MASTERS OF IMMUNOLOGY

381  Affinity Enhancement of Antibodies: How Low-Affinity Antibodies Produced Early in Immune Responses Are Followed by High-Affinity Antibodies Later and in Memory B-Cell Responses
Herman N. Eisen

CANCER IMMUNOLOGY AT THE CROSSROADS: EXPERIMENTAL IMMUNOTHERAPIES

393  Tim-3: An Emerging Target in the Cancer Immunotherapy Landscape
Ana C. Anderson

CANCER IMMUNOLOGY MINIATURES

399  Sustained Complete Response to CTLA-4 Blockade in a Patient with Metastatic, Castration-Resistant Prostate Cancer
Julie N. Graff, Sachin Puri, Carlo B. Bifulco, Bernard A. Fox, and Tomasz M. Beer
Synopsis: Graff and colleagues analyzed sera and biopsies from a prostate cancer patient, which showed amplification of the 3-hydroxyisobutyryl-CoA hydrolase (HIBCH) gene with strong protein expression, suggesting that the augmented antibody response to HIBCH contributed to the durable immune response in prostate cancer.

410  Reversal of NK-Cell Exhaustion in Advanced Melanoma by Tim-3 Blockade
Ines Pires da Silva, Anne Gallois, Sonia Jimenez-Baranda, Shaukat Khan, Ana C. Anderson, Vijay K. Kuchroo, Iman Osman, and Nina Bhardwaj
Synopsis: Silva and colleagues show that Tim-3 expression in NK cells from melanoma patients correlates with poor prognostic blockade of Tim-3 induces NK-cell proliferative and cytolytic capacity and responsiveness to growth factors, indicating that Tim-3 is a therapeutic target for patients with advanced melanoma.

423  \( CD^+ \) T Lymphocyte Ablation Prevents Pancreatic Carcinogenesis in Mice
Yaqing Zhang, Wei Yan, Esha Mathew, Filip Bednar, Shanshan Wan, Meredith A. Collins, Rebecca A. Evans, Theodore H. Welling, Robert H. Vonderheide, and Marina Pasca di Magliano
Synopsis: Zhang and colleagues show that Kras-expressing epithelial cells recruit CD4\(^+\) T cells that repress the activity of CD8\(^+\) T cells to establish the immunosuppressive microenvironment in the iKras\(^*\) mouse model of pancreatic cancer; elimination of CD4\(^+\) T cells uncovers the antineoplastic function of CD8\(^+\) T cells.

436  Enhancing Efficacy of Anticancer Vaccines by Targeted Delivery to Tumor-Draining Lymph Nodes
Laura Jeanbart, Marie Ballester, Alexandre de Titta, Patricia Corhtésy, Pedro Romero, Jeffrey A. Hubbell, and Melody A. Swartz
Synopsis: Jeanbart and colleagues show in two cancer models that targeting vaccines to the tumor-draining lymph node (tdLN) using nanoparticle carriers drives stronger effector immunity and better therapeutic outcomes, suggesting that the tumor-antigen experience of the tdLN outweighs the presence of tumor-derived immunosuppressive cytokines there.
**Combination of Alphavirus Replicon Particle-Based Vaccination with Immunomodulatory Antibodies: Therapeutic Activity in the B16 Melanoma Mouse Model and Immune Correlates**

Francesca Avogadri, Roberta Zappasodi, Arvin Yang, Sadna Budhu, Nicole Malandro, Daniel Hirschhorn-Cymerman, Shakuntala Tiwari, Maureen F. Maughan, Robert Olmsted, Jedd D. Wolchok, and Taha Merghoub

**Synopsis:** Avogadri and colleagues show that anti-CTLA-4 or anti-GITR immunomodulatory antibody improves the efficacy of a nonpathogenic viral vector–based vaccine (VRP-TRP-2) in the B16F10 melanoma mouse model. Superior antitumor protection conferred by anti-GITR was associated with enhanced humoral response and reduced CD4+PD-1+ T-cell intratumoral accumulation.

