CELEBRATING 8 YEARS

The D. Dan and Betty Kahn
Technion Institute of Technology • University of Michigan • Weizmann Institute of Science
Partnership Symposium

FRONTIERS IN BIOMEDICAL RESEARCH

DECEMBER 2-6, 2019
COLLABORATIVE LEADERSHIP TEAM
Associate Professor Peleg Hasson has joined the Technion in 2010 and since then he has head the tissue development laboratory at the Rappaport Faculty of Medicine. His research is aimed at dissecting the interactions between cells and the extracellular matrix, primarily within a growing and regenerating tissues. Towards that end, the Hasson laboratory has generated multiple novel mouse models for manipulating extracellular modifying enzymes that are involved in distinct human diseases.
Prof. Avraham Levy was born in Paris, immigrating to Israel as a young man. He earned his BSc and MSc in agriculture and plant breeding at the Hebrew University of Jerusalem, and his PhD in plant genetics from the Weizmann Institute of Science. He conducted postdoctoral research at Stanford University and at the Institut National de Recherche Agronomique in Versailles, France, after which he joined the Weizmann Institute of Science. He was Head of the Department of Plant Sciences as well as Chair of the Professorial Council. He currently serves as Dean of the Faculty of Biochemistry.

In his research, Prof. Levy probes the evolutionary processes that have generated hundreds of thousands of plant species, compared to only a few thousand species of mammals. His research asks: What are the genetic and epigenetic mechanisms responsible for biodiversity in the plant kingdom? This includes mechanistic studies on hybridization, genome doubling, DNA recombination, DNA repair and genome stability as well as population genetics analyses of wheat evolution in the wild habitat. A better understand of these mechanisms might be used to improve food production, to assess evolution under climate change as well as to find alternative energy solutions. In particular, he harnesses advanced genetic manipulation techniques, such as genome editing, to engineer plants with desired features in a precise manner.

Prof. Levy coordinates a group of Israeli scientists who are working on precise genome editing in plants, and serves on the scientific board of Israeli Agro-biotech companies. He was awarded the Landau Prize of Mifal Hapais for Plant Sciences and was the recipient of an ERC grant for targeted engineering of plant genomes. He previously served as President of the Genetic Society of Israel.

Prof. Avraham Levy is the incumbent of the Gilbert de Botton Professorial Chair of Plant Sciences and he is the Director of the Y. Leon Benoziyo Institute for Molecular Medicine; and the Dr. Erhard, Emmi, and Fred Loewinsohn Center for Pediatric Health.

Prof. Levy is married and he is the father of four children.
David J. Pinsky, M.D. is the J. Griswold Ruth M.D. & Margery Hopkins Ruth Professor of Internal Medicine, the Chief of Cardiovascular Medicine, and a Director of the University of Michigan’s Samuel and Jean Frankel Cardiovascular Center. He graduated with top honors from both the University of Toledo and the Ohio State University College of Medicine, then trained in internal medicine at Mount Sinai. After training in cardiology, nuclear cardiology, and vascular biology at Columbia, he joined the Columbia faculty where he served until his recruitment to the University of Michigan in 2003. Dr. Pinsky is an inventor on over a dozen patents, is an author of over 200 scientific papers and book chapters, and leads an active laboratory focused on understanding how natural blood vessel defense mechanisms may be amplified to protect in conditions such as stroke, heart attack, or organ transplantation. His work focuses on a protective enzyme which lines blood vessels, amplifying a natural defense mechanism against unchecked inflammation and coagulation. His lab was the first to directly measure nitric oxide in the beating heart, and to discover that very small amounts carbon monoxide may actually protect blood vessels following flow interruption. His team has also discovered a fundamental new mechanism by which white blood cells control their own destiny in the vicinity of a clotted vein, in a cholesterol-choked artery, in the brain, or in the heart. Pinsky’s goal is to understand, amplify and harness a blood vessel’s natural defenses in order to develop novel diagnostic and therapeutic strategies. Dr. Pinsky is an elected member of honorary scientific societies including the ASCI, AAP, ACCA, and the Association of University Cardiologists. He has served on and chaired numerous national peer-review and strategy panels for the AHA, DOD, and NIH, and is a popular lecturer world-wide.
THE PROGRAM

MONDAY, DECEMBER 2
Arrival and Transport to Hotel
(dinner and refreshments available in hotel room)

TUESDAY, DECEMBER 3
11:00 Registration and Light Lunch
13:00 Welcome Remarks

SESSION 1: PRECISION MEDICINE
CHAIRS: LONA MODY, UM
AMOS TANAY, WIS
13:30 Amos Tanay, WIS
Understanding Blood Aging: From Electronic Health Records to Single Cells
13:50 Shai Shen-Orr, IIT
Human Immune Monitoring Coming of Age
14:10 Betsy Foxman, UM
The Nose/Throat Microbiome and Susceptibility to Influenza Infection
14:30 Roy Kishony, IIT
Predicting Antibiotic Treatment Failure
14:50 Lona Mody, UM
Preventing Infections: From Translational Research to Precision Health
15:10 Roi Avraham, WIS
Characterizing Human Bacterial Infection Using Single Cell RNA-seq Analysis of Blood Immune Cells
15:30 Coffee Break
SESSION 1 continued...
16:00 Naama Geva-Zatorsky, IIT
Studying the Mechanisms of Gut Microbiota-Host Interactions: How do Individual Microbes Communicate with the Host?
16:20 Ido Amit, WIS
The Power of ONE: Immunology in the Age of Single Cell Genomics

SESSION 2: METABOLIC DISORDERS
CHAIRS: OREN ROM, UM
RUMA BANERJEE, UM
16:40 Roger Cone, UM
Characterization of the Melanocortin-3 Receptor as a Target for Treatment of Eating Disorders
17:00 Eyal Gottleib, IIT
Targeting Metabolic Vulnerabilities of Cancer
17:20 Ayelet Erez WIS
Implications of Amino-Acid Metabolism for Cancer Diagnosis and Therapy
17:40 Ruma Banerjee, UM
B12 Disorders and Immunomodulation
SESSION 4: CARDIOVASCULAR RESEARCH

CHAIRS: IZHAK KEHAT, IIT
        ABHIJIT GHOSH, UM

11:40 Eldad Tzahor, WIS
Novel Strategies for Heart Regeneration

12:00 Abhijit Ghosh, UM
Circulating Transgelin and Anti-Transgelin Antibodies in Abdominal Aortic Aneurysm and Electronic Cigarette Vaped Rats

12:20 Izhak Kehat, IIT
Regulation of Transcription in the Heart

12:40 Benjamin Brenner, IIT
Cancer Associated Thrombosis-Mechanisms and Implications

SESSION 5: INFECTIOUS DISEASE

CHAIRS: MICAL PAUL, IIT
        NOAM STERN-GINOSSAR, WIS

14:00 Joseph Eisenberg, UM
New Directions to Address Old Problems: A System Approach to Diarrheal Disease Epidemiology

