

## ClinImmune Labs CHT/CHS Practice Exam

**Instructions:** For each question please select the best answer in the context of laboratory histocompatibility and tissue typing.

1. Which of the following is not a secondary lymphoid organ?
  - a. Spleen
  - b. Thymus
  - c. Lymph nodes
  - d. Liver
  - e. Tonsils
  
2. Which of the following is not a component of the reticuloendothelial cell system?
  - a. Microglial cells
  - b. Kupffer cells
  - c. Langerhans cells
  - d. Neutrophils
  - e. Monocytes
  
3. Opsonization is a term to describe what?
  - a. Lysis of bacteria
  - b. Coating of bacteria
  - c. Ingestion of bacteria
  - d. Killing of bacteria
  - e. Phagocytosis
  
4. Which of the following does not describe a role of antibodies in host defense?
  - a. They serve as a bridge between bacteria and phagocytes
  - b. They lyse bacteria
  - c. They enhance complement binding to the bacterial cell wall
  - d. They prevent viruses from infecting cells
  - e. They bind pathogens in mucus secretions
  
5. MHC Class I and II molecules differ in all of the following except
  - a. Types of T cells they stimulate
  - b. Types of cells they are expressed on
  - c. Which chromosome they are located on
  - d. Types of antigens they present
  - e. Whether or not they have foreign peptides in the antigen-binding groove
  
6. The primary role of the proteasome in antigen presentation is to
  - a. Prevent premature folding of MHC class I molecules
  - b. Process cytoplasmic proteins
  - c. Degrade recycled MHC molecules
  - d. Bind HLA-DM in the endosome
  - e. Chaperone peptides to the cell surface

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7. *Peptides that bind to MHC class I molecules differ from peptides that bind to MHC class II molecules in all except which of the following ways?*
- They are shorter
  - They were processed by different proteases
  - They anchor in the middle instead of the end of the MHC molecule
  - They interact with different subsets of T cells
8. *HLA-DM is primarily involved in the*
- Activation of cytotoxic T cells
  - Loading antigen onto HLA-DR molecules
  - Preventing HLA-A molecules from folding prior to antigen binding
  - Rejection of islet grafts
  - Induction of diabetes mellitus
9. *The antigen-binding site of an antibody is comprised of which of the following?*
- The variable region of the light and heavy chains
  - The variable region of the light chain only
  - The entire light chain
  - The entire heavy chain
  - The Fc portion of the immunoglobulin molecule
10. *The immunoglobulin that binds the most complement is*
- IgA
  - IgD
  - IgM
  - IgG2
  - IgE
11. *The immunoglobulin responsible for activating mast cells in an allergic response is*
- IgA
  - IgD
  - IgM
  - IgG
  - IgE
12. *The molecular interaction between an antibody and its corresponding antigen is mediated by all except which of the following?*
- Hydrogen bonds
  - Hydrophobic interactions
  - Covalent bonds
  - Electrostatic interactions
  - Van der Waals interactions.

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13. *The phenomenon of 'affinity maturation,' in which later antibodies bind to antigen with a higher affinity than the ones made weeks earlier, is due to*
- Allelic exclusion
  - VDJ recombination
  - Isotype switching
  - Junctional flexibility
  - Somatic hypermutation
14. *Positive and negative selection of T cells occurs...*
- Before TCR gene rearrangement
  - After TCR gene rearrangement
  - After T cells have left the thymus
  - In the bone marrow
  - In the spleen
15. *Antibodies in the serum of a transplant recipient that react with HLA class I (HLA-A,B,C) antigens on the donor are particularly dangerous in that they can induce...*
- Hyperacute rejection
  - Acute rejection
  - Chronic rejection
  - Type III hypersensitivity reactions
  - Type I anaphylactic reactions
16. *Which of the following immunosuppressive drugs could be classified as an antiproliferative (anti-metabolite)?*
- Cyclosporine
  - FK506
  - Rapamycin
  - Azathioprine
  - Prednisolone (steroids)
17. *Recipients of organ transplants are generally required to take immunosuppressive drugs for ...*
- 6 months
  - 2-5 years
  - 10-15 years
  - Until there is no evidence of rejection
  - For the remainder of their lives
18. *If HLA-A, HLA-B and HLA-DR alleles are compared between a parent and a child, how many would you typically expect to be matched?*
- Impossible to predict without DNA testing
  - None
  - 3
  - 4
  - 6

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19. *IgM differs from IgG in all of the following except...*
- Complement binding
  - Avidity
  - Molecular weight
  - Affinity
  - Kappa and lambda chains
20. *Dead cells stained with AO/EB appear orange because*
- Ethidium bromide prevents AO binding
  - AO leaks out of the dead cell, leaving only ethidium bromide
  - Ethidium bromide fluoresces much more strongly than AO
  - AO binds only RNA, which washes away when the cell is dead
  - Dead cells are actually orange.
21. *A patient with an anti-HLA-A2 antibody would likely have a PRA of?*
- 10%
  - 20%
  - 30%
  - 40%
  - Cannot tell without knowing the composition of the panel
22. *A patient with an anti-HLA-A2 antibody would be most likely to have a positive T cell crossmatch with which of the following donors?*
- A1, A3, B8, B35, DR4, DR17
  - A1, A24, B7, B8, DR1, DR17
  - A24, A68, B7, B64, DR1, DR7
  - A11, A29, B38, B62, DR4, DR7
  - A1, A3, B35, B55, DR1, DR4
23. *A patient with an anti-HLA-Bw4 antibody would be most likely to have a positive T cell crossmatch with which of the following donors?*
- A1, A3, B8, B35, DR4, DR17
  - A1, A24, B7, B8, DR1, DR17
  - A24, A68, B7, B64, DR1, DR7
  - A11, A29, B38, B62, DR4, DR7
  - A1, A3, B35, B55, DR1, DR4
24. *A patient with an anti-HLA-B8 CREG antibody might be expected to have a positive T cell crossmatches with all of the following donors except?*
- A1, A3, B8, B35, DR4, DR17
  - A1, A24, B7, B8, DR1, DR17
  - A24, A68, B7, B64, DR1, DR7
  - A11, A29, B38, B62, DR4, DR7
  - A1, A3, B35, B55, DR1, DR4

