This is a 3 hour exam covering Basic Principles of Immunology and Virology. This exam is worth 47.5% of your grade. There are 23 pages. Write answers on exam pages in the space provided.

**IMMUNOLOGY (115 Total Points) 77/115**

(Q) <10 pts> True/False Circle the correct answer.

T  F  (1) When pluripotent hematopoietic stem cells undergo mitosis, they can only generate stem cells of the myeloid or lymphoid lineages.

F   (2) Hematopoiesis is a process which generates cells that participate in both innate and adaptive immunity.

T  F  (3) NK cells undergo mitosis in germinal centers in order to bind the antibodies they use for ADCC reactions. (ADCC = antibody dependent cellular cytotoxicity)

T  F  (4) Homing receptors on activated dendritic cells are used to direct activated B cells back to the site of antigen location (e.g., the infection site) via the blood.

F  (5) CD4+ T cell help stimulates differentiation from a naïve B cell expressing two H chain genes (mu and delta) to an activated B cell expressing one H chain gene of a new isotype. This is termed “ allelic exclusion.” (Type switching)

F  (6) Cells expressing HLA class I, but not HLA class II, molecules are displaying the property of “allelic exclusion.”

F  (7) The degradation of proteins into peptides 8-10 amino acids long is accomplished by the proteasome.

F  (8) The invariant chain (II) functions to keep peptides >20 amino acids long from entering the lumen of the endoplasmic reticulum via TAP (Transporter of Antigenic Proteins).

T  F  (9) Class II HLA molecules have a peptide binding groove formed by a protein-protein interaction between the amino terminal domains of two different membrane-anchored proteins.

T  F  (10) Secretion of IgG by a plasma cell requires a modification in the Fc domain that allows a protease to cleave the last 25 amino acids which are anchored in the surface membrane.
Q) <1 pt> Antigenic variation within the same species of microbe, e.g. influenza virus or trypanosome, is responsible giving these microbes an opportunity to cause pathology in a host that had previously developed protective immune responses to earlier versions of the microbe. This property of the microbe increases its ____________. (one word answer)

Q) <10 x 1 = 10 pts> There are two major T cell populations emerging from the thymus after birth. Indicate the polypeptide chains comprising the TCR of each population, the CD4 and 8 (e.g. CD4+8+) molecules associated with each TCR that stabilizes its interaction with MHC:peptide complex, and the MHC class on APC that is recognized by each CD molecule.

<table>
<thead>
<tr>
<th>TCR genes</th>
<th>CD4, 8</th>
<th>MHC class</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>d &amp; β</td>
<td>CD4+8+</td>
</tr>
<tr>
<td>b)</td>
<td>α &amp; δ</td>
<td>CD8+4-</td>
</tr>
</tbody>
</table>

What are the properties of the major T cell population emerging from the thymus before birth?

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>c)</td>
<td></td>
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</table>
| d)         | NK cells express only one of the proteins in your answers above. It is ____________.

Q) <3 pts> Resting memory B cells specific for antigen X (= anti-X memory B cells) can be distinguished from resting anti-X naive B cells by several characteristics. Circle T if the characteristic given is true or F if it is false.

- [ ] [ ] Resting anti-X memory and naive B cell heavy chains have identical hypervariable regions 1 and 2 but not region 3.
- [ ] [ ] Resting anti-X memory and naive B cell light chains have identical constant regions.
- [ ] The frequency of anti-X memory B cells is higher than anti-X naive cells.
- [ ] The affinities of the ARMs are greater for antigen X in naive B cells because the surface IgM is pentameric.
- [ ] Anti-X memory, but not naive, B cells, can provide signals 1 and 2 to anti-X naive T cells.
Q) 5 pts> Resting memory T cells specific for antigen X (anti-X memory T cells) can be distinguished from resting anti-X naïve T cells by several characteristics. Circle T if the characteristic given is true or F if it is false.

T  F  Resting anti-X memory and naïve T cell beta chains have identical constant regions.
T  F  Resting anti-X memory and naïve T cell alpha chains have identical hypervariable regions 1 and 2 but not region 3.
T  F  The affinities of the ARMs are greater for antigen X (peptide) in memory T cells.
T  F  Anti-X memory T cell ARMs can isotype switch from γδ to ωβ.
T  F  The CD45 on anti-X naïve and memory T cells are different isoforms.

Q) 4 pts> The B cell is checked twice for expression of Ig molecules that have an auto-reactive ARM. Briefly indicate (1) the common feature of the mechanism leading to apoptosis of autoreactive B cells and (2) the anatomical regions where these processes occur.

