Genomic Instability and DNA Repair

April 2–6, 2017 | Santa Fe Community Convention Center | Santa Fe, New Mexico | USA

Scientific Organizers:
Julia Promisel Cooper, National Cancer Institute, National Institutes of Health, USA
Marco F. Foiani, Instituto FIRC di Oncologia Molecolare, Italy
Geneviève Almouzni, Centre National de la Recherche Scientifique, France

Joint with the meeting on DNA Replication and Recombination

Genome stability is the foundation upon which all cellular and organismal processes depend. This conference will grapple with the intricate array of biochemical reactions orchestrated by the cell to replicate, repair and segregate chromosomes accurately despite constant threats from spontaneous and environmentally-induced damage. Defects in these reactions lead to genomic instability, a confirmed driver of cancer and degenerative diseases. Fascinating and therapeutically crucial questions remain about the mechanisms underlying chromosome stability, and cross-disciplinary approaches are required to address them. How do epigenetic chromatin marks influence repair of underlying DNA sequences, and how can we predict the effects of chemotherapeutic agents that alter such marks? To what extent is the nucleus organized into subdomains with distinct functions; how are these subdomains altered when cells move or differentiate? How are the myriad helicases, nucleases and polymerases coordinated to safeguard genome stability, why are these molecules often mutated in human disease, and how can we ameliorate the effects of such mutations? What is the array of strategies available to cancer cells as they achieve unlimited proliferation? This conference has a history of bringing together investigators from diverse subfields who otherwise rarely meet. Cutting-edge concepts in translational, genomic, cellular, molecular, RNA and structural biology will be dissected to take the conversation to unprecedented levels of depth and breadth. The concurrent conference on “DNA Replication and Recombination” will provide additional opportunities for cross-talk. Both conferences are committed to nurturing interactions among longtime experts in the field with students, postdocs and investigators new to the field.

Session Topics:
• Mechanisms of DNA Repair
• RNA Metabolism and Genome Stability
• Interplay between Chromatin Structure and DNA Replication/Repair (Joint)
• Cell Cycle Regulation of DNA Damage Response
• Nuclear Dynamics and Genome Stability
• DNA Repair and Human Diseases
• Replication Fork Establishment and Replication Coupled Repair (Joint)
• Telomeres and Centromeres

Scholarship Application & Discounted Abstract Deadline: December 5, 2016
Abstract Deadline: January 12, 2017
Discounted Registration Deadline: February 2, 2017

Note: Scholarships are available for graduate students and postdoctoral fellows and are awarded based on the abstract submitted.

Meeting Hashtag: #KSgenomic
www.keystonesymposia.org/17Z1
**Workshop 1: Genome Instability and DNA Repair (Z1)**

**Scientific Organizers:** Julia Promisel Cooper, Marco F. Foiani and Geneviève Almouzni

**Sponsored by:** AstraZeneca, Bayer HealthCare Pharmaceuticals, Editas Medicine, Inc., EMD Serono Research and Development Institute, Inc., Journal of Molecular Cell Biology (JMCB) and TESARO, Inc.

**DNA Replication and Recombination (Z2)**

**Scientific Organizers:** John F.X. Diffley, Anja Groth and Scott Keeney

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**SUNDAY, APRIL 2**

Arrival and Registration

**MONDAY, APRIL 3**

Welcome and Keynote Session (Joint)

*Julia Promisel Cooper*, NCI, National Institutes of Health, USA

*Scott Keeney*, HHMI/Memorial Sloan Kettering Cancer Center, USA

Tatsuya Hirano, RIKEN, Japan

**Johannes C. Walter**, Harvard Medical School, USA

Mechanisms of Replication-Coupled Repair

**Mechanisms of DNA Repair (Z1)**

*Timothy C. Humphrey*, University of Oxford, UK

Wei Yang, NIDDK, National Institutes of Health, USA

**James E. Haber**, Brandeis University, USA

Short Talk: Rad51-Mediated Double-Strand Break Repair and Mismatch Correction of Highly Diverged Substrates

