Highlights from Recent Cancer Literature

Phenotype Switching: Tumor Cell Plasticity as a Resistance Mechanism and Target for Therapy
Kristel Kemper, Pauline L. de Goeje, Daniel S. Peeper, and Renée van Amerongen

αvβ6 Expression in Myoepithelial Cells: A Novel Marker for Predicting DCIS Progression with Therapeutic Potential
Michael D. Allen, John F. Marshall, and J. Louise Jones

Synergy between the NAMPT Inhibitor GMX1777(8) and Pemetrexed in Non–Small Cell Lung Cancer Cells Is Mediated by PARP Activation and Enhanced NAD Consumption
Manuel Chan, Michel Gravel, Alexandre Bramoulle, Gaëlle Bridon, Dina Avizonis, Gordon C. Shore, and Anne Roublon

This study shows how new NAD-depleting drugs offer a way to leverage the efficacy of clinical agents that target dihydrofolate reductase, used widely in the oncology clinic, in deadly lung adenocarcinomas

Network Modeling of TGFβ Signaling in Hepatocellular Carcinoma Epithelial-to-Mesenchymal Transition Reveals Joint Sonic Hedgehog and Wnt Pathway Activation
Steven Nathaniel Steinway, Jorge G.T. Zahtudo, Wei Ding, Carl Bart Rountree, David J. Feith, Thomas P. Loughran Jr, and Reka Albert

In preclinical models of liver cancer, results define a network of signaling pathways that regulate epithelial-mesenchymal transition and might be targeted to blunt malignant progression.

Modeling Lung Cancer Evolution and Preclinical Response by Orthotopic Mouse Allografts
Chiara Ambrogio, Francisco J. Carmona, August Vidal, Mattia Falcone, Patricia Nieto, Octavio A. Romero, Sara Puertas, Miguel Vizoso, Ernest Nadal, Teresa Poggio, Montserrat Sánchez-Cespedes, Manel Esteller, Francisca Mulero, Claudia Voena, Roberto Chiarle, Mariano Barbacid, David Santamaría, and Alberto Villanueva

Orthoallografts grown from murine primary non–small cell lung cancers recapitulate both the histopathological features and therapeutic responses seen clinically in advanced human disease, potentially improving preclinical modeling needed for effective drug development in this setting.

An HMGB1-related protein that also functions as a danger signal/alarmin to promote T-cell immunity is found to contribute to T cell-dependent antitumor responses, with implications for its possible use as an adjuvant to heighten responses to cancer vaccines.

A Quantitative Sensory Analysis of Peripheral Neuropathy in Colorectal Cancer and Its Exacerbation by Oxaliplatin Chemotherapy
Mariana de Carvalho Barbosa, Alyssa K. Kosturakis, Cathy Eng, Gwen Wendelschafer-Crabb, William R. Kennedy, Donald A. Simone, Charles S. Cleeland, and Patrick M. Dougherty

This clinical study illuminates a connection between the pattern of effects in peripheral neuropathy, a major scourge of successful cancer treatment, with the specific nerve fiber types most vulnerable to cytotoxic chemotherapy, with important implications for how to focus future work to ameliorate risks of this important survivor challenge.

The Alarmin HMGN1 Contributes to Antitumor Immunity and Is a Potent Immunoadjuvant
Feng Wei, De Yang, Poonam Tewary, Yana Li, Sandra Li, Xin Chen, O.M. Zack Howard, Michael Bustin, and Joost J. Oppenheim

An HMGB1-related protein that also functions as a danger signal/alarmin to promote T-cell immunity is found to contribute to T cell-dependent antitumor responses, with implications for its possible use as an adjuvant to heighten responses to cancer vaccines.
5999  MYCN-Dependent Expression of Sulfatase-2 Regulates Neuroblastoma Cell Survival
Valeria Solari, Lucia Borriello, Gianluca Turcatel, Hiroyuki Shimada, Richard Spoto,
G. Esteban Fernandez, Shahab Asgharzadeh, Edwin A. Yates, Jeremy E. Turnbull, and
Yves A. DeClerck
Précis: An enzyme responsible for modifying extracellular proteoglycans appears to be an important mediator of the effects of the MYCN oncogene in a deadly pediatric tumor, offering new insights into how MYCN drives malignancy by altering the tumor microenvironment.

