

Understanding Cancer Biology-Handling Process of Lung Cancer Tissue

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Abstract: Lung cancer soon emerging on par with other deadly cancers and the diagnosis and learning the cause of illness is vital for managing the disease and extend the life expectancy of patients. Biomedical science bridges between the biological science and medicine advancing healthcare in diagnosing complex diseases, understanding cause of illness assisting in designing advanced treatment plans. In this current review we discuss in-detail about the handling process of lung cancer tissue cases which involves a strict and legal process of clinical and scientific phases handled by qualified professionals where core responsibilities starting with surgical team in careful extraction and collection of samples and presented to Histopathologist for fixation of lung cancer tissue where further investigated with biomarkers by pathologist and reported.

Keywords: Lung cancer, biomedical science, biomarkers, clinical analysis.

I. INTRODUCTION

Lung cancer emerging as one of the leading carcinomas on par with deadliest cancer known types, though manageable if reported with root cause by timely diagnosis for designing effective treatment plan to affected patients saving lives [1-4]. Biomedical science is a science bridging between the biology study and medicine giving an effective advanced healthcare [5,6]. This is possible by following systematically workflow the careful extraction and collection of lung cancer tissue i.e. sample acquisition, pathological processing, molecular diagnosis and clinical integration diagrammatic representation given in Figure 1[7-10].

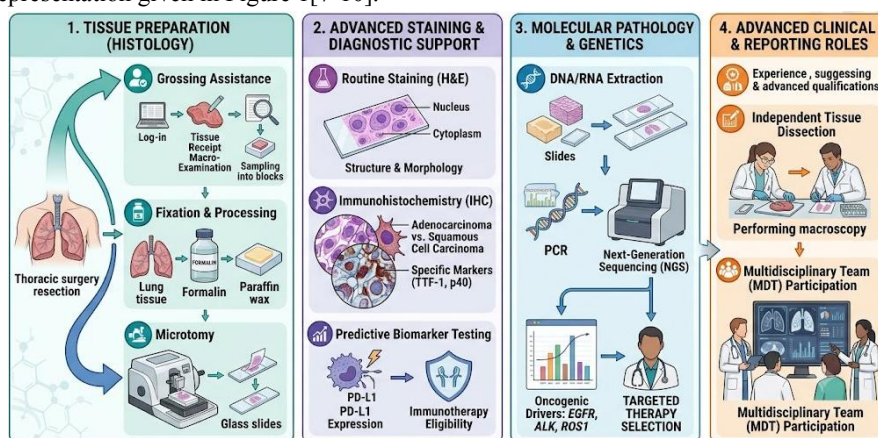


Figure 1: Stages of handling Lung cancer tissue case study

The detailed process explained as follows.



1. **Sample acquisition (Pre-analytical processing of lung cancer tissue):** Lung cancer tissue sample collected by the assistance of surgical team with core needles at trans bronchial biopsies; lobectomy with fine needle aspiration. After collection Tissue fixation done according to protocol by fixing within 30-60 minutes of collection in 10% Neutral buffered formalin solution with duration lasting for 6-48 h [11-14].
2. **Histopathological evaluation:**
 - a) Primary staining done for the extracted tissue sample with gold standard staining materials acidic-hematoxylin(H) & basic- Eosin (E) for assessing tissue adequacy (which is vital for pathological study where cell volume collected in sufficient quantity & quality i.e. target cells required to perform immune histological study, molecular genomic sequencing.
 - b) Identifying major subtypes of lung cancer are classified according to occurrence
 - i) Non-small cell lung carcinoma (NSCLC) exists as
Adenocarcinoma-40%
Squamous cell carcinoma-25-30%
Large cell carcinoma.
 - ii) Small cell lung carcinoma (SCLC)- 15% [15-20].
3. Biomarking and molecular profiling: This phase helps in starting advanced precision treatment from the diagnostic profiling- microdissection and macrodissection of tumor rich areas from the stained slides investigated for specific biomarkers given below [21-25].
4. EGFR-epidermal growth factor,
ALK- ALK inhibitors
ROS1-Rearrangements ROS1 inhibitors
BRAF-BRAF/MEK inhibitors -V600E mutation
KRAS-G12C mutation/ KRAS G12C inhibitors
MET-Exon 14 skipping mutation, MET amplification.
RET/NTRK-Fusion events-selective RET/NTRK inhibitors
PD-L1- TPS (Tumor Protection Score)-immune checkpoint inhibitor selection.
TTF-1-pulmonary thyroid origin (75-85%)
Napsin A-Functional Pneumocytes.
p⁴⁰ -specific for squamous cell differentiation
p⁶³-squamous cell carcinoma
CK5/6-squamous cell carcinoma
CD56-squamous cell carcinoma
High Ki-6T-squamous cell carcinoma
Chromogranin A-squamous cell carcinoma
Synaptophysin-squamous cell carcinoma
5. Clinical integration: Tissue stewardship and material management processed to avoid exhaustion of tissue during diagnostic workups such as setting sectioning rules to have extra cut about 4-5µm during initial microtomy on suspecting a limited core biopsy as malignant. It is followed by DNA/RNA extraction where a high dense tumor area with high nucleic acid yield by dissection process selected. Liquid biopsy as backup planned to avoid patient discomfort for tissue collection on finding insufficient s cfDNA-NGS utilized as complimentary route [26-28].
6. Multidisciplinary discussion and reporting: coming to a final phase of lung cancer tissue Handling case where the core components to finalize the treatment is as follows with synoptic standardized data profiling done with the biomarkers put before the panel of tumor board discussion for designing a precision treatment to the patient [29-31].



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