

The 27th Advanced School in Life Sciences

EpiSyStem: Stem Cell Epigenetics

**Different aspects of epigenetic regulation and
systems biology in stem cells & differentiation**

including the ISSCR 2022 Jerusalem International Symposium



27-31 March 2022

General Director: Roger Kornberg (Stanford University)

Director: Eran Meshorer (The Hebrew University of Jerusalem)

Organizer: Eitan Segev (EpiSyStem Manager, The Hebrew University of Jerusalem)

The Israel Institute for Advanced Studies
Edmond J. Safra Campus, Givat Ram,
The Hebrew University of Jerusalem

Sunday, 27 March

Feldman bldg. Edmond J. Safra Campus, Givat Ram, Jerusalem

09:00-09:30 Registration

09:30-09:35 Greetings by **Yitzhak Hen** (IIAS Director)

09:35-09:40 Welcoming remarks

09:40-10:30 **Roger Kornberg** (Stanford University): Keynote lecture

10:35-10:50 Coffee break

Session 1: Epigenetics, chromatin & RNA I Chair: **Oren Ram**

10:50-11:40 **Alexander van Oudenaarden** (Hubrecht Institute): Chromatin profiling in single cells

11:40-12:30 **Amos Tanay** (Weizmann Institute of Science): Epigenetics mechanisms and the gap between differentiation and commitment during mouse gastrulation

12:30-13:20 **Yael Mandel-Gutfreund** (Technion): A novel role for lncRNA-mediated regulatory circuits in human pluripotency

13:20-14:30 Lunch break

Session 2: Epigenetics, chromatin & RNA II Chair: **Yehudit Bergman**

14:30-15:20 **Geneviève Almouzni** (Institut Curie): Chromatin dynamics and cell fate from a histone variant view point

15:20-16:10 **Eran Meshorer** (The Hebrew University of Jerusalem): CAPRIN1 links pluripotency with RNA metabolism

16:10-16:40 Coffee break

16:40-17:30 **Omri Wurtzel** (Tel Aviv University): m6A is required for resolving progenitor identity during planarian stem cell differentiation

17:30 Reception

Monday, 28 March

Feldman bldg. Edmond J. Safra Campus, Givat Ram, Jerusalem

Session 3: Stem cell technologies Chair: **Omri Wurtzel**

- 09:00-09:50 **Giuseppe Testa** (University of Milan): Brain organoid based neurodevelopmental disease modelling at high resolution
- 09:50-10:40 **Oren Ram** (The Hebrew University of Jerusalem): CloneSeq: Highly Sensitive Single-cell Based Platform for Comprehensive Characterization of 3D cultured cells
- 10:40-11:10 Coffee break
- 11:10-12:00 **Efrat Shema** (Weizmann Institute of Science): Single-molecule epigenetics: illuminating the histone code for cancer research and diagnostics
- 12:00-12:50 **Gilles Brocart** (Diagenode): Parallel between a product development in a commercial RnD and the Diagenode's DPLX ncRNA-seq technology
- 12:50-14:00 Lunch break

Session 4: Neural mechanisms Chair: **Efrat Shema**

- 14:00-14:50 **Jovica Ninkovic** (Helmholtz Zentrum München): Understanding Glial Plasticity for Successful Repair
- 14:50-15:40 **Ramon Birnbaum** (Ben-Gurion University of the Negev): The role of gene regulatory networks in neuronal progenitors
- 15:40-16:10 Coffee break
- 16:10-17:00 **Magdalena Götz** (Helmholtz Zentrum München): Novel mechanisms of neurogenesis and neural repair

Tuesday, 29 March

Feldman bldg. Edmond J. Safra Campus, Givat Ram, Jerusalem

Session 5: Epigenetics and regulation of gene expression

Chair: **Ramon Birnbaum**

09:00-09:50 **Maria Elena Torres-Padilla** (Helmholtz Zentrum München): Epigenetic mechanisms of cellular plasticity