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25. *A positive AHG T cell crossmatch between an untransfused male recipient and non-beaded spleen cells from the donor is most likely due to*
- Anti-Bw6
  - Macrophage contamination
  - Auto antibodies
  - CYNAP antibodies
  - Anti-HLA-DQ antibodies
26. *A positive B cell crossmatch does not usually lead to hyperacute renal allograft rejection because*
- There are very few B cells in the transplanted kidney
  - These antibodies are of low affinity
  - These antibodies are of low avidity
  - The vascular endothelium expresses very little HLA class II antigens
  - The antibodies are usually in low titer
27. *Among the HLA-Class II molecules*
- Most polymorphism exists in exon 1 of the B chain
  - Most polymorphism exists in exon 2 of the A chain
  - DRB3, DRB4 and DRB5 are the most polymorphic
  - The DRA chain can combine with several different DRB chains
  - Only the B chain makes up the peptide binding site
28. *If the frequencies of alleles A and B are 0.2 and 0.6, respectively, what is the probability of an AA child in a mating of AB x AB parents?*
- 0.004
  - 0.012
  - 0.25
  - 0.50
  - 0.80
29. *A positive MLC between a brother and sister who are both typed as HLA-DR4,- is most likely due to*
- The siblings not being HLA-identical
  - A meiotic crossover between HLA-DR4 alleles
  - A proliferative response to HLA class I alleles
  - High background in the MLC
  - Somatic hypermutation
30. *Failure of bone marrow engraftment could be due to all of the following except...*
- Insufficient preparative chemotherapy to the patient
  - A positive crossmatch
  - A graft that has too few CD34+ cells
  - ABO-mismatched donor cells
  - Not treating the patient with GM-CSF

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31. *The process of somatic hypermutation leads to ...*
- Greater polymorphism of HLA class I
  - Greater polymorphism of HLA class II
  - Greater affinity of IgG molecules
  - Inactivation of the T cell receptor
  - Teenage mutant Ninja turtles
32. *An immunosuppressive agent that binds to the same molecular target as CsA is*
- OKT3
  - Prograft (FK506)
  - CellCept (Mycophenolate)
  - Imuran (azathioprine)
  - Prednisone (steroids)
33. *DR51, DR52 and DR53, respectively, are gene products of a DRA and*
- DRB3, DRB4, DRB5
  - DRB1, DRB4, DRB5
  - DRB5, DRB4, DRB3
  - DRB1, DRB3, DRB4
  - DRB5, DRB3, DRB4
34. *All of the following techniques are useful in distinguishing autoantibodies from high PRA alloantibodies except*
- Platelet absorption
  - NIH-CDC analysis on frozen cell trays
  - DTT treatment
  - Flow cytometry
  - Autocrossmatch
35. *The number of MHC-Class I and II loci...*
- Is the same for all humans
  - Has been constant throughout evolutionary history
  - Is relatively constant, but many new alleles arise by translocation every year
  - Varies with the haplotype
  - Is the same for all primates
36. *The T cell receptor delivers an intracellular activation signal primarily via which accessory molecule?*
- CD3
  - CD2
  - CD4
  - CD8
  - CD28

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37. *The T cell receptor detects an MHC Class I molecule with the help of which accessory molecule?*
- CD3
  - CD2
  - CD4
  - CD8
  - CD28
38. *Acute rejection is thought to be mediated primarily by ...*
- T cells
  - B cells
  - Platelets
  - Antibodies
  - Cytokines
39. *The T cell receptor detects an MHC Class II molecule with the help of which accessory molecule?*
- CD3
  - CD2
  - CD4
  - CD8
  - CD28
40. *The phenomenon by which a patient's IgM alloantibodies become IgG alloantibodies several weeks later is known as...*
- Somatic hypermutation
  - Affinity maturation
  - Isotype switching
  - Clonal selection
  - Immunization
41. *A PRA specificity of B40, B44, B45 and B49 is most likely due to*
- B7 CREG antibody
  - B8 CREG antibody
  - B12 CREG antibody
  - Multiple specific antibodies
  - Isotope clustering
42. *The T cell receptor differs from the IgM B cell receptor in that it...*
- Is not secreted
  - Does not undergo gene rearrangement
  - Is a homodimer
  - Is associated with accessory molecules to deliver intracellular signals
  - Provides no useful role in effector function

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43. *The cytokine that plays a critical role in the up-regulation of HLA-DR molecules is*
- IL-1
  - IL-2
  - IFN- $\gamma$
  - IFN- $\beta$
  - GM-CSF
44. *A short DNA oligonucleotide used for PCR-SSP amplification is properly termed a*
- Probe
  - Amplicon
  - Polymerase
  - Primer
  - Okazaki fragment
45. *SSP and SSOP methods assay certain portions of HLA alleles. The critical portions assayed are*
- Introns
  - Hypervariable regions
  - Conserved regions
  - Promoter regions
  - GC-rich regions
46. *Molecular typing can be performed from cDNA molecules. cDNA molecules lack what feature which may require adaptation of methodology from genomic typing?*
- Base methylation
  - Stem/Loop structures
  - Introns
  - Hypervariable regions
  - Exons
47. *The wipe (swipe) test assays for contamination of pre-PCR regions with...*
- Amplified DNA
  - Degraded DNA
  - Taq inhibitors
  - HLA proteins
48. *Which of the following pairs are unambiguously amino acid identical?*
- DR17/DRB1\*030101
  - DRB4\*01030101/DRB4\*01030102N
  - DRB1\*0301/DRB3\*0301
  - DR3/DR17
  - DRB1\*030101/DRB1\*030102

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49. Which of the following represents invalid molecular nomenclature?
- DRB4\*01030102N
  - DQB1\*0101
  - Cw\*150502
  - A2\*0101
  - DQA1\*0101
50. Which of the following statements is false?
- Class II proteins have polymorphism in only one of the two polypeptide chains
  - Class I proteins have polymorphism in only one of the two polypeptide chains
  - Class III proteins are on chromosome 6
  - $\beta_2M$  subtyping is not critical for bone marrow transplantation
  - DRB4 alleles are not always present
51. A cord blood is typed to have more than 2 HLA-A and more than 2 HLA-DRB1 alleles. What is the least likely single explanation?
- Maternal blood present in cord blood sample
  - Contamination of pre-PCR area with PCR amplicons
  - Low temperature in high stringency wash
  - New allele(s) detected
  - DNA mixed with another sample
52. A sample with a new HLA-B allele arrives in the laboratory. It has a point mutation in a region of exon 3 that had previously been considered monomorphic. What technique would be most likely to detect the new allele?
- PCR-SSP
  - PCR-SSOP
  - SBT
  - RFLP
  - Anomalous linkage disequilibrium with HLA-Cw
53. A bone marrow patient is A1,A11,B62,B64,DRB1\*0103,DRB1\*150101. Which of the following potential donors is the best match?
- A1,Blank,B62,B64,DRB1\*0103,DRB1\*1503
  - A1,A11,B7,B8,DR5,DR6
  - A1,A11,B\*1401,B\*15,DRB1\*0103,DRB1\*1501
  - A1,A9,B14,B15,DR1,DR15
  - A1,A11,B14,B15,DRB1\*0102,DRB1\*1502
54. Which of the listed probes will have the highest  $T_m$ ?
- AACTAGTTA
  - CTATGGATCGTTGGCTACTCT
  - GTAGATTATATTACTCTAGCA
  - AACTAGTTC
  - ATATATATAT

