New developments in lung cancer diagnosis and pathological patient management strategies

During the last decade we have seen many changes in the field of Lung Pathology, and had to keep with the immense progress: new therapy options for lung cancer patients have changed our practice and required to learn from disciplines such as genetics and immunology. Numerous clinical studies are on the way, testing new drugs to interfere with the biology of lung cancer, and individualized therapy is no longer a vision, but daily reality. For oncologists it is even sometimes hard to recruit a sufficient number of lung cancer patients for the clinical trials. Pathologists have to test and evaluate the targets in a given cancer specimen to provide the information for the correct treatment—never before pathologists were such an important part in the clinical management team as now.

And news is coming up almost every day. The aim of this series is to discuss new developments or already present techniques and confront pathologists with this news, hopefully convincing them to adjust the daily practice accordingly. For other disciplines information is provided, what pathology can add into their clinical practice in serving patients. For this series I have invited several outstanding pathologists from all over the world.

There is a general aspect to be mentioned: Pathology as a discipline is at a major cross road. If pathologists do not keep with the new development, they will be replaced by others.

Outsourcing of molecular tests to commercial companies is already seen in some countries, however, this means loss of competence: If pathologists just handle the mailing of tissues, they will be faced with a problem in tumor boards, because they have no control over the methodology and performance of a molecular tissue analysis, and this all will not support our patients. Young medical doctors will not be interested in the H&E based morphology, so we also will run out of residents and stuff members. Drs. Brcic and Kern present here an article on their personal view on outsourcing of molecular tests for non-small cell lung carcinomas.

On the other side there is a bright future for pathology: new methods will enter pathology, learning immunopathology will not only enable pathologists to direct the oncologic treatment, but will also broaden our understanding of immune diseases. Dr. Hofmann will discuss new insight into the interaction between lung cancer and the patient´s immune system.

Organoids might enable us to test drugs for their efficacy on an individualized basis. In addition, also cell culture studies and xenotransplants are used to study the role and factors of progression as well as resistance mechanisms in lung cancer, long before this is going to happen in the patient. Drs. Ku-Geng, D'Arcangelo, and Ming-Sound will discuss these new methods and their value not only for basic research, but also their impact on patient's treatment options.

New treatment options are coming up for the neuroendocrine carcinomas, and subclassification in small cell carcinoma might pave the way for new treatment options in these most often highly aggressive carcinomas. Dr. Lantuejoul and colleagues will discuss what we have learned in interpreting the prognosis and about the molecular changes in these carcinomas.

Several attempts have been made in the past to create a new classification of lung cancer based on genetics. Due to the increasing number of driver mutations detected in these carcinomas new attempts are on the horizon. Drs. Hung and Chirieac will discuss this aspect in their contribution.

Digital pathology is a reality and already practiced in many pathology departments routinely. However, there is more on the horizon: Dr. Sakamoto and colleagues focus on digital pathology and artificial intelligence and the impact this will have on the future of pathology. We all will have to learn a lot more, but also will get help in our daily practice by this new technology. Very likely IT personnel will have to be hired for pathology departments to better help us with this new technology.

Finally, I will discuss metastasis. As we all know, metastasis is what will ultimately kill our lung cancer patients. A lot of reports simplify the process of metastasis. It is important to remember, that metastasis is based on a cascade of events, which are in part interconnected. A better understanding and sorting of the different events might pave the way of inhibiting metastatic seeding in the future.

At this end I would like to dedicate this series to Adi Gazdar, an outstanding pathologist, who would have been on this expert panel for sure—unfortunately he died several months ago. I was fortunate of having had the opportunity to discuss

lung cancer issues during international meetings with him, and long time ago he was a guest here in my institution. His comments were always helpful. He will be missed by the pulmonary pathology community!

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Helmut Popper

Helmut Popper, MD

Prof. of Pathology, Institute of Pathology, Medical University of Graz, Graz, Austria. (*Email: helmut.popper@medunigraz.at*)

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