

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Precision Engineering of the Genome, Epigenome and Transcriptome (EK24)

Scientific Organizers: Charles Gersbach, Rachel E. Haurwitz and Fyodor D. Urnov

Sponsored by Novo Nordisk A/S, Synthego, TCR<sup>2</sup> Therapeutics and Vertex Pharmaceuticals Incorporated.

## Plant Genome Engineering: From Lab to Field (EK25)

Scientific Organizers: Caixia Gao, Daniel F. Voytas and Holger Puchta

March 8-10, 2021 • Virtual at your computer

Supported by the Directors' Fund

### MONDAY, MARCH 8

#### Welcome and Keynote Address (8am Denver/Mountain Time Start) (EK24)

\***Fyodor D. Urnov**, University of California, Berkeley, USA

**Tim W. Yu**, Boston Children's Hospital, USA  
*Developing Custom Genetic Therapies*

#### Welcome and Keynote Address (8am Denver/Mountain Time Start) (EK25)

\***Caixia Gao**, Chinese Academy of Sciences, China

\***Daniel F. Voytas**, University of Minnesota, USA

\***Holger Puchta**, Karlsruhe Institute of Technology, Germany

**Pamela C. Ronald**, University of California, Davis, USA  
*Enhancing Food Security through Rice Genetic Improvement*

#### Engineering of Editors and Epi-Editors (8:30am Denver/Mountain Time Start) (EK24)

\***Samuel H. Sternberg**, Columbia University, USA

*Targeted DNA Integration using CRISPR RNA-Guided Transposases*

**Cecilia Cotta-Ramusino**, Tessera Therapeutics, USA  
*[NOT AVAILABLE ON DEMAND] New Editing Technologies*

\***Patrick D. Hsu**, University of California, Berkeley, USA  
*CRISPR in the Time of COVID*

**Prashant Mali**, University of California, San Diego, USA  
*[NOT AVAILABLE ON DEMAND] Endogenous RNA Editing Systems*

**Balint Csorgo**, 275.00

*Short Talk: A Compact Cascade-Cas3 System for Targeted Genome Engineering and Gene Discovery*

**Yarui Diao**, 275.00

*Short Talk: CRISPR-based Multimodal Functional Analysis Reveals the Key Role of Retroviral Sequence LTR7 in Governing Neural Fate Commitment of Human Embryo Development*

#### Plant Genome Editing Tools and Technology Development I (8:40am Denver/Mountain Time Start) (EK25)

\***Daniel F. Voytas**, University of Minnesota, USA  
*Overcoming Bottlenecks in Editing Plant Genomes*

**Feng Zhang**, University of Minnesota, USA  
*Improving Scalable and Precision Genome Editing in Plants*

\***Holger Puchta**, Karlsruhe Institute of Technology, Germany  
*CRISPR/Cas Mediated Plant Chromosome Engineering*

**Avraham A. Levy**, Weizmann Institute of Science, Israel  
*From a DNA Break to Targeted Recombination between Homologous Chromosomes in Plants*

**Ayumu Takatsuka**, 150.00

*Short Talk: MitoTALEN-Mediated Mitochondrial Gene-Knockout Revealed a Cytoplasmic Male Sterility-Causative Gene in Oryza Sativa cv. Tadukan*

**Shin-ichi Arimura**, 275.00

*Short Talk: Targeted Base Editing in the Plastid Genome of Arabidopsis thaliana*

#### Career Roundtable (Joint) (12:30pm Denver/Mountain Time Start)

**Britt S. Adamson**, Princeton University, USA

**Rachel E. Haurwitz**, Caribou Biosciences, Inc., USA

**Steven E. Jacobsen**, University of California, Los Angeles, USA

#### Poster Session 1 (Joint) (1:30pm Denver/Mountain Time Start)

##### Controlling CRISPR (3pm Denver/Mountain Time Start) (EK24)

\***Charles Gersbach**, Duke University, USA

**Jacob E. Corn**, ETH Zürich, Switzerland  
*Visible and Invisible HDR in Human Cells*

**Bas van Steensel**, Netherlands Cancer Institute, Netherlands  
*Multiplexed Probing of the Impact of Chromatin on Cas9-Induced DSB Repair Pathways*

**Ahmad S. Khalil**, Boston University, USA  
*Design of Eukaryotic Gene Regulatory Circuits*

**Jennifer E. Phillips-Cremins**, University of Pennsylvania, USA  
*Engineering the Repetitive 3D Genome in Human Disease*

**Alyna Katti**, Weill Cornell Medicine, USA

*Short Talk: Strategies to Improve Engineering Cancer Associated SNVs with Base Editing*

**Daniel M. Sapozhnikov**, 150.00

*Short Talk: Unraveling the Transcriptional Impact of DNA Demethylation at Specific Promoters by Targeted Steric Blockage of DNA Methyltransferase with CRISPR/dCas9*

