Sample optimisation in lung, prostate and gastric cancer

Clinical takeaways

- Tissue is the gold-standard sample for biomarker analysis to provide prognostic and predictive information and to inform treatment decisions
- Follow pre-analytical best practice to ensure sufficient quality and quantity of sample for biomarker testing/molecular profiling
- Tissue conservation is highly important - collect as much high-quality tissue as possible and carefully select biomarkers/assays to avoid tissue exhaustion
- Multidisciplinary communication is key for optimal sample acquisition and processing

LUNG CANCER[1,2,3,4,5]

Method of sample collection

Recommended:
Less invasive method

Metastatic disease:
Consider obtaining tissue samples from metastases if more accessible

Tumour tissue not available:
Cytology samples can be used

Liquid biopsy (ctDNA) can be used for some biomarker testing

Number of biopsies

5-10 (endobronchial/ transbronchial biopsies)

4 per lesion (EBUS-TBNA)

Histology

At diagnosis, the primary purpose of the biopsy is to perform histological analysis for diagnostic purposes

IHC for P40, TFF1 can be used to differentiate squamous carcinoma vs adenocarcinoma

Biomarker testing

Reflex Testing

Recommended tests:
IHC testing for PD-L1. If adenocarcinoma: IHC for ALK (ROS1)

NGS: *ALK, BRAF, EGFR, ROS1, ERBB2, KRAS, MET, NTRK1/2/3, RET.* RNA-based testing should be considered if no driver alteration was identified by a DNA-only based test

Single tests (if NGS not possible):
Always start with IHC for accurate diagnosis and PD-L1. If adenocarcinoma: IHC for ALK (ROS1)
Targeted testing for molecular alterations (notably *EGFR*) is possible, with an adequate management of the biopsy to avoid tissue exhaustion

PROSTATE CANCER[6,7,8,9]

Recommended:
MRI-guided transperineal biopsy

Metastatic disease:
Use a pre-existing stored primary or metastatic tumour biopsy or obtain metastatic biopsies

Tumour tissue not available:
Liquid biopsy (ctDNA)

Number of biopsies

2-5 (MRI guided)
12 (systematic template)

NGS - recommended

Metastatic prostate cancer and high-risk local and/or locally advanced prostate cancers meeting certain criteria:

HRR genes (*BRCA1, BRCA2, ATM, PALB2, FANCA, RAD51D, CHEK2*, and *CDK12*) and MMR genes. Germline testing is also recommended in these patients undergoing tumour NGS

Single tests (if large panel testing not possible):
BRCA1, BRCA2** and *ATM*, and IHC for MMR* status

GASTRIC CANCER[10,11,12]

Recommended:
Multiple endoscopic biopsies

Metastatic disease:
EUS-FNA/FNB can be used to target a metastatic site

In small lesions:
Endoscopic mucosal resection or endoscopic submucosal dissection can be performed

Number of biopsies

6-10 (biopsies)

Reflex Testing

Recommended tests:
IHC for MMR* status, PD-L1
IHC followed by FISH or other ISH method for HER2 (ERBB2)

Insufficient/limited sample:
NCCN guidelines recommend to firstly perform IHC for HER2 and PD-L1, then NGS to jointly assess MSI and possibly other alterations (e.g., *NTRK*...)

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PRECISION ONCOLOGY connect

***Genetic counselling and germline testing should be considered**

Abbreviations: CtDNA, Circulating tumour DNA; EBUS-TBNA, Endobronchial ultrasound-guided transbronchial fine needle aspiration; EUS-FNA/FNB, Ultrasound-guided fine-needle aspiration/biopsy; FISH, Fluorescence in situ hybridisation; HRR, Homologous recombination repair; IHC, Immunohistochemistry; ISH, In situ hybridisation; MMR, Mismatch repair; MRI, Magnetic resonance imaging; MSI, Microsatellite instability; NGS,Next Generation sequencing; TMB, Tumour mutation burden.

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