1. If the B cell binds strongly to self-antigen, apoptosis

2. Site (a) bone marrow — Site (b) lymph nodes

Q) 2 pts> Why is the same HLA molecule able to present many different peptides to the TCR repertoire recognizing that HLA?

3. HLA's have anchor residues specific for amino acid on antigen peptide chain have to match only at H.R. sites — all others can be different.

Q) 2 pts> Describe in words what change(s) occur in a dendritic cell (DC) that was in infected tissue and is now in the draining lymph node (LN)?

4. Dendritic cells lose ability to phagocytose microbes and they become express MHC's with antigen peptides on expression.

Q) 4 pts> Using the symbols for cytokines, e.g. IL-3 or TNFα (alpha), name the cytokines which promote differentiation of (a) Th0 → Th1 or (b) Th0 → Th2. Also name the cytokines which inhibit differentiation of (c) Th0 → Th1 or (d) Th0 → Th2.

5. IL-2

6. IL-12
Q) **H. pylori** is a bacteria that can multiply within the acidic environment of the stomach, causing pathology (e.g., ulcers). Pepsin is a host protease secreted into the stomach that has its highest activity at the stomach pH. The class of immunoglobulin (Ig) found in the stomach is IgA dimer.

a) <2 pts> Secretory component (SC) is a protein that binds to the Fc regions of IgA dimer. What function might you expect SC to have in this acidic environment containing pepsin? Use the one line below to answer. **Don’t exceed 10 words. Compose your thoughts before writing.**

- SC will be involved in cleaving IgA’s Fc region and allowing their release to opsonize H. pylori.

b) <4 pts> A person with a severe case of stomach ulcers is a patient on your service. What test could you order from the clinical laboratory to determine if this person is infected with **H. pylori**? Note: it is not necessary to biopsy the stomach wall and stain for bacteria! Use the one line below to answer. **Don’t exceed 10 words. Compose your thoughts before writing.**

- IgA antibody test will show that there is a bacteria in the gut your body is reacting to.
Q) <2 pts> Name two routes by which naïve B or T lymphocytes could enter lymph node X.

   (a) via high endothelial venules

   (b) via different lymph vessels

Q) <4 @ 2 = 8 pts> Heteropolysaccharide (Hetpoly) antigens (Ags) have different sugar subunits and are often stimulators of B-1 cells for T-independent (TI) adaptive immune responses in humans over the age of 6-months old, but not less. Certain bacteria express (on their surface) HetpolyS, an antiphagocytic shield against phagocytosis (S= a particular repeated subunit). Thus, these bacteria can escape being opsonized by innate immune mechanisms in the infant.

<2 pts> Name two innate opsonin-generating reactions that, if they failed to be initiated, would impede phagocytosis. Answers only in space provided.

1. (a) classical alternative complement pathway

   (b) MBL lectin complement pathway

<2 pts> The antibodies (Abs) produced in adults against certain oligosaccharide structures ("epitopes") present in the HetpolyS ("antigen") are competent to activate the classical pathway (CP) of complement and promote the phagocytosis leading to destruction of these bacteria. Vaccination of pregnant women with HetpolyS is one way to create a source of anti-HetpolyS Abs. In addition to generating HetpolyS specific Abs in the blood of the mother, what additional feature of the Abs is essential for the success of this strategy?

1. (c) The Ab needs to be IgG so it can cross placenta and protect baby too.

<2 pts> What modification to the vaccine (vaccine = HetpolyS) is necessary to achieve success?

0.5 (d) Inject it so IgGs are produced systemically

   oral vaccine might only give IgAs.

(continued on next page)
<2 pts> B-2 B cells will generate immunological memory, if appropriately stimulated. Thus, infants are often vaccinated using the modified HeppolyS vaccine. Will infection by bacteria expressing the same HeppolyS used for vaccination of the infant recall the immunological memory? Give a reason.

(e) **NO** (circle one) **Infants start producing B-2 cells to replace B-1 cells they had as fetus.** - so they have immunological memory from vaccine.

Q1 <4 pts> Tumors in humans are usually mutated cells that are mitotic and have become “immortalized” by avoiding detection or elimination by the host immune system. A large percentage of these mutations result in the creation of “stop codons” that are in the same reading frame as the original gene. Thus, the mRNA of the mutant cell gene is identical in length but the protein products are of different length, the mutant protein being shorter but consisting of the same amino acid sequence as the normal gene up to the point of the stop codon, as shown below.