**Joseph J. Loparo**, Harvard Medical School, USA

Short Talk: Single-Molecule Imaging of Non-Homologous End Joining

**Michael D. Stone**, University of California, Santa Cruz, USA

Mechanical Transitions in Long Duplex Telomere DNA Molecules

**Fena Ochs**, University of Copenhagen, Denmark

Short Talk: Dynamic Chromatin Superstructures Safeguard Integrity of Nuclear Compartments Challenged by DNA Breakage

**Replication/Repair Structure and Function (Z2)**

*John F.X. Diffley*, Francis Crick Institute, UK

**Michael E. O’Donnell**, Rockefeller University, USA

**Tyler H. Stanage**, University of Wisconsin-Madison, USA

Short Talk: The Escherichia coli RalA Protein is Involved in the Switch between DNA Replication and Translesion Synthesis in vivo

**Karlene A. Cimprich**, USA

When RNA Meets DNA: Dangerous Liaisons in the Genome

**Alessandro Costa**, Francis Crick Institute, UK

Cryo-EM Approaches to Understanding the Eukaryotic Replicosome

**Matthew L. Bochman**, Indiana University, USA

Short Talk: Hrq1, The Yeast Homolog of RecQ4, Inhibits Telomerase Activity on Long Telomeres

**Workshop 1: Genome Instability and DNA Repair I (Z1)**

*James E. Haber*, Brandeis University, USA

**Elena Balkanska-Sinclair**, Duke University, USA

The BRD4-NUT Fusion Protein from Nut-Midline Carcinoma modulates DNA Damage Signaling and Ionizing Radiation Response

**Michael M. Cox**, University of Wisconsin-Madison, USA

Ionizing Radiation Resistance in Experimentally Evolved Escherichia coli Populations

**Nitika Taneja**, NCI, National Institutes of Health, USA

SNF2 Family Protein FR3 Suppresses Nucleosome Turnover to Promote Epigenetic Inheritance and Proper Replication

**Ryan M. Baxley**, University of Minnesota, USA

Progressive Genomic Instability and Telomere Erosion in Human Cells following Inactivation of a Single MCM10 Allele

**Michael H. Hauer**, Friedrich Miescher Institute for Biomedical Research, Switzerland

Histone Degradation in Response to DNA Damage Enhances Chromatin Dynamics and Recombination Rates

**Mariano Labrador-San Jose**, University of Tennessee, USA

Components of the DNA Damage Response Pathway, ATR and ATM, Modulate Chromatin Insulator Activity through Phosphorylation of Histone H2Av at Insulator Sites

**Mitch McVey**, Tufts University, USA

Coordination of ATPase and Polymerase Activities of Drosophila DNA Polymerase Theta during Interstrand Crosslink and Alternative End-Joining Repair of Double-Strand Breaks

**Hilda A. Pickett**, Children’s Medical Research Institute, Australia

BLM and SLX4 Play Opposing Roles in Recombination-Dependent Replication at Human Telomeres

**Workshop 1: Recombination and Repair (Z2)**

**Tracey E. Beyer**, Biotech Research and Innovation Centre, Denmark

Ontogeny of Genome Rearrangements in Budding Yeast

*Simon N. Powell*, Memorial Sloan Kettering Cancer Center, USA

Replication Fork Cleavage Occurs within 100bp from Local ATM Signaling of Site-Specific DNA Replication Block in Human Cells

**Erin Hannah Sybouts**, University of Texas Health Science Center at San Antonio, USA

Recombination and BLM Helicase Compensate for Replication Fork Defects in the Absence of 53BP1 Protein

**Shane McDevitt**, Temple University Lewis Katz School of Medicine, USA

Mechanisms of RNA-Transcript Templated DNA Recombination Repair Promoted by RAD52

**Susanne S. C. Bantele**, Max Planck Institute of Biochemistry, Germany

Regulation of the Conserved Chromatin Remodeler Fun30SMARCAD1 at DNA Double-Strand Breaks