09:50-10:40 **Yehudit Bergman** (The Hebrew University of Jerusalem): Epigenetic programming of cell fate decisions; lessons from the immune and intestinal systems

10:40-11:10 Coffee break

11:10-12:00 **Michiel Vermeulen** (Radboud University): Deciphering gene expression regulation in health and disease using integrative omics approaches

12:00-12:50 **Howard Cedar** (The Hebrew University of Jerusalem): Mapping the epigenetic flowchart of development

12:50-14:00 Lunch break & Poster session

Afternoon Old City Tour and Dinner



PROGRAM OUTLINE (*As of March 22, 2022*)

ALL TIMINGS ARE GMT+2 (Jerusalem Time)

WEDNESDAY, MARCH 30, 2022

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

07:30 Registration opens

09:00 OPENING REMARKS

Eran Meshorer, The Hebrew University of Jerusalem, Israel

09:05 – 11:00 Session 1: EPIGENETIC REGULATION AND CHROMATIN

Chairs: Ruth Ashery-Padan, *Tel-Aviv University* & **Eran Meshorer**, *Hebrew University*

09:05 EPIGENETIC MECHANISMS IN DEVELOPMENT AND DISEASE

Alex Meissner, *MPI, Germany*

09:30 THE HISTONE VARIANT H3.3 IS REQUIRED FOR TRIM28 DEPENDENT SILENCING IN MOUSE EMBRYONIC STEM CELLS

Sharon Schlesinger, *The Hebrew University of Jerusalem, Israel*

09:45 INTEGRATED MULTI-OMICS ANALYSES REVEAL POLYCOMB REPRESSIVE COMPLEX 2 RESTRICTS NAIVE HUMAN PLURIPOTENT STEM CELL TO TROPHOBLAST FATE INDUCTION

Peter Rugg-Gunn, *Babraham Institute, UK*

09:55 REGENERATION AND LONG-TERM CHANGES IN STEM-CELL DNA METHYLATION

Yehudit Bergman, *The Hebrew University of Jerusalem, Israel*

10:10 HISTONE H3 VARIANTS ON THE MOVE

Geneviève Almouzni, *Institut Curie, France*

10:35 EPIGENETIC MECHANISMS OF CELLULAR PLASTICITY

Maria-Elena Torres-Padilla, *Helmholtz Center Munich, Germany*

11:00 *Refreshment Break*

11:20 – 13:10 Session 2: DISEASE MODELING

Chairs: Chaya Kalcheim, *Hebrew University* & **Eldad Tzahor**, *Weizmann Institute*

11:20 NOVEL MECHANISMS OF NEUROGENESIS AND NEURAL REPAIR

Magdalena Götz, *Helmholtz Center Munich, Germany*

11:45 LEGACY OF A DYING CELL

Yaron Fuchs, *Technion – Israel Institute of Technology, Israel*



WEDNESDAY, MARCH 30, 2022 (cont)

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

- 12:00 USING PATIENT-DERIVED NEURONS TO STUDY THE MECHANISMS UNDERLYING FUNCTIONAL CHANGES IN NEURODEVELOPMENTAL AND NEUROPSYCHIATRIC DISORDERS
Shani Stern, University of Haifa, *Israel*
- 12:15 MODELING NUCLEAR ENVELOPATHIES CAUSED BY LAP1 AND NUP214 MUTATIONS USING HPSCS
Achia Urbach, Bar-Ilan University, *Israel*
- 12:30 PATIENT-SPECIFIC HESC-DERIVED COLON ORGANOIDs CAN PREDICT DISEASE SEVERITY
Dalit Ben-Yosef, Ichilov Hospital/Tel Aviv University, *Israel*
- 12:45 STEMNESS IN HEALTHY AND INJURED BRAIN-LESSONS FROM COMPARATIVE ANALYSIS OF GLIOSIS
Jovica Ninkovic, LMU Munich and Helmholtz Center Munich, *Germany*
- 13:10 *Lunch Break*