14:20 Mical Paul, IIT
Problems and Challenges of the Antibiotic Pipeline
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<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Title</th>
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<tbody>
<tr>
<td>14:40</td>
<td>Keith Kaye, UM</td>
<td>UM</td>
<td>Conducting Clinical Trials Addressing Antimicrobial Resistance: Global Challenges and Solutions</td>
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<tr>
<td>15:00</td>
<td>Noam Stern-Ginossar, WIS</td>
<td>WIS</td>
<td>RNA Modifications Sculpts Innate Immune Response to Infection</td>
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<td>15:20</td>
<td>Arnold Monto, UM</td>
<td>UM</td>
<td>The Future of Influenza Vaccine</td>
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<td><strong>Coffee Break</strong></td>
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<td><strong>SESSION 6: IMMUNOLOGY</strong></td>
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<td><strong>CHAIRS:</strong></td>
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<td>MARILIA CASCALHO, UM ZIV SCHULMAN, WIS</td>
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<tr>
<td>16:00</td>
<td>Miki Rahat, IIT</td>
<td>IIT</td>
<td>Anti-EMMPRIN Vaccination Induces Necroptosis and Shifts Macrophage Polarization</td>
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<td>16:20</td>
<td>Ziv Schulman, WIS</td>
<td>WIS</td>
<td>Generation of High-Affinity Antibodies: A Game of Clones in Immunological Niches</td>
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<td>16:40</td>
<td>Joseph Holoshitz, UM</td>
<td>UM</td>
<td>Empirical Validation of the MHC Cusp Theory: A New Therapeutically Targetable Mechanism of HLA-Disease Association</td>
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<td>17:00</td>
<td>Noga Ron-Harel, IIT</td>
<td>IIT</td>
<td>Cellular Metabolism in T Cell Activation and Aging</td>
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<td>17:20</td>
<td>Marilia Cascalho, UM</td>
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<td>TNRSF13B Polymorphisms and the Control of Immunity: The Challenge of Diversity</td>
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<td><strong>THURSDAY, DECEMBER 5</strong></td>
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<td><strong>SESSION 7: NEUROSCIENCE</strong></td>
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<td><strong>CHAIRS:</strong></td>
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<td>ORLY REINER, IIT HERMAN WOLOSKER, WIS</td>
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<td>09:00</td>
<td>Elior Peles, WIS</td>
<td>WIS</td>
<td>Axoglial Contact Regulation of Myelination</td>
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<tr>
<td>09:20</td>
<td>Gabriel Corfas, UM</td>
<td>UM</td>
<td>Molecular and Cellular Mechanisms of Hidden Hearing Loss or Why I Can’t Hear Well in a Loud Restaurant</td>
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<tr>
<td>09:40</td>
<td>Herman Wolosker, IIT</td>
<td>IIT</td>
<td>Regulation of Synaptic Plasticity by Astroglia-Neuron Crosstalk</td>
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<td>10:00</td>
<td>Melvin McInnis, UM</td>
<td>UM</td>
<td>Modeling Mood and Emotion from Passively Collected Speech to Predict Need for Intervention in Bipolar Disorder</td>
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<td>10:20</td>
<td>Uri Alon, WIS</td>
<td>WIS</td>
<td>A Systems Biology Approach to Bipolar Disorder</td>
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<td><strong>SESSION 7 continued...</strong></td>
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<tr>
<td>11:10</td>
<td>Orly Reiner, WIS</td>
<td>WIS</td>
<td>Modeling Early Human Brain Development in Health and Disease</td>
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<td>11:30</td>
<td>Shai Berlin, IIT</td>
<td>IIT</td>
<td>Two-Photon Gated NMDARs</td>
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<td>11:50</td>
<td>8</td>
<td>Motti Choder, IIT</td>
<td>mRNA Imprinting: a Novel Mode of Regulation of Gene Expression</td>
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<td>12:00</td>
<td>9</td>
<td>Lola Eniola-Adefeso, UM</td>
<td>Nanoparticle Systems for Specific Targeting of Neutrophils in Thromboinflammation and Other Inflammatory Diseases</td>
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<td>12:30</td>
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<td>Yoav Arava, IIT</td>
<td>Protein Synthesis Regulation Through Binding of Aminoacyl tRNA Synthetases to mRNA</td>
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<td>12:50</td>
<td>9</td>
<td>Assaf Bester, IIT</td>
<td>Separate Wheat from Chaff: CRISPR Approach to Study the Non-Coding Genome</td>
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<td>13:00</td>
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<td>David Sherman, UM</td>
<td>Functional Convergence of Polyketide Synthases and Ribosomes for the Discovery of New Anti-infective Agents</td>
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<td>13:15</td>
<td>9</td>
<td>Yaron Antebi, WIS</td>
<td>Specific Activation from Promiscuous Interactions in the BMP Pathway</td>
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<td>13:30</td>
<td>8</td>
<td>David Markovitz, UM</td>
<td>A Molecularly Engineered Anti-Cancer Banana Lectin: a Sweet Story</td>
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<td>13:45</td>
<td>9</td>
<td>Netanel Korin, IIT</td>
<td>Microfluidics and Mechano-medicine Applications in Vascular Disease</td>
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<td>Yifat Merbl, WIS</td>
<td>Dumpster Diving for Health</td>
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<td>14:15</td>
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<td>Max Shtein, UM</td>
<td>Personalizing Small Molecular Medicines</td>
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<td>14:30</td>
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<td>Sarel Fleishman, WIS</td>
<td>Computational Design of New and Improved Antibodies and Enzymes</td>
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<td>Victor Malka, WIS</td>
<td>Development of Laser Plasma Accelerator for Early Cancer Tumor Detection with Xray Phase Contrast Imaging</td>
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<td>Sam Nason, UM</td>
<td>Restoring Fine Finger Control to Paralyzed Hands Using a Low-Power Brain-Machine Interface</td>
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<td>15:30</td>
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<td>Lunch and Poster Session</td>
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<td>Poster Award Announcements</td>
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<td>Closing Remarks</td>
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THE PROGRAM

FRIDAY, DECEMBER 6
Individual Lab Meetings

SATURDAY, DECEMBER 7
Free Day in Tel Aviv

SUNDAY, DECEMBER 8
Archaeological Tour of Jerusalem
Transport by Bus from Renaissance Tel Aviv Hotel

MONDAY, DECEMBER 9TH
Check-out and Transfer to Airport
CONFERENCE SPEAKERS AND CHAIRS
Understanding biological circuits that perform computations is a central problem in biology. Circuits can be made of proteins inside the cells, or cells that communicate with each other in a tissue. From the point of view of physics, the circuits offer the challenge of understanding the collective behavior of interacting molecular machines designed to operate with remarkable precision under strong biological constraints. Dr. Alon’s lab studies biological circuits using a combined experimental and theoretical approach, aiming to uncover general underlying principles that govern their functioning and evolution.
Born on Kibbutz Hatzor, Prof. Ido Amit earned his PhD in biological regulation at the Weizmann Institute of Science in 2007. For four years, he was a postdoctoral fellow at the Broad Institute of Harvard University and the Massachusetts Institute of Technology, before joining the Weizmann Institute in 2011.

Ido Amit is a Professor at the Immunology Department at the Weizmann Institute of Science. His lab pioneered single cell genomic technologies and their application to characterize the immune system. Amit’s research answers some of the most fundamental questions in immunology which are being translated into innovate new targets for immunotherapy in autoimmune diseases, neurodegeneration and cancer. Prof. Amit is also known in the science community as a leader in the field of immunogenomics, aimed at detecting and engineering genome sequences that are essential for the function of the immune system in physiology and disease. Among others, Prof. Amit is a recipient of the EMBO Gold Medal award and an HHMI International Research Scholar for his work to reveal the function of the immune system.
Dr. Yaron Antebi is a Senior Scientist in the Molecular Genetics Department at the Weizmann Institute of Science. He received his PhD in high energy physics from the Weizmann Institute of Science, before deciding to change his research field to biology and focus on understanding intercellular communication networks in biological systems. Dr. Antebi conducted research as a postdoctoral fellow at the California Institute of Technology, before joining the Weizmann Institute in 2018.

In his lab, Dr. Antebi aims to understand the way cells interpret and integrate information from their environment to determine cellular behavior, and study the computational capabilities that emerge from the complex interaction network within signaling pathways. His research combines theoretical and experimental techniques with the goal of enabling a more rational approach to control cellular behavior with implications in therapeutic strategies, tissue engineering and synthetic biology.
Yoav Arava is a faculty member at the Faculty of Biology at the Technion. He did his graduate studies at the Weizmann Institute of Science, working on regulation of insulin expression in pancreatic beta cells. During a postdoctoral period at Stanford University, Yoav shifted to work on basic mechanism of protein synthesis using the unicellular eukaryote yeast cells as a model. This is also a major research direction also at the Technion, where his lab identified and characterized several protein factors that are involved in regulation of protein synthesis during cellular growth and stress.
Dr. Avraham manages the lab of host-pathogen genomics and is interested in how individual encounters between host and pathogenic bacteria can ultimately define the outcome of infection. This is achieved by applying cross-disciplinary single-cell analysis platforms that collectively enable us to extensively profile and precisely monitor host-pathogen interactions within the context of \textit{in vivo} infections.
Dr. Banerjee is the Vincent Massey Collegiate Professor of Biological Chemistry at the University of Michigan Medical School. Her research focuses on the chemical biology of sulfur-based redox homeostasis and signaling and on $\text{B}_{12}$ trafficking in humans with a strong emphasis on redox biochemistry. She was awarded the Pfizer Award by the American Chemical Society, the Merck Award by the American Society for Biological Chemistry and Molecular Biology, and was an Established Investigator of the American Heart Association. She has edited books on “The Chemistry and Biochemistry of B$_{12}$” and on “Redox Biochemistry” and has published >250 articles. Dr. Banerjee serves as an Associate Editor for the Journal of Biological Chemistry and for Chemical Reviews and is on the editorial boards of Antioxidants and Redox Signaling, Trends in Chemistry (Cell Press).
Dr. Benhar has a longstanding interest in nitric oxide signaling and in redox mechanisms involved in inflammation and cancer. Benhar and his group employ proteomic and biochemical tools to explore the roles of protein redox modifications (such as cysteine S-nitrosylation) in cellular signaling in macrophages and cancer cells.

