2022 Annual NHGRI Centers of Excellence in Genomic Sciences (CEGS) Meeting:
AGENDA

October 18 – 20, 2022
Duke University
Durham, NC

Monday, October 17, 2022

PM

6:00 **Welcome Meetup**

Join us as we kickoff this year's meeting and celebrate 20 years of CEGS.

Bull McCabe's Irish Pub
427 W Main St, Durham, NC 27701 | (919) 682-3061

Tuesday, October 18, 2022

AM

7:00 **Shuttle**

Shuttle service available from Washington Duke Inn and 21C Durham to Trent Semans Center.

Group ground transportation from other hotels not provided. Please coordinate transportation to meeting independently.

7:00-8:00 **In-person Check-in and Breakfast**

TSC – Great Hall
Mary Duke Biddle Trent Semans Center for Health Education (TSC)
Duke University
8 Searle Center Drive
Durham, NC 27710

8:00-8:30 **Welcome and Opening Remarks**

Dean Mary Klotman, MD
Dean, Duke University School of Medicine
Vice Chancellor for Health Affairs at Duke University

Adam Felsenfeld, PhD
Program Director, NHGRI

Tim Reddy, PhD
Duke CEGS / CCGR

8:30-9:30 **Center for Live Cell Genomics**

Introduction *(5 mins)*

Live Cell Genomics
Sofie Salama, UC Santa Cruz *(15 mins)*
Holger Schmidt, UC Santa Cruz *(15 mins)*
Mircea Teodorescu, UC Santa Cruz *(15 mins)*

Q&A
Moderated by Laavanya Sankaranarayanan, Duke UPGG PhD student

9:30-10:30 **Center for Dynamic RNA Epitranscriptomes**

Sequencing RNA Modification at Base Resolution
Chuan He, University of Chicago *(30 mins)*

Transcriptome-wide Profiling and Quantification of N^6-Methyladenosine by Enzyme-assisted Adenosine Deamination
Weixin Tang, University of Chicago (*10 mins)*

RBrowser: A Multimodal Data Exploration Platform for RNA and its Modifications
Mengjie Chen, University of Chicago *(10 mins)*

Synthetic Biology Approaches to Harness the Epitranscriptome
Bryan Dickinson, University of Chicago *(10 mins)*

10:30-10:45 **Break**

Walk to Duke Gardens *(10:30 – 11:30)*
A few groups will walk from TSC to Duke Gardens for a moment to stretch and brief view of what's blooming. *We recommend you join us in leaving at the beginning of the break.*

TSC - Walking Map

10:45-11:30 **Trainee Career Panel**
This Q&A session will highlight various post training career pathways, explore the current state of academic careers and biotech collaborations as well as the current state of the genomic workforce and related challenges.

Panel
Lisa Chadwick, PhD; Program Director, NHGRI

Shane Liddelow, PhD; Assistant Professor of Neuroscience and Ophthalmology, NYU Langone

Bill Majoros, PhD; Assistant Professor of Biostatistics & Bioinformatics, Duke

Sudarshan Pinglay, PhD; Postdoctoral Fellow, NYU Langone

Moderators
Makenzie Beaman, Duke MSTP MD/PhD student
Apoorva Iyengar, Duke UPGG PhD student
Schuyler Melore, Duke UPGG PhD student

11:30-12:30 **Center for Personal Dynamic Regulomes**

Overview
Howard Chang, Stanford University *(12 mins)*

Oncogenes Outside Chromosomes: Form and Function
King Hung, Stanford University *(12 mins)*

Scaling Single Cell Analysis to Millions of Cells
Ben Parks**,** Stanford University *(12 mins)*

Machine Learning Identifies Genetic Basis of Amyotrophic Lateral Sclerosis
Sia Zhang, Stanford University *(12 mins)*

Q&A
Moderated by Laavanya Sankaranarayanan, Duke UPGG PhD student

PM

12:30-1:30 **Lunch**
Pick up boxed lunch in TSC lobby and enjoy outdoors and nearby tables.

