PRESS RELEASE
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2021 LOUIS-JEANTET PRIZES

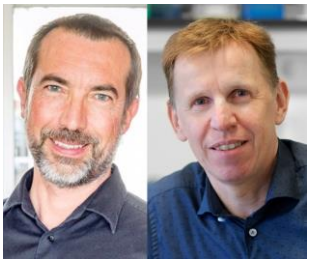
The 2021 Louis-Jeantet Prizes are awarded to PATRICK CRAMER, Director at the Max Planck Institute for Biophysical Chemistry in Göttingen, and jointly to JÉRÔME GALON from the Institut National de la Santé et de la Recherche Médicale (INSERM) in Paris, and TON SCHUMACHER from the Netherlands Cancer Institute in Amsterdam.

2021 Louis-Jeantet Prize for medicine

PATRICK CRAMER, of German nationality, is awarded the 2021 Louis-Jeantet Prize for Medicine for providing an understanding of the key structural and biochemical aspects of gene transcription in eukaryotic cells.

Gene transcription is a fundamental pathway in human development and health. Patrick Cramer has played a pivotal role in elucidating the structural basis of the eukaryotic transcription machinery by describing the mechanisms underlying RNA polymerase II transcription initiation, elongation, and regulation.

Patrick Cramer will use the prize money to accelerate efforts to understand gene transcription in the context of chromatin, to support efforts to investigate the mechanism of coronavirus replication, and to seek small molecule inhibitors for SARS-CoV-2 polymerase.



2021 Jeantet-Collen Prize for translational medicine

JÉRÔME GALON, of French nationality, and TON SCHUMACHER, of Dutch nationality, will share the 2021 Jeantet-Collen Prize for translational medicine for the development of technologies to study the role of the immune system in cancer progression and for the improvement of cancer diagnosis and treatment.

The immune system is the body's defence mechanism: it usually protects the body from the harmful effects of pathogens or abnormal cells, including cancer cells. Jérôme Galon and Ton Schumacher have made seminal contributions to the understanding of how the immune system recognises cancer cells and to the understanding of the antitumor activity of novel cancer immunotherapies.

Jérôme Galon and Ton Schumacher will use the prize award to further understand the immune microenvironment during tumour transition and to predict which tumour antigens are recognized by T cells, in order to achieve novel diagnostic and therapeutic opportunities.

The recipients of each LOUIS-JEANTET PRIZE are awarded CHF 500,000, of which CHF 450,000 is for the continuation of the prize-winners' research and CHF 50,000 is for their personal use.

PATRICK CRAMER

Born in 1969, Patrick Cramer studied chemistry at Stuttgart, Heidelberg, Bristol and Cambridge, and carried out his Ph.D. at the European Molecular Biology Laboratory (EMBL) in Grenoble. From 1999 until 2001 Cramer worked as a postdoctoral researcher with the later Nobel laureate Roger Kornberg at Stanford University, USA. He became a professor of biochemistry at the University of Munich in 2001 and served as Director of the Gene Center Munich from 2004 to 2013. Since 2014, he has been Director of the Max Planck Institute for Biophysical Chemistry in Göttingen.

In 2009 Patrick Cramer was elected to the European Molecular Biology Organization (EMBO) and to the German National Academy of Sciences Leopoldina. In 2020 he was elected to the National Academy of Sciences, USA. Throughout his career, he has been honoured with awards and recognitions, including the Gottfried Wilhelm Leibniz Prize and, most recently, the Otto Warburg Medal.

A molecular movie of gene transcription

During the complex process of transcription, cells make copies of their genes in the form of RNA molecules. These RNA molecules then serve as instructions for building proteins – the tools of living cells. The copying process, from DNA to RNA, starts with the recruitment of an RNA polymerase complex to a gene and is followed by a set of successive steps: initiation, elongation, and termination. RNA polymerases, the molecular machines in our cells, associate with many other proteins to control which gene is transcribed at any specific time. This timely and precise regulation of gene transcription is essential for the development of organisms and the maintenance of healthy cells.

Patrick Cramer and his team are investigating how RNA polymerase machines are structured. They also want to understand how polymerases work and how they are controlled. They have deciphered the three-dimensional structure of RNA polymerase II and showed how it is controlled by a large number of cellular factors. His research group was able to clarify in detail how transcription is regulated and make it visible in a video that is now widely used in teaching.

In diseases such as cancer, transcription is strongly activated, enabling the disease's uncontrolled cell growth. Cramer's team has described how genes are switched on in human cells by factors that convert the copying machine into a highly active form. His work provides a framework for investigating and controlling gene regulation, which governs cell differentiation, development, and diseases. Recently, Cramer also described the polymerase that the new coronavirus SARS-CoV-2 uses to copy its genome.

JÉRÔME GALON and TON SCHUMACHER

Jérôme Galon was born in 1967 in France. He obtained his Ph.D. in immunology from the University of Jussieu, Paris Diderot, University of Paris and he worked at the National Institute of Health (NIH) in Bethesda, USA on functional genomics, bioinformatics, and immunology. In 2000 he established a research group at the National Institute of Health and Medical Research (INSERM) in Paris, France. In 2007 he became Director of research and Director of the laboratory of integrative cancer immunology. In 2015 he created the immune-oncology diagnostic company HalioDx.

