

An AACR Special Conference on
**Evolutionary Dynamics in Carcinogenesis and Response to
Therapy**

March 14-17, 2022 | Hilton Tampa Downtown | Tampa, FL

CO-CHAIRS:

Christina Curtis, Stanford University, Stanford, CA

James V. DeGregori, University of Colorado, Aurora, CO

Marco Gerlinger, Barts Cancer Institute, Queen Mary University of London, United Kingdom

Robert J. Gillies, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

Andriy Marusyk, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

CONFERENCE PROGRAM

[R] – Remote Presentation

MONDAY, MARCH 14

5:30 p.m.-7:15 p.m.	WELCOME AND KEYNOTE LECTURES Bayshore Ballrooms IV-VII Session Chair: Andriy Marusyk , H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
5:30 p.m.-5:50 p.m.	Welcome from Cochairs & Introduction of Cancer Evolution Working Group Robert J. Gillies, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL Andriy Marusyk, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL Frank H. Laukien, Harvard University, Cambridge, MA
5:50 p.m.-6:30 p.m.	Harnessing evolutionary dynamics for control and cure of metastatic cancers Robert A. Gatenby, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
6:35 p.m.-7:15 p.m.	Cancer evolution, immune evasion, and metastasis Charles Swanton, The Francis Crick Institute and UCL Cancer Institute, London, United Kingdom
7:15 p.m.-9:00 p.m.	OPENING RECEPTION Galleria B & Bayshore Ballrooms I-III

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TUESDAY, MARCH 15

7:00 a.m.-8:00 a.m.	BREAKFAST Bayshore Ballrooms I-III
8:00 a.m.-10:00 a.m.	PLENARY SESSION 1: LONGITUDINAL DISSECTION OF RESISTANCE EVOLUTION Bayshore Ballrooms IV-VII Session Chair: Marco Gerlinger , Barts Cancer Institute, Queen Mary University of London, United Kingdom
8:00 a.m.-8:30 a.m.	Darwinian and non-Darwinian evolution of cancer drug resistance Marco Gerlinger, Barts Cancer Institute, Queen Mary University of London, United Kingdom
8:30 a.m.-8:45 a.m.	Deciphering clonal evolution under chemotherapy in high-risk neuroblastoma using patient derived models* Natalie Andersson, Lund University Faculty of Medicine, Lund, Sweden
8:45 a.m.-9:15 a.m.	Tracking population heterogeneity and chemoresistance with functionalized cell barcodes Amy Brock, The University of Texas at Austin, Austin, TX
9:15 a.m.-9:30 a.m.	Advanced melanoma exhibits a diversity of evolutionary routes to lethality* Alexander Coulton, University College London, London, United Kingdom
9:30 a.m.-10:00 a.m.	Integrative mechanisms underlying the evolution of drug resistance in oncogene-driven lung cancer Trevor G. Bivona, University of California San Francisco, San Francisco, CA
10:00 a.m.-10:30 a.m.	BREAK
10:30 a.m.-11:30 a.m.	PANEL DISCUSSION: GENETIC, EPIGENETIC AND FUNCTIONAL HETEROGENEITY IN CANCER: WHICH ONE(S) CAN WE CALL EVOLUTION? Bayshore Ballrooms IV-VII

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Moderator: Alexander R.A. Anderson, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

Panelists:

Amy Brock, The University of Texas at Austin, Austin, TX

Robert A. Gatenby, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

Charles Swanton, The Francis Crick Institute and UCL Cancer Institute, London, United Kingdom

11:30 a.m.-1:45 p.m.

LUNCH ON OWN

1:45 p.m.-3:45 p.m.

PLENARY SESSION 2: CLONAL EVOLUTION, PART I

Bayshore Ballrooms IV-VII

Session Chair: Iñigo Martincorena, Wellcome Sanger Institute, Hinxton, United Kingdom

1:45 p.m.-2:15 p.m.

Somatic mutation and clonal expansion in normal tissues

Iñigo Martincorena, Wellcome Sanger Institute, Hinxton, United Kingdom

2:15 p.m.-2:30 p.m.

Integration of clonal composition and tumor heterogeneity reveals novel evolutionary states and intervention targets in ovarian cancer*

Alexandra Lahtinen, University of Helsinki, Helsinki, Finland

2:30 p.m.-3:00 p.m.

Outcompeting cancer in the intestine

Louis M. Vermeulen, Academic Medical Center, Amsterdam, The Netherlands

3:00 p.m.-3:15 p.m.

In vivo tracking of clonal dynamics during UV-induced skin carcinogenesis*

Stanislav Avdieiev, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL

3:15 p.m.-3:45 p.m.