14:10 – 15:35 Session 3: ADULT STEM CELL & STEM CELL NICHES

Chairs: **Karina Yaniv**, Weizmann Institute & **Naomi Habib**, Hebrew University

- 14:10 STEM CELL CLONALITY AND THE NICHE
Leonard I. Zon, Boston Children's Hospital and Harvard University, *USA*
- 14:35 EYES OPEN ON STEM CELL LOCATION, SIGNATURE & NICHE
Ruby Shalom-F Feuerstein, Technion – Israel Institute of Technology, *Israel*
- 14:50 TELOCYTES SUPPORT COLORECTAL CANCER PROGRESSION
Michal Shoshkes Carmel, The Hebrew University of Jerusalem, *Israel*
- 15:00 IMMUNE STIMULATION FOR HEMATOPOIETIC STEM CELLS
Roi Gazit, Ben Gurion University of the Negev, *Israel*
- 15:15 CIRCADIAN REGULATION OF HEMATOPOIETIC STEM CELLS BY LIGHT AND DARKNESS ONSET
Tsvee Lapidot, Weizmann Institute of Science, *Israel*
- 15:30 **Poster Teasers**
- HISTONE EXCHANGE SENSOR REVEALS VARIANT AND CHAPERONE SPECIFIC DYNAMICS IN MOUSE EMBRYONIC STEM CELLS
Marko Dunjic, Weizmann Institute of Science, *Israel*



WEDNESDAY, MARCH 30, 2022 (cont)

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

SYMMETRIC INHERITANCE OF PARENTAL HISTONES GOVERNS EPIGENOME MAINTENANCE, GENOME FUNCTION AND CELL FATE

Alva Biran, University of Copenhagen, *Denmark*

DECOY HOST CELL ACE2 RECEPTOR AND INTERRUPTION OF NON-STRUCTURAL PROTEINS OF VOCS AGAINST SARS-COV-2 INFECTION IN HUMAN LUNG ORGANIDS

Haibo Zhang, University of Toronto, *Canada*

DEVELOPMENT OF SPERMATOGENESIS IN A NOVEL TESTIS-ON-A-CHIP USING TESTICULAR CELLS OF IMMATURE MICE.

Mahmoud Huleihel, Ben-Gurion University of the Negev, *Israel*

15:35 *Refreshment Break*

16:00 – 17:50 Session 4: PLURIPOTENCY, REPROGRAMMING and EARLY DEVELOPMENT I

Chairs: **Varda Rotter**, Weizmann Institute & **Gad Vatine**, Ben-Gurion University

16:00 CHALLENGING PLASTICITY AND FORCING FATE: SINGLE-CELL ANALYSES OF BIDIRECTIONAL REPROGRAMMING ROUTES BETWEEN PLURIPOTENT AND EXTRA-EMBRYONIC ENDODERM STATES

Anna-Katerina Hadjantonakis, Memorial Sloan Kettering Cancer Center, *USA*

16:25 COMPARATIVE PARALLEL MULTI-OMICS ANALYSIS OF CELL UNDERGOING REPROGRAMMING TO PLURIPOTENT AND TROPHECTODERM STATES

Yossi Buganim, The Hebrew University of Jerusalem, *Israel*

16:40 CAPRIN1 LINKS EMBRYONIC STEM CELL DIFFERENTIATION WITH RNA METABOLISM

Juliane O. Viegas, The Hebrew University of Jerusalem, *Israel*

16:50 DIFFERENTIATION SHIFTS FROM A REVERSIBLE TO AN IRREVERSIBLE HETEROCHROMATIN STATE AT THE DM1 LOCUS

Rachel Eiges, Share Zedek Medical Center, *Israel*

17:05 DIVERGENCE AND CONVERGENCE OF MORPHOGENETIC PATHS IN EMBRYO-LIKE MODELS

Iftach Nachman, Tel Aviv University, *Israel*

17:20 HETEROCHROMATIN FORMATION AND NUCLEAR COMPARTMENTALIZATION BY THE LNCRNA XIST

Kathrin Plath, UCLA, *USA*

17:45 **Poster Teasers (4)**

GENERATION AND CHARACTERIZATION OF TRIPLOID HUMAN EMBRYONIC STEM CELLS

Guy Haim, The Hebrew University of Jerusalem, *Israel*



WEDNESDAY, MARCH 30, 2022 (cont)