Afternoon moderated by Tim Reddy, Duke CEGS / CCGR PI

1:30-2:30 **Center for Synthetic Regulatory Genomics**

Introduction to SyRGe, The Center for Regulatory Genomics
Jef Boeke, NYU Langone *(5 mins)*

Architecture of Mammalian Gene Regulation
Matt Maurano, NYU Langone *(8 mins)*

Default Chromatin States in Yeast and Mammalian Cells
Brendan Camellato, NYU Langone *(5 mins)*

Genomically Rewritten and Tailored Genetically Engineered Mouse Models (GREAT-GEMMs)
Weimin Zhang, NYU Langone *(7 mins)*

Pooled Big DNA Deliveries and Phenotyping
Raquel Ordoñez Ciriza, NYU Langone *(4 mins)*

CRISPR Engineering of Episomes in Yeast (CREEPY)
Yu Zhao, NYU Langone *(4 mins)*

Engineering Brain Genes
Shane Liddelow, NYU Langone *(7 mins)*

Q&A
Moderated by Laavanya Sankaranarayanan, Duke UPGG PhD student

2:30-3:30 **Center for Combinatorial Gene Regulation**

Overview of Center for Combinatorial Gene Regulation (CCGR)
Tim Reddy, Duke *(5 mins)*

Multiplex Epigenome Editing with CRISPR/Cas12
Schuyler Melore, Duke *(5 mins)*

Epigenome Editing to Modulate Gene Expression in the Prader-Willi Syndrome Locus
Dahlia Rohm, Duke *(5 mins)*

Improving Analyses of Genome-wide CRISPR Screens

Maria ter Weele, Duke *(5 mins)*

Modeling cooperative transcription factor binding
Kyle Pinheiro de Oliveira, Duke *(5 mins)*

Identifying Rare Disease Populations with Undiscovered Genetic Etiology
Makenzie Beaman, Duke *(5 mins)*

Identifying and Reversing a New Cause of GSD IX
Apoorva Iyengar, Duke *(5 mins)*

A Portal for Results of High-Throughput Functional Genomic Studies
Warren Kibbe, Duke *(5 mins)*

Q&A
Moderated by Laavanya Sankaranarayanan, Duke UPGG PhD student

3:30-3:40 **Break**

3:40-4:10 **Flash talks**
Each CEGS Site to select two individuals to present a flash talk (3 min each).

Alexander Urban	Center for Personal Dynamic Regulomes	Advanced Methods to Resolve the Sequence of Inaccessible Regions of the Human Genome
Naomi Pacalin	Center for Personal Dynamic Regulomes	Bidirectional Epigenetic Editing with Single-cell Profiling
Matt Elliott	Center for Live Cell Genomics	WetAI: An IoT Integrated Device Environment to Automate Scalable Cerebral Organoid Experiments
Mohammed A. Mostajo-Radji	Center for Live Cell Genomics	Cloud Controlled Microscopy Enables Project-Based Learning in Underserved Communities
Tiffany Tsou	Center for Synthetic Regulatory Genomics	Hox Genes and a Generic Landing Pad Line
Antonio Vela-Gartner	Center for Synthetic Regulatory Genomics	Deploying Machine Learning to Optimize CRISPR Cutting in Yeast
Zhongyu Zou	Center for Dynamic RNA Epitranscriptomes	FMRP Phosphorylation Modulates Neuronal Translation through YTHDF1
Feng Zhang	Center for Dynamic RNA Epitranscriptomes	Epitranscriptomic regulation of cortical neural stem cell maintenance via Mettl8-dependent mitochondrial tRNA m3C modification
Keith Siklenka	Center for Combinatorial Gene Regulation	Characterizing the role of gene regulatory elements in the differentiation and function of mouse CD4+ T cell subsets
Sean McCutcheon	Center for Combinatorial Gene Regulation	Epigenome Editing Screens to Map Transcriptional Regulators of Human CD8 T Cell State

4:30 **Shuttle to Carolina Theatre for Downtown Dinner Tour**
Shuttle service available from Trent Semans Center to Carolina Theatre for dinner event (pre-registration for dinner event is required). ***Individuals will need to coordinate transportation following dinner.***

4:30 **Shuttle to Washington Duke Inn and 21C Durham**
Shuttle service available from Trent Semans Center to Washington Duke Inn and 21C Durham.