**Walter J. Chazin**, Vanderbilt University, USA

Mechanisms for Counting and Handoff by Human DNA Primase- A Role for the 4Fe-4S Cluster?
Holger Puchta, Karlsruhe Institute of Technology, Germany
The RTR Complex Partner RMI2 and the DNA Helicase RTEL1 Are Both Independently Involved in Preserving the Stability of 45S rDNA Repeats in Arabidopsis thaliana

Christian Biertuempfel, Max Planck Institute of Biochemistry, Germany
DNA Recognition Features of Human Holliday Junction Resolvase GEN1

RNA Metabolism and Genome Stability (Z1)

Hengyao Niu, Indiana University Bloomington, USA
Effects of Altered RNA Processing on Genome Stability and the Proteome

Vihandha Wickramaasinghe, Peter MacCallum Cancer Centre, Australia
Short Talk: Salmonella Typhimurium forms Biofilms on Solid Tumors

Frédéric L. Chedin, University of California, Davis, USA
Short Talk: R-Loop Formation is a Hallmark of Active Early Replication Origins in Mammalian Genomes

Julius Brennecke, IMBA - Institut für Molekulare Biotechnologie GmbH, Austria
An RNA-Based Genome Immune System Safeguards Genome Stability

Eric A. Hunt, New England Biolabs, USA
Short Talk: Prokaryotic Argonautes and their Potential as New Molecular Tools

Alice Meroni, University of Milan, Italy
Short Talk: DNA Polymerase eta Sensitizes Cells to Nucleotide Pool Deprivation in Absence of RNase H

Francesca Storici, Georgia Institute of Technology, USA
Short Talk: DNA-Mediated Association of Two Histone-Bound CAF-1 Complexes Drives Tetrasome Assembly in the Wake of DNA Replication

Starting Recombination (Z2)

Bernard de Massy, Institut de Génétique Humaine, France
The Control of Initiation of Meiotic Recombination by PRDM9

Tanya T. Paull, University of Texas at Austin, USA
Double-Strand Break Repair Factors and R-Loop-Mediated Genomic Instability

David Cortez, Vanderbilt University School of Medicine, USA
Regulation of Replication Fork Stability by Single-Stranded DNA Binding Proteins

Lorraine S. Symington, Columbia University, USA
Regulation of DNA Repair in Heterochromatin and Euchromatin

Regulating Recombination (Z2)

Xiaolan Zhao, Memorial Sloan Kettering Cancer Center, USA
DNA End Resection and Repair Pathway Choice
KEYSTONE SYMPOSIA
on Molecular and Cellular Biology

Genomic Instability and DNA Repair (Z1)

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Jennifer A. Cobb, University of Calgary, Canada
Nej1 Regulates Repair Pathway Choice by Inhibiting Dna2-Sgs1 Mediated Resection

Aurele Piazza, University of California, Davis, USA
Short Talk: Multi-Invasions Are Recombination Byproducts that Induce Chromosomal Rearrangements

Eric C. Greene, Columbia University, USA
Single-Molecule Studies of Recombination Pathways

Sneha Saxena, Indian Institute of Science, India
Short Talk: RAD51 Paralog XRCC2 Suppresses Pathological Replication Fork Progression

Poster Session 2

WEDNESDAY, APRIL 5

Nuclear Dynamics and Genome Stability (Z1)
* Arnab Ray Chaudhuri, Erasmus University Medical Center, Netherlands
Marco F. Foiani, Instituto FIRC di Oncologia Molecolare, Italy
An Integrated ATR, ATM and mTOR-Mechanical Network Controlling Nuclear Plasticity and Cell Migration
Angela Taddei, Institut Curie, France
Nuclear Organization and Chromatin Status Modulate Homologous Recombination Efficiency and Outcome
Irene Chiolo, University of Southern California, USA
Short Talk: Highways for Repair: Nuclear Myosins and Actin Filaments Relocalize Heterochromatin DNA Breaks to the Nuclear Periphery
Martin W. Hetzer, The Salk Institute, USA
How the Nuclear Membrane Controls Genome Function
Emmanuelle Fabre, Hopital St Louis, France
Short Talk: DNA Damage Increases Chromatin Stiffening in Budding Yeast
Neil T. Umbreit, Dana-Farber Cancer Institute, USA
Short Talk: Chromosome Bridge Resolution Requires Mechanical Forces from Actin-Based Contractility
Peter Ly, University of California San Diego, USA
Short Talk: Mitotic Errors Promote Chromosome Shattering and DNA Break Repair by Non-Homologous End Joining