The Benhar group has developed a new proteomic approach to identify proteins regulated by S-nitrosylation. Research by the group has provided new insights into the crosstalk between nitric oxide and the thioredoxin antioxidant system in cancer cells.

**Representative Papers**


1. Dynamics of Impulse Propagation and Reentrant Activity.
We investigate the effects of the ionic and structural properties of the heart on the normal and abnormal propagation of its action potential. As studies demonstrates that reentrant propagation of activity underlies some arrhythmias, I am using theoretical, numerical and experimental approaches to better understand the dynamics of such pattern of activation.

Analysis in the time, phase and frequency domains is used for mechanistic correlation of activation patterns with the ionic and structural properties of the atria. Emphasis is given to technological developments enabling the translation of knowledge derived from animal and computational models into the clinical setting of patients with atrial fibrillation.

3. Mapping of Cardiac Fibrillation.
We study and develop novel methods to better characterize the structure and electrical function of the heart. Here we focus on optimizing existing electrical approaches to increase accuracy in invasive and non-invasive mapping of fibrillation. In addition, we are developing revolutionary new photonic approaches for structural and functional characterization of the heart in-vivo.

Representative Papers


Shai was born in Israel and raised in Montreal, Canada. After his high school studies, Shai completed his bachelor’s prior his military services in Ben-Gurion, Israel. He then served as a Medical officer in the Medical Corps, during which he also started his PhD studies at Tel Aviv university’s faculty of medicine. After graduating, he moved with his wife for a postdoctoral fellowship at University of California at Berkeley in Neurosciences. During his Postdoc, he specialized in engineering novel optical and optogenetic tools to study synaptic plasticity. During 2016, Shai was recruited to the Technion’s Neuroscience Department at Rappaport’s faculty of medicine. His lab continues to engineer novel optical tools and novel genetic methods to study the brain. Since his arrival to the Technion, Shai has patented unique MRI- contrast agents, received the young innovator prize from the Rich Foundation, obtained several competitive grants, including a starting grant from the European Research council.
Dr. Assaf Bester received his MS and Ph.D. training under the supervision of Professor Batsheva Kerem at the Hebrew University in Jerusalem, Israel. He obtained his Ph.D. in Genetics in 2012 for his work on the molecular basis for replication induced genomic instability in cancer. In 2014 Dr. Bester starts his post-doctoral training in the laboratory of Professor Pier Paolo Pandolfi at Harvard Medical School. Dr. Assaf is an assistant professor at the Technion since 2019. The Bester lab studied gene gradation and the role of non-coding RNA in cell identity and cancer.
Dr. Benjamin Brenner is Professor of Hematology and the Caster Chair for Leukemia Research, at the Ruth and Bruce Rappaport Faculty of Medicine of the Technion (Haifa, Israel). He was Director of the Institute of Hematology and Bone Marrow Transplantation and Chair of Division of Internal Medicine at the Rambam Health Care Campus in Haifa, Israel between 01.2011 and 03.2019. Dr. Brenner is Director of the Hematology Research Center and Supervisor of Academic Promotion at Rambam. His research interests over the years have included venous thrombosis, cancer-related thrombosis, inherited bleeding disorders and their management, mechanisms of thrombosis and clinical studies of new anticoagulants and hemostatic agents. His major focus of interest is women’s health issues associated with thrombosis, especially in regard to pregnancy complications in patients with inherited thrombophilias and placental hemostasis. Prof. Brenner has been co-chair of two subcommittees of the SSC, namely, Women’s Health Issues in Thrombosis and Hemostasis and Perinatal and Pediatric Thrombosis. He is a member of the Steering Committee of RIETE and International Advisory Committee of the North America Thrombosis Forum. Prof. Brenner is an Associate Editor of Seminars in Thrombosis and Hemostasis. He has multiple publications in peer-reviewed journals as well as chapters and books that he has initiated and edited, with a focus on women’s health issues, cancer, antithrombotic therapy, and pregnancy.
Dr. Cascalho’s research focuses on the immunobiology of B cell and T cell responses to transplants, microorganisms, and tumors. Dr. Cascalho’s interest in B cell biology was sparked by her early work on molecular mechanisms of immunoglobulin gene recombination and mutation (1-2). Her discovery that DNA mismatch repair drives B cell Ig gene hypermutation led her to investigate the genetic, molecular biological and cellular basis of immune fitness, viral evolution and the B cell biology pertinent to organ transplantation. These interests led to the current inquiry into the genetic and molecular determinants of B cell responses to microorganisms and transplants. Dr. Cascalho and her team and collaborators, including Dr. Jeffrey Platt (co-PI in this proposal) discovered that the receptor encoded by TNFRSF13B (TACI or Transmembrane Activator and CAML Interactor) controls plasma cell differentiation by inducing BLIMP-1 (3). Although deficiency in TACI or expression of dominant-negative TACI variants had been associated with the common variable immunodeficiency syndrome, Dr. Cascalho observed that TACI-deficient mice, despite low baseline levels of Ig, produce burst of high affinity antibodies against model antigens and against an enteric pathogen, C. rodentium (4). Especially remarkable was that TACI-deficient mice or immunodeficient mice given antibodies produced by TACI-deficient mice clear C. rodentium infection more rapidly and completely than wild type mice. Consistent with the qualitative impact of TACI-deficiency in mice, Dr. Cascalho also observed that human kidney transplant recipients with TACI variants are more apt to develop severe antibody-mediated rejection. These findings led to the hypothesis that the extraordinary allelic diversity of TNFRSF13B may be advantageous and maintained by balanced selection. The research proposed in this application will determine how modifying TACI function by expression of the murine equivalent of the most common human dominant-negative allele improves resistance and decreases transmission of C. rodentium, as preliminary work indicates. The research will affirm the mechanism of immune-mediated resistance and test a novel approach to locally modify TACI function which if successful would constitute a much needed therapy to break the cycle of diarrhea and malnutrition in undeveloped countries. Dr. Cascalho’s expertise in the analysis of B cell responses and immunoglobulin genes is central to the success of the research proposed in this application.
The cross-talk between the various stages of gene expression is a new field, in which my group has been at the forefront. Analogous to the whole-genome view, obtained in recent years by zooming-out from single gene to gene networks, we have shifted our attention from studies of the distinct steps of gene expression (e.g., transcription, translation) to the integration of all these processes. Hence, our work tries to unravel the cross-talks between all distinct processes. This integration is critical for ability of the cell to function as a system. These studies have led us to propose the following novel concepts:

• “mRNA imprinting,” which results from co-transcriptional binding of factors to nascent transcripts; this phenomenon affects the functionality and the fate of the imprinted transcripts in the cytoplasm. Using novel proteomic and genomic approaches, we have recently found dozens of proteins that bind nascent transcripts co-transcriptionally.

• “Synthegradases,” which are factors that enhance, or repress, both mRNA synthesis and decay simultaneously. These factors play key roles in determining RNA levels in the cells, and are also capable of imprinting these RNAs.

• “Synthegradosome,” which is a two-arm machinery that comprises of many transcription factors (including Pol II subunits) and mRNA decay factors; the syntehgradosome shuttles between the nucleus, where it mediates mRNA synthesis, and the cytoplasm, where it mediates mRNA demise.

• “mRNA coordinators,” which are factors that integrate all stages of the mRNA lifespan into a system.

These concepts should help us obtaining a “bird eye” view of regulation of gene expression.
Before joining the University of Michigan, Roger Cone served as a professor and chairman in the Department of Molecular Physiology and Biophysics and also the Joe C. Davis Chair in Biomedical Science at Vanderbilt University School of Medicine in Nashville, Tennessee. He was also the director of the Vanderbilt Institute for Obesity and Metabolism and an associate director for Vanderbilt’s Diabetes Research and Training Center.

Prior to joining Vanderbilt in 2008, Cone served as the director of the Center for the Study of Weight Regulation and Associated Disorders at Oregon Health and Science University (2003-2008) and a senior scientist at the Vollum Institute.

Cone and his laboratory associates work on the central control of energy homeostasis. Their primary interest is understanding how the central nervous system regulates energy storage, and the role of these neural circuits in obesity, disease cachexia, and anorexia nervosa. Recent projects include: development of small molecule compounds for the treatment of obesity, identification of novel cell signaling pathways in the brain involved in the regulation of body weight, and identification of genes predisposing humans to anorexia nervosa.