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55. *Primers and probes bind to their DNA targets through a process known as*
- High stringency
  - Hydrogen bonding
  - Covalent bonding
  - Primer dimerism
  - Low Stringency
56. *Which is true of the 3' and/or 5' ends of an oligonucleotide primer?*
- The 3' and 5' ends always have purines
  - The 3' and 5' ends always have pyrimidines
  - The 3' and 5' ends may both serve as an template for Taq elongation
  - The 3' end may accept GTP in the presence of a DNA polymerase
  - The 5' end is the critical portion for determining the specificity of a primer
57. *Which of the following is true regarding the DNA polymerase used in PCR?*
- The enzyme should only accept nucleotide diphosphates
  - The enzyme should have low fidelity
  - The enzyme should denature at 37°C
  - Isomerase enzymes should be able to switch strands
  - The enzyme should not be heat labile
58. *Which of the following activities should be performed post-PCR?*
- Amplification, probing, high stringency wash
  - DNA extraction, low stringency wash, probing
  - Gel electrophoresis, probing, primer aliquotting
  - Amplification, probing, primer aliquotting
  - DNA extraction, high stringency wash, primer synthesis
59. *Which statement best explains the "N" suffix sometimes seen with DNA HLA allele nomenclature?*
- Some alleles are not typeable by molecular methods
  - Some alleles are not typeable by serological methods
  - Serology and DNA sometimes arrive at different typings
  - Mutations may prevent an HLA allele from being expressed
  - Suffixes in molecular nomenclature distinguish class II from Class III alleles
60. *SSP primers usually target what?*
- IgG Fc regions
  - Hypervariable regions
  - Unique intronic sequences
  - Conserved regions
  - Sequences in DRB1 exon 1
61. *High resolution Class I and Class II typing is most important in which of the following situations?*
- Living-related kidney transplantation with high PRA
  - ABO-mismatched liver transplant
  - Unrelated bone marrow transplantation
  - Autologous bone marrow transplantation



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- e) Two haplotype matched living related bone marrow transplantation
62. Which of the following is an ASHI **requirement** for PCR amplification setup?
- Dedicated pipetters
  - Different color lab coats for pre- and post-PCR
  - Phenol/chloroform DNA extraction
  - Two independent interpretations of raw data
  - Wipe test performed alongside every amplification setup
63. Which of the following is the preferred sample for DNA extraction?
- Whole blood without anticoagulants
  - Red blood cells
  - Heparinized serum
  - The distal ends of hair
  - Whole blood with ACD anticoagulant
64. Which is not a proper method for minimizing PCR contamination?
- Frequent cleaning of pre-PCR areas with 10% bleach
  - Aliquotting reagents into single-use aliquots
  - Combining pre-PCR and post-PCR into the smallest practical space
  - UV irradiation of pre-PCR areas
  - Use of aerosol barrier pipet tips on pre-PCR pipetters
  - Use of dUTP in PCR and the enzyme UNG on samples
65. A sample typed by SSP in 1996 was determined to be DRB1\*0101,DRB1\*0401. When the same sample was retyped in 1998 by SSP the typing was DRB1\*0101,DRB1\*04(01,34). What is the best explanation of these results?
- New alleles sometimes have the same primer reactivity patterns as old alleles
  - Long term DNA storage at  $-80^{\circ}\text{C}$  affects primer reactivity
  - IUB codes require reinterpretation with time
  - As new DQB1 alleles are discovered the DRB1 typings should be revised for unusual linkages
  - DRB1\*0434 was thought to be a rare allele in 1996 but by 1998 was appreciated as a common allele
66. An HLA laboratory's DNA typing report lists 0101,1101 as the final result. What is wrong with this report?
- 0101,1101 is an impossible combination for any HLA locus
  - It is wrong to report results for only one HLA locus
  - The HLA locus was not defined
  - 1101 should always be reported as 110101
  - 0101,1101 should be written as 0101/1101
67. ASHI has detailed and mandatory QC requirements for which of the following in a molecular typing laboratory?
- Water bath cycle speeds
  - Thermal cycler block temperature measurements
  - Electrophoresis current variations
  - Taq polymerase pH dependency
  - F-stop and exposure settings

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68. Which statement accurately describes the PCR process?
- a) PCR products are inhibitors of the polymerase chain reaction
  - b) PCR requires a special kind of restriction enzyme
  - c) PCR requires forward and reverse probes
  - d) The MW of the amplified DNA is not diagnostic of PCR specificity
  - e) PCR geometrically amplifies the target DNA
69. Which acronym is incorrect?
- a) ASHI: American Society for Histocompatibility and Immunogenetics
  - b) PCR: Polymerase Chain Reaction
  - c) RFLP: Required Forward Linkage PCR
  - d) SSP: Sequence Specific Primers
  - e) SBT: Sequence-Based Typing
70. Which of the listed DNA typing methods is improperly matched with a critical methodological step?
- a) SSP: Gel electrophoresis
  - b) SSOP: High stringency wash
  - c) Reverse SSO: High stringency wash
  - d) SSOP: DNA/membrane crosslinking
  - e) Reverse SSO: DNA/membrane crosslinking
71. Which statement is true of agarose gel electrophoresis of PCR-SSP products?
- a) Short DNA fragments sequester in the gel matrix and move slower than large fragments
  - b) On a molar basis, ethidium bromide staining makes small DNA fragments brighter than large DNA fragments
  - c) Cannot resolve differences in molecular weight less than 100 base pairs
  - d) DNA migrates toward the positive electrode
  - e) Electrophoresis is best performed in a medium of pure water
72. Which of the following is generally considered an absolute contraindication to kidney transplantation?
- a) A positive B cell crossmatch
  - b) A positive AHG-augmented T cell crossmatch
  - c) A positive NIH T cell crossmatch
  - d) A<sub>2</sub> blood group donor into an O recipient
  - e) O blood group donor into an A recipient
73. Which of the following diseases is strongly associated with a HLA Class I allele?
- a) Ankylosing spondylitis
  - b) Type I insulin-dependent diabetes mellitus
  - c) Narcolepsy
  - d) Rheumatoid arthritis
  - e) Multiple sclerosis

