



Editorial

Juggling the Various Facets of Modern Anatomic Pathology: A Perspective

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Anatomic pathology, along with the role of anatomic pathologists, has significantly evolved over the past several years. Indeed, although gross examination and microscopic evaluation of tissue specimens remain essential pillars of cancer diagnosis, modern anatomic pathologists have had to acquire novel skills to keep pace with the most recent advances in modern molecular biology [1]. In this scenario, the role of molecular pathologists in the overall management of oncology practice has dramatically changed, encompassing the diagnosis, prognosis, and prediction of patients' potential response to targeted therapies. Indeed, with the development of precision medicine, and the related promising clinical outcomes evidenced so far, microscopic evaluation and morphological reports can no longer be considered the finish line of the diagnostic process but rather the starting line from which the adequate management of cancer patients begins [2]. Non-small-cell lung cancer (NSCLC) is a case in point. The diagnostic process of lung adenocarcinoma starts with the evaluation of at least eight actionable driver mutations, in particular, Epidermal Growth Factor Receptor (*EGFR*), Kirsten Rat Sarcoma Viral Oncogene Homolog (*KRAS*), V-Raf Murine Sarcoma Viral Oncogene Homolog B (*BRAF*) gene mutations, Anaplastic Lymphoma Receptor Tyrosine Kinase (*ALK*), ROS Proto-Oncogene 1, Receptor Tyrosine Kinase (*ROS1*), Rearranged During Transfection (*RET*), Neurotrophic Receptor Tyrosine Kinase (*NTRK*) gene rearrangements, MET Proto-Oncogene, Receptor Tyrosine Kinase (*MET*) exon 14 skipping, as well as the evaluation of the expression of programmed death-ligand 1 (PD-L1) [3]. Accordingly, with the steadily growing number of actionable biomarkers, extensive training in molecular genetic testing has become pivotal for modern pathologists. In particular, modern pathologists should be aware of the fact that tissue material is precious for morphological diagnosis and should not be sacrificed for any unnecessary ancillary immunohistochemical/immunocytochemical stains [1,2]. In addition, modern pathologists should be trained on the various principles characterizing the broad range of molecular platforms. In particular, they should have thorough knowledge of the pros and cons of each molecular technique to select the most efficient molecular workflows for tissue processing [2]. It is in this complex scenario that modern pathologists act as a liaison between clinicians and technicians, thereby acquiring a prominent position in multidisciplinary tumor boards [1,2,4].

Modern anatomic pathology has undergone important technical innovations. One major innovation has been the implementation of digital pathology and artificial intelligence. The main advantage of adopting digital technologies in clinical laboratories is the simplification of laboratory workflows, an aspect that drastically reduces costs and turnaround time, as well as improve remote counseling between pathologists [1,5]. The other major paradigm shift in modern anatomic pathology has been the application of artificial intelligence algorithms. Indeed, these algorithms, such as digital spatial profiling, and morphological and molecular data, are able to reveal crucial information about neoplastic and non-neoplastic diseases, thereby streamlining the whole diagnostic process while markedly improving accuracy [1,6–8].



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Despite these incredible advances, including whole slide image tools for primary diagnoses [6], the development of standardized protocols and guidelines is urgently required to fully implement these technologies in everyday clinical practice [1,7,8].

Finally, modern pathologists should help in the professional adoption of social media to facilitate knowledge sharing within the pathology community [9,10]. In this evolving scenario, journal clubs, conferences, and other didactic tools have indeed been developed to favor discussions among pathologists as well as other healthcare figures [1].

In conclusion, anatomic pathology has undeniably undergone major changes. Indeed, going far beyond the traditional morphological (gross and microscopic) evaluation of tissue specimens, it has been enriched with a wide range of molecular and computational tools, including NGS, digital technology, and artificial intelligence. Thus, in this rapidly evolving scenario, it is necessary to embrace all radical changes to streamline cancer diagnosis and targeted treatments. Accordingly, novel training programs are crucial for modern pathologists to stay abreast of all the facets of modern anatomic pathology [11,12].

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