Pathology

How to Use the Workbook with the Videos

Using this table as a guide, read the Facts in *First Aid for the USMLE Step 1* 2016, watch the corresponding First Aid Express 2016 videos, and then answer the workbook questions.

<table>
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<tr>
<th>Facts in <em>First Aid for the USMLE Step 1</em> 2016</th>
<th>Corresponding First Aid Express 2016 videos</th>
<th>Workbook questions</th>
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<td>Inflammation (8 videos)</td>
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<td>226.1–233.1</td>
<td>Neoplasia (5 videos)</td>
<td>9–20</td>
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Questions

INFLAMMATION

1. Describe the fundamental differences between the intrinsic and extrinsic pathways of apoptosis. Name two important similarities between the pathways. (p 216)

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

2. Describe the fundamental differences between apoptosis and necrosis. What are the six types of necrosis? List an example of each. (pp 216-217)

____________________________________________________________________

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3. Name three organs that manifest irreversible ischemia with red infarcts. Name three that show pale infarcts. (p 219)

____________________________________________________________________

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4. Which cells mediate the acute phase of inflammation? Which mediate the chronic phase? (p 219)

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

5. In the chart, compare and contrast the ligand-receptor interactions required for each step of leukocyte extravasation. (p 221)

<table>
<thead>
<tr>
<th>Ligand-Receptor Interaction</th>
<th>Endothelial Cells</th>
<th>Leukocytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tight-binding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diapedesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migration</td>
<td></td>
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</tr>
</tbody>
</table>

6. What are the three ways that free radicals can be eliminated? Under what conditions might these mechanisms fail? (p 221)

____________________________________________________________________

____________________________________________________________________
7. In the chart, compare and contrast the characteristics of transudates and exudates. *(p 224)*

<table>
<thead>
<tr>
<th>Transudate</th>
<th>Exudate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes</td>
<td></td>
</tr>
<tr>
<td>Cellularity</td>
<td></td>
</tr>
<tr>
<td>Protein level</td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td></td>
</tr>
</tbody>
</table>

8. What three conditions are associated with a low erythrocyte sedimentation rate? *(p 224)*

**NEOPLASIA**

9. Define the following terms and provide an example of each. *(pp 226-227)*
   A. Hyperplasia
   B. Metaplasia
   C. Dysplasia
   D. Anaplasia
   E. Neoplasia

10. Describe the differences between tumor grade and tumor stage. *(p 228)*

11. Compare and contrast the characteristics of benign vs malignant tumors. *(p 228)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Benign Tumor</th>
<th>Metastatic Tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiated?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distinct boundaries?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metastatic potential?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. Which cancers are most common in men? In women? What is the overall leading cause of death in the United States? (p 228) ________________________________________________________________

13. Match the neoplasm(s) to the condition(s) with which it is most commonly associated. (p 229)

   _____ A. Acute lymphoblastic leukemia
   1. Acanthosis nigricans
   _____ B. Astrocytoma, angiomyolipoma, cardiac
tabdomyoma
   2. Actinic keratosis
   _____ C. Colonic adenocarcinoma
   3. AIDS
   _____ D. Gastric adenocarcinoma
   4. Autoimmune diseases
   _____ E. Esophageal adenocarcinoma
   5. Barrett esophagus
   _____ F. Hepatocellular carcinoma
   6. Chronic atrophic gastritis,
   post surgical gastric
   _____ G. Lymphoma
   7. Cirrhosis
   _____ H. Malignant lymphoma
   8. Down syndrome
   _____ I. Malignant melanoma
   9. Dysplastic nevus
   _____ J. Melanoma, basal cell carcinoma, and
   squamous cell carcinoma of skin
   10. Immunodeficiencies
   _____ K. Non-Hodgkin lymphoma and Kaposi
   sarcoma
   11. Paget disease of bone
   12. Plummer-Vinson syndrome
   13. Radiation exposure
   _____ L. Sarcoma and papillary thyroid cancer
   14. Tuberous sclerosis
   _____ M. Secondary osteosarcoma and fibrosarcoma
   15. Ulcerative colitis
   _____ N. Squamous cell carcinoma of esophagus
   16. Xeroderma pigmentosum, albinism
   _____ O. Squamous cell carcinoma of skin
   _____ P. Visceral malignancy

14. Oncogenes are associated with a ______ (gain/loss) of function and require damage to ______
   (one/both) allele(s); examples include __________________________. In contrast, tumor suppressor
   genes are associated with a ______ (gain/loss) of function and require damage to ______
   (one/both) allele(s); examples include __________________________. (p 230)

