A01 A high-glucose environment augments the clonal evolution of Hexokinase-2 gene copy number expression in anaplastic thyroid cancer. Abha Aggarwal, Jessica Marshall, Matthew Nehs. Brigham and Women's Hospital, Boston, MA.

A02 Clonal dynamics and the earliest steps of carcinogenesis in chronically UV-exposed skin. Stanislav Avdieiev, Leticia Tordesillas, Mahmoud Abdalah, Omar Chavez Chiang, Luiza Silva Simoes, Robert A. Gatenby, Elsa R. Flores, Kenneth Y. Tsai, Joel S. Brown. H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL.

A03 Evolution of chronic myelomonocytic leukemia to acute myeloid leukemia occurs without acquisition of exome mutations. Ryan M. Carr¹, Terra Lasho², David L. Marks³, Ezequiel J. Tolosa³, Luciana L. Almada¹, Denis Vorobyev², Stephanie L. Safgren¹, Isaac Horn¹, Eric Solary², Peter Valent³, Abhishek A. Mangaonkar⁴, Klaus Geissler⁴, Sergey Nikolaev⁵, Martin E. Fernandez-Zapico¹, Mrinal M. Patnaik¹. ¹Mayo Clinic, Rochester, MN, ²Gustave Roussy Cancer Center, Villejuif, France, ³Medical University of Vienna, Vienna, Austria, ⁴Sigmund Freud University Vienna, Vienna, Austria.

A04 Conservation of copy number profiles during engraftment and passaging of patient-derived cancer xenografts. Xing Yi Woo¹, Jessica Giordano³, Anuj Srivastava¹, Zi-Ming Zhao¹, Michael W. Lloyd³, Roobi de Bruijn⁴, Yun-SuHk Suh⁵, Rajesh Patidar⁶, Jong-Il Kim⁵, Han-Kwang Yang⁵, Charles Lee¹, Brandi Davis-Dusenberg⁷, Dennis A. Dean⁷, Yvonne A. Evrard⁸, James H. Doroshow⁸, Claudio Isella³, Jeffrey A. Moscow⁸, Livio Trusolino⁹, Annette T. Byrne⁹, Jos Jonkers⁹, Carol J. Bult³, Enzo Medico², Jeffrey H. Chuang¹, The PDXNet Consortium⁹, The EUROPDX Consortium¹⁰. ¹The Jackson Laboratory for Genomic Medicine, Farmington, CT, ²University of Torino, Candiolo, Italy, ³The Jackson Laboratory, Bar Harbor, ME, ⁴Netherlands Cancer Institute, Amsterdam, The Netherlands, ⁵Seoul National University, Seoul, South Korea, ⁶Frederick National Laboratory for Cancer Research, Frederick, MD, ⁷Seven Bridges Genomics, Charlestown, SC, ⁸National Cancer Institute, Bethesda, MD, ⁹Royal College of Surgeons in Ireland, Dublin, Ireland, ¹⁰EurOPDX, Candiolo, Italy.

A05 Evolution of myeloid malignancies from severe congenital neutropenia: Mutations are coming with the gain of clones. Tomas Wojdyla¹, Adya Sapra², Hrishikesh Mehta², Roman Jaksik¹, Marek Kimmel³, Seth Corey². ¹Silesian Tech University, Gliwice, Poland, ²Cleveland Clinic, Cleveland, OH, ³Rice University, Houston, TX.

A06 Antagonistic duality of NPM1 mutations in AML. Andrei L. Gartel, Irum Khan. UIC, Chicago, IL.

A07 Alternating clonal dominance during unperturbed tumor expansion and metastasization. Alex Chieh-Yuan Li, I-Lin Ho, Fuchenchu Wang, Ruitao Liu, Li Zhao, Jingjing Liu, Jiang Hong, Faezeh Darbanian, Er-Yen Yen, Andrew Futreal, Jianjua Zhang, Alessandro Carugo, Kim-Anh Do, Giulio Draetta, Andrea Viale. University of Texas MD Anderson Cancer Center, Houston, TX.
A08 Heterogeneous clonal dynamics of leukemia progression and chemotherapy response in patient-derived xenograft models. Humberto Contreras-Trujillo1, Jiya Eerdeng1, Samir Akre1, Du Jiang1, Aparna Jorapur1, Mary Vergel-Rodriguez1, Areen Andreasian1, Lisa Harton1, Charles Bramlett1, Basia Gala1, Anna Nogalska1, Gang Xiao2, Jae-Woong Lee2, Lai Chan2, Markus Müschen2, Akil Merchant1, Rong Lu1.
1University of Southern California, Los Angeles, CA, 2City of Hope Comprehensive Cancer Center, Monrovia, CA, 3Cedars-Sinai Medical Center, Los Angeles, CA.