\***Henriette O'Geen**, 275.00

*Short Talk: Determinants of Persistence in Epigenetic Editing*

**Isaac B. Hilton**, 275.00

*Short Talk: Programmable Human Histone Phosphorylation and Gene Activation using a CRISPR/Cas9-Based Chromatin Kinase*

##### Plant Genome Editing Tools and Technology Development II (3pm Denver/Mountain Time Start) (EK25)

\***Steven E. Jacobsen**, University of California, Los Angeles, USA  
*Epigenetic Editing in Plants*

**Seiichi Toki**, National Agriculture and Food Research Organization, Japan

*Plant DNA Repair and Genome Engineering*

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**Erika Toda**, Tokyo Metropolitan University, Japan  
*An Efficient DNA- and Selectable-Marker-Free Genome-Editing System Using Zygotes in Rice and Its Possible Application to Other Crop Species*

\***Caixia Gao**, Chinese Academy of Sciences, China  
*Precise Prime Editing in Plants*

**Lanqin Xia**, Chinese Academy of Agricultural Sciences, China  
*CRISPR/Cas-Mediated Precision Genome Editing for Crop Improvement*

**Jian-Kang Zhu**, Shanghai Center for Plant Stress Biology, CAS, China  
*Strategies for Efficient Gene Targeting in Plants*

**Keishi Osakabe**, 275.00  
*Short Talk: Genome Editing Using the CRISPR Type I-D Nuclease in Plants*

### TUESDAY, MARCH 9

#### Therapeutics I: Ex Vivo Editing (8am Denver/Mountain Time Start) (EK24)

\***Rachel E. Haurwitz**, Caribou Biosciences, Inc., USA  
*The Future is Allogeneic - Translating a CRISPR Platform into Gene-Edited Cell Therapies*

**Matthew Porteus**, Stanford University School of Medicine, USA  
*Genome Editing of Blood Cells to Cure Disease*

**Chiara Bonini**, Vita-Salute San Raffaele University, Italy  
*T-Cell Gene Editing for Cancer Immunotherapy*

\***Nicole Gaudelli**, Beam Therapeutics, USA  
*An Adenine Base Editing Strategy for the Treatment of Sickle Cell Disease by Elimination of the Pathogenic Globin Protein*

**Delphine Guipouy**, 275.00  
*[NOT AVAILABLE ON DEMAND] Short Talk: Knockout of NKG2A by CRISPR in Human NK Cells Enhance their Cytotoxic Activity Against Solid Tumors*

**Dimitrios Laurin Wagner**, 275.00  
*Short Talk: Fast and Efficient Generation of TRAC-integrated CAR T Cells without Viruses*

**Adrian Veres**, 150.00  
*Short Talk: Optimizing Stem Cell Lines for in vitro-derived Beta Cell Therapeutics via Genome-wide CRISPR Knock-out Screening*

**Sébastien Levesque**, CHU de Québec - Université Laval, Canada  
*Short Talk: Expanding the Scope of Marker-Free Selection for CRISPR-Driven Genome Editing in Human Cells*

#### Application of Genome Editing in Agriculture I (8am Denver/Mountain Time Start) (EK25)

\***Zachary Lippman**, Howard Hughes Medical Institute/Cold Spring Harbor Laboratory, USA  
*Engineering Quantitative Trait Variation for Crop Improvement by Genome Editing*

\***Jens Boch**, Leibniz Universität Hannover, Germany  
*Expanding the TALEN Toolbox for Genome Editing*

**Joyce Van Eck**, Boyce Thompson Institute, USA  
*Exploring Insect Interactions in *Physalis* Using CRISPR Generated Mutant Lines*

**Magdy Mahfouz**, King Abdullah University of Science and Technology, Saudi Arabia  
*RNA-Virus Interference via CRISPR-Cas13 Systems*

**Mariette Andersson**, Swedish University of Agricultural Sciences, Sweden  
*Genome Editing for Improved Potato Traits*

**Eyal Fridman**, 275.00  
*Short Talk: RECAS9-Mediated QTL Mapping by Mitotic Genome Editing in Cereals*

**Sergei Svtashev**, 275.00  
*Short Talk: CRISPR-Cas9-mediated 75.5 Mb Inversion in Maize*

**Trevor Weiss**, 150.00  
*Short Talk: Differential CRISPR/Cas9 Genome Editing Influenced by Epigenetic Factors*

#### Meet the Editors (Joint) (12:30pm Denver/Mountain Time Start)

**Roland George Roberts**, Public Library of Science, UK

**Holger Matthias Breithaupt**, EMBO, Germany

**Kevin Davies**, CRISPR Journal, USA

**Bing Yang**, Frontiers in Genome Editing, USA

**Ruth Zearfoss**, Cell Press, USA

**Caitlin Karniski**, Nature Portfolio, USA

#### Poster Session 2 (Joint) (1:30pm Denver/Mountain Time Start)

#### Therapeutics II: In Vivo Editing (3pm Denver/Mountain Time Start) (EK24)

**David G. Ousterout**, Locus Biosciences, Inc., USA  
*Development of crPhage to Treat Infections*

\***Fyodor D. Urnov**, University of California, Berkeley, USA  
*Towards a CRISPRi/a Therapeutic for Radiation Injury*