Cone has been recognized for a number of awards and distinctions including election to the National Academy of Sciences and the National Academy of Medicine, and named as a fellow of the American Association for the Advancement of Science.

Cone has received both local and international awards for his work, including the Ernst Oppenheimer Award (U.S. Endocrine Society), the Berthold Memorial Award (German Endocrine Society), the Freedom to Discover Award for Distinguished Achievement in Metabolic Diseases Research from Bristol-Myers Squibb, the Ipsen Prize, the Berson Award from the American Physiological Society, and the Donald Steiner Award from the University of Chicago.

Cone holds several U.S. patents and has published over 160 scholarly articles. He has served on the Board of Scientific Counselors for the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the board of the Hilda and Preston Davis Foundation, and currently serves on the Editorial Board of the journal *Cell Metabolism*, and the National Academy’s Board on Life Sciences.

Cone earned his B.A. in biochemistry, summa cum laude, from Princeton University in 1980. He received his Ph.D. in biology from Massachusetts Institute of Technology in 1985 under the mentorship of the gene therapy pioneer, Richard Mulligan.
Gabriel Corfas obtained an MSc in Biological Sciences from the University of Buenos Aires and a doctorate in Neurobiology from the Weizmann Institute of Science where he studies the molecular mechanisms of learning and memory under the mentorship of Dr. Yadin Dudai. During his postdoctoral training at Harvard Medical School, he contributed to the identification and cloning of the trophic factor Neuregulin 1 and its mechanism of action. In 1996 he was recruited as Assistant Professor at Harvard Medical School and Boston Children’s Hospital, eventually becoming Professor of Neurology and Otolaryngology, and director of basic research in Otolaryngology at BCH.

Since 2014 Corfas is the Director of the of Kresge Hearing Research Institute and associate chair for research for the Department of Otolaryngology and Head and Neck Surgery at the University of Michigan in Ann Arbor. Dr. Corfas is also very involved in Otolaryngology research at the national level, having served as member of the Board of Scientific Counselors for the National Institute of Deafness and other Communication Disorders and member of the Board of Directors for the American Tinnitus Association. Dr. Corfas was elected to serve as Secretary, Treasurer and member of the Council for the Association for Research in Otolaryngology.

Dr. Corfas’ laboratory is dedicated to understanding the molecular mechanisms of neuron-glia interactions and roles of glia in health and disease and using this knowledge towards developing treatments for nervous system disorders. Some of the Corfas’ lab key discoveries include a novel mechanism for ErbB4 receptor signaling in embryonic neural precursors and its role in cortical development; the effects of social isolation on central nervous system myelination and its implications for cognition and behavior; trophic factors that mediate synapse formation and regeneration of synapses in the inner ear and their use in hearing restoration; the identification of a drug that prevents and ameliorates small fiber neuropathy; the effects of transient demyelination on hearing; the roles of enteric glia in gastrointestinal motility; and mechanisms of age-related vestibular dysfunction.
Dr. Eisenberg is the John G. Searle endowed Chair and Professor of Epidemiology in the School of Public Health at the University of Michigan. Dr. Eisenberg received his PhD in Bioengineering in the joint University of California, Berkeley/University of California, San Francisco program, and an MPH from the School of Public Health at the University of California, Berkeley. Dr. Eisenberg studies infectious disease epidemiology with a focus on waterborne and vectorborne diseases. His broad research interests, global and domestic, integrate theoretical work in developing disease transmission models and empirical work in designing and conducting epidemiology studies. He is especially interested in the environmental determinants of infectious diseases.
LOLA ENIOLA-ADEFESO, PhD
University of Michigan – University Diversity and Social Transformation Professor; Vice Chair for Graduate Studies, Department of Chemical Engineering; Professor of Chemical Engineering, Professor of Biomedical Engineering, Professor of Macromolecular Science and Engineering, College of Engineering

Dr. Eniola-Adefeso is the director of the Cell Adhesion and Drug Delivery lab at the University of Michigan. She graduated from the University of Maryland Baltimore County (UMBC) with a bachelor’s in Chemical and Biomolecular Engineering. She completed her masters (2000) and doctoral degree (2004) in Chemical and Biomolecular Engineering at the University of Pennsylvania. She was postdoctoral associate at Baylor College of Medicine in Houston, Texas in the Pediatrics/Leukocyte Biology Department.

Dr. Eniola-Adefeso’s research interests focus on the interactions between blood leukocytes and the endothelial cells lining the blood vessel lumen during inflammation response with the central goal of using acquired knowledge to facilitate the design of novel vascular-targeted drug delivery vehicles. Dr. Eniola-Adefeso’s lab currently focuses on two major research thrust: (1) elucidation the mechanism of the receptor-ligand interactions critical for the adhesion and migration of immune cells and (2) hemodynamics and hemorheology-driven design of sophisticated leukocyte mimetics particulate carriers for targeting therapeutics to diseased vasculature. Since her arrival at Michigan, has received several honors and awards including the NSF CAREER Award, American Heart Association Innovator Award, and the American Heart Association Scientist Development Grant. Her research is currently funded by an R01 from the National Heart, Lung and Blood Institute, a grant from the National Science Foundation, and an industrial partnership with Banyan Biomarkers Inc.
Ayelet Erez was born in Israel, and completed her medical studies at the Technion Institute in Haifa, Israel. Following her Paediatric Residency, she completed a PhD in Cancer Genetics at Tel Aviv University. She then went to Baylor College of Medicine in Houston Texas, where she trained in Clinical Genetics together with being a postdoctoral fellow in metabolism.

Ayelet returned to Israel on 2012 as a senior researcher at the Weizmann Institute of Science in Rehovot Israel. In parallel, Ayelet works at the Genetic Institute in Souraski Medical Center in Tel Avivi as a paediatric cancer geneticist.

In her lab, Ayelet’s research focuses on changes in cancer metabolism through the prism of amino acid homeostasis. She has found that in addition to changes in amino acid anabolism to support cancer proliferation, there are also changes in amino acid catabolism in the tumor, which can be identified at the genomic and biochemical levels. These findings may potentially lead to the development of identifiable metabolic alterations for cancer diagnosis and therapy. Ayelet Erez is the incumbent of the Lea Omenn Career Development Chair.
Dr. Fleishman's lab is interested in how protein function is encoded in the structures of protein binders, enzymes, and antibodies. To test their understanding, they computationally design new protein functions not seen in Nature and experimentally characterize these designs. Iterations of design and experimental characterization enable them to understand new features of how protein function is specified in Nature.
Dr. Betsy Foxman is the Hunein F. and Hilda Maassab Professor of Epidemiology, Director of the Center for Molecular and Clinical Epidemiology of Infectious Diseases (MAC-EPID), and Director of the Interdisciplinary Training Program in Infectious Diseases (IPID). Dr. Foxman received her Bachelor’s of Science in Conservation of Natural Resources from the University of California, Berkeley, and MSPH and PhD in Epidemiology from the University of California, Los Angeles School of Public Health. She has been at Michigan since 1984. Dr. Foxman studies the transmission, pathogenesis, ecology and evolution of infectious agents, with an emphasis on transmission. She researches the transmission of antibiotic resistance among bacteria, of bacteria among individuals, and the population transmission system using molecular biologic, epidemiologic, and ecologic approaches. Her studies have demonstrated sexual transmission of uropathogenic E. coli, and sexual transmission of Group B Streptococcus. Currently she is characterizing the role of oral and vaginal microbiota in pre-term birth, the dynamics of oral microbiota and risk of dental caries, and investigating transmission of antibiotic resistance among E. coli and Group B Streptococcus. Additional projects include studies of viral infection and bacterial pneumonia, characterizing biofilm growth on medical devices, and determining the effectiveness of cranberries in preventing urinary tract infections.
Naama Geva-Zatorsky, Assistant Professor at the Technion, Faculty of Medicine. Ph.D., at the Weizmann Institute, Systems-Biology with Prof. Uri Alon, completed with honors and received the JFK, Teva and Barenholz awards. Postdoctoral studies, at Harvard Medical School, Mentor- Prof. Dennis Kasper and Profs. Benoist and Mathis. During her postdoc, in a collaborative effort, characterized the host response to ~60 different gut bacteria. She also applied metabolic labeling to enable, for the first time, visualization of anaerobic gut microbes, in real time, in association with the host.