A09 The landscape of somatic mutations in normal human cells. Luiza Moore1, Mathijs Sanders1, Tim Coorens1, Daniel Leongamornlert1, Peter Ellis1, Thomas Mitchell1, Patrick Tarpey1, Yvette Hooks1, Raheleh Rahbari1, Henry Lee-Six1, Christine Iacobuzio-Donahue2, Kourosh Saeb-Parsy3, Inigo Martincorena1, Peter Campbell1, Michael Stratton1. 1Wellcome Sanger Institute, Cambridge, United Kingdom, 2Department of Pathology, Memorial Sloan Kettering Cancer Center, New York, NY, 3Deartment of Surgery, University of Cambridge, and Cambridge NIHR Biomedical Research Centre, Cambridge Biomedical Campus, Cambridge, United Kingdom.

1University of California San Francisco, San Francisco, CA, 2Genentech, Inc., South San Francisco, CA.


A12 Age, not therapy-associated bottlenecking, drives clonal evolution in the hematopoietic system in the decades following allogeneic stem cell transplantation. Jesse J. Salk1, Jake Higgins1, Charles Valentine1, Masumi Ueda2, Rainer Storb2, Jerald Radich2. 1TwinStrand Biosciences, Seattle, WA, 2Fred Hutchinson Cancer Research Center, Seattle, WA.

A13 The tick-tock of the molecular clock: Random methylation state changes inform homeostasis in the intestinal crypt. Ryan O. Schenck1, Ester Gil-Vazquez2, Simon Leedham2, Alexander R.A. Anderson2, Darryl Shibata3. 1University of Oxford, Oxford, United Kingdom, and Moffitt Cancer Center, Tampa, FL, 2University of Oxford, Oxford, United Kingdom, 3University of Southern California, Los Angeles, CA.

A14 Opposing evolutionary pressures drive clonal evolution and health outcomes in the aging blood system. Kimberly M. Skead1, Armande Ang Houle1, Sag El Isbell2, Mawusse Agbessi1, Vanessa Bruat3, Boxi Lin2, David Soave3, Liran Shlush4, Stephen I. Wright3, John E. Dick5, Quaid D. Morris2, Philip Awadalla2. 1Ontario Institute for Cancer Research, Toronto, ON, Canada, 2University of Toronto, Toronto, ON, Canada, 3Wilfred Laurier University, Toronto, ON, Canada, 4Weizmann Institute, Rehovot, Israel, 5Princess Margaret Hospital, Toronto, ON, Canada.

A15 Game theory cancer models using interacting particle systems. Yusha Sun1, Yinang Zheng1, Gonzalo Torga2, Ken Pienta3, Rober Austin1. 1Princeton University, Princeton, NJ, 2The Royal Marsden Hospital, London, United Kingdom, 3Johns Hopkins Medical Institute, Baltimore, MD.
We describe an evolutionary game theory model that has been used to predict the population dynamics of interacting cancer and stromal cells. We first consider the mean field case assuming homogeneous and non-discrete populations. Interacting particle systems (IPS) are then presented as a discrete and spatial alternative to the mean field approach. Finally, we discuss cases where IPS gives results different from the mean field approach.
A16 Multiregional sequencing analysis identifies extensive intratumor heterogeneity in gastric cancer. Ted Toal1, Guadalupe P. Polanco-Echeverry2, Ruta Sahasarabudhe1, Ana Estrada-Florez3, Mabel Bohorquez2, Shiro Urayama4, Amanda R. Kirane3, Maria Echeverry2, Javier G. Torres4, Luis Carvajal-Carmona5. 1University of California Davis, Davis, CA, 2Universidad del Tolima, Ibagué, Colombia, 3UC Davis Comprehensive Cancer Center, Sacramento, CA, 4Instituto Mexicano del Seguro Social, Mexico City, CA, Mexico.

