

Introduction to Pathology/ neoplasia/ 2020/ Dr Heyam Awad

1. A 34-year-old male complained of abdominal discomfort. Endoscopy showed a 5mm flat lesion at the gastric antrum (stomach). Histopathologic examination revealed **normal looking pancreatic tissue**. This lesion is a: **This is a choristoma, and choristomas are congenital anomalies**

A. **Congenital anomaly.**

B. Hamartoma

C. Benign neoplasm. **Note that choristomas are not true neoplasms**

D. Teratoma

E. Adenoma

2. Which of the following definitions regarding neoplasms is incorrect?

A. Tumor autonomy: ability of tumors to proliferate regardless of normal regulatory mechanisms.

B. Clonality: tumor cells originating from one mutated cell.

C. **Sarcoma: Malignant tumor originating from epithelial tissue. No, sarcomas are of stromal/mesenchymal origin.**

D. Polyp: mass projecting above mucosal surface.

E. Tumor differentiation: The extent to which tumors resemble their cell of origin.

3. Ki 67 is an immunohistochemical stain that stains mitotically active cells. Of the following tumors, which one will show more staining with Ki67? **The idea of this question is that rate of mitosis ( division) is more in malignant tumors.**

A. Hamartoma

B. Lipoma

C. Choristoma

D. Adenoma

E. **Lymphoma**

4. A mass described histologically as: infiltrative and composed of glandular structures lined by pleomorphic cells with prominent nuclei and abnormal mitotic figures is a/an: **infiltrative means malignant and the presence of glandular structures means an adenocarcinoma.**

A. Adenoma

**B. Adenocarcinoma**

C. Dysplasia

D. Carcinoma in situ

E. Sarcoma

5. A 45-year-old woman complained of abdominal pain which was thought to be due to appendicitis. During the appendectomy operation, the surgeon noted several masses on the peritoneal surface. The appendix was normal, and no appendiceal masses were seen. Frozen section of the peritoneal lesions showed metastatic carcinoma. The most likely primary site for these metastases is the: **peritoneal spread occurs in tumors originating in organs exposed to the peritoneal cavity; mainly appendix and ovary.**

A. Lung

**B. Ovary**

C. Kidney

D. Brain

E. Liver

6. A cervical biopsy showed immature large cells with hyperchromatic nuclei confined to the lower third of the mucosa. The basement membrane was intact. Which of the following describe the lesion correctly: **this describes moderate dysplasia**

A. Neoplastic; **dysplasia is not neoplastic**

B. Innocent and not premalignant

**C. Can regress**

D. Micro-invasive

E. Carcinoma in situ

7. Which of the following mutation can cause cancer?

A. Decreased BCL2 expression

B. A translocation resulting in downregulation of RAS protein

**C. MYC amplification**

D. Increased expression of TP53

E. Deletion of a single RB allele. **Both alleles need to be lost to cause cancer.**

8. Micro RNAs are:

- A. Short double stranded segments of nucleic acids. **They are single stranded**
- B. Modulate gene expression by increasing DNA methylation. **Wrong, they do not affect transcription by any means.**
- C. **Inhibitors of protein translation: correct, this is done through degradation of mRNA or inhibition of translation**
- D. Negative regulators of gene expression that work at the transcription level
- E. Inhibitors of mRNA formation: **wrong, mRNA is formed, but is degraded later.**

9. Tumors can become self-sufficient in growth signals through all of the following mechanisms except:

- A. Increased expression of Cyclin Dependent Kinase 4.
- B. Increased Cyclin D expression
- C. RAF over-expression
- D. **Increased GTPase: on the contrary, this will inhibit ras so will decrease growth**
- E. ABL-BRC translocation

10. A 55-year-old man had increasing fatigue for the past 6 months. Laboratory studies show a WBC count of 189,000/microliter. The peripheral blood smear shows many mature and immature myeloid cells present. Cytogenetic analysis of cells obtained via bone marrow aspiration reveals a t(9:22) translocation. This translocation leads to formation of a hybrid gene that causes cancer through which of the following mechanisms? **This is straightforward and very easy.**