In her lab, she is applying Systems-Biology thinking strategies with Microbiology, Immunology, metabolomics and bacteriophage biology to study the mechanistic interactions of the gut microbiota with mammalian host physiology in health and disease (specifically IBD and Cancer).

Geva-Zatorsky recently received the Alon and Horev fellowships, the UNESCO-L'Oreal award, Human Frontiers, EMBO and Fulbright fellowships, the CIFAR-Azrieli Global Scholar award of the Humans&Microbiome Program and the Jonshon&Johnson WiSTEM2D award.

**Representative Papers**


Dr. Ghosh studies the biochemical and molecular mechanisms behind cardiovascular diseases that are caused by tobacco smoking. He is specially interested to understand the pathogenesis of Abdominal Aortic Aneurysm (AAA) due to smoking. His research concerns cell signaling pathways, redox reactions and biomarkers that can help understand the cause and diagnosis of AAA. He is also interested in studies aimed at determining the effects of electronic cigarette vapors on cardiovascular, pulmonary and oral health. Dr. Ghosh completed his Ph.D studies from Jadavpur University, Kolkata, India and did further trainings in National Institutes of Science and Technology, Tsukuba, Japan. He was a visiting fellow at the National Institutes of Health, Bethesda, U.S.A prior to joining University of Michigan, Ann Arbor. He has mentored both basic and clinically oriented trainees through his research activities.

**Representative Papers**


Dr. Eyal Gottlieb is the Laura and Isaac Perlmutter Chair of Cancer Research, at the Ruth and Bruce Rappaport Faculty of Medicine, Technion – Israel Institute of Technology, Haifa, Israel.

Dr. Gottlieb received his BSc in Agriculture from the Hebrew University of Jerusalem and MSc and PhD in Molecular Cell Biology from the Weizmann Institute of Science, where he studied the role of the tumor suppressor gene, p53, in programmed cell death. In 1998 Dr. Gottlieb started his postdoctoral research as an EMBO fellow at the University of Chicago, and in 1999 he moved to the University of Pennsylvania, Philadelphia, where he became a Leukemia and Lymphoma Society Special Fellow. During his postdoctoral work, Dr. Gottlieb initiated his interest in metabolism and cancer research. In 2003, he moved to the Cancer Research-UK, Beatson Institute in Glasgow as a Research Group Leader and was appointed a Professor of Molecular Cell Biology at the University of Glasgow in 2009. In 2016, Dr. Gottlieb moved to the Technion where, in addition to his Chair position, he is the Director of the Laura and Isaac Perlmutter Metabolomics Center.

Dr. Gottlieb studies metabolic adaptations that support tumor growth under metabolic stress. Specifically, he explores vulnerabilities induced by the loss of the metabolic tumor suppressors fumarate hydratase (FH) and succinate dehydrogenase (SDH), as well as metabolic essentialities required for the survival of cancer cells under oxygen and nutrients scarcity. He utilizes genetics and biochemical approaches and particularly employs metabolomics, including stable isotope tracing, in cells and in-vivo, to delineate metabolic adaptabilities of cancer cells. Many of his discoveries are clinically relevant, and were translated to several drug discovery programs in academia and industry.


Beyond his academic research activities, Dr. Gottlieb is a Senior Editor at Cancer Research and a member of several Editorial Boards including Cell Chemical Biology, Cancer & Metabolism and Cell Death and Differentiation. He served as an adviser in several pharmaceutical and biotech companies, including AstraZeneca and Astex Pharmaceuticals and he is a co-Founder and Executive Board member of two Biotech companies, MetaboMed and Pangea Therapeutics.
The research theme of Dr. Holoshitz’ laboratory is the role of signal transduction events in health and disease. Using cellular, molecular, signal transduction and protein chemistry strategies, the laboratory is focusing on three research projects: 1. We have recently discovered that the rheumatoid arthritis (RA) shared epitope (SE) is capable of altering important signaling events. The cell surface receptor of the SE has been identified. We are presently characterizing the intracellular events that the SE triggers and deciphering the structure/function requirements of ligand-receptor interaction, using empiric and combinatorial peptide design approaches as well as mutational analysis of the binding domain(s) on the receptor. In a related project, the effect of the SE on endothelial and dendritic cells activation and differentiation is being studied. Beyond their potential utility for understanding immune mechanisms in RA, these studies could provide new insights into MHC-disease association. 2. The second project involves non-peptidic phosphoantigens, which activate a subset of T cells, called gamma-delta T cells. We have made progress in understanding the signaling pathway triggered by these compounds. We are currently investigating the effect of phosphoantigens on the cytolytic activity of gamma-delta T cells and the mechanisms involved in attenuation of that activity with SE ligands. 3. The focus of the third project is aberrations in program cell death (apoptosis) signaling in RA. We have identified a pathway that aberrantly attenuates apoptotic signals in lymphocytes and synovial fibroblasts from patients with RA. We are currently focusing on a family of G protein coupled receptors, which transduce the aberrant signal. In addition, proteome and microarray gene expression analyses are being employed to identify gene and protein expression patterns of RA lymphocytes in response to activation of these G protein-coupled receptors.
ALON KAHANA, MD, PhD
University of Michigan – Associate Professor, Ophthalmology and Visual Sciences

The Kahana lab pursues the following interrelated projects: (1) Molecular markers and personalized medicine for periorbital basal cell carcinoma; (2) Role of nuclear receptor ligands in orbital inflammation and thyroid eye disease; (3) Orbital muscle and nerve regeneration (using zebrafish); (4) Clinical outcomes in orbital surgery.

Representative Papers


Rajesh C. Rao; May P. Chan; Christopher A. Andrews; Alon Kahana. EZH2, Proliferation Rate, and Aggressive Tumor Subtypes in Cutaneous Basal Cell Carcinoma. JAMA Oncol. 2016;2(7):962-963.
Dr. Kaye is a Professor of Medicine in the Division of Infectious Diseases and Department of Medicine at University of Michigan Medical School. He is the Director of Research for the Division of Infectious Diseases. Dr. Kaye’s particular academic interests and skills include the prevention and management of healthcare-associated infections including those due to multi-drug resistant pathogens; antimicrobial stewardship; infections in the older adults; and surgical site infection.

Dr. Kaye received his medical degree from the University of Pennsylvania and completed his Internal Medicine residency and Infectious Diseases fellowship at Beth Israel Deaconess Medical Center in Boston, MA. During fellowship, Dr. Kaye earned a Master’s in Public Health from the Harvard School of Public Health. Dr. Kaye has authored over 280 peer-reviewed articles and 18 book chapters and has presented original research at national and international conferences. Dr. Kaye has dedicated his entire career to infection prevention and antimicrobial stewardship and served as the Corporate Medical Director for Infection Prevention at Detroit Medical Center (DMC) from 2008-2016 and as Corporate VP of Quality and Patient Safety at DMC from 2012-2016. He is currently serving as Past President of the Society for Health Epidemiology of America (SHEA). He is recognized as an expert in healthcare epidemiology and antimicrobial resistance and has been invited to speak on these topics at venues throughout the world. Some of his most noteworthy work pertains to the polymyxin antimicrobials, nephrotoxic antibiotics discovered in the 1950s that have recently taken on growing recognition and importance due their high level of activity against practically untreatable multi-drug resistant (MDR) Gram-negative bacilli. He currently is the PI on 2 NIH-funded trials evaluating the treatment of infections due to extremely-drug resistant (XDR) Gram-negative bacteria with polymyxins. Dr. Kaye also conducts cutting edge research pertaining to infection prevention, and is currently the PI on an AHRQ-funded trial evaluating the impact UV disinfection of patient rooms on the acquisition of infection due to Clostridium difficile and MDR pathogens in hospitals.
IZHAK KEHAT, MD, PhD
Technion – Israel Institute of Technology – Principal investigator, Molecular Cardiovascular System Research Lab

The mechanisms responsible for maintaining macromolecular protein complexes, with their proper localization and subunit stoichiometry, are incompletely understood. We study the maintenance of the sarcomere, the basic contractile macromolecular complex of cardiomyocytes. We perform single-cell analysis of cardiomyocytes using imaging of mRNA and protein synthesis, and demonstrate that three distinct mechanisms are responsible for the maintenance of the sarcomere: mRNAs encoding for sarcomeric proteins are localized to the sarcomere, ribosomes are localized to the sarcomere with localized sarcomeric protein translation, and finally, a localized E3 ubiquitin ligase allow efficient degradation of excess unincorporated sarcomeric proteins. We show that these mechanisms are distinct, required, and work in unison, to ensure both spatial localization, and to overcome the large variability in transcription. Cardiomyocytes simultaneously maintain all their sarcomeres using localized translation and degradation processes where proteins are continuously and locally synthesized at high rates, and excess proteins are continuously degraded.