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74. *The proper final concentration of DMSO for freezing lymphocytes is*
- 5%
  - 10%
  - 15%
  - 20%
  - dependent upon the concentration of serum
75. *The alternative complement pathway differs from the classical complement pathway by all of the following except it...*
- Does not require antibodies to initiate
  - Utilizes  $Mg^{2+}$  instead of  $Ca^{2+}$  in an early step
  - Starts with complement component C3 rather than C1
  - Results in a different membrane-attack complex
  - Requires other serum proteins to function properly
76. *Multiplexing of PCR-SSP reactions involves*
- Adding multiple DNA's to the same PCR-SSP reaction
  - Amplifying the DNA with a two-stage PCR amplification profile
  - Using multiple 5' and/or 3' primers in the same reaction
  - Computer analysis of SSP reaction patterns to look for multiple valid results
  - Keeping the HLA field complex enough to deter new applicants to the field
77. *Indirect allo MHC recognition is...*
- The recipient recognizes processed donor MHC on self MHC
  - The recipient recognizes the donor's MHC-bearing cells as foreign
  - Stimulation of the anti-donor response through cytokine release
  - Recruitment of CD45RO memory T cells against donor
  - The recipient recognizes Class II MHC on the donor after treatment with IFN- $\gamma$
78. *The structural components of a nucleotide are...*
- A,C,G,T
  - A,C,G,U
  - Base, Sugar, Phosphate
  - Base, Acid, Neutral
  - Hydrogen bonds, Phosphate Backbone, Hydroxyl Groups
79. *RNA and DNA differ in...*
- Three-dimensional conformation
  - Base usage
  - Sugar
  - B & C only
  - A, B, & C

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80. *The MHC peptide binding groove...*
- a) Holds peptides through covalent bonds
  - b) Is the same for Class I and Class II
  - c) Completely hides the bound peptide
  - d) A,B, & C
  - e) None of the above
81. *Codon 10, position 2 of a sequence equivalent to what nucleotide position (assume that numbering start at the same position)?*
- a) 10
  - b) 20
  - c) 25
  - d) 29
  - e) 32
82. *A typical thermal cycler program for clinical HLA typing has*
- a) 1 PCR cycle
  - b) 5 PCR cycles
  - c) 10 PCR cycles
  - d) 30 PCR cycles
  - e) 60 PCR cycles
83. *A PCR reaction is setup against exon 2 of an HLA gene. A 5' primer binding to nucleotides 10-25 and a 3' primer binding to nucleotides 105-90 are used. Assuming a successful amplification what is the size of the PCR product?*
- a) 105bp
  - b) 96bp
  - c) 65bp
  - d) 66bp
  - e) 25bp
84. *Standard nucleic acid purine bases are*
- a) C,U,T
  - b) A,B,Cw
  - c) DR,DQ,DP
  - d) C,T
  - e) A,G
85. *Features of DNA Include...*
- a) Anti-parallel strands
  - b) External bases and Internal phosphate backbone
  - c) Nuclear location in cells
  - d) A, B only
  - e) A, C only

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86. Which of the following samples would be unacceptable for HLA phenotyping by serology?
- Blood collected in sodium heparin
  - Blood collected in CPDA-1
  - Blood collected in ACD solution A
  - Blood collected in ACD solution B
  - Blood collected in EDTA
87. Which sample is the best for molecular testing for class II HLA antigens?
- 5ml Ficoll separated PBL's ( $1 \times 10^5$  cells/ml) in PBS
  - 3ml EBV transformed B cells ( $1 \times 10^5$  cells/ml) in PBS
  - 2 ml peripheral blood in EDTA
  - 2 ml peripheral blood in ACD solution B
88. You receive a requisition form with today's date and only 4 ml of blood in ACD solution A and 3 ml of blood in a plain red top for HLA class I and II phenotyping and PRA from a 2 year old patient labeled with the patient's first name and last name; what step(s) do you take next?
- Reject it due to improper blood tube additive; notify physician
  - Reject it due to improper labeling; notify physician
  - Notify the requesting physician the sample quantity is insufficient; request additional blood for testing
  - Notify the requesting physician the sample is improperly labeled; request the sample to be re-collected
  - Notify the requesting physician the sample volume is acceptable; verify date of collection
89. ASHI standards state the minimum sample labeling requirements include(s) unique...
- Identifier
  - Identifier and date of collection
  - Identifier, date and time of collection
  - Identifier, date and time of collection, phlebotomist's initials
  - Identifier, date and time of collection, phlebotomist's initials, sample source
90. Which of the sample sources below yields the greatest number of B cells?
- Whole blood
  - Thymus
  - Spleen
  - Lymph node
91. Which of the following samples for CDC PRA should be rejected?
- Plain red top tube
  - Serum separator tube
  - Frozen serum aliquot
  - ACD yellow top tube

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92. Given an adult bone marrow transplant patient's WBC is  $5.0 \times 10^3$  cells/ $\mu$ l with 20% lymphs and 2,000 lymphocytes/well are required for a class I typing on two 72-well trays, what is the minimum blood volume needed for testing?

- a. 20 ml
- b. 10 ml
- c. 5 ml
- d. 2 ml

93. Answer the following as T for True or F for False.

- \_\_\_ a- EDTA is preferred over ACD as an additive for molecular testing
- \_\_\_ b- EDTA chelates calcium and is acceptable for CDC assays
- \_\_\_ c- EDTA is acceptable for flow cytometry assays
- \_\_\_ d- Moderate hemolysis of serum should not interfere with PRA testing
- \_\_\_ e- Plasma is unacceptable for CDC PRA testing
- \_\_\_ f- Heparinized blood is acceptable for molecular testing
- \_\_\_ g- Heparin does not interfere with Taq polymerase
- \_\_\_ h- Lithium heparin is an acceptable substitute for sodium heparin
- \_\_\_ i- It is acceptable for a red top to be collected from a patient who is at that moment receiving a dialysis treatment
- \_\_\_ j- Blood shipped to the lab for serology testing should be kept at 4 degrees
- \_\_\_ k- Patients receiving long-term steroid treatment may have insufficient lymphocytes for HLA testing
- \_\_\_ l- Patients receiving blood products should have their blood collected for HLA typing immediately following the transfusions to ensure adequate cell numbers
- \_\_\_ m- You should ask for the WBC and differential on leukopenic and pediatric patients to determine how much blood should be collected for HLA typing
- \_\_\_ n- Requisition forms must include name of an authorized requester
- \_\_\_ o- Plain red top, EDTA and ACD are all acceptable samples for ABO blood grouping
- \_\_\_ p- Lymphocytes from EBV transformed cell lines react the same as PBLs in CDC assays
- \_\_\_ q- The color of the stopper is a universal code for a vacutainer's contents

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- \_\_\_\_\_ r- EDTA blood stored for 1 year at RT is an acceptable sample
- \_\_\_\_\_ s- Blood spotted on SS 903 cards and stored for 1 year at RT is an acceptable sample
- \_\_\_\_\_ t- ACD tubes maintain cell viability are better than heparin during long transit times

94. *When planning to start up a new lab, in what order should you do the following?*

1. Secure adequate work space
2. Hire all personnel
3. Obtain accreditation
4. Determine necessary services

- a. 1,2,3,4
- b. 2,3,1,4
- c. 4,1,2,3
- d. 4,3,2,1
- e. none of the above

95. *Maslow's hierarchy of needs indicates for individuals whose basic needs for food and shelter are met, the next need is*