Replication Fork Progression and Restart (Z2)
* Anne D. Donaldson, University of Aberdeen, UK
Kenneth J. Marians, Memorial Sloan Kettering Cancer Center, USA
Imaging Individual Replisomes Reveals Independence and Decoupling of Polymerases During Replication
Anja Groth, University of Copenhagen, Denmark
Chromatin Replication and Epigenome Maintenance
Alberto Ciccia, Columbia University, USA
Short Talk: Restoration of Fork Stability in BRCA1- and BRCA2-Deficient Cells

Xiaolan Zhao, Memorial Sloan Kettering Cancer Center, USA
Smc5/6-Mediated Control of Recombinational Repair is Critical for Genome Duplication
Advaitha Madiredy, Albert Einstein College of Medicine, USA
Short Talk: FANCD2 Facilitates DNA Replication through Common Fragile Sites
Joseph L. Stodola, Washington University School of Medicine, USA
Short Talk: Kinetic Analysis of Lagging Strand Replication and Okazaki Fragment Maturation
Joseph Yeelles, MRC Laboratory of Molecular Biology, UK
Short Talk: How the Eukaryotic Replisome Responds to DNA Damage in the Leading- and Lagging-Strand Templates

Poster Session 3

DNA Repair and Human Diseases (Z1)
* Hilda A. Pickett, Children's Medical Research Institute, Australia
Agnel Sfeir, New York University School of Medicine, USA
Single-Molecule Analysis of mtDNA Replication Uncovers the Basis of the Common Deletion
Cecilia Cotta-Ramusino, Editas Medicine, USA
Short Talk: Characterization of the Interplay between DNA Repair and CRISPR/Cas9-Induced DNA Lesions at an Endogenous Locus
Simon J. Boulton, London Research Institute, Clare Hall Laboratories, UK
Mechanistic Insights into Telomere Dysfunction Disorders
Madalena Tarsounas, University of Oxford, UK
Short Talk: MUS81 Nuclease Activity Is Essential for Replication Stress Tolerance and Chromosome Segregation in BRCA2-Deficient Cells
Janet Partridge, St Jude Children's Research Hospital, USA
Short Talk: Histone H3G34R Mutation Causes Replicative Stress, Defective Homologous Recombination and Genomic Instability in Fission Yeast

Replication Initiation Mechanisms (Z2)
* Kenneth J. Marians, Memorial Sloan Kettering Cancer Center, USA
Stephen P. Bell, Massachusetts Institute of Technology, USA
Mechanism and Timing of MCM2-7 Ring Closure During Origin Licensing
Stephen D. Bell, Indiana University, USA
DNA Replication in the Archaea
Heath Murray, Newcastle University, UK
Short Talk: A New Bacterial Replication Origin Element Specifies Single-Strand Initiator Binding
Anne D. Donaldson, University of Aberdeen, UK
The Conserved Role of Rif1 as a Substrate-Targeting Subunit of Protein Phosphatase 1

* Session Chair † Invited but not yet accepted     Program current as of June 15, 2019. Program subject to change. Meal formats are based on meeting venue. For the most up-to-date details, visit www.keystonesymposia.org/17Z1 and www.keystonesymposia.org/17Z2.
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THURSDAY, APRIL 6

**Replication Fork Establishment and Replication-Coupled Repair (Joint)**

*Jeaninne Gerhardt*, Weill Cornell Medicine, USA  
*Karlene A. Cimprich*, , USA  
*James M. Berger*, Johns Hopkins University School of Medicine, USA