Representative Papers


Dr. Kimchi’s lab studies programmed cell death (PCD), a network of multiple cell death and survival pathways, whose complex coordination determines a cell’s decision to live or die. They focus on apoptosis, autophagy and necroptosis. Their aim is to discover new pathways within and among these three modules, and to identify points of vulnerability in human diseases.
ROY KISHONY, PhD
Technion – Israel Institute of Technology – Marilyn and Henry Taub Professor of Life Sciences; Faculty of Biology; Faculty of Computer Science (secondary); Director – the Lorry Lokey center for Life Sciences and Engineering

Prof. Kishony is the Marilyn and Henry Taub Professor of Life Sciences and Director of the Lorry Lokey center for Life Sciences and Engineering at the Technion-Israel Institute of Technology. Prof. Kishony received his B.A. in Physics and Mathematics from the Hebrew University and his Ph.D. in Physics from Tel-Aviv University (1999). He moved to Biology as a postdoc at Princeton and Rockefeller Universities and continued as a Bauer Fellow at Harvard University. In 2005 he joined the newly established Department of Systems Biology at Harvard Medical School, where he was rapidly promoted to a Full Professor (2011). As a physicist at a major medical school, Dr. Kishony became fascinated by the urgent public health concern over the rapid evolution of antibiotic resistance. His combined theoretical-experimental background enabled him to define key questions in evolution of resistance in bold new ways. His lab has made a series of ground-breaking discoveries, showing how some drug interactions can select against resistance, unraveling mechanisms that keep resistance in check in natural ecological environments, and pioneered unique experimental and theoretical methodologies for tracking whole-genome evolution of pathogenic bacteria. The video of his experiment of evolving bacteria on a “MEGA-plate” was viewed more than 25 million times, making it one of if not the most viewed science videos in the world. These new approaches and discoveries inspire novel treatment paradigms for effective antimicrobial chemotherapy and genome-based diagnostics. Bringing his combined experimental-computational-theoretical expertise, Dr. Kishony has recently joined the Faculty of Biology and Faculty of Computer Science (secondary) at the Technion to develop an interdisciplinary initiative in quantitative biology at the Technion’s Lorry Lokey center for Life Sciences and Engineering.
Our research interest is in engineering aspects of vascular biology with a focus on the interplay between hemodynamics, vascular physiology, and transport phenomena in vascular diseases. The long-term objective of this research is to allow better understanding of the biophysical determinants of vascular disease and to leverage this knowledge to develop innovative therapeutic approaches. Projects are interdisciplinary and include: machine-responsive nano medicines, novel thrombolytic and anti-platelet nano-therapeutics, biomimetic micro-fluidic models of vascular disease and the study of red blood cell mechanics.

**Representative Papers**


Professor Shulamit Levenberg is the elected Dean of the Biomedical Engineering Department at the Technion. She also serves as the director of the Technion Center for 3D Bioprinting and The Rina & Avner Schneur Center for Diabetes Research. Prof Levenberg earned her PhD at the Weizmann Institute of Science, where she focused on cell adhesion dynamics and signaling, and pursued her post-doctoral research in tissue engineering at MIT, in the lab of Professor Robert Langer. In 2004, she joined the Technion Faculty of Biomedical Engineering where she conducts interdisciplinary research on stem cells and tissue engineering. She spent a sabbatical year (2011-2012) as a visiting professor at the Wyss Institute for Biology Inspired Engineering at Harvard University and a summer sabbatical (2017) at the University of Western Australia as a winner of the Raine Visiting Professor Award. Prof Levenberg received the Krill Prize for excellence in scientific research, awarded by the Wolf Foundation, and was named by Scientific American as a “Research Leader” in tissue engineering, for her seminal work on vascularization of engineered tissues. She also received the France-Israel Foundation Prize, the Italian Excellence for Israel Prize, the Teva Research Prize and the Juludan Prize. In 2018, she received the Rappaport Prize for Biomedical Sciences and in 2019 received the Bruno prize. Levenberg has authored over 100 publications, and presented her work in over 100 international conferences as an invited or keynote speaker. She is founder and CSO of two start-up companies in the areas of cultured meat and nanoliter arrays for rapid antimicrobial susceptibility testing. She is a member of the Israel National Counsel for Bioethics and is actively involved in training young scientists.
Victor Malka, Professor at the Weizmann Institute of Science in Israel, has obtained his PhD thesis at Ecole polytechnique in 1990. He was until September 2019 a CNRS Research Director at Laboratoire d’Optique Appliquée, and a Professor at Ecole Polytechnique. He worked on different topics such as atomic physics, inertial fusion, laser plasma interaction. His works now is mainly devoted on relativistic laser plasma interaction and on laser plasma accelerators and related societal applications, in which he makes several breakthrough contributions. He has published about 350 articles and has been invited in more than 175 international conferences. He got several international prizes and has coordinated many European projects. Victor Malka, fellow of APS and EPS, is member of the European Academy of science and officer of physic division. He is also member of Science Romanian Academy of Science. He got 2 Advanced and 2 Proof of Concept grants from the European Research Council.
DAVID MARKOVITZ, MD
University of Michigan – Professor of Internal Medicine; Division of Infectious Diseases

David Markovitz is a Professor of Internal Medicine in the Division of Infectious Diseases at the University of Michigan, who also has appointments in the programs in Cellular and Molecular Biology, Cancer Biology, and Immunology. His laboratory focuses on understanding how human cellular factors control the replication of viruses, and retroviruses in particular. These studies are performed both to understand the biology of viruses and to develop possible therapies for these important human pathogens, as well as to exploit the viruses as a mechanism for understanding human cellular biology and cancer. Dr. Markovitz’s work has been recognized by his election to the two principal honorary societies for academic Internal Medicine physicians, the American Society for Clinical Investigation and the Association of American Physicians, as well as to the American Clinical and Climatological Association.

In addition to his research, Dr. Markovitz is a consultant on the Infectious Diseases service at the University of Michigan and Veterans Hospitals. He has been married to Ruth Hurwicz Markovitz for 37 years, and they have three wonderful children, Lara, Rebecca, and Adam. David has a wide range of non-medical interests, and majored in Middle Eastern Studies as an undergraduate. He has a long-time interest in art, music, movies, novels, sports, and both serious and junky TV. David has traveled widely, and speaks 3½ languages.
Donna M. Martin, MD, PhD is the Donita B. Sullivan MD Research Professor in Pediatrics, Professor of Human Genetics, and Interim Chair of Pediatrics at the University of Michigan. Her research focuses on the genetic basis of neural development and disorders of human development, with an emphasis on genes that influence neuronal stem cell proliferation, differentiation, and migration. Her laboratory explores how transcription factors and chromatin remodeling proteins control gene transcription and nucleosome remodeling, thereby influencing key signaling and developmental pathways. Dr. Martin is a member of the American Society for Clinical Investigation, serving as Councilor 2017–2020, and Secretary of the American Society of Human Genetics, 2020-2023.
Melvin McInnis is the Thomas B and Nancy Upjohn Woodworth Professor of Bipolar Disorder and Depression. He is the director of the Heinz C Prechter Bipolar Research Program and associate director of the University of Michigan Depression Center. His psychiatry training was at the Maudsley Hospital, Institute of Psychiatry, London. He completed a fellowship in Medical Genetics at Johns Hopkins University and joined the faculty of Psychiatry at the Johns Hopkins School of Medicine in 1993. He was elected Fellow of the Royal College of Psychiatry (UK) in 2007.

Dr. McInnis was recruited to the University of Michigan in 2004 and leads the Heinz C Prechter Bipolar Research Program, a rich resource of clinical and biological data on individuals with bipolar disorder as well as healthy controls. An extensive multidimensional collaborative research team, involving several schools across UM, is focused on mechanisms that incorporates biological, genetic, and clinical data and programs designed towards predictive computational modeling integrates acoustic speech data with multimodal data from mobile and clinical observations to test models of outcomes in the illness.
Standing at the intersection of Biochemistry, Proteomics, and Immunology, Dr. Merbl’s lab studies proteostasis regulation in cancer and immunity. Maintaining protein homeostasis is a crucial cellular task involving an extensive protein network of more than 1,000 proteins that are responsible for sensing and responding to cellular stress, to allow proper function of our proteome. They focus primarily on two aspects of proteostasis control namely, regulatory mechanisms of protein post-translational modifications (PTMs) and degradation in health and disease.