Group ground transportation from other hotels not provided. Please coordinate transportation to independently.

4:45 **Downtown Dinner Tour with Carolina Taste *(registration required)***

This optional event will be a great opportunity to network with other meeting attendees and explore the Downtown Durham food scene. For more information, http://bit.ly/CEGSDINNER.

Meet at the **Carolina Theatre**
309 W Morgan St, Durham, NC 27701

Wednesday, October 19, 2022

AM

7:00 **Shuttle**

Shuttle service available from Washington Duke Inn and 21C Durham to Trent Semans Center.

Group ground transportation from other hotels not provided. Please coordinate transportation to meeting independently.

7:30-8:30 **Breakfast**

TSC – Great Hall
Mary Duke Biddle Trent Semans Center for Health Education (TSC)
Duke University
8 Searle Center Drive
Durham, NC 27710

Morning moderated by Greg Wray, Duke CEGS / CCGR PI

8:30-9:30 **Center for Admixed Science and Technology**

Welcome and Summary
Lucila Ohno-Machado, UCSD *(5 mins)*

Exploring the Contribution of Complex Variants to Polygenic Traits Across Diverse Population
Melissa Gymrek, UCSD *(15 mins)*

Enabling Collaborative Studies Across Data Silos Using Secure and Federated Algorithms
Hoon Cho, Broad Institute of MIT and Harvard *(20 mins)*

A Pilot Study of Standardizing Social Determinants of Health Data
Hua Xu, University of Texas Health Science Center (20 mins)

9:30-9:45 **Break**

If you are presenting a poster during AM or PM sessions, please hang now on the 6th floor.

9:45-10:45 **Poster Session**

This AM poster session will include the ODD numbered posters. Join upstairs!

TSC – 6th Floor
Mary Duke Biddle Trent Semans Center for Health Education (TSC)

11:00-12:00 **Center for Integrated Cellular Analysis**

CICA Overview
Rahul Satija, New York Genome Center *(6 mins)*

CICA Session A: Epigenomics

Integrated Single-cell Genotyping and Chromatin Accessibility Charts JAK2-V617F Human Hematopoietic Differentiation
Franco Izzo, Cornell University *(9 mins)*

Nanobody-tethered Transposition Allows for Multifactorial Chromatin Profiling at Single-cell Resolution
Ivan Raimondi, Cornell University *(9 mins)*

CICA Session B: Perturbation

Efficient Combinatorial Targeting of RNA Transcripts in Single Cells with Cas13 RN Perturb-seq
Harm Wessels, New York Genome Center *(9 mins)*

Deciphering the Regulation of Cleavage of Polyadenylation at Single-cell Resolution with CPA-Perturb-seq
Maddie Kowalski, New York Genome Center *(9 mins)*

CICA Session C: Integration

Dictionary Learning for Integrative, Multimodal, and Scalable Single-cell Analysis
Yuhan Hao, New York Genome Center *(9 mins)*

Cross Species Comparisons Utilizing a Cell Type Atlas of the Spanish Ribbed Newt Brain
Jamie Woych, Columbia University *(9 mins)*

PM

12:00-1:00 **ExCITe Challenge Lunch**

Join us as we work in small groups to overcome some of genomics biggest challenges. Pickup your lunch in the lobby then return to Great Hall and find a table. Bonus if you do not already know everyone at the table!

Afternoon moderated by Greg Crawford, Duke CEGS / CCGR PI

1:00-2:00 **Center for Genome Editing and Recording**

The Center for Genome Editing and Recording
Jonathan Weissman, Whitehead Institute/MIT *(10 mins)*

Lineage Tracing Reveals the Phylodynamics, Plasticity, and Paths of Tumor Evolution
Dian Yang, Whitehead Institute *(10 mins)*

Engineered Virus-like Particles for Efficient *in vivo* Delivery of Therapeutic Proteins
Samagya Banskota, Broad Institute *(10 mins)*

Deciphering Cell States and Genealogies of Human Hematopoiesis with Single-cell Multi-omics
Remote Presentation

Chen Weng, Whitehead Institute *(10 mins)*

Mapping the DNA Repair Process that Enable Genome Editing
Britt Adamson, Princeton University *(10 mins)*

Q&A
Moderated by Makenzie Beaman, Duke MSTP MD/PhD student

2:00-2:10 **Break**

2:10-3:10 **Poster Session**
This PM poster session will include the EVEN numbered posters. Join upstairs!