- A. Downregulation of p53
- B. **Increased activity of tyrosine kinase**
- C. Downregulation of ABL gene
- D. Increased cyclin D activity
- E. MYC amplification

11. Choose the correct statement regarding RB gene:

- A. To cause cancer, both copies of the RB gene must be deleted in germ cells; somatic mutations are incapable of causing cancer. **Wrong, both copies need to be deleted, either in an inherited or acquired manner.**
- B. The protein product of the RB gene is stimulated via gaining more phosphate groups. **No, Rb is stimulated by hyphosphorylation**
- C. Normal RB causes arrest of cell cycle at the G2/M phase. **No, at G1/S phase**
- D. **HPV can cause cancer by binding to and functionally deleting RB.**
- E. RB acts via binding to and inhibiting the transcription of cyclin B. **no, cyclin E**

12. All of the following statements are correct regarding tumours' changes in metabolism except:

- A. **Warburg metabolism ensures obtaining the maximum energy from each mole of glucose consumed. No, maximum carbon atoms but less energy.**
- B. Warburg effect is utilised clinically in PET scan.
- C. IDH mutations result in oncometabolites that cause epigenetic changes leading to carcinogenesis.
- D. Autophagy is used by tumour cells during chemotherapy treatment to aid survival.
- E. Warburg effect is facilitated by overactivation of oncogenes and downregulation of tumour suppressor genes

13. Which of the following statements is incorrect regarding epithelial- mesenchymal transition (EMT) in neoplasia?

- A. EMT is a process aiming at acquiring a phenotype that permits increased motility of cells.
- B. **SLUG and SNAIL transcription factors are downregulated in this process. Definitely wrong, they are the most important genes in EMT and metastasis.**
- C. E cadherin is downregulated
- D. EMT is essential for tumor invasion and metastasis
- E. Cells acquire actin filaments during EMT.

14. Which of the following statements is incorrect regarding P53:

- A. When phosphorylated it inhibits Rb protein causing cell cycle arrest. **Wrong, it stimulates RB, stimulated Rb causes cell cycle arrest.**
- B. Is inhibited by binding to HPV
- C. During hypoxia p53 induces DNA repair and causes cell senescence

D. Mutated p53 enables malignancy by increasing the chance of accumulation of other genetic mutations.

E. Patients with Li-Fraumeni syndrome inherit a mutated copy of P53.

15. Around 20% of breast carcinomas can be treated by Herceptin ; an antibody therapy targeting HER2/NEU gene product which is a : **this is easy**

A. Growth factor

**B. Growth factor receptor**

C. Transcription factor

D. MiRNA

E. Growth inhibitor

16. A 37-year-old female developed right sided colon cancer. She has family history of colon cancer. Examining her colon showed a 4 cm tumor and numerous polyps. The most likely mutated gene in her case is: **she has familial adenomatous polyposis.**

A. **APC**

B. Beta catenin

C. E cadherin

D. Mismatch repair gene

E. ATM

17. WNT signalling pathway causes:

A. Destruction of APC

**B. Beta catenin activation**

C. Stimulation of beta catenin destruction complex

D. Increased E cadherin expression

E. Downregulation of SLUG/SNAIL genes

18. A normal fibroblast can divide up to 70 times. In a fibrosarcoma, malignant fibrous cells still can divide after the 80<sup>th</sup> division. Which of the following genes is activated to acquire this ability? **Ability to divide beyond the normal limit**