Normal: ASCDFGHJKLMNHPQRSTGVWGYS
Mutant: ASCDFGHJKLMNH

Letters = amino acids; Lines = mRNA

The mutant protein is probably nonfunctional and may be involved in regulation of mitosis. **Why might tumors with such a mutation avoid detection and subsequent elimination?**

**Hint:** think about antigen presentation. Compose your thoughts before writing.

... repair enzymes & proof-reading enzymes check for length to determine whether or not the mRNA needs to be degraded or not. They cannot detect change in composition - only length?
Q) Answer by circling one of the four types of hypersensitivity reactions which is described in each case. <10 @ 1 = 10 pts>

I  II  III  IV  CTL-induced IDDM*
II  III  IV  IgE-cosinophil ADCC# against a worm infection
III  IV  Mast cell degranulation caused by anaphylotoxins
I  II  III  IV  CD4+ Th1 granuloma reaction due to macrophage activation
I  II  III  IV  Asthma, allergic rhinitis, hay fever (respiratory diseases)
I  II  III  IV  Insulin-resistant diabetes (antibody to insulin receptor)
II  III  IV  Systemic anaphylaxis due to cross-linking IgE receptors on mast cells
I  II  III  IV  IgE-mediated mast cell degranulation
II  III  IV  Poison Ivy skin rash (contact dermatitis)
II  III  IV  Hyperthyroidism induced by anti-TSH receptor antibodies

*IDDM - insulin-dependent diabetes mellitus (type 1 diabetes)
#ADCC - Antibody-Dependent Cellular Cytotoxicity

Q) <5 pts> Activation of serine proteases is an important step in the initiation of Complement (C') activity by all three pathways. These serine proteases then establish a common enzymatic activity known as **MAC** (membrane attack complex). 

Write the formulas of these enzymatic activities using letters of the C' protein fragments:

- Classical pathway
  - C9 makes pore
  
- Mannan pathway
  - Same as above 

- Alternate pathway
  - C5 convertase \( \rightarrow \) C3b, Bb \( \rightarrow \) C5 convertase

Which pathway is antibody-dependent? **Classic**
Q) <10 pts> Cellular adhesion molecules fall into four major families or categories. I've given you one. You name the other three:

selectins - P, L, E

integrins - LPA's

- VCAMS, ICAMS (binds LPAs - on endothelial cells)

- CD31 - PECAMS (for platelets)

In the formation of an "immunological synapse" between non-memory B-2 cells and activated CD4+ Th cells, certain cell surface molecules interact and account for transmission of signal #2 to the B cell. Other molecules are more responsible for generalized cell adhesion. The synapse is composed of an inner circle and an outer zone that surrounds the inner circle. The molecules within the inner circle that are responsible for antigen specificity and for generation of signal #2 include on the T cell surface:

1. TCR
2. CD4

The antigen-specific molecules on T cells bind to X on the B cell; the signaling molecules on T cells bind to Y on B cells.

X = MHC II
Y = B7

If the T cell is helper 1 type, signal #3 cytokine is IL-2.
If the T cell is helper 2 type, signal #3 cytokine is IL-4.
Q) <10 @ 1 = 10 pts> A human with DiGeorge’s syndrome fails to develop a thymic epithelium and the gland is essentially without function. From the list below draw a line through the types of antigen-specific immune effector responses which are absent and circle the types which are still present?

- Classical pathway of C' activation
- CTL-mediated tumor cell lysis
- Alternative pathway of C' activation
- NK-mediated tumor cell lysis
- Antigen processing by skin dendritic cells
- Type I allergic reactions
- Phagocytosis by neutrophils
- Production of cytokines

no T cells

Q) <2pts> What single “lost function” of thymic epithelial cells is most important for the diagnosis of this syndrome? Be brief!

0 ability to activate macrophages through TH1 cells - so increased susceptibility to bacterial infections.

Q) In vitro virus-infected human fibroblasts, in which the mature virus buds out through the plasma membrane, can express viral antigens (Ags) in two different forms recognizable by the Ag-specific cells the adaptive immune system. Early after the in vitro infection, the infected cells are not lysed

(a) <1pt> Give the general name for viruses that escape cells by budding and an example of such a virus.

1 Enveloped virus - Paramyxoviridae family

Influenza virus, Respiratory syncytial virus

expresses HA & NA glycoprotein
(b) How many HLA class I molecules (used in tissue typing and located in the same gene family at the MHC locus) are potentially involved in antigen presentation? Name them.  

