Nobel Laureate
for Chemistry
2004

AARON CIECHANOVER

Nagoya University Lecture
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INTERNATIONAL PEACE FOUNDATION BRIDGES
event series

2024.1.27(sat) 14:00 – 16:00
NAGOYA CONGRESS CENTER - Shirotori Hall

Science and technology as a novel language of peace - the journey to new drug development in our time

We are exiting the era where our approach to treatment is “one size fits all” and enter a new one of “personalized medicine” where we shall tailor the treatment according to the patient’ s molecular/mutational profile. It will require a change in our approach to scientific research and development and to education, where interdisciplinarity will domineer and replace in many ways the traditional, discipline-oriented approach.

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NAGOYA UNIVERSITY
高等研究院 名古屋大学

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Science and technology as a novel language of peace - the journey to new drug development in our time

Many important drugs such as penicillin, aspirin or digitalis were discovered by serendipity - some by curious researchers who noted an accidental phenomenon, some by isolation of active ingredients from plants known for centuries to have a specific therapeutic effect. Other major drugs like statins were discovered using more advanced technologies such as targeted screening, yet the discoverers were looking for a different effect. In all these cases the mechanisms of action of the drug were largely unknown at the time of their discovery and were discovered only later. With the realization that not all patients with diseases that physically and histo-pathologically appear to be the same - different malignancies, for example - respond similarly to treatment, and their clinical behavior is different, we have begun to understand that their molecular basis is distinct. Accordingly, we are exiting the era where our approach to treatment is “one size fits all” and enter a new one of “personalized medicine” where we shall tailor the treatment according to the patient’ s molecular/mutational profile. Here, unlike the previous era, the understanding of the mechanism will drive the development of the new drugs. This era will be characterized by the development of technologies where sequencing and processing of individual genomes will be cheap (US$ <1,000) and fast (a few min), by identification and characterization of new disease-specific molecular markers and drug targets and by design of novel, mechanism-based drugs to modulate the activities of these targets. It will require a change in our approach to scientific research and development and to education, where interdisciplinarity will domineer and replace in many ways the traditional, discipline-oriented approach.

Prof. Aaron Ciechanover

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Prof. Aaron J. Ciechanover is a biologist, born in Haifa, Israel. He studied Medicine in Jerusalem and carried out his graduate studies at the Faculty of Medicine at the Technion (Israel Institute of Technology) in Haifa, Israel. He continued as a post-doctoral fellow at the MIT and returned to Israel at the mid-1980s as a faculty member at the Technion. He shared the Nobel Prize for Chemistry with Prof. Avram Hershko and Prof. Irwin Rose for the discovery of ubiquitin-mediated protein degradation. Thanks to the work of the three Laureates, it is now possible to understand at the molecular level how the cell controls a number of central processes by breaking down certain proteins and not others. Examples of processes governed by ubiquitin-mediated protein degradation are cell division, DNA repair, quality control of newly-produced proteins and important parts of the immune defence. When degradation does not work properly, we fall ill. Most neurodegenerative diseases (Parkinson’ s) and many malignancies (Uterine cervical cancer) are few examples. This knowledge led already to the development of efficient drugs, and many more are in the pipeline.