Question No. 1 of 10

Instructions: (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

1. An 8-year-old male complains of fatigue and dactyliitis, and has a history of recurrent bacterial infections. Examination of a blood smear appears as follows:

What is the likely diagnosis?

(A) Anemia
(B) Malaria
(C) Dehydration due to excess fluid loss
(D) Sickle cell disease
(E) Thalassemia

Feedback

A. Incorrect!
Anemia is symptomatic of sickle cell anemia, but is not the root cause.

B. Incorrect!
Protection against malaria is conferred by this disorder.

C. Incorrect!
The answer is in the shape of the erythrocytes.

D. Correct!
The micrograph shows sickle-shaped erythrocytes.

E. Incorrect!
Erythrocytes in thalassemia tend to be small and abnormally shaped.

Solution

The cells shown in the micrograph are indicative of sickle cell disease. Sickle cell anemia arises from a single point mutation in the beta chain, at the sixth position valine replaces glutamic acid. Due to the point mutation the beta chains polymerize, a process that is accelerated by infections, hypoxia, acidosis, physical exercise, vasooocclusion due to cold and hypertonic dehydration. In patients who are heterozygotes it is referred to as sickle cell trait, and it confers protection against malaria.

(D) Sickle cell disease
**Question No. 2 of 10**

**Instructions:** (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

2. A 23 year old female in her second trimester of pregnancy notices the appearance of dark spots on her skin, as follows. What is the most likely diagnosis?

<table>
<thead>
<tr>
<th>(A) Albinism</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B) Melasma</td>
</tr>
<tr>
<td>(C) Vitiligo</td>
</tr>
<tr>
<td>(D) Melanoma</td>
</tr>
<tr>
<td>(E) Urticaria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A. Incorrect!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albinism involves depigmentation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Correct!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melasma is hyperpigmentation of the face associated with pregnancy or oral contraceptive use.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Incorrect!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitiligo involves depigmentation.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>D. Incorrect!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanoma is a dark lesion with irregular borders associated with sun exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. Incorrect!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urticaria is hives, not skin pigmentation.</td>
</tr>
</tbody>
</table>

**Solution**

Melasma is hyperpigmentation of the face associated with pregnancy or oral contraceptive use.

**(B) Melasma**

<table>
<thead>
<tr>
<th>Question #03</th>
<th>3. Allergic contact dermatitis is a Type ____ hypersensitivity.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A) I</td>
</tr>
<tr>
<td></td>
<td>(B) II</td>
</tr>
<tr>
<td></td>
<td>(C) III</td>
</tr>
<tr>
<td></td>
<td>(D) IV</td>
</tr>
<tr>
<td></td>
<td>(E) V</td>
</tr>
</tbody>
</table>

| Feedback     | A. Incorrect!  
Think of a type that is mediated by cells, not antibodies. |
|--------------|---------------------------------------------------------------|
|              | B. Incorrect!  
Think of a type that is mediated by cells, not antibodies. |
|              | C. Incorrect!  
Think of a type that is mediated by cells, not antibodies. |
|              | D. Correct!  
Allergic contact dermatitis is a Type IV hypersensitivity. |
|              | E. Incorrect!  
Think of a type that is mediated by cells, not antibodies. |

| Solution     | Allergic contact dermatitis is a type IV hypersensitivity reaction at site of contact to antigen.  
(D)IV |
## Question #04

4. A 29 year old female presents with an ulcerative, scaly lesion as shown below. What is a possible cause?

(A) Squamous cell carcinoma  
(B) Melanoma  
(C) Urticaria  
(D) Verrucae  
(E) Atopic dermatitis

### Feedback

A. Correct!  
The picture shows a patient with squamous cell carcinoma.

B. Incorrect!  
Melanoma tends to be a dark lesion with irregular borders.

C. Incorrect!  
Urticaria is hives, not ulcerative lesions.

D. Incorrect!  
Verrucae are warts, not ulcerative lesions.

E. Incorrect!  
Atopic dermatitis, or eczema, involves pruritic eruption on flexor surfaces.

### Solution

Squamous cell carcinoma is a red ulcerative lesion due to excessive sun exposure. It is locally invasive but rarely metastasizes. Histopathology shows keratin pearls. Actinic keratosis is a precursor.

**(A) Squamous cell carcinoma**

Image source: National Cancer Institute,  
Question No. 5 of 10

Instructions: (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

5. Blood cells are classified as which kind of tissue?
   (A) Epithelial
   (B) Connective
   (C) Muscle
   (D) Nervous
   (E) None of the above

Feedback

A. Incorrect!
Think of the source of blood cells.

B. Correct!
Blood cells are classified as connective tissue, as they originate within the bone marrow.

C. Incorrect!
Think of the source of blood cells.

D. Incorrect!
Think of the source of blood cells.

E. Incorrect!
Think of the source of blood cells.

Solution

Blood cells are classified as connective tissue, as they originate within the bone marrow.

**(B) Connective**
6. Sections from the stomach of a 45 year old male with Barrett’s esophagus (shown below) reveal that the disease involves replacement of the normal squamous epithelium lining of the esophagus with _____.