A17 CaTCH—a barcode-guided CRISPRa-inducible reporter to isolate clones from heterogeneous populations. Christian Umkehrer1, Laura Formenti2, Felix Holstein3, Julian Jude4, Kimon Froussios1, Tobias Neumann1, Lisa Haas1, Jesse Lipp2, Thomas Burkard1, Michaela Fellner1, Thomas Wiesner3, Johannes Zuber1, Anna Obenauf2. 1Research Institute of Molecular Pathology, Vienna, Austria, 2Boehringer Ingelheim RCV GmbH & Co KG, Vienna, Austria, 3Medical University of Vienna, Vienna, Austria.

A18 Apc mutant intestinal stem cells act as supercompetitors in tumor initiation. Sanne M. van Neerven3, Nina E. de Groot1, Lisanne E. Nijman1, Milou S. van Driel2, Brendon Scicluna3, Edward Morrissey2, Nicolas Léveillé2, Louis Vermeulen1. 1Amsterdam UMC, Amsterdam, The Netherlands, 2MRC Weatherall Institute of Molecular Medicine, Oxford, United Kingdom.

A19 Tumor evolution and subclonal dynamics in multiple myeloma. Josh N. Vo1, Yi-Mi Wu2, Pankaj Vats1, Alexander Hopkins1, Jamie Estill1, The MMRF CoMMpass Network2, Xuhong Cao3, Daniel Auclair2, Dan R. Robinson1, Arul M. Chinnaiyan1. 1Michigan Center for Translational Pathology (MCTP), Ann Arbor, MI, 2Multiple Myeloma Research Foundation, Norwalk, CT.

A20 Epigenetically regulated DNA rereplication as a precursor to inherited gene amplification. Greg Wright, Johannes Menzel, Philip Tatman, Joshua C. Black. University of Colorado School of Medicine, Aurora, CO.

A21 Modeling chromosome instability in high-grade serous ovarian cancer. Daniel Bronder1, Daniela Hirsch1, Anthony Tighe2, Louisa Nelson2, Darawalee Wangsa1, Bjorn Bakker3, Diana Spierings3, Floris Foijer2, Kerstin Heselmeyer-Haddad1, Thomas Ried1, Stephen Taylor2. 1National Cancer Institute, Bethesda, MD, 2University of Manchester, Manchester, United Kingdom, 3European Research Institute for the Biology of Ageing, Groningen, The Netherlands.

A22 dMMR and MSI-H do not correlate in prostate carcinoma in African American patients. Malhaar Agrawal, Rong Xia, Rachelle Mendoza, M.A. Haseeb, Zaheer Bukhari. SUNY Downstate Medical Center, Brooklyn, NY.

A23 MicroRNA degradation-mediated genetic heterogeneity in glioblastoma. Valya Ramakrishnan3, Beibei Xu1, Johnny Akers3, Thien Nguyen3, Brian Hirshman4, Jie Li1, Jann Sarkaria5, Hua Wei6, Ying Mao6, Tao Jiang7, Clark C. Chen1. 1University of Minnesota, Minneapolis, MN, 2VisiCELL Medical Inc, San Diego, CA, 3University of California Los Angeles, Los Angeles, CA, 4University of California San Diego, San Diego, CA, 5Mayo Clinic, Rochester, MN, 6Fudan University, Shanghai, China, 7Capital Medical University, Beijing, China.

A25 Coexpression of DNA hypermutators APOBEC3A or APOBEC3B with oncogenic BRAFV600E is sufficient to initiate tumors in vivo. Maurizio Fazio1, Rodsy Modhurima3, Erika Weiskopf1, Ellen van Rooijen1, Jeffrey K. Mito2, Julien Ablain1, Leonard I. Zon1. 1Howard Hughes Medical Institute, Stem Cell
A26 Task allocation and cooperation between transcriptomically distinct groups within cancer cell line populations. Andrea L. Gardner, Kaitlyn E. Johnson, Daylin Morgan, Tyler Jost, Grant Howard, Eric Brenner, Amy Brock. University of Texas at Austin, Austin, TX.


A29 SETD2 loss drives genomic instability by increasing CENP-A levels and generation of dicentric chromosomes. W. Kimryn Rathmell, Frank M. Mason, Emily S. Kounlavong, In Young Park, Cheryl L. Walker. Vanderbilt University Medical Center, Nashville, TN, Baylor College of Medicine, Houston, TX.

A30 Cell fusions as a novel source of tumor heterogeneity. Daria Miroshnychenko, Etienne Baratchart, Meghan Ferrall-Fairbanks, Phillip Altrock, David Basanta, Andriy Marusyk. Moffitt Cancer Center, Tampa, FL.