- a. Esteem
- b. Social
- c. Self-actualization
- d. Safety
- e. None of the above

96. Which of the following is not part of a quality assurance program?

- a. Checking freezer temperature daily
- b. Annual competency evaluation
- c. Monitoring turn-around time
- d. Bloodborne pathogen safety training
- e. None of the above

97. *Examples of variable costs include which of the following?*

- a. Typing trays, test tubes, salaries
- b. Pipets, space rental, Taq polymerase
- c. Call-back pay, complement, magnetic beads
- d. Gloves, RPMI, utilities

98. *If the chi-square for the association of B7 with DRB1\*0701-DRB4\*0103102N is 48. What conclusion is valid based on this statistic?*

- a. The presence of B7 has no predictive value is evaluating the likelihood of the DRB4 null allele
- b. DRB1\*0701 is strongly linked to DRB4\*01030102N
- c. Antibodies to B7 will cross react with DR7
- d. B7 is seen more frequently than expected with DRB1\*0701-DRB4\*0103102N

## ClinImmune Labs CHT/CHS Practice Exam

99. *The resolution (ability to distinguish among alleles) of SBT results compared to PCR-SSP results is...*
- Higher
  - Lower
  - The same
  - Depends on alleles
100. *If you counted 311 cells in 3 of the 4 outside squares of a hemacytometer and the sample was initially diluted 1:8 what is the cell concentration?*
- $1.5 \times 10^6$  cells/ $\mu$ l
  - $29.9 \times 10^6$  cells/ml
  - $29.9 \times 10^6$  cells/ $\mu$ l
  - $8.3 \times 10^6$  cells/ml
101. *A 100 $\mu$ l stock solution of DNA is at 167 $\mu$ g/ml. To what volume should you dilute the stock to achieve a working concentration of 40ng/ $\mu$ l?*
- 418 $\mu$ l
  - 4180 $\mu$ l
  - 318 $\mu$ l
  - 3180 $\mu$ l
102. *Solution three results from combining all of solution one with solution two. Solution one consists of 2.0ml of cells at a concentration of  $5 \times 10^6$  cells/ml. Solution two consists of 7.0ml of cells at a concentration of  $3 \times 10^6$  cells/ml. What is the cell concentration in solution three?*
- $3.4 \times 10^6$  cells/ml
  - $4.0 \times 10^6$  cells/ml
  - $3.8 \times 10^6$  cells/ml
  - $4.5 \times 10^6$  cells/ml
103. *Which of the following transfusions are ABO-compatible (donor into recipient)?*
- A into O
  - B into AB
  - O into B
  - AB into B
  - A into B
- 1 only
  - 2,4
  - 2,5
  - 2,3
104. *A T cell crossmatch is negative by AHG-CDC but positive by flow crossmatch. The most likely explanation is that the anti-donor antibody is...*
- IgM
  - IgG
  - Very low titer
  - Against a non-HLA target

## ClinImmune Labs CHT/CHS Practice Exam

105. *The percent of each antigen with an "8" reaction is also known as...*
- Chi-square
  - Percent inclusion
  - R value
  - Strength index
106. *Another name for correlation coefficient is...*
- Chi-square
  - Percent inclusion
  - R value
  - Strength index
107. *The panel reactive antibody (PRA)...*
- Is a constant value, in all populations, representative of the amount of antibody in a patient's serum
  - Is a relative value, dependent on the frequency on the antigen in the donor cell population tested
  - Is much more useful than R value, Chi-square or tail analysis when defining antibody specificity
  - Should always be tested in an assay more sensitive than the assay used for final crossmatch
108. *It is important to understand antibody detection limitations of specific assays. When utilizing complement-mediated cytotoxicity assays, which immunoglobulins are most sensitively detected?*
- IgG<sub>4</sub> and IgA
  - IgG<sub>2</sub> and IgG1
  - IgG<sub>3</sub> and IgM
  - IgG<sub>4</sub> and IgM
109. *The primary humoral immune response...*
- Is primarily comprised of IgG,IgA,IgE
  - Is usually of high affinity
  - Needs very little antigen to respond
  - Usually occurs within 5-10 days of stimulation
110. *A T cell crossmatch is positive by AHG-CDC but negative by flow crossmatch. The most likely explanation is the anti-donor antibody is...*
- IgM
  - IgG
  - Very low titer
  - Against a non-HLA target
111. *Which of the following is false concerning shipping blood for HLA typing (as of 2002)?*
- Shipping is regulated by the DOT and IATA
  - Specimens must be packed in a 3 container system
  - There must be sufficient absorbent material to soak up a spill
  - Blood specimens known to carry pathogens are packaged the same as routine diagnostic specimens



## ClinImmune Labs CHT/CHS Practice Exam

112. *What is the usual minimum set of family members required to assign the “a” and “c” patient haplotypes?*
- Patient and Uncle
  - Patient and one sibling
  - Patient and mom
  - Two siblings of the patient
113. *DRB1\*0102 is in strong linkage disequilibrium with DQB1\*0501. You class II type a sample as DRB1\*010202, DRB1\*0301, DQB1\*0201, DQB1\*0302. Which of the following could not explain the results?*
- The sample is from an isolated South American population. This population may have different linkage disequilibria than published values
  - Linkage disequilibria are not absolute and exceptions to common linkages are sometimes seen
  - The DRB1\*01022 variant may have different linkage disequilibria than the more common DRB1\*01021
  - In the presence of DRB1\*0301 the DRB1\*0102 may have a linkage to DQB1\*0302
114. *You are given a table of allele frequencies published in 1998 without any additional explanatory material. What should be your paramount questions?*
- Was the method used SSP or SSOP? Did they type adults or children?
  - How many samples were typed? From what population(s) were the samples drawn?
  - Was the method used SSP or SSOP? From what population(s) were the samples drawn?
  - How many samples were typed? Did they type adults or children?
115. *A PCR-RFLP assay is performed on DNA amplified from exon 2 of the HLA-DRB1 gene. The restriction enzyme chosen recognizes a single site contained in DRB1\*0701 but in no other DRB1 allele. In a patient with the HLA type DRB1\*0101/DRB1\*0701 how many bands would be expected to appear in the RFLP gel analysis?*
- One
  - Two
  - Three
  - Four
116. *Linkage disequilibrium between HLA loci is correlated with...*
- Physical distance between loci on chromosome 6
  - Order of discovery of the loci
  - ABO
  - Sex
117. *Imagine a world in which HLA class I alleles were on chromosome 6 but HLA class II alleles were on chromosome 7. Which potential consequence is least likely?*
- Class II would now assume more importance in matching for bone marrow transplantation
  - Family studies and haplotype assignments would now have to consider class I and class II independently
  - Linkage disequilibrium between class I and class II alleles would decrease
  - Crossover events between class I and class II loci would be observed less frequently