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

HIGH RESOLUTION SINGLE-CELL TRANSCRIPTOMIC MAP OF EARLY HUMAN EMBRYONIC NEURODEVELOPMENT

Miri Danan-Gotthold, Karolinska Institute, *Sweden*

THE ROLE OF TELOCYTES IN THE HAIR FOLLICLE STEM CELL NICHE

Marco Canella, The Hebrew University of Jerusalem, *Israel*

SAFETY AND EFFICACY OF FIRST-IN-HUMAN INTRATHECAL TRANSPLANTATION OF HUMAN ASTROCYTES (ASTRORX) DERIVED FROM EMBRYONIC STEM CELLS IN ALS PATIENTS: FROM BENCH TO BEDSIDE

Michal Izrael, Kadimastem, *Israel*

17:50 *Poster Session with light dinner & drinks*

20:00 *Closing of the day*

THURSDAY, MARCH 31, 2022

09:00 – 11:00 Session 5: PLURIPOTENCY, REPROGRAMMING, AND EARLY DEVELOPMENT II

Chair: Adi Kimchi, Weizmann Institute & **Nissim Benvenisty**, Hebrew University

09:00 RIBOSOMAL PROFILING IN SINGLE CELLS

Alexander van Oudenaarden, Hubrecht Institute, *The Netherlands*

09:25 IN-VITRO CELLULAR REPROGRAMMING TO MODEL GONAD DEVELOPMENT AND ITS DISORDERS

Nitzan Gonen, Bar-Ilan University, *Israel*

09:40 UNDERSTANDING HUMAN REPROGRAMMING: A JOURNEY FROM EPIBLAST AND TROPHOBLAST INTO IBLASTOIDS

Jose Polo, Monash University, *Australia*

10:05 EX UTERO MAMMALIAN EMBRYOGENESIS: FROM STEM CELLS TO ORGANS

Jacob Hanna, Weizmann Institute of Science, *Israel*

10:20 MODELING MAMMALIAN GASTRULATION AT SINGLE EMBRYO AND SINGLE-CELL RESOLUTION

Yonatan Stelzer, Weizmann Institute of Science, *Israel*

10:35 TRANSCRIPTION/EPIGENETIC REGULATION OF ENHANCER REWIRING DURING EARLY ESC DIFFERENTIATION

Robert Blelloch, University of California in San Francisco, *USA*

11:00 *Refreshment Break*



THURSDAY, MARCH 31, 2022 (cont)

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

11:20 – 13:05 Session 6: STEM CELL TECHNOLOGIES & TISSUE ENGINEERING

Chairs: *Yechiel Elkabetz, Max Planck Institute & Daphna Nachmani, Hebrew University*

- 11:20 DECIPHERING GENE EXPRESSION REGULATION IN DEVELOPMENT AND DISEASE USING INTEGRATIVE OMICS APPROACHES
Michiel Vermeulen, Radboud University, *The Netherlands*
- 11:45 THE ELECTRO-MITOCHONDRIAL COUPLING OF A MICROPHYSIOLOGICAL HUMAN HEART
Yaakov Nahmias, The Hebrew University of Jerusalem, *Israel*
- 12:00 ENGINEERING PERSONALIZED TISSUE IMPLANTS
Tal Dvir, Tel Aviv University, *Israel*
- 12:15 ANALYSIS OF HAPLOINSUFFICIENCY DISORDERS IN HUMAN EMBRYONIC STEM CELLS
Roni Sarel-Gallily, The Hebrew University of Jerusalem, *Israel*
- 12:25 CLONESEQ: HIGHLY SENSITIVE SINGLE-CELL BASED PLATFORM FOR COMPREHENSIVE CHARACTERIZATION OF 3D CULTURED CELLS
Oren Ram, The Hebrew University of Jerusalem, *Israel*
- 12:40 DERIVATION OF INTERMEDIATE PLURIPOTENT STEM CELLS AMENABLE TO PRIMORDIAL GERM CELL SPECIFICATION
Jun Wu, UT Southwestern, *USA*
- 13:05 *Lunch Break*