A33 Development and characterization of resistance to enzalutamide in breast cancer cells. Mauricio de la Rosa, Jessica Herrera, Victor Trevino. Tecnológico de Monterrey, Monterrey, Nuevo Leon, Mexico.


A36 Investigating clonal dynamics and evolution of metabolic vulnerabilities in chemoresistant triple-negative breast cancer. Gloria V. Echeverria, Mingchu Xu, Yuan Qiu, Chunxiao Fu, Sahil Seth, Stacy L. Moulder, William F. Symmans, Joseph R. Marszalek, Timothy P. Heffernan, Jeffrey T. Chang, Helen Piwnica-Worms. Baylor College of Medicine, Houston, TX, The University of Texas MD Anderson Cancer Center, Houston, TX, University of Texas Health Science Center, Houston, TX.

A38 Clonal evolution of tumors over the time in patients with triple-negative breast cancer. Nilesh Laxman Gardi¹, Rohan Sanjay Chaubal², Pallavi Parab¹, Sunil Pachakar³, Yogesh Kembhavi⁴, Sejal Patwardhan³, Raman Govindarajan⁴, Rajendra Badwe⁴, Sudeep Gupta¹. ¹Department of Medical Oncology, Tata Memorial Hospital, Tata Memorial Centre, Homi Bhabha National Institute (HBNI), Mumbai, Maharashtra, India, ²Department of Surgical Oncology, Tata Memorial Hospital, Tata Memorial Centre, Homi Bhabha National Institute (HBNI), Mumbai, Maharashtra, India, ³Advanced Centre for Treatment, Research and Education in Cancer, Tata Memorial Centre, Homi Bhabha National Institute (HBNI), Mumbai, Maharashtra, India, ⁴Jivagen Biotherapeutics Pvt Ltd, Pune, Maharashtra, India.

A39 Convergent evolution and markers of immunotherapy resistance in a melanoma patient with complete response and progression to immune checkpoint inhibition. David Liu¹, Jia-Ren Lin², Gyuinara G. Kasumova³, Alex Heyde⁴, Alvin Shi⁵, Adam Kraya⁶, Gao Zhang⁷, Dennie T. Frederick³, Avinash Sahu¹, Tatyana Sharova³, Donald Lawrence⁸, Mai P. Hoang⁹, Daniel P. Cahill¹⁰, Christine Lian¹¹, Eytan Ruppin¹², Benjamin Izar¹, Meenhard Herlyn⁷, Martin A. Nowak⁴, Eliezer M. Van Allen⁵, Katherine Nathanson⁶, Keith T. Flaherty⁶, Ryan J. Sullivan⁶, Manolis Kellis⁵, Peter K. Sorgert², Genevieve M. Boland¹. ¹Dana-Farber Cancer Institute, Boston, MA, ²Department of Systems Biology, Harvard Medical School, Boston, MA, ³Department of Surgery, Massachusetts General Hospital, Boston, MA, ⁴Program for Evolutionary Dynamics, Harvard University, Cambridge, MA, ⁵CSAIL, Massachusetts Institute of Technology, Cambridge, MA, ⁶Division of Translational Medicine and Human Genetics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, ⁷The Wistar Institute, Philadelphia, PA, ⁸Division of Medical Oncology, Massachusetts General Hospital, Boston, MA, ⁹Department of Pathology, Harvard Medical School, Massachusetts General Hospital, Boston, MA, ¹⁰Department of Neurosurgery, Harvard Medical School, Massachusetts General Hospital, Boston, MA, ¹¹Department of Pathology, Harvard Medical School, Brigham and Woman’s Hospital, Boston, MA, ¹²Cancer Data Science Lab, National Cancer Institute, National Institutes of Health, Bethesda, MD.

A40 DNA methylation changes are associated with resistance evolution in infant KMT2A-rearranged acute lymphoblastic leukemia. Rumen Kostadinov¹, Byunggil Yoo², Midhat Farooqi², Neil Miller², Shannon Kelley¹, Margaret Gibson², Emily Farrow², Erin Guest², Sarah Wheelan¹, Patrick Brown¹. ¹Johns Hopkins University, Baltimore, MD, ²Children’s Mercy Hospitals & Clinics, Kansas City.