## ClinImmune Labs CHT/CHS Practice Exam

118. *HLA typing has value in parentage testing because*
- HLA loci are few in number
  - HLA alleles are few in number
  - The polymorphism of HLA alleles is high
  - HLA alleles do not exhibit classical Mendelian segregation
119. *Which change would increase Relative Risk for disease Y with HLA allele X?*
- Fewer patients with the disease Y observed in the sampled population
  - Fewer total individuals with HLA type X in the sampled population
  - Fewer controls with HLA type X in the sampled population
  - Fewer patients with disease Y but without HLA type X in the sampled population
120. *Which is an example of the deductive reasoning process?*
- Using Hardy-Weinberg calculations as evidence for admixture in a specific population
  - Gathering statistics on various populations to formulate rules governing population behavior
  - Collating statistics on allele frequencies
  - Reviewing the literature to find studies to support a specific hypothesis
121. *Which of the following statements is true regarding molality, molarity, and normality?*
- Molarity is the same thing as molality when using hexane as a solvent
  - Normality is the same thing as molality for acid but not bases
  - In a solution of glucose,  $C_6H_{12}O_6$ , normality has the same value as molarity
  - In a solution of sulfuric acid,  $H_2SO_4$ , normality has the same value as molarity
122. *Pure water is critical in many laboratory applications. Type I water is defined as having a high purity because it has a \_\_\_\_\_ of 10.0*
- clarity
  - surface Tension
  - resistivity
  - pH
123. *New crossmatch assay "X" was evaluated in your laboratory. 100 cell-sera combinations were chosen and then tested using AHG-CDC and assay "X". AHG-CDC identified 50 positive crossmatches. Assay "X" reported 3 positive crossmatches that were negative by AHG-CDC. Assay "X" reported 17 negative crossmatches that were positive by CDC. All other results were the same. What is the concordance between these assays?*
- 51%
  - 17%
  - 3%
  - 80%
124. *Using the data from question #123, and assuming that AHG-CDC is the gold standard, what is the sensitivity of assay "X"?*
- 17%
  - 66%
  - 33%

## ClinImmune Labs CHT/CHS Practice Exam

d. 80%

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125. Using the data from question #123, and assuming that AHG-CDC is the gold standard, what is the specificity of assay "X"?
- 17%
  - 47%
  - 33%
  - 94%
126. When pipetting the components of a PCR mix according to a recipe, which parameter is most important variable in achieving a successful PCR amplification?
- Pipetter Precision
  - Pipetter Accuracy
  - Pipetter Reproducibility
  - Pipetter Resolution
  - Pipetter Display: Digital versus Analog
127. If 100g of NaCl (Na=22.99 g/Mole, Cl=35.43 g/Mole) are dissolved in 1500ml of water what is the molarity of the resulting solution?
- 0.23M
  - 0.58M
  - 0.75M
  - 1.14M
128. To make physiological saline approximately how many grams of sodium chloride are required per 100ml of water?
- 0.0085
  - 0.085
  - 0.85
  - 8.5
129. Which of the following immunosuppressive drugs directly blocks IL-2 production?
- OKT3
  - Cyclosporin
  - Azathioprine
  - Sirolimus
130. Which of the following immunosuppressive drugs directly eliminates T cells?
- OKT3
  - Cyclosporin
  - Azathioprine
  - Sirolimus
131. Which of the following immunosuppressive drugs blocks the autocrine signal delivered through the IL-2/CD25 interaction?
- OKT3
  - Cyclosporin
  - Azathioprine
  - Sirolimus

## ClinImmune Labs CHT/CHS Practice Exam

132. *Channel shift in a flow cytometry crossmatch is determined by examining which histogram?*
- FSC versus SSC
  - FITC versus cell number
  - CD20 versus CD3
  - CD20 versus CD4
133. *Patient serum X gave a 10-channel shift versus NHS in a flow cytometry crossmatch. How should this crossmatch be interpreted?*
- Positive crossmatch
  - Negative crossmatch
  - Ambiguous crossmatch
  - Depends upon the HLA lab and their SOP
134. *SSO probes should be designed to have their target mismatches \*where\* to maximize specificity?*
- At the ends of the probe
  - In the center of the probe
  - At the purine positions of the probe
  - At the pyrimidine positions of the probe
135. *In a reverse SSO assay the genomic DNA is often incubated with sodium hydroxide before application to the membrane. Why?*
- To clips the ends from the genomic DNA
  - To remove homopolymer sequences
  - To denature the DNA
  - To remove non-standard bases
136. *HLA Antigens are...*
- Dominant
  - Co-dominant
  - Recessive
  - Incompletely penetrant
137. *Due to water bath failure, the stringent wash step of an SSOP assay occurred at 5°C higher than planned. The likely consequence of this deviation is...*
- The autoradiograph spots will be more intense than normal
  - There might be false positive reactions
  - There might be false negative reactions
  - No effect on the assay as long as the non-stringent washes are carried out correctly
138. *Tris-EDTA buffer, pH 8.0, is the recommended buffer for long-term storage of DNA, especially at 4°C. How does it work?*
- The high pH inhibits bacterial growth while the EDTA prevents inhibits nucleases
  - The high pH inhibits nucleases while the EDTA inhibits bacterial growth
  - The high pH inhibits acid hydrolysis while the EDTA prevents DNA looping
  - The high pH inhibits acid hydrolysis while the EDTA prevents inhibits nucleases



## ClinImmune Labs CHT/CHS Practice Exam

139. A  $-20^{\circ}\text{C}$  freezer used for storage of DNA typing reagents is  $-35^{\circ}\text{C}$ . Adjusting the temperature controls has no effect. What immediate action should be taken?
- None. The colder the better
  - Cold-sensitive reagents should be moved to another  $-20^{\circ}\text{C}$  but the remaining reagents are fine in this improved, extra-cold freezer
  - Beakers of warm water should be placed on the bottom shelf since warm air rises
  - Reagents should be moved to a backup  $-20^{\circ}\text{C}$  freezer and service called
140. Which of the following statements is FALSE?
- Significant R values increase as N increases
  - Significant Chi-Square values increase as N increases
  - Chi-square values have a wider numerical range than R values
  - R values can be derived directly from Chi-square without access to the raw data
141. Which of the below equivalencies is FALSE?
- B\*3501 = B35
  - B\*1501 = B77
  - B\*1522 = B\*3543
  - B\*5002 = B45
142. Which is false regarding the chi-square statistic?
- The Yates correction should be used, especially with small sample sizes
  - Use of chi-square is an example of an inferential statistical method
  - The chi-square should only be used when the data is expressed as TN, TP, FN, and FP
  - Chi-square becomes unreliable when expected values become small
143. How can granulocytes in the cell preparation interfere with a crossmatch assay?
- They take up staining dyes resulting in false positive results
  - They kill lymphocytes resulting in false positive results
  - Since live granulocytes do not take up AO they dilute the count of live cells
  - Since dead granulocytes do not take up EB they dilute the count of dead cells
144. Within the field of histocompatibility, **Prozone** is a term that refers to...
- Complete cell death during a crossmatch due to excess antibody
  - Complete cell death during a crossmatch due to excess complement
  - Achieving the correct titer of AHG to avoid false reactions during an AHG-CDC assay
  - False negative crossmatch results due to excess antibody
145. AHG best enhances the detection of anti-HLA antibodies under the following circumstances during a crossmatch assay?
- Low titer or IgM antibody
  - Low titer or IgG<sub>4</sub> antibody
  - CYNAP or IgM antibody
  - Low titer or high-complement binding antibodies