   Number: 5  
   Names: proteasome, TAP, tapasin, ERp57, calreticulin  

(c) What are the two forms of viral antigen expression on the surface of the infected fibroblasts?  

   X = glycoproteins  
   Y = non-glycoproteins  

(d) Which of the two forms of viral antigen in (c) is recognized by Abs?  

   X   Y (circle one)  

Q) How is antibody production to the viral proteins initiated in a first-time infected rodent?  

   ANSWER by filling in the blanks.  ARMs = Antigen Recognition Molecules.  

   The ARMs on naive B cells in the secondary lymphoid organ interact with glycoproteins on enveloped viruses that are released from infected cells and drain to the lymphoid organ, generating signal #1 to these B cells. Also, released viruses at the infection site are nonspecifically captured by dendritic cells and the proteins are cleaved into complexes, then presented on the MHC I and II of these virus-capturing cells as they migrate from the infection site to the lymphoid organ. CD4⁺ naïve T cells that enter the lymphoid organ interact with virus-capturing cells by using their antigen-specific T cell receptor to generate signal #2 and co-stimulator CD 80/86 molecules to generate signal #3 to these T cells. These activated T cells interact with the antigen-capturing B cells that have processed the captured antigen into complexes present on the MHC II of these B cells, generating signal #4 to these B cells. Cytokines from the activated T cells stimulate the activated B cells to undergo proliferation and differentiation in two cell types: Ab-secreting plasma cells and long-lived memory B cells. Accompanying these changes, the gene encoding the ARMs undergoes rearrangement (leading to isotype switching) and somatic hypermutation, leading to affinity maturation of the Abs to the viral proteins. 

20 blanks
1. (2 pts) Define a virus in one sentence.

Obligate intracellular organism with DNA or RNA (not both) nucleic acid genome surrounded by a protective capsid

2. (0.5 pts each) Define the following terms and indicate whether each is virus or host encoded:

- capsid - protein covering of genome that protects the genome and transports it from cell to cell 0.5

- nucleocapsid - complex of DNA or RNA and capsid proteins

- envelope - phospholipid bilayer acquired from host with viral coded protein inserted in it. Present on some viruses.

- virion - a viral particle with genome and capsid; with or without envelope 0.5

3. (1 pt) Name the two major types of virus symmetry.

a) icosahedral
b) helical ✓

4. (2 pts) Viruses with RNA genomes have higher mutation rates than viruses with DNA genomes. Why?

RNA dependent RNA polymerases used to replicate these viruses do not have proofreading mechanisms
5. (1 pt) What is the mutation rate of a typical:

DNA virus? 1 in 10,000

RNA virus? 1 in 1000

6. (2 pts) Define the term attenuation and give an example of an attenuated virus.

**attenuation is inactivation of the "dangerous" part of the virus (genome) and preservation of part that causes an immune response (surface glycoprotein)

E.g.: Sabin's vaccine for polio

7. (3 pts) List three viruses that are transmitted primarily by:

the respiratory route?

a) rhinovirus (common cold)
b) respiratory syncitial virus (RSV)
c) morbillivirus (measles)

the fecal oral route?

a) poliovirus (enterovirus)
b) rotavirus
c) hepatitis A

8. (2 pts) Describe one mechanism by which a virus establishes latency in the host.

**Virus is not lytic - it does not kill host cells when it replicates, ensuring longevity of host cells.**
9. (1 pt) What virus is the etiological agent of adult T cell leukemia?

HTLV-I

10. (3 pts) Viruses belonging to the family picornaviridae are responsible for a wide range of human disease. Name the specific picornavirus associated with each of the following human diseases:

hand-foot-and mouth disease

Coxsackievirus type A

Common Cold

Rhinovirus

Acute Hepatitis

Hepatitis A

11. (2 pts) Name one treatment for the common cold and briefly discuss its effects.

IFN-α nasal spray – helps body fight off viruses

12. (4 pts) Two patients report that they have eaten at a local restaurant known to be the source of a community wide outbreak of hepatitis A infection. One patient ate at the restaurant 6 weeks ago and the other ate there just last week. Describe how you would treat and counsel each of these patients. Be specific about the treatment.

Patient A: 6 weeks ago

Acute infection has probably resolved in this patient as it does in most cases.

So, advise him to stay away from that restaurant.

