

Press Information, July 28, 2021

Cells: The Basic Units of Life

How cell atlases can shed light on disease mechanisms with remarkable accuracy

The Schering Stiftung awards the Ernst Schering Prize 2021 to Aviv Regev. A pioneer in the field of single-cell analysis, she successfully combines approaches from biology and computer science and thus revolutionizes the field of precision medicine.

Aviv Regev is considered a pioneer in the field of single-cell biology and has broken new ground by combining the disciplines of biology, computation, and genetic engineering. She has uniquely succeeded in combining and refining some of the most important experimental and analytical tools in such a way that she can analyze the genome of hundreds of thousands of single cells simultaneously. This single-cell genome analysis makes it possible to map and characterize a large number of individual tissue cells. Aviv Regev was the first to apply these single-cell technologies to solid tumors and to successfully identify those cells and genes that influence tumor growth and resistance to treatment. In addition, she discovered rare cell types that are involved in cystic fibrosis and ulcerative colitis. Last but not least, together with international research groups, and her colleague Sarah Teichmann she built the Human Cell Atlas and inspired scientists all over the world to use these tools to create a comprehensive atlas of all cell types in the human body. These cell atlases of parts of the human body illuminate disease mechanisms with remarkable accuracy and have recently also been used successfully to study disease progression in COVID-19.



Prof. Aviv Regev, PhD
Photo: Casey Atkins

Prof. Aviv Regev, PhD, is Executive Vice President and Global Head of Genentech Research and Early Development at the biotechnology company Genentech, a member of the Roche Group, and a professor at the MIT Department of Biology and the Broad Institute in Cambridge, MA (USA) (currently on leave). Prof. Aviv Regev receives the **Ernst Schering Prize 2021** for her outstanding research. A seven-member jury composed of international scientists selected Regev's research from among 27 nominations. The 50,000-euro prize is one of the most prestigious German science prizes. It is given annually by the Schering Stiftung to scientists worldwide whose path-breaking research yields new, inspiring models or leads to fundamental shifts in biomedical knowledge. Prof. Stefan Kaufmann, chair of the Foundation Council of the Schering Stiftung, said: "The unique combination of single-cell analysis and bioinformatics makes it possible to gain a much better understanding of the composition of healthy and diseased tissue in its particularities and thus provides the foundation for new therapeutic approaches in the future."

Professor Regev was nominated for the Ernst Schering Prize by **Prof. Geneviève Almouzni**, PhD, Honorary Director and Head of the Chromatin Dynamics team at the Research Center of the Institut Curie, Paris. Professor Almouzni, who will lead a conversation with Aviv Regev about her research at the award ceremony, said: "Aviv Regev is one of the leading scientists of her generation. Her energy and her curiosity are infectious, and she inspires younger generations thanks to her leadership and mentoring skills. Her contributions to the field of single-cell genomics, including the establishment and inspiration of the international Human Cell Atlas community, make her an ideal choice for the Ernst Schering Prize."

Award Ceremony: Ernst Schering Prize

September 7, 2021, from 5:15 p.m., in English

Berlin-Brandenburg Academy of Sciences and Humanities | Markgrafenstr. 38 | 10117 Berlin

5:15 p.m. Ernst Schering Lecture "Cell Atlases as Roadmaps in Health and Disease" by Prof. Aviv Regev, Leibniz Hall and livestream on [YouTube](#)

6:30 p.m. Award Presentation, Leibniz-Hall

By registration only. Please register with Dr. Katja Naie at naie@scheringstiftung.de.

Lectures by Prof. Aviv Regev

September 8, 2021

Lecture to students: *The Human Cell Atlas: Google Maps for the Human Body*
Schulfarm Insel Scharfenberg, Berlin-Tegel (not open to the public)

September 8, 2021, 3:00 p.m.

Public scientific lecture: *From Cell Atlases to Therapies in Cancer*
Max Planck Institute for Molecular Genetics (MPIMG)
Seminar Room 1
Innestrasse 63–73 | 14195 Berlin
In English | No registration necessary.

Background Information

Cells are the basic units of life. All the cells of an individual have the same DNA sequence, yet they differ, because in each cell, different genes are expressed from the genome. If a gene's function is affected and thus leads to malfunction that is the basis of a disease, the disease manifests primarily in those cells where this gene is needed for the cell's function. Thus, knowing our cells – the genes that act in them and how they differ from each other – is essential for understanding disease.

For the past 150 years, scientists have tried to provide a more exact description of cells: their shape, function, location, and molecules in cells. For a long time, the classification of cells was made based only on the morphology visible through the microscope. Although the DNA has been isolated for the first time in 1869, the first genomes and transcriptomes – the RNA molecules transcribed from active genes in a cell – could only be sequenced one century later, requiring the use of bulk samples, averaging millions of cells together. If each cell is one piece of fruit, this would be akin to studying a handful of blueberries in a fruit smoothie blended together from many other types of fruit.

Aviv Regev was a key pioneer in developing single-cell genomics, which allowed her to look at individual cells - the pieces of fruit within a fruit salad, instead of a smoothie. Thanks to the continual refinement of the methodology and combined with even newer spatial techniques and powerful machine learning algorithms, Regev can now map and characterize tens of millions of cells. She analyzes where they reside within tissues, the molecular circuits that control them, and how they maintain our tissues in health and malfunction in disease. This way, she succeeded in, among other things, identifying cells and genes that drive tumor growth and those that are responsible for resisting treatment. Her outstanding work has laid the foundation for the Human Cell Atlas, which is now being used and refined by numerous scientists worldwide with the goal of mapping and characterizing all cells of the human body under physiological and pathological conditions.

Aviv Regev is Executive Vice President and Global Head of Genentech Research and Early Development at the biotechnology company Genentech, a member of the Roche Group. Prior to Genentech, Regev served as founding director of the Klarman Cell Observatory at the Broad Institute, Professor of Biology at MIT, and Investigator of the Howard Hughes Medical Institute. She is a founding co-chair of the Human Cell Atlas. Aviv Regev has pioneered the development of foundational experimental and computational methods in single-cell genomics and is a leader in deciphering molecular circuits that govern cells, tissues, and organs in health and disease. Among many honors, she is an elected member of the National Academy of Sciences and the National Academy of Medicine in the United States.

Further Information

This press release as well as images and soon a graphic novel on Professor Regev's research can be found at <https://scheringstiftung.de/en/presse/>.

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