(A) Adipose tissue
(B) Metastatic columnar epithelium
(C) Simple squamous epithelium
(D) Keratinized stratified epithelium
(E) Squamous cell carcinoma

A. Incorrect! 
Look at the shape of the epithelial cells.

B. Correct! 
In Barrett’s esophagus, of the normal squamous epithelium lining of the esophagus is replaced with metastatic columnar epithelium.

C. Incorrect! 
Look at the shape of the epithelial cells.

D. Incorrect! 
Look at the shape of the epithelial cells.

E. Incorrect! 
Look at the shape of the epithelial cells.

In Barrett’s esophagus, the normal squamous epithelium lining of the esophagus is replaced with metastatic columnar epithelium. You can see these cells in the micrograph provided in the question.

(B) Metastatic columnar epithelium
Question No. 7 of 10

Instructions: (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

7. An organ section from a 59 year old alcoholic shows abnormally high lipid accumulation, as follows. Which organ was this section derived from?

(A) Lung
(B) Stomach
(C) Liver
(D) Brain
(E) Pancreas

Feedback

A. Incorrect!
Think of the organ most involved in alcohol exposure.

B. Incorrect!
Think of the organ most involved in alcohol exposure.

C. Correct!
Steatosis is the abnormal accumulation of lipids within cells that typically takes place in the alcoholic liver.

D. Incorrect!
Think of the organ most involved in alcohol exposure.

E. Incorrect!
Think of the organ most involved in alcohol exposure.

Solution

Steatosis is the abnormal accumulation of lipids within cells that typically takes place in the alcoholic liver. Even if you did not recognize the characteristics of a section from the liver (such as the hepatocytes, which stain red in this micrograph), your knowledge that the liver is most affected during alcoholism would permit you to “best guess” the correct answer.

(C) Liver
**Question No. 8 of 10**

**Instructions:** (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

8. A 56-year-old female undergoes cholecystectomy. Incidental examination of a section of his gall bladder reveals the following image of gall bladder adenocarcinoma. What is the most likely tissue layer of origin for this adenocarcinoma?

(A) Lamina propria  
(B) Serosa  
(C) Muscularis  
(D) Simple columnar epithelium  
(E) Perimuscular fibrous tissue

**Feedback**

A. Incorrect!  
Think of the definition of an adenocarcinoma, regardless of the organ it affects.

B. Incorrect!  
Think of the definition of an adenocarcinoma, regardless of the organ it affects.

C. Incorrect!  
Think of the definition of an adenocarcinoma, regardless of the organ it affects.

D. Correct!  
Adenocarcinoma is a cancer of the epithelium of glandular tissues.

E. Incorrect!  
Think of the definition of an adenocarcinoma, regardless of the organ it affects.

**Solution**

Adenocarcinoma is a cancer of the epithelium of glandular tissues. This, the most likely tissue layer of origin for this adenocarcinoma is the simple columnar epithelium.

**Answer:** (D) Simple columnar epithelium
Question No. 9 of 10

Instructions: (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

9. In the following histological section from a patient diagnosed with Whipple’s disease, foamy macrophages (arrow) are evident in which layer of the small intestine?

- (A) Lamina propria
- (B) Simple columnar cells of intestinal villi
- (C) Goblet cells of intestinal villi
- (D) Crypts of Lieberkuhn
- (E) Submucosa

Feedback

- A. Correct!
The macrophages are present in the lamina propria.

- B. Incorrect!
Think of the layer just underneath the epithelium.

- C. Incorrect!
Think of the layer just underneath the epithelium.

- D. Incorrect!
Think of the layer just underneath the epithelium.

- E. Incorrect!
Think of the layer just underneath the epithelium.

Solution

The macrophages are present in the lamina propria. Remember that the GI system follows the same general organization, as follows:

- (A) Lamina propria
**Question No. 10 of 10**

**Instructions:** (1) Read the problem statement and answer choices carefully, (2) Work the problems on paper as needed, (3) Pick the answer, and (4) Review the core concept tutorial as needed.

<table>
<thead>
<tr>
<th><strong>Question #10</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. In the following H&amp;E stained section of an adrenal gland from a 51 year old male with adrenal cortical carcinoma, the tumor cells are compact with a cytoplasm that can be described as:</td>
</tr>
<tr>
<td><img src="image_url" alt="Image" /></td>
</tr>
</tbody>
</table>

- (A) Eosinophilic
- (B) Basophilic
- (C) Gram-positive
- (D) Gram-negative
- (E) Silver impregnated

<table>
<thead>
<tr>
<th><strong>Feedback</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Correct! Eosin is acidophilic, staining the cytoplasm purplish-pink.</td>
</tr>
<tr>
<td>B. Incorrect! Think of which dye stains cytoplasm.</td>
</tr>
<tr>
<td>C. Incorrect! Gram stain was not used on this section.</td>
</tr>
<tr>
<td>D. Incorrect! Gram stain was not used on this section.</td>
</tr>
<tr>
<td>E. Incorrect! Silver impregnation was not used on this section.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Solution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Eosin is acidophilic, staining the cytoplasm purplish-pink. The information that the section came from a patient with ACC is extraneous to the question being asked.</td>
</tr>
</tbody>
</table>

(A) Eosinophilic