TSC – 6th Floor
Mary Duke Biddle Trent Semans Center for Health Education (TSC)

3:20-4:20 **Center for SubCellular Genomics**

Towards Organelle Genomics
Junhyong Kim, University of Pennsylvania *(15 mins)*

Measuring the Small Molecules in Individual Organelles with Mass Spectrometry
Jonathan Sweedler, University of Illinois *(15 mins)*

Connecting Subcellular Morphology with Molecular States Using Computer Vision
Remote Presentation
James Zou, Stanford University *(15 mins)*

Q&A
Moderated by Makenzie Beaman, Duke MSTP MD/PhD student

4:20-4:50 **Flash talks**
Each CEGS Site to select two individuals to present a flash talk (3 min each).

Yasemin Atiyas *Remote Presentation*	Center for SubCellular Genomics	Towards the Isolation and Molecular Analysis of Single Lysosomes from Single Cells
David Froelicher *Remote Presentation*	Center for Admixture Science and Technology	Secure and Federated Genome-Wide Association Studies
Matteo D'Antonio	Center for Admixture Science and Technology	HLA Types are Associated with Hundreds of Complex Traits and Diseases in an Ancestry-dependent Manner
Aidan Daly	Center for Integrated Cellular Analysis	Spatiotemporal Pathology of Colon Aging: An Integrative Spatial Transcriptomics and Single-nuclear Modeling Approach
Ignacio Vazquez-Garcia	Center for Integrated Cellular Analysis	Genomic Instability as a Determinant of Immune Escape in Ovarian Cancer
Aaron Lin	Center for Genome Editing and Recording	Building a Molecular Recorder for Viral Infection
Vikram Pattanayak *Remote Presentation*	Center for Genome Editing and Recording	Population-scale Off-target Assessment of Cas9 and Other Gene Editing Enzymes

5:00 **Shuttle to Washington Duke Inn and 21C Durham**
Shuttle service available from Trent Semans Center to Washington Duke Inn and 21C Durham.

Group ground transportation to other hotels not provided. Please coordinate transportation to independently.

Group ground transportation to and from dinner not provided. Please coordinate transportation independently.

6:00 **Bull City Run Club meet up *(optional)***
Join the Bull City Run Club for a 3 mi, 4 mi, 6.4 mi route

6:30 **Dinner *(included for meeting registrants)***
This dinner and meeting reception will include local and regional favorites along with options for vegetarian, vegan, and gluten-free diners. Starters offered at 6:30 pm with dinner planned for 7 pm. Additional registration not required.

The Pit
321 W. Geer Street, Durham, NC 27701 | (919) 282-3748

Thursday, October 20, 2022

AM

7:00 **Shuttle**
Shuttle service available from Washington Duke Inn and 21C Durham to Trent Semans Center.

Group ground transportation from other hotels not provided. Please coordinate transportation to meeting independently.

7:30-8:30 **Breakfast**

TSC – Great Hall
Mary Duke Biddle Trent Semans Center for Health Education (TSC)
Duke University
8 Searle Center Drive
Durham, NC 27710

Morning moderated by Warren Kibbe, Duke CEGS / CCGR PI

8:30-9:30 **Center for the Multiplexed Assessment of Phenotype**

Developing New Methods to Assess Genetic Variation at Scale
Douglas Fowler, University of Washington *(10 mins)*

Expanding Cellular Context for Mutation Scans of Clinically Relevant Genes
Lea Starita, University of Washington *(10 mins)*