## ClinImmune Labs CHT/CHS Practice Exam

146. *Formamide and TMAC can be used in what assay for what purpose?*
- PCR-SSP: To raise the annealing temperature
  - AHG-CDC: To fix the cells
  - PCR-SSP: To increase yield
  - SSOP: To enhance annealing specificity
147. *The human haploid genome is  $3.3 \times 10^9$  base pairs. Assuming a random distribution of bases, what size probe would be expected to have a single target in the haploid genome?*
- 6bp
  - 10bp
  - 16bp
  - 26bp
148. *What are the most probable haplotype assignments for the displayed family?*

	HLA-A	HLA-B	HLA-DR
<i>Patient</i>	*29 *31	*07 *40	*0404 *1501
<i>Sibling #1</i>	29,31	7,60	*0404 *1501
<i>Sibling #2</i>	11,29	7,60	13,15
<i>Sibling #3</i>	11	57,60	7,13

- a=A29,B7,DR15; b=A11,B57,DR7; c=A31,B60, DR4; d=A11,B60,DR13
  - a=A11,B57,DR7; b=A31,B60, DR4; c=A11,B60,DR13; d=A29,B7,DR15
  - a=A29,B60,DR4; b=A11,B57,DR7; c=A31,B7, DR15; d=A11,B60,DR13
  - a=A31,B7,DR15; b=A11,B60,DR7; c=A29,B60, DR4; d=A11,B57,DR13
149. *What is the probable haplotype assignment for sibling #2 in the above table?*
- a/b
  - a/c
  - a/d
  - c/d
150. *How does ABO-A2 differ from ABO-A1?*
- There are twice as many A2's as A1's per cell
  - A2 is found on T cells while A1 is found on red cells
  - The A2 phenotype expresses about one-quarter the A antigen sites as A1
  - A2 is extremely rare, being found on less than 1% of Americans
151. *What is a true statement regarding HLA-A20?*
- Not a component of the official WHO nomenclature
  - Rare in Caucasians
  - Representative "null" allele
  - Shares many public epitopes with HLA-Bw4

## ClinImmune Labs CHT/CHS Practice Exam

152. *Per ASHI standards the viability of the negative control well in a serological typing assay should be...*
- At least twice the viability of the positive control well
  - Greater than 50%
  - Greater than 80%
  - Greater than 90%
153. *If there are 4 possible alleles at a locus how many possible genotypes exist?*
- 4
  - 8
  - 10
  - 16
154. *If there are 5 possible alleles at locus A and 6 possible alleles at locus B how many possible A-B haplotypes exist?*
- 5
  - 6
  - 22
  - 30
155. *Based on the below table of CPM's in a one-way MLC, who is the best matched donor or control?*

	Ax	Bx	Cx	Dx	Ex	Fx	Gx
A=Patient	508	11384	40,085	595	58,201	81,251	50,183
B=Dad	30,231	211	49,945	49,601	62,939	46,505	44,836
C=Sibling #1	19,355	27,099	405	37,312	54,016	39,811	37,137
D=Sibling #2	308	14,121	31,110	369	63,699	31,487	46,767
E=Control #1	27,538	29,554	53,417	40,115	724	43,893	23,842
F=Control #2	52,536	59,778	63,186	51,086	59,565	1,743	60,997
G=FCP	54,013	67,867	64,099	59,500	64,219	50,698	60,007

- Dad
  - Sibling #1
  - Sibling #2
  - Control #1
156. *Based on the above table of CPM's in a one-way MLC, if A+Ax were changed to 5000 CPM what would be the consequence for response calculations against Dad?*
- The SI would increase while the RRI would decrease
  - The SI would decrease while the RRI would increase
  - Both the SI and the RRI would increase
  - Both the SI and RRI would decrease

## ClinImmune Labs CHT/CHS Practice Exam

157. *Based on the previous question regarding a changed background response for A+Ax what are the appropriate interpretive guidelines?*
- High background is indicative of a matched donor situation
  - High background is indicative of a mismatched donor situation
  - High background can lead to false negative interpretations
  - High background can lead to false positive interpretations
158. *In a flow cytometric crossmatch, what is the purpose of the forward scatter versus side scatter plot?*
- Gate on live lymphocytes to the exclusion of other blood cells
  - Determine the size and side scatter of the cell populations
  - Distinguish T cells from B cells
  - Quantify the level of anti-donor IgG antibody
159. *What is true about converting molecular HLA-B typing to UNOS equivalent antigens?*
- Take the first two digits of the molecular designation to derive the antigenic equivalent
  - Take the third and fourth digits of the molecular designation to derive the antigenic equivalent
  - Rare molecular alleles can always be ignored
  - Some HLA-B alleles have antigenic equivalents that are contradictory to their molecular designations
160. *The "S" suffix in a molecular designation has what meaning?*
- The allele is secreted
  - The protein is secreted
  - The allele is truncated ("small")
  - The protein is truncated ("small")
161. *A 2% agarose gel has what advantage compared to a 0.8% agarose gel in submarine electrophoresis?*
- The gel excludes all RNA
  - The gel is better able to separate high molecular weight DNA fragments
  - The gel is better able to separate low molecular weight RNA fragments
  - The gel is better able to separate low molecular weight DNA fragments
162. *Successful PCR depends upon avoiding inhibitors of Taq polymerase. Which of the following substances are Taq polymerase inhibitors?*
- Cresol Red
  - Hemoglobin
  - Too pure water
  - Heparin
- 1 and 2
  - 1 and 3
  - 2 and 4
  - 3 and 4