The Merbl lab employs advanced high-throughput immuno-proteomic, proteomics and genomic methods, cell biology, biochemistry and in-vivo models to reveal new proteostasis control mechanisms. They combine their expertise to gain novel insight on basic research questions as well as develop cutting-edge technologies to transform their ability to analyze the proteomic landscape. Importantly, they aim for translating our findings into clinical applications and therapeutic interventions to promote human health.
Dr. Mody is Professor with Tenure at the University of Michigan and Associate Director for Clinical Programs at the VA Ann Arbor GRECC. She has an active translational research laboratory to define the clinical and molecular epidemiology of antimicrobial resistant pathogens and developing measures to prevent them. Dr. Mody’s work has led to a thriving consortium of long-term care facilities in SE Michigan interested in learning ways to enhance infection prevention in a traditionally resource poor setting. Her research is funded and supported by NIH, the VA and other foundations. Her most recent research projects involve two NIA funded RO1 studies to evaluate transmission of emerging resistant organisms in NHs and a multi-component targeted programs to curb infections older skilled nursing home patients. She is also involved in an AHRQ funded grant to evaluate the usefulness of gown and glove use in nursing homes. She is nationally active at several career development and research dissemination activities at the American Geriatrics Society, Society for Healthcare Epidemiology of America, the Infectious Diseases Society of America, and the Joint Commission. Dr. Mody is fluent in English, Hindi and Gujarati.
Arnold S. Monto, MD is the Thomas Francis Collegiate Professor of Public Health and Professor of Epidemiology at the University of Michigan School of Public Health in Ann Arbor. The major focus of his work has been the epidemiology, prevention and treatment of acute infections in the individual and the community. Respiratory infections, in particular influenza, have been a major interest, with special reference to the evaluation of vaccines in various populations and the assessment of the value of antivirals. He has worked on these issues in tropical as well as temperate regions. He led the studies of respiratory infection in Tecumseh, MI, a landmark study of infection in the community. He has studied various approaches to influenza vaccine use, particularly to control transmission of the virus in the community.

Dr. Monto is involved in assessing the efficacy of various types of influenza vaccine in prophylaxis and antivirals in prophylaxis and therapy of influenza, including implications of resistance. He now heads an observational study of effectiveness of influenza vaccines in various settings, including households. His recent activities have included evaluation of face masks and hand hygiene in the control of influenza transmission and determination of efficacy of the traditional inactivated and live attenuated influenza vaccines. He has been a member of the National Allergy and Infectious Diseases Advisory Council of the US National Institutes of Health and is currently a member of the Vaccine and Related Biological Products Advisory Committee (VRBPAC) of the FDA. He was past president of the American Epidemiological Society, the 2009 recipient of the Alexander Fleming Award of the Infectious Diseases Society of America for lifetime achievement and the 2012 recipient of the Charles Merieux award of the National Foundation for Infectious Diseases. He was a member of the Emergency Committee making recommendations to the World Health Organization during the last influenza pandemic.
Samuel R. Nason received the B.S. degree in electrical engineering from the University of Florida, Gainesville, FL, USA, and the M.S. degree in biomedical engineering from the University of Michigan, Ann Arbor, MI, USA, and is currently a Ph.D. candidate in biomedical engineering at the University of Michigan. His research focuses on low-power technologies for neural interfaces, with a more specific application towards dexterous finger and hand neuroprostheses.
Mical Paul is Director of the Infectious Diseases Institute at Rambam Health Care Center and Associate Professor at The Ruth and Bruce Rappaport Faculty of Medicine, Technion, Israel Institute of Technology. Her research is clinical and focuses on the management of infections in the hospital, multidrug-resistant bacteria, endemic infections and computerized decision support. She is an editor with Clinical Microbiology and Infection and the Cochrane Infectious Diseases Group and member of several World Health Organization and European Society of Clinical Microbiology and Infectious Diseases guideline development groups.
Myelin is an insulating membrane sheath produced by specialized glial cells; Schwann cells in the peripheral nervous system (PNS) and oligodendrocytes in the central nervous system (CNS). It enables fast and efficient nerve conduction, and provides essential trophic support to maintain axonal integrity and survival. Destruction of myelin leads to several neurological diseases such as multiple sclerosis, and is also associated with psychiatric and neurodegenerative disorders. Dr. Peles's lab combines molecular, biochemical and advanced light and electron microscopy techniques to study the various aspects of myelinating glial cells and the mechanisms that enable them to form one of the most complex structures found in nature.
I investigate macrophage activation and function, and their interactions with other cell types (especially epithelial/tumor cells) in the changing microenvironment (e.g., ischemia/hypoxia). I study the mechanisms that allow macrophages to promote angiogenesis and invasiveness/metastasis in malignant and autoimmune diseases. In particular, I focus on the role of EMMPRIN/CD147 in angiogenesis and metastasis, its effects on MMPs and VEGF, and its regulation by microRNA and microenvironmental cues. I have recently developed two new targeted-therapy approach that passively or actively activate the immune system against EMMPRIN, and now I study their efficacy in cancer models. Additionally, I try to identify the pro-angiogenic role of EMMPRIN in autoimmune diseases (e.g., RA, PsA, and T2DM), and use its expression, together with other pro-angiogenic factors, to develop a unique biomarker profile to assist in the evaluation of the dynamic inflammatory/angiogenic status of patients in cancer and autoimmune diseases.
Dr. Reiner’s lab studies the process of embryonic brain development, and what goes awry during disease conditions. In the developing brain, there is a relative change in the type of neuronal stem cells that are born; and neurons born in one position have to reach their final destination by active cell migration.

These highly dynamic processes are regulated via the concerted action of multiple gene products; and aberrant regulations may result in devastating consequences. Much of their work is focused on one severe form of brain malformation, known as lissencephaly (or "smooth brain"). Over the years they found that genes associated with this disease, among others, affect a variety of polarity decisions. Through interdisciplinary approaches, combining molecular, biochemical, in vivo, ex vivo, and in vitro studies with mouse and human brain organoid models, they examine a wide range of human developmental brain malformations (e.g. microcephaly and lissencephaly) and diseases (e.g. epilepsy, autism spectrum disorders, and schizophrenia).
Dr. Rom received his Ph.D. in Medical Sciences from the Technion – Israel Institute of Technology and his training in Clinical Nutrition at Rambam Health Care Campus, Israel. After being awarded the Michigan-Israel Fellowship, he continued his research program at the University of Michigan Cardiovascular Center. Supported by the American Heart Association, Dr. Rom’s research focuses on elucidating metabolic and molecular mechanisms of cardiometabolic diseases to identify novel therapeutic targets. He is particularity interested in understanding the complex interactions between amino acid and lipid metabolism in the pathogenesis of atherosclerosis and non-alcoholic fatty liver disease (NAFLD). Currently, he is working on new potential therapies for atherosclerosis and NAFLD identified using a combined approach applying metabolomics, transcriptomics and genome-wide association studies.
Noga Ron-Harel is an assistant professor in the Faculty of Biology at the Technion, Israel. She established her research group in 2018 to study immunometabolism and aging. Research in the Ron-Harel lab aims at defining new mechanisms by which cellular metabolism regulates adaptive immunity, with the goal to discover new metabolic nodes that can be targeted to both alleviate immune deficiency (i.e. aging) and attenuate exacerbated immunity (i.e. autoimmunity).
Long lasting protection from harmful pathogens depends on collaboration of multiple types of immune cells each with a unique function. These cells interact with each other in small confined niches in lymphoid organs and exchange molecular signals required for differentiation into cells with the capacity to eliminate invading pathogens. Protective antibodies evolve in lymphoid organs in sites known as germinal centers. Dr. Shulman's lab examines how interactions between immune cells promote antibody affinity maturation and differentiation of B cells into long lived memory and antibody forming cells.
SHAI SHEN-ORR, PhD
Technion – Israel Institute of Technology – Associate Professor, Department of Immunology; Rapport Faculty of Medicine

Systems Biologist Shai Shen-Orr is an Associate Professor in the Faculty of Medicine at the Technion—where he directs the laboratory of Systems Immunology and Precision Medicine. Shai develops novel analytics for studying the immune system—tools which he applies to study the drivers of immune variation and to further Precision Medicine. Shai’s research founded CytoReason, a company building molecular tissue models by AI to advance drug development in pharma.
David Sherman studies the natural chemical compounds made by microorganisms in order to harness the tremendous capabilities of microorganisms to create complex molecules with the potential for use as new therapeutic treatments. His research explores the fundamental aspects of combinatorial biosynthesis while pursuing drug discovery opportunities for infectious diseases and cancer.