Charting normal and malignant differentiation topologies with single-cell multi-omics

Dan-Avi Landau, Weill Cornell Medicine, New York, NY

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3:45 p.m.-4:15 p.m.	BREAK
4:15 p.m.-6:15 p.m.	PLENARY SESSION 3: GENERATION OF GENOMIC AND EPIGENOMIC DIVERSITY Bayshore Ballrooms IV-VII Session Chair: Rong Li , Johns Hopkins University, Baltimore, MD
4:15 p.m.-4:45 p.m.	Cancer is a disease of epigenetic stochasticity [R] Andrew P. Feinberg, Johns Hopkins University, Baltimore, MD
4:45 p.m.-5:00 p.m.	TP53 field defects in uterine fluid are associated with ovarian cancer risk* Rosana Risques, University of Washington, Seattle, WA
5:00 p.m.-5:30 p.m.	Models of mutagenesis and carcinogenesis by human APOBEC3 enzymes Reuben S. Harris, University of Minnesota, Minneapolis, MN
5:30 p.m.-5:45 pm.	An emerging role for inflammation-associated alveolar intermediate cells in early phenotypic development of KRAS-mutant lung adenocarcinoma* Ansam Sinjab, UT MD Anderson Cancer Center, Houston, TX
5:45 p.m.-6:15 p.m.	Stress-induced mutations, the DNA damageome and cancer Susan M. Rosenberg, Baylor College of Medicine, Houston, TX
6:30 p.m.-8:00 p.m.	POSTER SESSION A/ RECEPTION Galleria B & Bayshore Ballrooms I-III

WEDNESDAY, MARCH 16

7:00 a.m.-8:00 a.m.	BREAKFAST Bayshore Ballrooms I-III
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- 8:00 a.m.-10:00 a.m.** **PLENARY SESSION 4: MICROENVIRONMENTAL SELECTION**
Bayshore Ballrooms IV-VII
Session Chair: Carlo Maley, Arizona State University, Tempe, AZ
- 8:00 a.m.-8:30 a.m. **Aging, tissue ecology, and the evolution of cancer within us**
James V. DeGregori, University of Colorado, Aurora, CO
- 8:30 a.m.-8:45 a.m. **Homotypic cell-cell fusion in TNBC cells downregulates cancer testis antigen MAGEC2 and increases therapeutic sensitivity to paclitaxel and doxorubicin***
Andrea Gardner, University of Texas at Austin, Austin, TX
- 8:45 a.m.-9:15 a.m. **Genetic heterogeneity and tumor microenvironment in glioblastoma**
Michalina Janiszewska, The Scripps Research Institute Florida, Jupiter, FL
- 9:15 a.m.-9:30 a.m. **Immunosuppressive niche engineering at the onset of human colorectal cancer***
Chandler Gatenbee, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
- 9:30 a.m.-10:00 a.m. **Insights from comparative oncology**
Carlo C. Maley, Arizona State University, Tempe, AZ
- 10:00 a.m.-10:30 a.m.** **BREAK**
- 10:30 a.m.- 12:15 p.m.** **PLENARY SESSION 5: MECHANISMS AND DYNAMICS OF RESISTANCE EMERGENCE, PART I**
Bayshore Ballrooms IV-VII
Session Chair: Andriy Marusyk, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
- 10:30 a.m.-11:00 a.m. **Exploring how competition can be leveraged to improve adaptive therapy in metastatic prostate cancer**
Renee Brady-Nicholls, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
- 11:00 a.m.-11:15 a.m. **Investigating dynamics of the mitochondrial network in triple negative breast cancer chemotherapy resistance* [R]**
Gloria V. Echeverria, Baylor College of Medicine, Houston, TX

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- 11:15 a.m.-11:30 a.m. **Evolutionary Tumor Board: Implementing dynamic personalized therapy using evolutionary theory and mathematical modeling for clinical decision support***
Mark Robertson-Tessi, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
- 11:30 a.m.-11:45 a.m. **Targeting Cellular Plasticity-driven Metabolic Adaptation to Overcome Chemoresistance in GBM***
Atique U. Ahmed, Northwestern University, Chicago, IL
- 11:45 p.m.-12:15 p.m. **Resistance to ALK-targeting therapies in lung cancers is acquired through complex, context specific evolutionary trajectories**
Andriy Marusyk, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL
- 12:30 p.m.-2:00 p.m.** **Cancer Evolution Working Group Session (LUNCH PROVIDED)**
Bayshore Ballrooms IV-VII
- Co-Chairs:**
Charles Swanton, The Francis Crick Institute and UCL Cancer Institute, London, United Kingdom

Frank H. Laukien, Harvard University, Cambridge, MA
- Speakers:**
Susan M. Rosenberg, Baylor College of Medicine, Houston, TX