**Aravind Asokan**, Duke University, USA  
*Engineering AAV for Targeted In Vivo Editing*

\***Ana Moreno Collado**, Navega Therapeutics, USA  
*Epigenome Regulation for Treatment of Chronic Pain*

**Chikdu Shivalila**, 275.00  
*Short Talk: A Versatile Platform for ADAR-Mediated RNA Editing in vivo in Preclinical Models*

**Jia Qi Cheng-Zhang**, University of Pittsburgh, USA  
*Short Talk: Upregulation of Disease Compensatory Gene via CRISPR Activation in Muscular Dystrophy Mice*

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**Serena Tamura**, 150.00

*Short Talk: CRISPR Activation to Rescue SCN2A Haploinsufficiency in Autism Spectrum Disorder*

### Application of Genome Editing in Agriculture II (3pm Denver/Mountain Time Start) (EK25)

\***Kan Wang**, Iowa State University, USA

*Breeding of a Transformable Model Maize Line for Genome Editing*

\***Yiping Qi**, University of Maryland, USA

*Expanding the Targeting Range of CRISPR in Plants*

**Tobias Jores**, University of Washington, USA

*Learning Properties of Regulatory Elements for Future Crop Engineering*

**William J. Gordon-Kamm**, Corteva Agriscience, USA

*The Status of Cereal Crop Transformation and Meeting Future Demands for Genome Modification*

**Tom Adams**, Pairwise, USA

*How CRISPR Technology Can Help Us All Eat More Fruits and Vegetables*

**Rammyani Bagchi**, 275.00

*Short Talk: Use of Polyvalent Guide RNAs for CRISPR Antivirals*

### Closing Remarks (5:50pm Denver/Mountain Time Start) (EK25)

**Caixia Gao**, Chinese Academy of Sciences, China

## WEDNESDAY, MARCH 10

### Delivery (8am Denver/Mountain Time Start) (EK24)

\***Daniel J. Siegwart**, University of Texas Southwestern Medical Center, USA

*Selective ORgan Targeting (SORT): A Synthetic Lipid Nanoparticle (LNP) Strategy for Effective Tissue-Specific Genome Engineering*

\***Charles Gersbach**, Duke University, USA

*In Vivo Editing Approaches for Gene Therapy and Functional Genomics*

**James Dahlman**, Georgia Tech / Emory Medical School, USA  
*Delivering Gene Editing Components by Testing Thousands of Nanoparticles in vivo*

**Peter Deng**, University of California, Davis, USA

*Short Talk: Mesenchymal Stem Cell Delivery for Zinc Finger Proteins in Preclinical Animal Models of Angelman Syndrome*

**Sean Burns**, Intellia Therapeutics, USA

*Short Talk: In Vivo Genome Editing of Hematopoietic Stem and Progenitor Cells using Non-viral Delivery of CRISPR/Cas9*

**Aaron Lin**, 275.00

*Short Talk: Broadening PAM Recognition of CRISPR-Associated Endonucleases by Protein Recombination*

**Kiara Berrios**, University of Pennsylvania, USA

*Short Talk: Controllable Genome Editing with Split-Engineered Base Editors*

**Kevin Hemphill**, 275.00

*Short Talk: CRISPR-mediated Transcriptional Activation and Simultaneous Gene Knockout and Activation with Synthetic Guide RNAs*

### Networking Lounge (Joint) (12pm Denver/Mountain Time Start)

### Screening & Single Cell Technologies (3pm Denver/Mountain Time Start) (EK24)

\***John G. Doench**, Broad Institute of MIT and Harvard University, USA  
*Bridging the Variant-to-Function Chasm: Screens with Base Editor Technology*

\***Britt S. Adamson**, Princeton University, USA  
*Single Cell Sequencing Technologies*

**Hyongbum Henry Kim**, Yonsei University College of Medicine, South Korea

*Predicting the Efficiencies and Outcomes of Genome Editing using Deep Learning*

**Jonathan S. Weissman**, Whitehead Institute, HHMI, and MIT, USA  
*Genome-Wide Programmable Transcriptional Memory by CRISPR-Based Epigenome Editing*

**Alberto Ciccia**, 275.00

*Short Talk: Functional Interrogation of DNA Damage Response Variants with Base Editing Screens*

**Brian Cosgrove**, 275.00

*Short Talk: Harnessing Epigenetic Editing Tools to Identify and Modulate Mechanically-Activated Genomic Enhancers*

**Pratiksha Thakore**, 275.00

[NOT AVAILABLE ON DEMAND] *Short Talk: Toward Genome-Scale Single-Cell Screens with Multi-Modal Perturb-Seq*

**Sarah Elisabeth Pierce**, Stanford University, USA

*Short Talk: Spear-ATAC: Pooled, Droplet-Based, Single-Cell Chromatin Accessibility CRISPR Screens*

### Closing Remarks (5:50pm Denver/Mountain Time Start) (EK24)