6010  Vaccine-Elicited CD8\(^+\) T Cells Cure Mesothelioma by Overcoming Tumor-Induced Immunosuppressive Environment
Zhiwu Tan, Jingying Zhou, Allen K.L. Cheung, Zhe Yu, Ka-Wai Cheung, Jianguo Liang,
Haibo Wang, Boon Kiat Lee, Kwan Man, Li Liu, Kwok-Yung Yuen, and Zhivei Chen
Précis: DNA vaccination can achieve complete cure of mesothelioma by eliciting enhanced CD8\(^+\) T cells that can overcome the tumor-induced immunosuppressive environment.

6022  Adverse Immunoregulatory Effects of 5FU and CPT11 Chemotherapy on Myeloid-Derived Suppressor Cells and Colorectal Cancer Outcomes
Julia Kanterman, Moshe Sade-Feldman, Moshe Biton, Eliran Ish-Shalom, Audrey Lasry,
Aviya Goldshtein, Ayala Hubert, and Michal Baniyash
Précis: FOLFIRI, a combination chemotherapy regimen used widely in patients with gastrointestinal cancers, may reinforce immunosuppression and thereby limits the benefits to be gained by recruiting the immune system to improve patient treatment.

6036  Promoting Thiol Expression Increases the Durability of Antitumor T-cell Functions
Pravin Keswarani, Amir A. Al-Khami, Gina Scurti, Krishnamurthy Thyagarajan, Navtej Kaur,
Shahid Husain, Quan Fang, Osama S. Naga, Patricia Simms, Gyda Beeson,
Christina Voelkel-Johnson, Elizabeth Garrett-Mayer, Craig C. Beeson,
Michael I. Nishimura, and Shikhar Mehrotra
Précis: Higher cell surface expression of thiol groups on T cells is associated with superior in vivo persistence and antitumor activity, with implications for improving T cell preparations used in adoptive immunotherapy for patients.

6048  Reducing CD73 Expression by IL1β-Programmed Th17 Cells Improves Immunotherapeutic Control of Tumors
Shilpak Chatterjee, Krishnamurthy Thyagarajan, Pravin Keswarani, Jin H. Song,
Myrosliwa Soloshchenko, Jianing Fu, Stefanie R. Bailey, Chentharmarkshan Vasu,
Andrew S. Kraft, Chrystal M. Paulos, Xue-Zhong Yu, and Shikhar Mehrotra
Précis: These findings show that including TGF\(β\) in ex vivo cultures used to program Th17 cells damages their immunotherapeutic potential, and they show how this potential can be more potently realized for adoptive T-cell immunotherapy in cancer patients.

6060  IPH4102, a Humanized KIR3DL2 Antibody with Potent Activity against Cutaneous T-cell Lymphoma
Anne Marie-Cardine, Nicolas Viaud, Nicolas Thonnart, Rachel Joly, Stéphanie Chanteux, Laurent Gauthier, Cécile Bonnafous, Benjamin Rossi, Mathieu Bléry, Carine Paturel, Armand Bensussan, Martine Bagot, and Hélène Sicard
Précis: This study offers a preclinical proof of concept for development of a novel therapy that targets one of the most relevant tumor antigens in cutaneous T-cell lymphoma, where there remains unmet medical need.

6071  Whole-Genome Sequencing of Asian Lung Cancers: Second-Hand Smoke Unlikely to Be Responsible for Higher Incidence of Lung Cancer among Asian Never-Smokers
Vidiya G. Krishnan, Philip J. Ebert, Jason C. Ting, Elaine Lim, Swee-Seong Wong, Audrey S.M. Teo,
Yong G. Yue, Hui-Hoon Chua, Xiwen Ma, Gary S.L. Loh, Yuhaol Lin, Joanna H.J. Tan, Kun Yu,
Shenli Zhang, Christoph Reinhard, Daniel S.W. Tan, Brock A. Peters, Stephen E. Lincoln,
Dennis G. Ballinger, Jason M. Laramie, Geoffrey B. Nilsen, Thomas D. Barber, Patrick Tan,
Axel M. Hllmer, and Pauline C. Ng
Précis: This whole genome study of Asian lung cancer patients, the largest performed to date, refutes the long-standing presumption that Asian never-smokers have a higher incidence of lung cancer due to second-hand smoke, which does not appear to be the case.
HTLV-1 bZIP Factor HBZ Promotes Cell Proliferation and Genetic Instability by Activating OncomiRs

