Biomedicine & Prevention
An Open Access Transdisciplinary Journal

The Molecular Pathology between Prevention and Care: the New Renaissance of Anatomic Pathology

Augusto Orlandi

From the University of Rome "Tor Vergata", Division of Anatomic Pathology, Department of Biomedicine and Prevention, Italy

The history of Anatomic Pathology is a fundamental part of the history of modern medicine. Giovanni Battista Morgagni and Rudolf Virchow, the fathers of modern medicine, were pathologists.[1] At the present, the Anatomic Pathology is based on multiple activities aimed to patients' diagnostic care. The classical pathological results was based on ancillary macroscopic and microscopic diagnosis of the diseases, by using traditional methods of morphological investigation in order to identify the relationship between the pathogenic mechanisms and clinical experience – the so-called "evidence-based medicine". The modern Anatomic Pathology is still based on microscopic evaluation of pathological changes of tissue and cells, but has also introduced electron microscopy sections with micro-analysis and scanning, immunofluorescence, laser microdissection, tissue microarrays, and well equipped molecular biology laboratories with the most modern technologies, essential to address new diagnostic problems. The interaction between contaminants and disease progression is now possible to be monitored by the application of X-Ray microdissection combined with electron microscopy and represents a fascinating field of investigation for the prevention of many diseases. The quality and completeness of the investigation of biomolecular and genetic markers play a crucial role to address the therapeutic approach and, consequently, the prognostic framework. In fact, the post-surgical treatment of lung cancer, breast, gastrointestinal sarcoma and melanoma has benefited from the introduction of biological and hormonal chemotherapy directed toward specific targets of the tumor. The presence of specific mutations and/or the expression of specific antigens or tumor markers allows to stratify patients according to their potential for positive response to the new biological treatments, with a more effective therapy and better employment of spending by the Public Health. Therefore, in addition to its diagnostic activities, it is now consolidated in the Anatomic Pathology the figure of molecular pathologist, able to correlate geno-phenotypic profiles of tumors with clinicopathological parameters, to identify and quantify appropriate targets to improve the new diagnostic aspect and treatment of patients. It is fundamental for the integration of clinical and molecular data from proteomics studies, gene expression and epigenetic regulation (search for somatic mutations by molecular biology or FISH) to lead to the identification of genes, involved in the differentiation of tumors, in their prognosis and in their response to drugs. The choice of samples for biomolecular analysis, a critical and fundamental point, must be necessarily performed by the pathologist who can distinguish representative tumor area from healthy or not representative tissue. This implies that the Pathologist will become more and more a crucial professional figure in the organization of modern diagnostic and care teams and structures. In this sense, the creation of tissue banks which will allow the retrospective analysis of tissues and the comparison with the information concerning the evolution of the disease and for research, with an increasing personalized medicine sensitive to the needs of each individual patient. All these findings reinforce the concept that Pathology is a necessary and informative tool in oncology and in the provisional design of clinical trials.[2] Finally, the application of molecular pathology to the screening of patients will reduce the risk of cancer progression in many patients, in particular by the identification of genomic material of specific pathogens, such as oncogenic Human Papilloma Virus.[3]

References

1. *Garrison FH. An Introduction to the History of Medicine. Saunders, Philadelphia,* 1913.
2. Nagtegaal ID, West NP, van Krieken JH, Quirke P. Pathology is a necessary and informative tool in oncology clinical trials. J Pathol. 2014; 232: 185-9.
3. Kroupis C, Vourlidis N. Human papilloma virus (HPV) molecular diagnostics. Clin Chem Lab Med. 2011; 49: 1783-99.