Preface

Advances in theranostic biomarkers for lung cancer from clinical to molecular pathology

In 2018, lung cancer is the first cause of death by cancer in the world (1). So, it is mandatory to continue to look for more effective treatments, targeting precisely the biological characteristics of tumors. In this context, the rapid discovery and, then, the use in daily practice of biomarkers of the efficacy of therapy is essential to thoracic oncology (2,3). Currently, the detection of a number of theranostic biomarkers is necessary to administer effective therapy to patients with advanced stage or metastatic lung cancer (4). A minimum of five analyses/tests is required to evaluate the status of PD-L1, *ROS1*, *ALK*, *BRAF* and *EGFR* in metastatic lung adenocarcinoma patients (4). The increase in the number of therapeutic molecules targeting genomic alterations combined with the accelerated development of molecules of immunotherapy has transformed suddenly the activity of clinical and molecular pathology laboratories. Within this context, the number of immunohistochemical and *in situ* hybridization analyses as well as molecular analyses has dramatically increased and it is now necessary to coordinate the best practices to obtain all the results at one time, with a good turnaround time (5). Moreover, the analytical methods must be now adapted to liquids (in particular blood), cytological and/or tissue samples. The laboratories are thus faced with several challenges. The first is to master the pre-analytical phase for optimal treatment of the biological samples and to decrease the number of false negative or positive results (5-7). Poor management (inadequate fixation or inappropriate buffers for examples) and an insufficient amount of the samples and long delays in their transfer from the clinical departments to the laboratories can directly influence the quality of the results (5,6). In this regard, the clinician and pathologist need to consider the choice of sample, either blood, cells and/or tissue, according to the clinical situation (8,9). The second challenge involves setting up adequate algorithms for the tests to be performed based in particular on the amount and type of available biological material (tissue micro biopsy, cytological samples, blood and/or other fluids). In some situation it can be difficult to perform from the same sample, all the immunohistochemical analyses for diagnosis, to look for theranostic biomarkers and to extract a minimal quantity of nucleic acids for molecular approaches such as next generation sequencing (10). Depending on the type of technique under consideration, the organization of the care and the proximity of the laboratory must be taken into account (11). The economic impact of investigating the more and more numerous theranostic biomarkers can also influence the strategy of the laboratory by initially looking for a minimal number of biomarkers and adopting targeted methods. Irrespective of the different strategies under consideration, the theranostic tests must be performed in a laboratory that masters perfectly the methods employed using technical platforms accredited according to international norms. The continual development of diagnostic methods, of techniques, of the type (origin) and, in particular, of the volume of the samples sent to the laboratory as well as the different targeted therapy, require laboratories to adapt and innovate by rapidly transferring knowledge from research laboratories to daily practice (3,12).

This special issue gives an update on the most recent advances in the domain of thoracic oncology and discusses in particular the new diagnostic approaches as well as theranostic biomarkers to look for both today and probably in the near future.

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