Céline Vernin, Morgan Thenoz, Christiane Pinatel, Antoine Gessain, Olivier Gout, Marie-Hélène Delfau-Larue, Nicolas Nazaret, Catherine Legras-Lachuer, Eric Wattel, and Franck Mortreux

**Précis:** As one of the few viruses definitively linked to cancer, HTLV-1 retains interest as a tool to gain insights into the pathogenic origins of cancer, hereby challenging the long-standing idea that the viral gene product Tax is most critical in directing early leukemogenesis.

ALK-Dependent Control of Hypoxia-Inducible Factors Mediates Tumor Growth and Metastasis

Cinzia Martinengo, Teresa Poggio, Matteo Menotti, Maria Stella Scalzo, Cristina Ambrogio, Elsa Pellegrino, Ludovica Riera, Roberto Piva, Domenico Ribatti, Fabio Pastorino, Patrizia Perri, Mirco Ponzoni, Qi Wang, Claudia Voena, and Roberto Chiarle

**Précis:** This study offers a rationale to explore ALK kinase inhibitors as effective treatments for certain lymphomas and non–small cell lung cancers, where ALK activity affects hypoxia responses and angiogenesis.

Metastatic Heterogeneity of Breast Cancer Cells Is Associated with Expression of a Heterogeneous TGFβ-Activating miR424–503 Gene Cluster

Yun Li, Wei Li, Zhe Ying, Han Tian, Xun Zhu, Jun Li, and Mengfeng Li

**Précis:** These findings define a microRNA cluster that controls the intensity of TGFβ signaling and metastatic response in breast cancer cells, with possible implications in cancer-associated deregulation of TGFβ signaling generally.

Stress Response Protein Cirp Links Inflammation and Tumorigenesis in Colitis-Associated Cancer

Toshiharu Sakurai, Hiroshi Kashida, Tomohiro Watanabe, Satoru Hagivara, Tsunekazu Mizushima, Hideki Iijima, Naoshi Nishida, Hiroaki Higashitsu, Jun Fujita, and Masatoshi Kudo

**Précis:** A little-studied RNA binding protein is found to act as a positive modifier of inflammation-driven colon cancers, contributing to the development of inflammatory bowel disease as well as colitis-associated cancer in established preclinical models.

BRCA1 Suppresses Epithelial-to-Mesenchymal Transition and Stem Cell Dedifferentiation during Mammary and Tumor Development

Feng Bai, Ho Lam Chan, Alexandria Scott, Matthew D. Smith, Cheng Fan, Jason L. Herschkowitz, Charles M. Perou, Alan S. Livingstone, David J. Robbins, Anthony J. Capobianco, and Xin-Hai Pei

**Précis:** This study offers the first genetic evidence that the BRCA1 gene acts directly to suppress epithelial-mesenchymal transition during breast tumorigenesis, offering an explanation for why BRCA1 mutation carriers are prone to aggressive basal-like breast cancers.
A Recurrent Activating PLCG1 Mutation in Cardiac Angiosarcomas Increases Apoptosis Resistance and Invasiveness of Endothelial Cells
Kristin Kunze, Tilmann Spieker, Ulrike Gamerdinger, Kerstin Nau, Johannes Berger, Thomas Dreyer, Jürgen S. Sindermann, Andreas Hoffmeier, Stefan Gattenlohner, and Andreas Brünninger
Précis: Mutation of PLCG1 identified in rare tumor may provide insights into apoptosis resistance and invasion.

Genetic Deletion of AEG-1 Prevents Hepatocarcinogenesis
Précis: This potentially seminal study unravels a novel role for the AEG-1 oncogene in shaping the tumor microenvironment in a manner that is essential for liver cancer development.