**Physical Mechanisms for Initiating DNA Replication in Cells**

*Agata Smogorzewska*, Rockefeller University, USA

**Stress Response at the Replication Fork**

*Eric J. Brown*, Perelman School of Medicine, University of Pennsylvania, USA

**Short Talk: Characterizing Replisome Ubiquitination upon Fork Stalling**

*André Nussenzweig*, NCI, National Institutes of Health, USA

**DNA Breaks and End-Resection Measured Genome-Wide by End Sequencing (END-seq)**

*Helle D. Ulrich*, Institute of Molecular Biology, Germany

**Coordination of DNA Damage Bypass with Genome Replication and Checkpoint Signaling**

*Stephane Koundrioukoff*, Institute Gustave Roussy, France

**Short Talk: DNA Replication Compensation: A Two Steps Mechanism**

**Workshop 2: Genome Instability and DNA Repair II (Z1)**

*Michael P. Sheetz*, Mechanobiology Institute, National University of Singapore, Singapore  
*Katharina Schlacher*, MD Anderson Cancer Center, USA  
*Epigenetics-Enabled MRE11 Replication Restart by p53 Promotes Replication Pathway Homeostasis to Suppress Opportunistic Transcription Reprogramming*  
*Andrě Nussenzweig*, NCI, National Institutes of Health, USA  
*DNA Breaks and End-Resection Measured Genome-Wide by End Sequencing (END-seq)*  
*Helle D. Ulrich*, Institute of Molecular Biology, Germany  
*Coordination of DNA Damage Bypass with Genome Replication and Checkpoint Signaling*  
*Stephane Koundrioukoff*, Institute Gustave Roussy, France  
*Short Talk: DNA Replication Compensation: A Two Steps Mechanism*  
*Petr Cejka*, University of Zurich, Switzerland  
*Processing of DNA Double-Strand Breaks for Repair by Homologous Recombination*  
*Ralph Scully*, Beth Israel Deaconess Medical Center, USA  
*Short Talk: Microhomology-Mediated Tandem Duplications form at Tus/Ter-Stalled Replication Forks in BRCA1 Mutant Cells*  
*Stephen C. West*, Francis Crick Institute, UK  
*Unresolved Recombination Intermediates as a Source of DNA Breaks and Chromosome Aberration*  

**Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z1)**  
**Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z2)**

FRIDAY, APRIL 7

**Departure**
Activation

Boris Pfander,
Max Planck Institute of Biochemistry, Germany
Robust Replication Control by Temporal Gaps between Licensing and Firing Phases

Hasan Yardimci,
Francis Crick Institute, UK
Super-Resolution Fluorescence Imaging of DNA Replication Intermediates

Jon Baxter,
University of Sussex, UK
Transcription Promotes Replication Fork Rotation and Double-Stranded DNA Intertwining via a Cohesin-Dependent Pathway

Ivan Psakhye,
IFOM, FIRC Institute of Molecular Oncology, Italy
DDK-Mediated Regulation of the deSUMOylating Enzyme Ulp2 Facilitates DNA Replication Initiation

Telomeres and Centromeres (Z1)

*Maria Teresa Teixeira, CNRS – UMR 8226, France
Titia de Lange, Rockefeller University, USA
How Shelterin Solves the Telomere Problem
End-Protection Problem

Kerry S. Bloom, University of North Carolina at Chapel Hill, USA
The Molecular Basis for the Centromere Spring

Nausica Arnoult, The Salk Institute for Biological Studies, USA
Short Talk: Regulation of DNA Repair Pathway Choice in S/G2 by the NHEJ Inhibitor CYREN

Julia Promisel Cooper, NCI, National Institutes of Health, USA
Telomeric Control of Kinetochore Assembly and Nuclear Envelope Breakdown

Finishing Recombination (Z2)

*Maria Jasin, Memorial Sloan Kettering Cancer Center, USA
Stephen C. Kowalczykowski, University of California, Davis, USA
Molecular Functions and Single Molecule Studies of BRCA1, BRCA2, and RAD51 Paralogs

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