

# The Role of Pathologist in Modern Oncology Practice

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## Abstract

**Background:** Pathologists are often viewed as the invisible members of oncology multidisciplinary teams, yet major decisions about patient care are totally dependent on their input. Making an accurate diagnosis is the first and most crucial step in managing cancer patients, which is the pathologist's arena.

**Methods:** Information about the topic was compiled from literature review, professional societies publications, colleagues input and personal experience.

**Results:** The purpose of this manuscript is to illustrate and outline the comprehensive role that should be fulfilled by a competent pathologist in providing state of the art service to oncology practices and to encourage maximum utilization of this role. The pathologist's role in oncology practices is becoming increasingly critical due to the accelerated rate of new diagnostic tools and tests used in clinical applications. The roles of pathologist's include making accurate diagnoses, evaluating disease response, participating in tumor boards, educating staff and conducting research.

**Conclusion:** The role of pathologist is central to modern oncology practice and the pathologist is an integral member of the oncology care team.

Various medical specialties and subspecialties have emerged over the last few decades creating increasing complexities in functions and roles of various health care professionals. To ensure best patient care, a strong cooperation among these subspecialties is crucial.

Some specialties are essential for any tertiary health care center such as laboratory medicine and radiology, because all other services are dependent on them. For example, a surgeon may need the guidance of the pathologist preoperatively and intraoperatively for optimal completion of surgery. Similarly, an oncologist will not be able to treat a cancer patient appropriately without a proper diagnosis made by a pathologist.

Since many of their activities are done away from the clinic or the patients, pathologists are considered by some as invisible members of oncology care team in spite of their critical role.

The pathologist has multiple roles in the contemporary and future oncology practice that are presented and discussed in this manuscript. (Table 1)

## Making an accurate diagnosis

To ensure that a pathologist carries this task effectively and efficiently to generate accurate specific diagnostic reports, he/she has to be updated on all issues relevant to tissue handling, evaluation and interpretation. The College of American Pathologists (CAP) offers anatomic pathology educational programs that are designed to improve the analytic and diagnostic skills of pathologists and technologists.<sup>1</sup> These skills and techniques have to be translated into a clear, accurate, surgical pathology report that indicates the diagnosis.<sup>2</sup> The pathologists should know their limitations and capabilities and they should ask for help when needed. Inaccurate interpretation of pathology samples in any given patient may lead to providing erroneous management which must be avoided at all costs.

## Helping clinicians interpret the laboratory data to synthesize a clearer clinical picture

How the diagnosis reached should be highlighted by explaining all specific studies used to reach it, such as special stains, immunohistochemistry, molecular studies, electron microscopy and flowcytometry.

How these studies correlate with the behavior or prognosis of the tumor has to be stated in the report.

Correlation with any previous tissue or cytology samples taken from the patient has to be made to explain clearly whether they are the same pathology or two different pathologies. Furthermore, the updated pathologic staging, grading and status of resection margins are all essential information for any report on malignant lesion. A standardized reporting format has to be followed. References are available in many sites such as CAP or reference books.<sup>3,4</sup>

The need for more tissue should be mentioned in the report with explanation why it is needed. Is it for more studies essential for diagnosis, prognosis and management or because the tumor is very heterogeneous and different areas of the tumor may show different morphology such as in many sarcomas, or just simply because the first biopsy was insufficient. Another scenario for requiring more tissue is the presence of carcinoma in situ in a superficial biopsy, where the possibility of invasion cannot be ruled out and a deeper biopsy is needed. The pathologist opinion will influence the sequence of the patient workup and enable

the clinician to select the best diagnostic procedure. Adequate tissue specimen is essential for securing a final and accurate diagnosis.

The pathologist should be receptive for the treating physician input regarding any missing relevant data from the report thus monitoring completeness of the surgical pathology report.

All available data has to be reported using clear, precise words, avoiding vague, equivocal, or ambiguous terminology; keeping in mind that every word may be utilized by the oncologist / clinician to tailor the treatment plan for the patient.

### **Assessing response to treatment**

In cases of patients with solid tumors who have received neoadjuvant therapy and in those with hematologic malignancies who have received induction therapy, the pathologist should comment on presence, grade and percentage of viable tumor, if it exists. Furthermore, comparison of tumor grade and differentiation in the current tissue sample with the previous samples is very important to plan further management.

### **Evaluating and assessing new diagnostic technology application and utilization in clinical practice**

The pathologist should evaluate all new technologies in the field and decide with the clinicians about acquiring it to their practice.

The behavior and prognosis of many cancers are better elucidated by the recent advanced in the genomic and molecular field. Pathologists should not only specify tumor size, lymph node status but also should state expression of certain markers with prognostic or predictive values. Pathologists have become central in the development, validation, implementation and appropriate use of predictive testing to better treat patients with targeted therapy.<sup>3</sup> Examples of such targets include over expression and or amplification of HE-2 Neu Oncogen, the expression or activation of epidermal growth factor receptor – Tyrosine Kinase pathway and over expression of C-Kit in gastrointestinal stromal tumor and leukemia.<sup>6</sup> Regular update of the pathology department policy and procedure manual for the proper and state-of- the-art way of handling and reporting of each tissue type should be done and maintained in the department. The oncology clinical team members should be kept abreast about all these updates.

By providing this diagnostic information and by characterizing the biologic behavior of the tumor, the pathologist plays a critical role in the oncology team and impacts tremendously the patient's care.

### **Role in multidisciplinary teams and tumor boards**

The contributions of pathologists in the multidisciplinary meetings and tumor boards are essential. The pathologist does not just present slides, discuss differential diagnosis and suggest further work up; but he/she also answers queries, explains reasons for incomplete report and reasons for requesting more tissue or second opinion.