A. **Telomerase gene**

B. Mismatch repair gene

C. Merlin gene

D. TWIST gene

E. Microsatellite instability gene

19. Malignant cells can evade apoptosis by which of the following mechanisms?

A. Increased FADD protein

**B. Increased FLIP protein**

C. Increased mitochondrial permeability

D. Decreased bcl2

E. Decreased IPA

20. TP53 deletion or inactivation mutation results in:

A. Increased Thrombospondin

B. Increased proapoptotic proteins

**C. Decreased micro RNA against bcl2**

- D. Increased expression of DNA repair genes
- E. Increased hypoxia

21. A 47-year-old man presented with abdominal pain. Colonoscopy revealed a 7 cm tumor which on histological examination was a poorly differentiated adenocarcinoma. He has lymph node metastases and liver and lung nodules. Which of the following statements regarding his tumor's stage and grade is correct:

- A. T stage is determined by the size of his tumor. **No, size is irrelevant in tumors originating in mucosal surfaces lining cavities.**
- B. His N stage is considered N0. **Of course not**
- C. **The poor differentiation is irrelevant to the stage. Correct, differentiation is related to grade not stage,**
- D. He has a grade 2 tumor. **poor differentiation is grade 3**
- E. The 5-year survival of his tumor exceeds 90%. **This is a metastatic tumor so it is stage 4, this has a poor prognosis**

22. Which of the following cells doesn't play a role in immunosurveillance?

- A. Natural killer cells
- B. **Plasma cell: humoral immunity doesn't play a role in immunosurveillance.**
- C. M1 macrophage
- D. T helper lymphocyte
- E. Cytotoxic T lymphocyte

23. Inherited skin cancer due to ultraviolet light is caused by a mutation in:

- A. RAS gene
- B. BRCA 1 gene
- C. Recombination repair genes
- D. TP53 gene
- E. **Nucleotide excision repair genes. This is mutated in xeroderma pigmentosa**

24. Hypercalcemia is considered a para-neoplastic syndrome in a patient with which of the following conditions?

- A. parathyroid adenoma, **no because hypercalcemia can be explained by hormonal production indigenous to the tumor site.**

B. T2 N2 M1 breast cancer metastasizing to the bone, **no, met to bone can explain the high calcium**

C. **T2 N1 M0 lung cancer. Here high calcium cannot be explained by primary site (lung) and there is no metastasis (M0) so we have a symptom not explained by the primary or metastatic site; this is the definition of paraneoplastic syndrome.**

D. Bone sarcoma, **primary bone tumor, so calcium stored in bone can be released, so hypercalcemia can be explained by the primary tumor site**

E. parathyroid carcinoma, **same explanation as A**

25. Malignant cells can suppress host immunity by:

A. CEA

B. alpha fetoprotein

C. **TGF beta**

D. IL 1

E. Mucin

26. Tumor cells can avoid being killed by cytotoxic T cells by expressing:

A. **PDL1**

B. CEA

C. TNF

D. MUC 17

E. HIF

27. A surgeon performing a mastectomy on a 55-year-old lady for breast carcinoma wanted to examine her lymph nodes to decide to remove them or not. He needs the answer during the operation; the best method to proceed is with:

A. Fine needle aspiration of the lymph node

B. **Frozen section of the lymph node. This is an intra-operative diagnostic procedure.**

C. Excisional biopsy of the lymph node

D. Blood test for serum markers

E. Cytology smear

28. A 65 year old woman has breast cancer that metastasized to the bone. She has **no family history** of breast cancer. The least likely mutated gene in her case is:

A. RAS

B. TP53

C. **BRCA 1: this gene mutation is common in inherited but not sporadic breast cancer.**

D. E cadherin

E. SLUG/SNAIL

29. A testicular mass composed of a cyst lined by respiratory type epithelium is a:

A. Hamartoma

B. **Teratoma**

C. Choristoma: **this is not a choristoma because it is a cyst, cysts are not normal.. and choristomas are completely normal tissue in an abnormal location.**

D. Adenoma

E. Seminoma

30. Choose the incorrect combination:

A. H pylori and gastric carcinoma

B. HPV and cervical carcinoma

C. **HTLV1 and B cell lymphoma: HTLV1 causes T cell lymphoma.**

D. Aflatoxin B and hepatocellular carcinoma

E. H pylori and gastric lymphoma.