14:00 – 15:50 Session 7: ORGANOIDS

Chairs: *Dafna Benayahu, Tel-Aviv University & Nadav Sharon, Technion*

- 14:00 IMPROVING THE FIDELITY OF ORGANOIDS TO MODEL HUMAN BRAIN DEVELOPMENT AND DISEASE
Arnold Kriegstein, University of California in San Francisco, *USA*
- 14:25 NOTCH ACTIVATION DURING EARLY MESODERM INDUCTION MODULATES EMERGENCE OF THE T/NK CELL LINEAGE FROM HUMAN IPSCS
Gustavo Mostoslavsky, Boston University, *USA*
- 14:35 RECONSTRUCTING HUMAN ORGANOID DEVELOPMENT WITH SINGLE-CELL TECHNOLOGIES
Barbara Treutlein, ETH Zurich, *Switzerland*
- 15:00 BUILDING BRAIN CELLULAR COMPLEXITY USING STEM-CELL BASED ORGANOID TECHNOLOGY
Abed Manssour, The Hebrew University of Jerusalem, *Israel*



THURSDAY, MARCH 31, 2022 (cont)

Weiss Auditorium, Edmond J. Safra Campus, Givat Ram, Jerusalem

- 15:15 STEM CELL ISOLATION AND TRANSPLANTATION IN HEXACORALLIANS; TOWARD CELL-THERAPY FOR CORALS
Benyamin Rosental, Ben Gurion University of the Negev, *Israel*
- 15:25 CHARTING THE ENVIRONMENTAL AND GENETIC CAUSES OF NEURODEVELOPMENTAL VULNERABILITIES BY HIGH RESOLUTION ORGANOID MODELLING
Giuseppe Testa, IEO Milano, *Italy*
- 15:50 *Refreshment Break*

16:10 – 18:00 Session 8: CLINICAL APPLICATIONS

- Chairs:** **Benjamin Dekel**, Sheba Medical Center & **Chaya Brodie**, Bar-Ilan University
- 16:10 HUMAN EMBRYONIC STEM CELLS – FROM THE RESEARCH LABORATORY TO RETINAL CLINICAL TRANSPLANTATION
Benjamin Reubinoff, Hadassah Medical Center, *Israel*
- 16:25 BIOPRINTING VASCULARIZED TISSUE CONSTRUCTS
Shulamit Levenberg, Technion – Israel Institute of Technology, *Israel*
- 16:40 HUMAN FETAL KIDNEY ORGANOID ENRICHED FOR NOTCH DEPENDENT EARLY EPITHELIAL DIFFERENTIATION
Michael Namestnikov, Sheba Medical Center / Tel Aviv University, *Israel*
- 16:50 ORGAN-ON-A-CHIP AS A NEW TOOL FOR STUDYING HUMAN PHYSIOLOGY
Ben Maoz, Tel Aviv University, *Israel*
- 17:00 SINGLE CELL PROFILING OF XENOGRAFT MOUSE MODELS REVEALS BONE MARROW STEM CELL NICHE REMODELING UPON ACUTE MYELOID LEUKEMIA
Karin Prummel, EMBL, *Germany*
- 17:10 GENOME EDITING FOR BETTER CARDIOMYOCYTE THERAPY
Charles Murry, University of Washington & Sana Biotechnology, *USA*
- 17:35 USING STEM CELLS TO MAKE PANCREATIC ISLETS
Douglas A. Melton, Harvard University, *USA*
- 18:00 *Closing Remarks*