeon, Young-Woo Sohn, Se-Young Oh, Sung-Hak Kim, Samuel Beck, Soonhag Kim, and Hyunggee Kim

Précis: This study connects key regulators of stem cell properties and chemotherapeutic drug resistance in brain cancer, with potential implications for improving treatment.

A Developmental Taxonomy of Glioblastoma Defined and Maintained by MicroRNAs
Tae-Min Kim, Wei Huang, Richard Park, Peter J. Park, and Mark D. Johnson

Précis: Findings suggest the existence of at least five distinct forms of glioblastoma that each relate to distinct stages of neural stem cell differentiation, providing an expanded framework to understand disease pathogenesis in a human neurodevelopmental context.

Correction: Cytokine Receptor CXCR4 Mediates Estrogen-Independent Tumorigenesis, Metastasis, and Resistance to Endocrine Therapy in Human Breast Cancer

Correction: Genome-Wide Analysis of Alternative Splicing in Medulloblastoma Identifies Splicing Patterns Characteristic of Normal Cerebellar Development
ABOUT THE COVER

Several recent studies have demonstrated the involvement of cell-surface nucleolin in angiogenesis and tumor growth. In this study, we addressed the following questions:

Does N6L (or Nucant), a synthetic ligand of cell-surface nucleolin (nM range), block angiogenesis and tumor growth? What are its mechanisms of action, its bio-distribution and finally does it target other cell surface nucleolin partner proteins?

The key findings of this study are that:

- N6L inhibits anchorage-dependent and independent growth of several tumor cell lines and blocked angiogenesis
- N6L inhibit, in vivo tumor growth in a number of mouse subcutaneous human xenograft models
- N6L bio-distribution studies indicate that N6L rapidly localizes selectively in tumor tissue (see cover figure)
- N6L is a pro-apoptotic molecule, as demonstrated by in vivo as well as in vitro experiments
- Pull-down experiments and mass-spectrometry analysis have confirmed that nucleophosmin is a partner for nucleolin and also a target (nM range) for N6L.

ImmuPharma group is currently developing N6L in Phase I/IIa clinical trials before initiating full efficacy studies in various indications as identified during this series of experiments. We believe that these findings pave the way for a novel approach of cancer treatment. For details, see the article by Destouches and colleagues on page 3296 of this issue.
Cancer Research

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