Kenneth J. Pienta, Johns Hopkins School of Medicine, Baltimore, MD

Robert A. Gatenby, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

Nicholas E. Navin, The University of Texas MD Anderson Cancer Center, Houston, TX
- 2:00 p.m.-5:00 p.m.** **PLENARY SESSION 5: MECHANISMS AND DYNAMICS OF RESISTANCE EMERGENCE, PART II**
Bayshore Ballrooms IV-VII
Session Chair: Sydney Shaffer, University of Pennsylvania, Philadelphia, PA

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- 2:00 p.m.-2:30 p.m. **The polyaneuploid cancer cell state as a mediator of therapeutic resistance**
Kenneth J. Pienta, Johns Hopkins School of Medicine, Baltimore, MD
- 2:30 p.m.-2:45 p.m. **Genetic and immune landscape evolution defines subtypes of MMR deficient colorectal cancer***
Benjamin R. Challoner, The Institute of Cancer Research, London, United Kingdom
- 2:45 p.m.-3:15 p.m. **Rare cell variability and drug resistance in cancer**
Sydney Shaffer, University of Pennsylvania, Philadelphia, PA
- 3:15 p.m.-3:45 p.m. BREAK**
- 3:45 p.m.-4:15 p.m. **Resolving the paradigm of the pre-existing resistance to targeted therapy, and the fitness costs associate with resistance: In vitro and theoretical evidence using an evolutionary game theoretic approach**
Jacob G. Scott, Cleveland Clinic, Cleveland, OH
- 4:15 p.m.-4:30 p.m. **Oct4 and Sox2 induce cellular transition of glioma stem cells to an immune suppressive, regulatory T cell-like state***
Hernando Lopez-Bertoni, Johns Hopkins School of Medicine, Baltimore, MD
- 4:30 p.m.-5:00 p.m. **Dynamics of response and resistance to cancer therapy [R]**
Ivana Bozic, University of Washington, Seattle, WA
- 5:00 p.m.-7:00 p.m. POSTER SESSION B / RECEPTION**
Galleria B & Bayshore Ballrooms I-III
- 7:00 p.m. EVENING OFF / DINNER ON OWN**

THURSDAY, MARCH 17

- 7:00 a.m.-8:00 a.m. BREAKFAST**
Bayshore Ballrooms I-III
- 8:00 a.m.-10:00 a.m. PLENARY SESSION 6: EVOLUTIONARY GUIDED (ADAPTIVE) THERAPY TO**

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PREVENT EMERGENCE OF RESISTANCE

Bayshore Ballrooms IV-VII

Session Chair: Alexander R.A. Anderson, H. Lee Moffitt Cancer Center & Research Institute, Tampa, FL

8:00 a.m.-8:30 a.m.

Karyotype heterogeneity driving evolutionary adaptation

Rong Li, Johns Hopkins University, Baltimore, MD

8:30 a.m.-8:45 a.m.

Design and construction of evolutionary-guided "selection gene drive" therapy*

Scott Leighow, Penn State University, University Park, PA

8:45 a.m.-9:15 a.m.

Exploiting immune surveillance to target colorectal cancer evolution and mutability

Alberto Bardelli, Candiolo Cancer Institute IRCCS, University of Turin, Italy

9:15 a.m.-9:30 a.m.

Developing adaptive therapy to suppress the evolution of treatment resistance in high-grade serous ovarian cancer*

Helen Hockings, Barts Cancer Institute, London, United Kingdom

9:30 a.m.-10:00 a.m.

Selection for a glycolytic phenotype

Mehdi Damaghi, Stony Brook University, Stony Brook, NY

10:00 a.m.-10:15 a.m.

BREAK

10:15 a.m.-12:15 p.m.

PLENARY SESSION 7: CLONAL EVOLUTION, PART II

Bayshore Ballrooms IV-VII

Session Chair: Christina Curtis, Stanford University, Stanford, CA

10:15 a.m.-10:45 a.m.

The role of the epigenome and phenotypic plasticity in colorectal cancer evolution

Trevor Graham, Institute of Cancer Research, London, United Kingdom

10:45 a.m.-11:00 a.m.

The spatial landscape of clonal somatic mutations in benign and malignant tissue*

Alastair Lamb, University of Oxford, Oxford, United Kingdom

11:00 a.m.-11:30 a.m.

Decoding breast cancer evolution with single cell genomics

Nicholas E. Navin, The University of Texas MD Anderson Cancer Center, Houston, TX

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- 11:30 a.m.-11:45 a.m. **Progression and regression dynamics of bivalve transmissible neoplasia in the soft-shell clam (*Mya arenaria*) after both natural and experimental exposure***
Rachael Giersch, Pacific Northwest Research Institute, Seattle, WA
- 11:45 a.m.-12:15 p.m. **Charting genotype to phenotype maps of tumorigenesis**
Christina Curtis, Stanford University, Stanford, CA
- 12:15 p.m.** **CLOSING REMARKS**
James V. DeGregori, University of Colorado, Aurora, CO