Vitamin D Suppresses Leptin Stimulation of Cancer Growth through microRNA
Ravi Kasiappan, Yuefeng Sun, Panida Lungchukiet, Waise Quarni, Xiaohong Zhang, and Wenlong Bai
Précis: This study suggests that vitamin D supplements may help obese women reduce their risk of cancer.

Preventive Targeting of BRCA1-Mutated Breast Cancers with Agents That Activate DNA Repair
Elizabeth Alli, David Solow-Cordero, Stephanie C. Casey, and James M. Ford
Précis: This work offers a preclinical proof of concept for a wholly new approach to chemoprevention in carriers of BRCA1 mutations as a strategy to reduce the prevalence of BRCA1-associated malignancy.

Pretargeted Dual-Modality Immuno-SPECT and Near-Infrared Fluorescence Imaging for Image-Guided Surgery of Prostate Cancer
Précis: This study describes a major advancement to methods used in surgical resections of primary prostate cancer, where image-guided techniques are increasingly important and can extend time to progression in patients.

Pancreatic Cancer–Specific Cell Death Induced In Vivo by Cytoplasmic-Delivered Polyinosine–Polycytidylic Acid
Praveen Bhoopathi, Bridget A. Quinn, Qin Gui, Xue-Ning Shen, Steven R. Grossman, Swadesh K. Das, Devanand Sarkar, Paul B. Fisher, and Luni Emdad
Précis: These findings offer a preclinical proof of concept for immediate evaluation of an immune adjuvant that also triggers apoptosis in pancreatic cancer cells, as a novel type of immunochemotherapy to treat pancreatic cancer.

A Small-Molecule Modulator of the Tumor-Suppressor miR34a Inhibits the Growth of Hepatocellular Carcinoma
Zhangang Xiao, Chi Han Li, Stephen L. Chan, Feiyue Xu, Lu Feng, Yan Wang, Jian-Dong Jiang, Joseph J.Y. Sung, Christopher H.K. Cheng, and Yangchao Chen
Précis: These findings offer a preclinical proof of concept for a lead small molecule candidate as a new class of therapeutic for liver cancer, based on restoration of miR-34a tumor suppressor function.
Activated d16HER2 Homodimers and SRC Kinase Mediate Optimal Efficacy for Trastuzumab
Lorenzo Castagnoli, Manuela Iezzi, Gaia C. Ghedini, Valentina Ciravolo, Giulia Marzano, Alessia Lamolinara, Roberta Zappasodi, Patrizia Gasparini, Manuela Campiglio, Augusto Amici, Claudia Chiodoni, Arianna Palladini, Pier Luigi Lollini, Tiziana Triulzi, Sylvie Menard, Patrizia Nanni, Elda Tagliabue, and Serenella M. Pupa
Précis: Mouse genetic and clinical results establish the variant HER2 signaling axis as a marker for optimal responses to trastuzumab treatment, with immediate clinical implications.

Effective Cancer Vaccine Platform Based on Attenuated Salmonella and a Type III Secretion System
Précis: This study describes an orally administered Salmonella-based vector system that can present tumor antigens to the immune system in a manner that yields potent antitumor responses, offering a novel platform for the engineering of more effective cancer vaccines.

Targeted Noninvasive Imaging of EGFR-Expressing Orthotopic Pancreatic Cancer Using Multispectral Optoacoustic Tomography
Shanice V. Hudson, Justin S. Huang, Wenyuan Yin, Sabrin Albeituni, Jamie Rush, Anil Khanal, Jun Yan, Brian P. Ceresa, Hermann B. Frieboes, and Lacey R. McNally
Précis: The technology described in this report offers the potential to detect pancreatic tumors with higher specificity and sensitivity, in both the preclinical and clinical settings, than existing technology permits.

miR326 Maturation Is Crucial for VEGF-C–Driven Cortactin Expression and Esophageal Cancer Progression
Chih-Chen Hong, Pai-Sheng Chen, Jeon Chiu, Ching-Feng Chiu, Ching-Yao Yang, Michael Hsiao, Yi-Wen Chang, Yang-Hao Yu, Mien-Chie Hung, Nai-Wen Hsu, Shih-Gwo Shiah, Nan-Yung Hsu, and Jen-Liang Su
Précis: These findings offer insights into how a key driver of esophageal cancer enhances its robust invasive and metastatic properties, with potential implications for the development of new biomarkers or therapies in this setting.

