Successful lung cancer screening more than just scanning persons at risk

Second in incidence behind breast cancer, lung cancer causes by far the highest death toll worldwide. Recent progress in systemic treatment with the introduction of targeted therapy and immunotherapy lead to encouraging improvement in long term survival. However, the overall prognosis remains still poor. This can be attributed to the fact, that lung cancer remains clinically silent for a long period of time and is therefore diagnosed at advanced stages which limits the curative options. Cigarette smoking is accountable for 80–90% of all lung cancers and it is estimated that more than one in five adults in the world smoke tobacco. These two aspects advocate for two streams of lung cancer prevention: (I) primary prevention with smoking prevention and cessation and (II) secondary prevention with early disease detection through low dose chest computed tomography.

Evidence from randomized controlled trails could prove that low-dose chest CT based screening of patients at risk is able to reduce lung cancer related mortality. This led to the recommendation for lung cancer screening with low dose CT in the United States. Individuals are enrolled in the program based on their smoking history and age. Still, the optimal selection of screening candidates is a matter of debate. Recently the United States Preventive Task Force adapted the eligibility criteria for screening from ≥30 to ≥20 PY as it became obvious that current smokers of 20–29 PY have a similar risk compared to former smokers of ≥30 PY who quit smoking within 15 years (a second eligibility criterium for screening). In his contribution to this series, Pilz discusses in more detail how to enhance the selection of a screening population based on independent risk factors integrated into a risk model. This might be a way to increase the effectiveness of a lung cancer screening program. Lung cancer screening CTs are currently conducted on an annual basis in the US. This adds an additional burden to the radiologists and requires an accurate longitudinal measurement of lesions if follow-up CTs, e.g., after 3 months were conducted to catch the lesion's growth dynamic. Measurements of small pulmonary nodules therefore must be highly accurate to avoid wrong conclusions. In their work, Sartorio and colleagues discuss the value of volumetric measurements compared to diameter as an option to increase the precision of nodule measurement as a prerequisite for follow-up. In addition to semiautomated volume measurement, it is reported by Yang *et al.* in this series, that new tools such as radiomics or neural network based deep learning approaches will help to increase the accuracy of classification. This will improve risk stratification of lung nodules detected by screening. Once a lung nodule is detected and the indication for a biopsy is set, the impact of underlying tumor heterogeneity on the efficacy of a core needle biopsy to allow a histopathological and molecular diagnostic characterization of a tumor needs to be considered. As an important contribution to this lung cancer screening series, the chance of detecting different histopathological and molecular features from a tumor specimen gained by a core needle biopsy is discussed by Binder *et al.*

As lung cancer screening is conducted as serial chest CT examinations e.g., on an annual basis, the aspect of cumulative radiation dose exposure is of high relevance. Several techniques have been developed to reduce the dose exposure to the patient and one of these—namely iterative reconstruction is discussed by Köng *et al.* in this series.

We know through other screening programs that screening can cause psychological distress. Apparently, it is important to consider psychological factors associated with lung cancer screening as well. In their work, Garcia *et al.* discuss the impact of false positive findings or indeterminate nodules and stigmatization of the individual by screening for lung cancer.

This special series in *Shanghai Chest* on lung cancer screening provides insights form renowned experts in their field to important aspects of lung cancer screening going beyond just scanning persons at risk.

Footnote

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