15. A 40-year-old otherwise healthy man is diagnosed with nasopharyngeal carcinoma. He does not
   smoke or drink. What is the most likely cause of his cancer? (p 231) __________________________

16. The vaccine Gardasil protects against which viruses that can cause which cancer? (p 231) _______

17. A 70-year-old who eats smoked salmon every day presents with abdominal pain and loss of
   appetite. Which diagnosis should be high on the differential? (p 231) __________________________

18. A 55-year-old woman with a 40-pack-year history of cigarette smoking presents with new-onset
   cough, hemoptysis, and oliguria. What diagnosis should be high on the differential? (p 231)

19. How are tumor markers best used? (p 232) __________________________________________________

20. An IV drug abuser who is being monitored for cirrhosis shows a sudden increase in his α-
    fetoprotein level. For which disease is he at increased risk? (p 232) __________________________
**INFLAMMATION**

1. The intrinsic pathway begins with changes in the levels of anti- and proapoptotic factors, leading to increased mitochondrial permeability. The extrinsic pathway begins with ligand-receptor interactions or perforin/granzyme release. Similarities: both require ATP, and both ultimately activate caspases.

2. Apoptosis occurs without any inflammation, whereas necrosis causes local inflammation. The six types of necrosis are coagulative (as occurs in the heart), liquefactive (bacterial abscess), caseous (eg, due to systemic fungal infection), fatty (saponification of pancreas), fibrinoid (as occurs in blood vessels), and gangrenous (limb gangrene).


5. 

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<tbody>
<tr>
<td>Rolling</td>
<td>E-selectin, P-selectin</td>
<td>Sialyl-Lewis&lt;sup&gt;x&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tight binding</td>
<td>ICAM-1</td>
<td>LFA-1</td>
</tr>
<tr>
<td>Diapedesis</td>
<td>PECAM-1</td>
<td>PECAM-1</td>
</tr>
<tr>
<td>Migration</td>
<td>C5a, IL-8, LTB&lt;sub&gt;4&lt;/sub&gt;, Kallikrein</td>
<td>Various</td>
</tr>
</tbody>
</table>

6. By enzymes (catalase, superoxide dismutase, and glutathione peroxidase), by spontaneous decay, and by antioxidants (vitamins A, C, and E). Deficiencies in free radical elimination can occur in individuals with genetic mutations that result in abnormal/absent enzymes, or with vitamin deficiencies.
7. Transudate | Exudate
--- | ---
Causes | Increased hydrostatic pressure
Decreased oncotic pressure
Sodium retention | Lymphatic obstruction
Inflammation
Cellularity | Hypocellular
Cellular
Protein level | Low
High
Specific gravity | Low
High

8. Congestive heart failure, sickle cell anemia, and polycythemia.

**NEOPLASIA**


   B. Metaplasia: one type of cell is replaced by another. Examples: Barrett esophagus, squamous metaplasia of the airways.

   C. Dysplasia: abnormal cells. Examples: cervical dysplasia, fibrous dysplasia of bone, congenital retinal dysplasia.


   E. Neoplasia: new growth, either benign or malignant. Examples: uterine fibroids, nevi, malignant cancers.

10. | Benign Tumor | Metastatic Tumor
--- | --- | ---
Differentiated? | Well-differentiated | May be poorly differentiated
Growth | Slow | Erratic
Distinct boundaries? | Yes | Diffuse or locally invasive
Metastatic potential? | No | Yes

11. Tumor grade is the degree of cellular differentiation within the tumor and is a characteristic of the tumor itself. In contrast, tumor stage describes the extent of tumor spread within a patient, and thus is a better indication of a patient’s prognosis than is tumor grade.
12. Prostate, lung, and colon/rectal cancers are the most common cancers in men; breast, lung, and colon/rectal cancers are the most common in women. The overall leading cause of death in the United States is cardiovascular disease.


14. Oncogenes are associated with a gain of function and require damage to only one allele for expression; examples include c-myc (Burkitt lymphoma) and ras (colon carcinoma). Tumor suppressor genes are associated with a loss of function and require damage to both alleles for expression; examples include NF1 (neurofibromatosis type 1) and BRCA2 (breast cancer).

15. Epstein-Barr virus (EBV).

16. HPV 6, 11, 16, and 18. HPV 16 and 18 have been associated with cervical cancer.

17. Gastric cancer. Smoked foods contain large amounts of nitrosamine.


19. To confirm a diagnosis, to check for tumor recurrence, and to monitor response to therapy.

20. Hepatocellular carcinoma. IV drug use and cirrhosis are associated with HCV, and HCV is associated with hepatocellular carcinoma.