Distinct Subpopulations of Head and Neck Cancer Cells with Different Levels of Intracellular Reactive Oxygen Species Exhibit Diverse Stemness, Proliferation, and Chemosensitivity
Ching-Wen Chang, Yu-Syuan Chen, Shiu-Huey Chou, Chia-Li Han, Yu-Ju Chen, Cheng-Chieh Yang, Chih-Yang Huang, and Jeng-Fan Lo
Précis: These findings suggest that strategies to stimulate low intracellular ROS levels, found here to be associated with stemness and chemoresistance in head and neck squamous cancers, should be explored clinically in combination with conventional chemotherapy.

PAD2 Overexpression in Transgenic Mice Promotes Spontaneous Skin Neoplasia
Précis: These findings provide a mechanistic rationale to target a highly tractable enzyme to prevent or treat inflammation-associated skin carcinomas.

SCCA1/SerpinB3 Promotes Oncogenesis and Epithelial–Mesenchymal Transition via the Unfolded Protein Response and IL6 Signaling
Namratha Sheshadri, Joseph M. Catanzaro, Alex J. Bott, Yu Sun, Erica Ullman, Emily I. Chen, Ji-An Pan, Song Wu, Howard C. Crawford, Jianhua Zhang, and Wei-Xing Zong
Précis: A protease inhibitor that is overexpressed in many human cancers is found to promote tumorigenesis by upregulating IL6 signaling in the tumor microenvironment.
Transient SNAIL1 Expression Is Necessary for Metastatic Competence in Breast Cancer
Hung D. Tran, Krishna Luitel, Michael Kim, Kun Zhang, Gregory D. Longmore, and David D. Tran

Précis: These findings provide a compelling genetic rationale to target metastasis by impeding a major regulator of this process despite its transient requirement.

Holo-Retinol–Binding Protein and Its Receptor STRA6 Drive Oncogenic Transformation
Daniel C. Berry, Liraz Levi, and Noa Noy

Précis: Results suggest that the blood carrier of vitamin A and its cell surface transporter and signaling receptor STRA6 may comprise novel targets for cancer therapy.

Ceramide Kinase Promotes Tumor Cell Survival and Mammary Tumor Recurrence
Ania W. Payne, Dhruv K. Pant, Tien-Chi Pan, and Lewis A. Chodosh

Précis: Results identify an actionable pathway in breast cancer patients that might be blocked during chemotherapy to limit tumor recurrence and extend survival.

Notch Signaling Drives Stemness and Tumorigenicity of Esophageal Adenocarcinoma
Zhiqiang Wang, Thiago G. Da Silva, Ke Jin, Xiaoxia Zhu, Avencia Sanchez-Mejias, Feng Bai, Bin Li, Dennis Liang Fei, Kelly Weaver, Rodrigo Vasquez-Del Carpio, Anna E. Moscovitz, Vadam P. Koshenkov, Lilly Sanchez, Lynne Sparling, Xin-Hai Pei, Dido Franceschi, Alfonso Ribeiro, David J. Robbins, Alan S. Livingstone, and Anthony J. Capobianco

Précis: This study provides a preclinical proof of concept for the repositioning of gamma-secretase inhibitors, previously evaluated in clinical trials, as a new treatment for aggressive esophageal cancers.

ABOUT THE COVER

Astrocyte elevated gene-1 (AEG-1) is an oncogene that is overexpressed in all cancers. Although the oncogenic function of AEG-1 has been studied in tumor cells, as yet the role of AEG-1 in tumor microenvironment cells has not been analyzed. Using immunofluorescence it was documented that AEG-1 is expressed at a high level in macrophages, and functional studies documented that macrophage AEG-1 plays an important role in regulating NF-κB activation and thereby initiation of hepatocarcinogenesis. For details, see article by Robertson and colleagues on page 6184.