

The Changing Role of the Pathologist in the Era of Precision Medicine: A Brief Review

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ABSTRACT

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Precision oncology, an upcoming field of Oncology, aims to target the specific genetic alterations in tumour cells, thereby avoiding the harmful effects of chemotherapy on normal cells, and improving quality of life. The role of the pathologists is changing, from being pure diagnosticians to ensuring good quality tissue and ensuring adequate tissue which is crucial for all necessary tests to guide tailored therapy in an individual case

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Just like the upgradation of smartphones, pathologists are now transforming to higher generation responsibilities to suit the increasing demands of patient care, especially when the tissue is of limited quantity, basically “doing more with less.” Currently, pathologists are not only involved in the diagnosis and staging of tumours but also as “guardians of tissue,” to make the best use of the available tissue provided to them.¹

Precision oncology is a field of Oncology that focuses on tailored treatment for each patient, aiming to therapeutically target the specific genetic aberrations in each tumour, sparing normal cells. Each tumour harbors its own signature genetic aberrations or driver mutations, which when targeted precisely, can help avoid chemotherapy which has deleterious effects on the normal cells.

Precision pathology aims to judiciously use the available tissue for the necessary diagnostic and molecular tests required for therapy in an individual case. The tests to be done in each case is dependent on the diagnosis, and they often require the help of immunohistochemistry, which is an antigen-antibody reaction based on the protein expression on the tumour cells. Most tumours will also need molecular testing, to detect the specific genetic aberration, either for the diagnosis, to look for targetable mutations to guide therapy, or both.¹

Tissue is often painstakingly obtained, from inaccessible areas, under image guidance, by the concerned personnel, which is mostly an interventional radiologist. It is important to make sure that the case is discussed by the “tissue acquisition team,” which comprises the medical oncologist, the proceduralist and the pathologist, before performing the biopsy, so that the proceduralist is aware of the minimum amount of tissue that needs to be procured in an individual case.

It is also important that informed consent be obtained from the patient, not only to cover the risks of the biopsy, but also consent to utilize the tissue for the necessary tests, for medicolegal purposes, for further opinions if required, and to enter clinical trials in future.²

Once the tissue is acquired, it has to be immediately placed in 10% Neutral buffered formalin (NBF) maintaining a pH between 7-7.2, for fixation, ensuring minimum cold ischemia time, thereby adequate preservation of proteins and nucleic acids, minimizing the deleterious effects of tissue ischemia which will interfere with subsequent testing.

The pathologist must ensure that the tissue cores are fixed for an optimum period of 6-24 hours in 10% NBF, adequately processed and that the individual cores of tissue go into separate blocks so that tissue

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blocks are sufficient for both immunohistochemistry and molecular tests which may need to be performed.³

The pathologist must do strategic planning upfront regarding judicious utilization of the available tissue so that the necessary ancillary tests can be comfortably done.²

The major challenges are related to inadequate tissue being procured due to a lack of awareness on the part of the proceduralist, improper fixation and processing of tissue, which interferes with the results of the subsequent tests, and placing all tissue cores in one block, which often results in exhaustion of tissue in the block and no residual tissue for further testing which can adversely affect therapeutic decision making.

Working with limited tissue is the major challenge for the pathologist, as now the tissue received is mainly core needle biopsies. The pathologist needs to be aware of and needs to anticipate the probable ancillary investigations that may be required in an individual case and work accordingly.

The decision on which specific tests to be done in the case is also the responsibility of the pathologist.² Ending up with no tissue and no conclusive diagnosis at the end of the day means a great loss to both the patient

and the treating clinician, as repeat biopsies are often not possible.

To conclude, the pathologist's roles and responsibilities in the field of precision oncology are crucial, being the key players in ensuring that the painstakingly acquired tissue is kept safe, preserved well and judiciously utilized.

END NOTE

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