A large number of today’s drugs are based on natural products which have been discovered from terrestrial and marine microbes. Sherman is performing molecular genetic analysis of natural products biosynthesis in marine cyanobacteria, actinomycetes and myxobacteria. He uses a diverse set of tools, including molecular genetic, biochemical and bioorganic chemical studies.

The unique chemistry that constructs complex terrestrial and marine natural products is derived from a virtually limitless source of novel enzymes (catalysts) responsible for creating a diverse set of biologically active small molecules. As new classes of marine natural products are explored, it will be possible to use the versatile tools of genetic engineering to over-express, purify and characterize fully the unique chemical catalysts that have evolved in the terrestrial and marine environments.

Sherman’s work exploits the huge potential of microorganisms to create novel organic molecules by deliberate in vivo and in vitro engineering of the genetic pathways of natural product biosynthesis, perhaps resulting in human and veterinary pharmaceuticals, specialty chemicals, and high value biomaterials. It is possible that the single most important new source of the needed metabolic diversity for the creation of new pathways will be provided by natural product biosynthetic genes derived from marine microorganisms. Sherman’s lab is aggressively pursuing novel metabolic pathways from micro- and macro-organisms, including those from sponge symbionts and other invertebrates.
MAX SHTEIN, PhD  
University of Michigan – Professor, Materials Science and Engineering; Chemical Engineering; Center for Entrepreneurship

Prof. Shtein earned his B.S. in Chemical Engineering at UC Berkeley (1998) and Ph.D. in Chemical Engineering, while co-advised by Prof. Benziger in ChE and Prof. Forrest in EE at Princeton (Summer 2004), where he developed key aspects of Organic Vapor Phase Deposition and invented Organic Vapor Jet Printing. He joined the Materials Science and Engineering department at the Univ. of Michigan in Fall 2004, where he now serves as Professor, with appointments in Chemical Engineering, Applied Physics, Macromolecular Science and Engineering, Art & Design, and as faculty co-director for the Undergraduate Program in Entrepreneurship in the College of Engineering.

Prof. Shtein’s lab at the University of Michigan specializes in organic thin films and nanostructures for biomedical and pharmaceutical applications, as well as energy conversion. His work has been recognized through the Presidential Early Career Award for Scientists and Engineers (PECASE), the MSE Department Achievement Award, College of Engineering-wide Vulcans Prize for Excellence in Education, the Newport Award for Excellence and Leadership in Photonics and Optoelectronics, the Materials Research Society (MRS) graduate student Gold Medal Award, and others. He co-founded Arborlight, LLC (www.arborlight.com – a multiple award-winning lighting technology company), Sublime, LLC (a pharmaceutical technology company), and co-authored the book “Scalable Innovation: A Guide for Inventors, Entrepreneurs, and IP Professionals.” (Taylor & Francis, ISBN-10: 1466590971)
Dr. Stern-Ginossar’s lab studies viruses and the creative strategies they use to maneuver their host cells. The lab is interested in deciphering the roles different viral elements are playing during infection, as well as how viruses interface with and commandeer cellular pathways to control gene expression. They study these complex interactions using mainly cytomegalovirus (CMV), a herpesvirus that infects the majority of the world’s population, leading to severe diseases in newborns and immunocompromised adults. They anticipate their studies will uncover new aspects of virus-host interactions, as well as reveal new cell biology principles.
AMOS TANAY, PhD
Weizmann Institute of Science – Department of Computer Science and Applied Mathematics; Faculty of Mathematics and Computer Science

Dr. Tanay builds mathematical models for the epigenetic changes in cells—mechanisms that affect the availability and function of the cell’s DNA without changing the sequence itself. Similar to tiny computers, cells regulate their activity by running “software” encoded into their DNA that controls the “hardware”—the components of the cell itself. In order for such software to work correctly and distinguish among different cell types, cells employ several mechanisms that serve as their memory.

Dr. Tanay and his group develop single cell genomics techniques to characterize the molecular activity and epigenetics of cells within tissues. They then apply mathematical methods to understand how individual cells determine and maintain their proper role within the context of billions of other cells in the body. Methods for profiling and modeling tissues at single cell resolution are particularly important in cancer, since tumors develop due to individual cells that rewrite their memory and suppress the tissue’s normal control mechanisms.

He has received a number of prestigious scholarships and awards, including the 2013 Helen L. and Martin S. Kimmel Award for Innovative Investigation, the 2012 Krill Award for Excellence in Scientific Research, the European Molecular Biology Organization (EMBO) young investigator award (2010), the Morris L. Levinson Prize in Mathematics (2010), and the Rothschild Postdoctoral Fellowship (2006). In 2015, he became a member of the EMBO.

Dr. Tanay is married and has four children. He is also a keen jazz piano player.
Prof. Eldad Tzahor received a BSc in biology from the Hebrew University of Jerusalem (1991), and a PhD in molecular biology (1999) at the Weizmann Institute of Science (Rehovot, Israel). After postdoctoral training at Harvard Medical School (Boston, USA), he joined the staff of the Weizmann Institute in 2003. Prof. Tzahor studies novel mechanisms for cardiac regeneration following injury in mammals, a major challenge in current biomedical research. The lab develops novel approaches in cardiac biology to stimulate heart regeneration and repair. Prof. Tzahor is considered a world leader in the field of cardiac regeneration. His research in the field of regenerative medicine could potentially lead to treatments for heart disease in adult patient. He is the recipient of a number of prestigious grants and awards, including two European Research Council (ERC) grants, Foundation LeDucq, Horizon 2020 Regenerative Medicine and the Levinson Prize in Biology.
Research in our laboratory focuses on understanding the roles of unconventional neurotransmitters, like the D-amino acids in the central nervous system. We are particularly interested in the regulation of N-Methyl-D-aspartate receptors (NMDARs) by D-serine, a D-enantiomer previously thought to be restricted to bacteria or lower invertebrates. D-Serine is now appreciated as the main physiologic ligand at the co-agonist site of NMDARs and mediates several NMDAR-dependent processes, including synaptic plasticity and neurodegeneration. Over the past few years, we elucidated the mechanisms of D-serine synthesis by the enzyme serine racemase and discovered novel pathways regulating D-serine production and release that play a role in synaptic plasticity and neurodevelopment. More recently, our laboratory characterized a new astrocyte-neuron metabolic crosstalk we coined the serine shuttle, whereby astrocytes export L-serine for the neuronal production of D-serine. We demonstrated that the serine shuttle is essential for synaptic plasticity and neurodevelopment by pharmacological and genetic inactivation of several of its components, including novel D-serine transporters we recently identified. Mutations in the serine shuttle components cause severe neurodevelopmental impairments in humans as well, highlighting an essential role of this pathway in brain function and neurodevelopment.

Representative Papers


Ada Yonath is focusing on protein biosynthesis and antibiotics hampering it. She is a member of Weizmann Inst (WIS) faculty and the Director of Kimmelman Center for Biomolecular Structure and Assembly; Department of Structural Biology; Faculty of Chemistry.

Ada Yonath is focusing on protein biosynthesis and antibiotics hampering it. She is a member of Weizmann Inst (WIS) faculty and the Director of Kimmelman Center for Biomolecular Structure and Assembly. She received her MSc from the Hebrew University and her PhD from WIS. She was a postdoc at Carnegie Mellon and MIT, and in the seventies she established the first structural-biology laboratory in Israel. During 1986-2004 she headed Max-Planck-Research-Unit for Ribosome Structure in Hamburg in parallel to her activities at WIS. Among others, she is a member of US-National (NAS); Israel; German; Korean; Italian; the Pontificia Accademia-delle-Scienze (Vatican), Korean and more. She holds honorary doctorates from Oslo, NYU, Mount-Sinai, Oxford, Cambridge, Hamburg, Berlin-Technical, Patras, De-La-Salle, Xiamen, Grenoble, Strasbourg, Mendel, Westlake, Lodz and almost all Israeli universities. Her awards include Israel Prize, the Louisa-Gross-Horwitz; Wolf; Harvey; Linus-Pauling Gold Medal; UNESCO/L'Oreal; Albert-Einstein Award for Excellence; and the Nobel Prize for Chemistry.
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