Patient B: 1 week ago

Because patient ate only 1 week ago, can give him pooled immunoglobulin - which is effective if given within 2 weeks after exposure.
13. (4 pts) Picornaviruses require an RNA dependent RNA polymerase for replication. Unlike most other viruses this enzyme is not packaged as part of the virion and is therefore not immediately available upon entry into the cell. How do picornaviruses gain access to the relevant enzyme?

Picornaviruses cleave 5' CAP and decode host mRNA. They use IRES to get into host cell & begin replication.

14. (2 pts) Name the disease and discuss the transmission cycle of an alphavirus associated with a rare but fatal encephalitic disease in humans.

Eastern equine encephalitis
caused by togaviridae
transmitted through mosquito bite from horse reservoir to human

15. (1 pt) Name the two opposing neurological manifestations of rabies.

a) Dumb
b) Furious

16. (1 pt) Of the following rabies virus genes circle the one that is expressed at the highest level? Draw an X over the one expressed at the lowest level?

M
N
P
G
17. (4 pts) A spelunker arrives in your office with small puncture wounds on the back of his/her neck. How will you evaluate and treat this patient.

Bats with rabies are abundant in caves. This bite could be from a bat.

Diagnosis can be made by checking for virus using PCR from serum (can't use NAb test b/c rabies has incubation up to 12 mos)

Treatment
1) Wash wound
2) give pooled immunoglobulin for passive immunity
3) give rabies vaccine HRIG.

18. (1 pt) The genus morbillivirus contains one important human pathogen. What is it? measles

19. (1 pt) The genus pneumovirus contains one important human pathogen. What is it? RSV

20. (1 pt) What virus associated with parotitis in children is classified as a rubulavirus? mumps

21. (2 pts) What is the common name for laryngotracheobronchitis? What virus in the genus respirovirus is responsible. para-influenza

22. (1 pt) The presence of Koplik's spots are diagnostic for what disease? measles

23. (2 pts) Measles virus infection is associated with three neurological complications. Name two of them. MIB6 - inclusion body encephalitis, SSPE
24. (2 pts) Why is antigenic shift only associated with infection by influenza virus type A?

- They have segmented genomes that can recombine when one cell is infected with 2 different strains.

25. (3 pts) What is the main function of:

- The HA protein of influenza virus?
  - Binds virus to host cell [✓]

- The NA protein of influenza virus?
  - Cleaves virus that are budding from the host cell [✗]

- The M2 protein of influenza A?
  - Allows H+ protons in & helps uncoat genome in fused endo-lysosome [✓]

26. (4 pts) What drug is used to treat severe cases of influenza A infection? How and why does it work?

- Amantadine is an M2 channel blocker.
  - M2 Channel blockage means that H+ can no longer enter & uncoat genome for entry into nucleus, where it replicates and is transcribed.

27. (2 pts) Influenza viruses are unique amongst negative stranded RNA viruses in that they replicate in the nucleus of the cell. Why do they have this requirement?

- Because their 5’ ends need to be capped, they need to snatch these from host mRNA.
28. (4 pts) A patient arrives in your office on Monday morning reporting severe flu symptoms that began the day before. He/she reports that they have an important meeting on Thursday and Friday and cannot afford to be ill at that time. What drug(s) if any would you consider offering this patient and why.

- Amantadine – if it was influenza, this would help as previously explained.
- NA inhibitors – would prevent more cells from being infected because NA can’t help them bud off.

29. (1 pt) What is the importance of the conversion of a human rotavirus virion to an ISVP?

- ?

30. (1 pt) Human rotaviruses are the major cause of what illness in children.

- Diarrhea

31. (1 pt) What virus is the major cause of this same illness in adults?

- Norwalk virus
32. (4 pts) Describe the following HIV related tests in terms of when they are used and what they test for?

bDNA assay
- 

RT-PCR assay
amplifies viral proteins - especially reverse transcriptase used to detect viral load - 1

ELISA - tests for p24 (a matrix protein coded for by gag gene) antibodies
used as initial test. If ( ), then do western blot to confirm

Western Blot
used to confirm results of ELISA test - western blots detect antigen

33. (1 pt) What is the major cellular receptor for HIV-1 on T cells?