A41 Drug-induced epigenetic assimilation fueled by metabolic reprogramming drives acquired resistance. Dinoop Ravindran Menon¹, Heinz Hammerlindl², Gregory Gimenez³, Sabrina Hammerlindl², Elmar Zuegner², Joachim Torrano², Natalie Bordag², Abdullah Al Emran³, Maybelline Giam³, Simon Denil³, Norman Pavelka⁶, Tan Aik-Choon¹, Richard Sturm³, Nikolass Hass⁴, Giulia Rancati³, Meenhard Herlyn⁷, Christoph Magnes⁴, Michael Ecchles³, Mayumi Fujita³, Helmut Schaidaer³. ¹University of Colorado, Anschutz Medical Campus, Denver, CO, ²The University of Queensland, Brisbane, QLD, Australia, ³University of Otago, Dunedin, New Zealand, ⁴Joanneum Research Forschungsgesellschaft m.b.H, Graz, Austria, ⁵Institute of Medical Biology, Singapore, Singapore, ⁶The Singapore Institute for Immunology, Singapore, Singapore, ⁷The Wistar Institute, Philadelphia, USA.

A42 Longitudinal evolution of triple-negative breast cancer (TNBC) tumors under NAST (neoadjuvant systemic therapy) is predictive of pathologic response: Profiling results from a randomized trial (ARTEMIS; NCT02276443). Lei Huo², Suhas Vasaikar¹, Gaiane M Rauch¹, Beatriz E Adrada¹, Helen Piwnica-Worms¹, Bora Lim¹, Alastair M. Thompson², Elizabeth A. Mittendorf², Jennifer Litton¹, Timothy P. Heffernan¹, William F. Symmans¹, Giulio F. Draetta¹, Andrew Futreal¹, Jeffrey Chang¹, Stacy L.
Moulder, Sahil Seth. The University of Texas MD Anderson Cancer Center, Houston, TX, Baylor College of Medicine, Houston, TX, Dana-Farber Cancer Institute, Boston, MA.

A43 Clonal dynamics upon multiple pharmacologic perturbations reveals pre-existing functional heterogeneity of tumorigenic compartment as the origin of treatment resistance in pancreatic cancer. Chieh-Yuan Li, I-Lin Ho, Sahil Seth, Sara Loponte, Edoardo Del Poggetto, Er-Yen Yen, Hong Jiang, Shan Jiang, Giulio Draetta, Alessandro Carugo, Andrea Viale. The University of Texas MD Anderson Cancer Center, Houston, TX.


A45 Progression of bivalve transmissible neoplasia in the soft-shell clam Mya arenaria. Rachael M. Giersch, Marisa A. Yonemitsu, Sam F.M. Hart, Michael J. Metzger. Pacific Northwest Research Institute, Seattle, WA.

A46 Synthesis, characterization, and anticancer activity of gallium-based nanoparticles. Mir Monir Hossain, Donald E. Pryor, Nick Penman, Songping D. Huang. Cleveland State University, Cleveland, OH, Kent State University, Kent, OH.

A47 Semisupervised learning for cell type classification in single-cell sequencing. Shanta Chowdhury, Xishuang Dong, Xiangfang Li. Prairie View A&M University, Prairie View, TX.

A48 Biomaterial-based tumor models to analyze the role of glioma extracellular matrix in therapeutic efficacy. Sara Pedron, Jann N. Sarkaria, Brendan A.C. Harley. University of Illinois, Urbana, IL, Mayo Clinic, Rochester, MN.

A49 Metformin promotes triple-negative breast cancer cells undergoing apoptosis via induction of TRAIL. Erik V. Polsdofer, Shuang Liu, Lukun Zhou, Susan Edgerton, Ann Thor, Bolin Liu. Department of Pathology, School of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO, Department of Genetics, Stanley S. Scott Cancer Center, School of Medicine, Louisiana State University Health Sciences Center, New Orleans, LA, Department of Genetics, Stanley S. Scott Cancer Center, School of Medicine, Louisiana State University Health Sciences Center, New Orleans, LA; Department of Pathology, School of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO.

A50 Targeting the CMG helicase as a “never” mutation to reduce cellular fitness in osteosarcoma cells. Darcy Welch, Elliot Kahlen, Mark Alexandrow, Damon Reed. Moffitt Cancer Center, Tampa, FL.

A51 The characteristics of tumoroid derived from colorectal cancer patient and the evaluation of the resistance to 5-FU. Jung-yeon Yi, Hyuna Kim, Yeon-jin Chu, Ki soon Kim, Jong Gu Lee, Woo Yong Oh, Yoonsook Lee. National Institute of Food and Drug Safety Evaluation, Cheongju, Republic of Korea.