This integrated care through the multidisciplinary approach has been widely recognized by different specialties. A good example is the many multidisciplinary breast teams that have been established all over the world.<sup>5</sup>

### **Education**

The pathologist should contribute and participate in the education of the clinical care teams whether in form of didactic lectures, tumor boards, or individual encounters to discuss specific cases and update the group on the most recent advances in the field.

### **Effective communication**

there are many ways to deliver the report to the clinician. However, direct communication is essential to clarify any ambiguous issues and to get critical points through. For cases with insufficient clinical information or ambiguous findings, additional information should be sought out. Some cases may require urgent intervention and therefore, personal communication will assure timely action. Documentation of this discussion has to appear in the final report, which can be sent via intranet to patient's electronic file and to responsible physicians by email as well as by sending a hard copy to patients file or doctors office.<sup>7,8</sup>

In a survey done by Zarbo, the greatest opportunities for improvement of anatomic pathology service were determined to relate not to professional competence but to communication.<sup>9</sup> These include timeliness of reporting, communication of relevant information and the mandated notification of significant abnormal results. i.e critical value which requires immediate contact of the physician to rapidly initiate/modify treatment or to perform further required timely evaluation (Table 2 & 3). However, since there are no established critical value guidelines in surgical pathology, some situations may arise that require a common sense and personal experience of the pathologist to determine when an immediate communication with the clinician is needed.<sup>8</sup>

When communicating verbally with team members of the tumor board, pathologist should clearly explain all the terminology and descriptions used in the report and should correct any formatting problems to the reports during interface that might change the meanings.<sup>2</sup> This step is important to avoid misconstruction that can happen due to unawareness of some physicians to certain terminology used in surgical pathology practice. For example, some physicians think that metaplasia and dysplasia are a premalignant condition and the terms can be used interchangeably; while it is true for the later but not for the former term unless it becomes an atypical metaplasia.

It is essential to deliver the diagnosis of unexpected malignancies, incomplete surgical resections, positive margins, unpredicted type of malignancy, frozen section results, discrepancies between frozen section and permanent section immediately and clearly to the clinicians, as these are critical findings that impact the management decisions.<sup>7,8</sup>

Any change of the final diagnosis for any reason such as obtaining more clinical information, getting more stains, more levels of the tissue blocks, more tissue from the same lesion should be delivered immediately to the oncologist and documented in the final amended report. The quality control officer of the laboratory should be informed and the reason for changing the report should be documented.

### **Oncology research**

Well-structured research projects can be generated utilizing the data provided by the pathologists in the form of elaborate standardized reports that are well archived and easily retrievable. Correlative studies can be conducted for newly discovered tumor markers, molecular findings, and genetic alteration or of the different tumor types with response to different treatment modalities, behavior

and prognosis. By putting together all these pathological data with the clinical details, brilliant research projects can be performed that will direct future diagnostic or management approaches and help more patients.

The breakthroughs in molecular oncology led the pathologist to play a key-role in translational research for the identification of new targets in tissue specimens that may eventually lead to new therapeutics.<sup>10</sup>

### Conclusion

The pathologist roles in the modern oncology practice are complex and diverse but they are essential and critical for patient care, medical staff education and the advancement of medical knowledge and research.

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**Table 1: The Roles of the Pathologists in Oncology Practice**

1. Making an accurate diagnosis using all available tools including conventional and state-of-the-art methods
2. Helping clinicians interpret the laboratory data to synthesize a clearer clinical picture.
3. Helping in assessing and determining disease response.
4. Evaluating and assessing new diagnostic technology application and utilization in clinical practice.
5. Playing an active role in the multidisciplinary teams and tumor boards.
6. Participating in the staff education.
7. Maintaining communication with clinicians to provide critical information in a timely fashion.
8. Participating actively in oncology research.

**Table 2: Critical values related to oncology patient**

1. Incomplete surgical resection
2. Positive margins (margin involved by tumor)
3. Discrepancy between frozen section & permanent section
4. Change of a benign diagnosis to malignant
5. Recurrence of tumor
6. Unexpected malignancy (see table 3)
7. Unpredicted type/grade or stage of malignancy
8. Negative resection specimen
9. Malignancy in superior vena cava syndrome
10. Major change of final diagnosis for any reason
11. Drug toxicity (e.g. lung, kidney, skin reaction)
12. Organisms due to immuno suppression e.g. Mycobacterium tuberculosis, fungus, invasive aspergillosis, virus
13. Neoplasm causing paralysis
14. Large vessel in a core biopsy

**Table 3: Examples of unexpected malignancies**

1. Lymphoma in a gastric biopsy for Helicobacter
2. Molar pregnancy in routine dilatation and curettage
3. Lymphoma in fine needle aspiration of a lymph node suspected as tuberculosis
4. Benign tumor with a focus of malignancy [table 4]
5. Hematologic malignant neoplasms AML type M3, Burkitt's lymphoma, and leukemia cutis.<sup>8</sup>

**Table 4: Examples of Benign lesion /tumor with an unexpected focus of malignancy**

1. Carcinoma ex-pleomorphic adenoma
2. Fibroadenoma with a focus of ductal carcinoma
3. Mature cystic teratoma containing immature elements or carcinoma
4. Benign prostatic hypertrophy with focal prostatic carcinoma
5. Nodular goiter with microscopic focus of papillary carcinoma.
6. Undescended testis with intratubular germ cell neoplasia and /or germ cell tumor.
7. Umbilical hernia with metastatic adenocarcinoma