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**Exposure to a Histone Deacetylase Inhibitor Has Detrimental Effects on Human Lymphocyte Viability and Function**


**Synopsis:** Wong and colleagues show that human lymphocytes are highly susceptible to panobinostat, which alters their signaling pathways and is cytotoxic at a much lower dose than needed for antitumor activity. They caution against the combined use of panobinostat with immunotherapy for melanoma.

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**Streptavidin: A Novel Immunostimulant for the Selection and Delivery of Autologous and Syngeneic Tumor Vaccines**

Chris Weir, Amanda L. Hudson, Elizabeth Moon, Angus Ross, Miles Alexander, Lyndsay Peters, Veronika Langova, Stephen J. Clarke, Nick Pavlakis, Ross Davey, and Viive M. Howell

**Synopsis:** Weir and colleagues describe a novel method that uses streptavidin as an immune stimulant for autologous and syngeneic cancer vaccines. Streptavidin was an effective novel vaccine carrier for soluble tumor proteins that provided survival advantage in the syngeneic cancer model.

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**Correction: Increased Frequency of ICOS+ CD4 T Cells as a Pharmacodynamic Biomarker for Anti-CTLA-4 Therapy**

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ABOUT THE MASTER

Herman N. Eisen, MD, is a professor emeritus in the department of biology at the Massachusetts Institute of Technology (MIT). Dr. Eisen joined the faculty at MIT in 1973 as one of the founding members of the MIT Center of Cancer Research, later named the Koch Institute for Integrative Cancer Biology. He is also affiliated with the Ragon Institute of Massachusetts General Hospital (MGH), MIT, and Harvard University. His early interest was in chemistry. Inspired by the work of Karl Landsteiner, who generated antibodies from hapten-linked proteins, and a seminar by Fred Sanger, who described how he deduced the amino acid sequence of insulin, Dr. Eisen began his distinguished research career in immunology, focused on antibody development and antigen recognition. Benefiting from the post–World War II expansion of NIH-supported research, Dr. Eisen received one of the first physician–scientist awards to study sulfonamide-induced antibodies at New York University (NYU). Using equilibrium dialysis he and his bench-mate, Fred Karush, determined the number of antigen-binding sites on antibodies (Eisen and Karush, J Am Chem Soc 1949;71:363–4). At Washington University in St. Louis (WUSL), Eisen and his colleagues discovered that the affinity of serum antibodies increases progressively with time after encountering antigen (later called affinity maturation of antibodies, and the subject of the Master primer in this issue). At MIT, the Eisen lab focused on CD8 T cells and their killing of cells that display peptide–MHC complexes recognized by the T cells’ antigen-binding receptor.

Dr. Eisen was born in Brooklyn, New York, in 1918. He entered the NYU honors program in 1934 and was the free-swinging, left-handed first baseman for the college’s baseball team until he developed tuberculosis and had to leave school for a year. He received his MD from NYU in 1943 and served residencies in pathology at the Columbia-Presbyterian Hospital and in medicine at the Bellevue Hospital. After brief stints at the Memorial Sloan-Kettering Institute and NYU Medical School, including part-time medical practice, he moved to WUSL in 1955, first as professor of medicine and then as professor and chairman of the department of microbiology.

Dr. Eisen has received numerous honors, including a National Cancer Institute Outstanding Investigator award, the von Behring-Heidelberger Award, and the American Association of Immunologists (AAI) Lifetime Service/Achievement award. He has served on the scientific advisory boards of the Howard Hughes Medical Institute, Yale Medical School, Harvard School of Public Health, MGH, the Children’s Hospital of Boston, the National Institute for Arthritis and Metabolic Diseases, the Roche Institute for Molecular Biology, and the Merck Institute. He was the vice president of the American Society for Clinical Investigation (1965) and the president of the AAI (1968). Dr. Eisen was elected to the American Academy of Arts and Sciences (1965), the U.S. National Academy of Sciences (1969), and the Institute of Medicine (1974).
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