Born in 1965, **Ton N. Schumacher** carried out his Ph.D. with Hidde Ploegh at The Netherlands Cancer Institute, describing fundamental rules of antigen presentation, and did his postdoctoral research with Peter Kim at The Whitehead Institute, MIT, USA. In 1996 he came back to his home country and joined The Netherlands Cancer Institute, where he is currently Senior Member. He is also Principal Investigator at the Oncode Institute, and professor of Immunotechnology at Leiden University.

Both **Jérôme Galon** and **Ton N. Schumacher** have received numerous prizes, including the European Inventor Award in Research (Jérôme Galon) and the Stevin Prize (Ton Schumacher). They both received the William B. Coley Award in 2010 and 2016, respectively.

Anti-tumour immune responses

In recent years, it has become apparent that our immune system can control the outgrowth of cancer. A fundamental question that stems from this observation has been how the human immune system can distinguish cancer cells from healthy body cells and how an improved understanding of the tumour microenvironment, in particular the interaction between the tumour and the host's immune system, can be used for diagnostic purposes.

The tumour microenvironment is complex, comprising, together with tumour cells and vascular vessels, various types of infiltrating immune cells. Jérôme Galon showed that the location, density, and type of the different immune cell populations within a tumour (defined as the "immune contexture") indicate the disease prognosis and the efficacy of various cancer therapies. He has shown for the first time in humans that the evolution of tumor clones is dependent on the recognition of neoantigens by T lymphocytes. He initiated and coordinated the largest worldwide multicentre consortium trialling a method, known as the "Immunoscore", to estimate the prognosis of cancer patients based on the immune contexture and the cytotoxic T-cells. The results of the study demonstrated that the Immunoscore has a greater prognostic value than the classical cancer staging system, providing important information for the personalised management of cancer patients. As a result, the Immunoscore was introduced into the World Health Organization (WHO) book for Digestive System Tumours classification, as well as the Clinical Practice Guidelines for gastrointestinal cancer, in 2020.

Ton Schumacher uses a technology-based approach to analyse immune function. Through development of novel assay systems, his research group has made it possible to describe with unprecedented depth which antigens are seen by the T cells that infiltrate human tumours. Schumacher and co-workers subsequently used these technologies to demonstrate that T cells in human cancers, such as melanoma and lung cancer, frequently respond to newly formed antigens ("neoantigens") that arise as a consequence of DNA mutations. His research provided the first evidence that immune checkpoint blockade, the most widely used form of cancer immunotherapy, can increase the capacity of the T cell-based immune system to recognize such neoantigens. Finally, the observation by Schumacher and others that T cell-based cancer immunotherapies show the most profound activity in cancer types with large amounts of DNA damage provides independent evidence for the role of cancer neoantigens in human tumour control and has inspired the development of neoantigen-directed cancer therapies.

Ton Schumacher and Jérôme Galon have opened a new view of cancer, in which the role of the patient's immunity is better appreciated and characterised. Together, their research provides patients with improved cancer diagnosis and novel opportunities for therapeutic intervention.

THE LOUIS-JEANTET PRIZES

Every year, the Louis-Jeantet Prizes distinguish leading-edge researchers who are active in the member states of the Council of Europe.

As one of the best-endowed awards in Europe, the Louis-Jeantet Prizes foster scientific excellence. They are not intended solely as the recognition of work that has been completed, but also to encourage the continuation of innovative research projects. When the research being recognised is close to practical applications for combating illnesses affecting humankind, one of the Louis-Jeantet Prizes converts into a Jeantet-Collen Prize for Translational Medicine, supported by generous donations from the Désiré Collen Stichting.

Established in 1986, the Louis-Jeantet Prizes have thus far been awarded to 96 researchers: 27 in the United Kingdom; 17 each in Switzerland and Germany; 15 in France; 4 each in Sweden, Italy and the Netherlands; and 2 each in Austria, Belgium, Finland and Norway. Among the 96 prize-winning researchers, 14 have subsequently won the Nobel Prize for physiology or medicine, or the Nobel Prize for chemistry.

Since 1986, a total sum of more than CHF 60 million has been awarded by the Foundation to the 96 prize-winners for the continuation of their work.

THE LOUIS-JEANTET FOUNDATION

Founded in 1983, the Louis-Jeantet Foundation is the legacy of Louis Jeantet, a French businessman and a citizen of Geneva by adoption. The Foundation's aim is to move medicine forward and to defend the role and identity of European biomedical research vs. international competition. Established in Geneva, the Foundation is part of an open Europe and devotes its efforts to recognizing and fostering medical progress for the common good.

The Louis-Jeantet Foundation allocates some CHF 2.5 million each year to promoting biomedical research. It invests this sum for European and for local research projects. At the local level, the Foundation encourages teaching and the development of research at the Faculty of Medicine of the University of Geneva.

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