CD4
34. (2 pts) What is the major cellular co-receptor for HIV-1 on:

- T cells? $\text{CCR4}$
- macrophages? $\text{CCR5}$

35. (2 pts) Describe in terms of protein-protein or protein-lipid interactions the three steps involved in HIV-1 membrane fusion.

a) $\text{gp120 binds to CD4 receptor} \quad \downarrow \text{conformational change}$

b) $\text{gp120 binds to co-receptor} \quad \downarrow \text{conformational change}$

$\text{CCR5}$

$\text{P} : \text{P}$

$\text{P} : \text{P}$

$\text{gp41 introduces a protein into cell lipid membrane}$

$\text{that initiates fusion}$

36. (2 pts) Where in the cell does:

- reverse transcription occur? $\text{cytoplasm}$
- integration occur? $\text{nucleus}$
- HIV-1 mRNA synthesis occur? $\text{nucleus}$
- HIV-1 protein synthesis occur? $\text{cytoplasm}$
37. (4 pts) Active antiretroviral therapies (ART) include a regimen of NRTIs, NNRTIs, and a protease inhibitor. Name one drug from each class of reagents and describe their mechanism of action in terms of how they inhibit HIV.

NRTI's - ART is an example. the drug induces modified nucleosides - di-deoxy's that integrate into DNA being made by reverse transcriptase and cause chain termination.

NNRTI's - Nevirapine is an example. this drug acts by directly inhibiting reverse transcriptase.

RT - Inhibit final proteolytic cleavage of capsid proteins for virus assembly. Zidovudine is an example or something that ends in "vir".

38. (2 pts) What 4 HIV proteins are encoded by the pol gene?

a) integrase
b) reverse transcriptase
  c) RNAse-H
  d) viral aspartyl protease

39. (1 pt) What two proteins present in the mature HIV virion are encoded by the env gene.

a) gp 120
b) gp 41
40. (2 pts) Name the polyomavirus and papillomavirus oncoproteins associated with inactivation of the tumor suppressor proteins p53 and Rb.

Papilloma  \( E_6 - p53 \)  polyoma  \( LT \)

\( E_7 - Rb \)

41. (1 pt) What single event has led to a dramatic increase in the incidence of PML since 1979.

rise in HIV+ cases

42. (1 pt) List 2 HPVs that are strongly associated with the development of cervical cancer.

a) 16
b) 41

43. (4 pts) The drug Podofilox (condylox) is used to treat condyloma acuminatum. Describe both its side effects and efficacy.

- can create nausea
- somewhat efficacious for anal warts.

44. (1 pt) Name 3 alphaherpesviruses?

a) HSV-1 (human herpes)

b) HSV-2

c) Varicella zoster virus

45. (1 pt) Where do alphaherpesviruses generally establish latent infections

sensory ganglia

46. (1 pt) Name 2 betaherpesviruses?

a) Cytomegalovirus

b) Roseolovirus  HIV - HIV -

47. (1 pt) Where do betaherpesviruses generally establish latency?

monocytes, spleen, lymph nodes
48. (1 pt) Name 2 gamma herpesviruses?
   a) Epstein-Barr
   b) HSB-8

49. (1 pt) Where do gamma herpesviruses generally establish latency?
   B-cells

50. (5 pts) Which herpes simplex virus is most associated with the following presentations:
   Oral herpes?
   HSB-1
   Ocular herpes?
   HSB-1
   Genital herpes?
   HSB-2
   Neonatal herpes?
   HSB-2
   Herpes encephalitis?
   HSB-1

51. (1 pt) What herpes virus is associated with infectious mononucleosis?
   Epstein Barr

52. (1 pt) Name 3 post-infectious complications associated with IM?
   a) fever
   b) headache
   c) dry mouth

53. (1 pt) What herpes virus is a major cause of congenital infections?
   CMV

54. (4 pts) What drug is commonly prescribed for genital herpes infections? Describe its mechanism of action?
   Acyclovir - needs thymidine kinase coded for by viral genome to be activated. Acts as a nucleoside analog and causes chain termination.
55. (4 pts) Interpret the following serologic tests in a patient with HBV infection:

A. HBsAg +, Anti-HBs neg, Anti-HBc neg
   Acute infection

B. HBsAg +, Anti-HBs neg, Anti-HBc +
   Chronic infection

C. HBsAg neg, Anti-HBs +, Anti-HBc +
   Resolved infection

D. HBsAg neg, Anti-HBs +, Anti-HBc neg
   Vaccination

56. (4 pts) A patient you are seeing has just been diagnosed as having chronic replicative HBV infection. The patient begins alpha-IFN 2B therapy. At follow-up it is noted that ALT levels have increased and a biopsy of the liver shows evidence of significant inflammation. Would you continue or halt therapy and why?

IFN α upregulates MHC I expression and mounts an immune response that deal with viruses. Cytotoxic T-cells lyse infected cells. It looks like in her case, the treatment is exacerbating liver damage—so I would stop it.