Doubling Rare Variant Burden-based Gene-trait Associations via Computational Predictor Choice
Fritz Roth, University of Toronto *(10 mins)*

Deep Molecular, Cellular, and Temporal Phenotyping of Developmental Perturbations at Whole Organism Scale
Cole Trapnell, University of Washington *(10 mins)*

Multiplexed Variants – Multiple Contexts
Christine Queitsch, University of Washington *(10 mins)*

Q&A
Moderated by Apoorva Iyengar, Duke UPGG PhD student

9:30-10:30 **A Phenomics First Resource for Interpretation of Variants**

Interoperable Phenotype Definitions to Improve Disease Diagnosis and Discovery
Melissa Haendel, University of Colorado Anschutz Medical Campus (*30 mins)*

Phenopackets, Tools for Sharing Individual-level Phenotypic Information
Remote Presentation
Peter Robinson, The Jackson Laboratory for Genomic Medicine *(15 mins)*

Q&A
Moderated by Apoorva Iyengar, Duke UPGG PhD student

10:30-10:40 **Break**
Please remove your poster from 6th floor.

10:40-11:40 **Center for Genomic Information Encoded by RNA Nucleotide Modifications**

Introduction to the Center
Sammie Jaffrey, Cornell University *(5 mins)*

Uncovering the Diversity and Function of rRNA and Protein Modifications in the Human Ribosome Using Single-molecule FRET and cryoEM
Remote Presentation
Scott Blanchard *(27.5 mins)*

Next-generation Mass Spectrometry-based de novo Methods for Direct Sequencing and Quantitative Mapping of RNA Modifications
Shenglong Zhang, New York Institute of Technology *(27.5 mins)*

11:40 **Lunch and ExCITE Report Back**
Pickup your lunch in the lobby and return as we hear from group on ExCITE discussions.

Afternoon moderated by Charlie Gersbach, Duke CEGS / CCGR PI

PM
12:40-1:40 **Center for Genome Imaging**

Imaging the Genome at Super-resolution: Easy to Say, but....
Remote Presentation
Ting Wu, Harvard University *(7 mins)*

How to Transform Whole Genome Imaging Challenges into Opportunities
Remote Presentation
Antonios Lioutas, Harvard University *(7 mins)*

Quality Control and Reproducibility of Genomic Super-resolution Imaging
Remote Presentation
Sara Aufmkolk, Harvard University *(7 mins)*

Ultraconserved Elements: Solving a Mysterious Genome-wide

Phenomenon
Remote Presentation
Tae Ryu, Harvard University *(7 mins)*

A Story About Spooning Homologs
Remote Presentation
Jumana Alhaj Abed, Harvard University *(7 mins)*

Oligopaint Probe Design to Paint and Image Genomic Repetitive Regions *in situ*
Remote Presentation
Nuno Martins, Harvard University *(7 mins)*

Q&A
Moderated by Apoorva Iyengar, Duke UPGG PhD student

1:40-2:05 **Flash talks**
Each CEGS Site to select two individuals to present a flash talk (3 min each).

Nicholas Popp	Center for Multiplexed Assessment of Phenotype	Comprehensive Characterization of Missense Variation in Coagulation Factor IX Reveals Features Necessary for Secretion and Gamma-Carboxylation
Matthew Berg	Center for Multiplexed Assessment of Phenotype	Proteome-wide Alanine Scanning Using Mistranslating tRNA Variants
Monica Munoz-Torres	A Phenomics First Resource for Interpretation of Variants	Ontologies for Phenotyping and Disease
Katerina Cortes	A Phenomics First Resource for Interpretation of Variants	Revealing Potential Mechanisms for Ehlers Danlos Syndrome using Knowledge Graphs
Fei Zhao *Remote Presentation*	Center for Genome Imaging	Genome-wide Super-resolution Fluorescence Imaging of Subsubtelomeric Chromosome Regions
Dimos Gkountaroulis *Remote Presentation*	Center for Genome Imaging	Leveraging Video Compression Codecs to Effectively Reduce Microscopy Data Size

2:05 **Closing Remarks**

Tim Reddy, PhD
Duke CEGS / CCGR PI