## ClinImmune Labs CHT/CHS Practice Exam

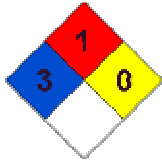
163. *The invariant chain serves what purpose during the biosynthesis of HLA molecules?*
- Enhances transport of peptides into the ER
  - Enhances transport of HLA class I to the exterior of the cell
  - Blocks internal self-peptides from binding to HLA class II
  - Increases the specificity of peptide-HLA binding
164. *The human HLA system is both polygenic and polymorphic. Which statement accurately the role that polygenism and polymorphisms play?*
- Both polygenism and polymorphism counteract the ability of HLA to help resist infectious disease
  - Polygenism helps the individual counteract infectious disease but polymorphism primarily helps the wider population
  - The effects of polymorphism and polygenism apply only to class I
  - The effects of polymorphism and polygenism apply only to class II
165. *A patient possessing HLA-A1,2,B14,55,DR1,11 successfully receives an allogeneic bone marrow transplant of type HLA-A1,2,B14,55,DR11,12. When the patient is HLA typed three years later what is the expected HLA-DR type from different sample types?*
- Buccal Swab: DR11,12. Peripheral Blood: DR11,12
  - Buccal Swab: DR1,11. Peripheral Blood: DR11,12
  - Buccal Swab: DR11,12. Peripheral Blood: DR1,11
  - Buccal Swab: DR1,11. Peripheral Blood: DR1,11
166. *Which of the following methods best protects PHI in accordance with HIPAA?*
- Transmitting patient data via email accompanied with a confidentiality disclaimer
  - Transmitting patient data via fax accompanied with a confidentiality disclaimer
  - Deidentifying the patient data before transmission via fax
  - Using only numeric patient identifiers (no names) before transmitting by any method when accompanied by a confidentiality disclaimer
167. *Without a signed consent HIPAA prevents patient data from being released to...*
- The patient
  - Requesting physician
  - Hospital billing department
  - Hospital researchers
168. *In what important way are nitrile exam gloves superior to latex exam gloves?*
- The do not trigger or sensitize to latex allergies
  - They are less expensive
  - They are more resistant to all chemicals
  - They are available in a more colors and more vivid colors
169. *Per CAP standards a laboratory's document control system should...*
- Prevent documents from becoming too long
  - Ensure that all copies of documents in use are current
  - Prevent documents from containing unnecessary and confusing jargon
  - Ensure that all SOP's have sections entitled "Materials and Methods" and "References"

## ClinImmune Labs CHT/CHS Practice Exam

170. *The human genetic code is determined by groups of how many nucleotides?*
- 2
  - 3
  - 4
  - Variable
171. *The human genetic code is...*
- Degenerate
  - Deciduous
  - Binary
  - Polymorphic
172. *Which relative is most like to share one or more haplotypes with a patient?*
- Second Cousin
  - First Cousin
  - Parent
  - Sibling
173. *If a population is in Hardy-Weinberg Equilibrium what can be said about rare allele "y"?*
- "y" is seen in the population only because of a recent influx of newcomers
  - "y" will increase in frequency
  - "y" will decrease in frequency
  - "y" is usually seen in the heterozygous situation
174. *The speed of a centrifuge is doubled. What happens to the RCF?*
- Doubles
  - Stays the same
  - Quadruples
  - Depends upon the rotor radius
175. *Ficoll-Hypaque separates lymphocytes based upon what inherent property?*
- Density
  - Size
  - Adherence ("stickiness")
  - Color
176. *In the event of a significant laboratory fire, what should be your course of action?*
- Hit the alarm, rescue personnel, close the lab door, evacuate
  - Close the lab door, hit the alarm, rescue personnel, evacuate
  - Call 911, evacuate
  - Rescue personnel, hit the alarm, close the lab door, evacuate
177. *Liquid nitrogen presents what danger(s) to personnel?*
- Toxicity, suffocation
  - Frost bite, suffocation
  - Flammability, toxicity
  - Very low LD50, frost bite

## ClinImmune Labs CHT/CHS Practice Exam

178. A chemical has an NFPA rating as indicated below. What is an accurate statement of its hazards?



- a. High health hazard, low reactivity and flammability
  - b. High reactivity and flammability, low radioactivity
  - c. Explosive but otherwise innocuous
  - d. Unstable at low temperatures, some gamma ray emissions
179. A frame shift at the start of the second exon of an HLA-B gene will most likely produce what effect?
- a. Conformational change resulting in poor antibody binding
  - b. Premature truncation of the protein product due to a stop codon
  - c. Creation of new public epitopes
  - d. Heterozygous sequencing results that are clear but of shorter length
180. Given a eucaryotic DNA sequence of length 200b, known to contain an exon of 180bp, how many possible reading frames are there?
- a. 1
  - b. 3
  - c. 6
  - d. 20
181. In a crossmatch between donor and recipient, both the T cell and the DTT-B cell crossmatch are positive at 1:16. What can be said about the recipient anti-donor antibody?
- a. Expected to be ELISA class II negative
  - b. High levels of IgM auto-antibody
  - c. Low titer IgG and high-titer IgM
  - d. Class I antibody
182. Reagent X arrives in the lab without an expiration date. What action should you take?
- a. Develop a written policy that states, "Chemicals with unlisted expiration dates are good for 7 years"
  - b. Use the chemical indefinitely
  - c. Use the chemical until routine clinical assays show obvious degradation
  - d. Obtain manufacturer and HLA lab recommendations and derive an expiration date
183. What approach is even better than the correct answer to 182?
- a. Read over the ASHI manual and find published expiration guidelines
  - b. Buy two bottles of the chemical. Store one, as recommended, at 4C and the other at RT. When the RT one goes bad you know the 4C is also bad
  - c. Periodically QC the reagent and develop a QA analysis of its performance
  - d. Employ Google on a monthly schedule to look for reports of adverse outcomes using older lots of the reagent

## ClinImmune Labs CHT/CHS Practice Exam

184. *A supervisor notices that a previously meticulous worker has been making an inordinate number of mistakes in clinical assays. What approach should the supervisor take?*
- Use the power of peer pressure by emailing defamatory reports on the employee to co-workers
  - Meet with the worker, investigate the problems, and develop a corrective plan
  - File a secret memo in the worker's personnel file so as to not embarrass them
  - Be extra nice to the employee on the theory that honey catches more flies than vinegar
185. *The products of the KIR gene system are...*
- Non-Polymorphic
  - Homologous to the HLA antigens
  - Detect self through HLA class I
  - Detect HLA-DRB4 null alleles
186. *In a typical HLA laboratory, what would be the order of total annual costs from greatest to least?*
- Amortized equipment>supplies>reagents
  - Reagents>supplies>salaries
  - Salaries>reagents>amortized equipment
  - Reagents>amortized equipment>salaries
187. *The absolute  $A_{260}$  and  $A_{280}$  values and their ratio for a DNA sample provide what information?*
- Length and concentration
  - Free 3' ends and length
  - Concentration and RNA/Protein contamination
  - Concentration and percent degraded
188. *Which statement is true regarding the relative number in normal blood?*
- Lymphocytes>RBC
  - Granulocytes>lymphocytes
  - RBC>platelets
  - Lymphocytes>WBC
189. *KIR gene products are normally expressed upon...*
- NK cells
  - Macrophages
  - T cells
  - B cells
190. *Which assay involves direct allorecognition?*
- FXM
  - SSO
  - AHG-CDC
  - MLR
191.  *$\beta 2M$  is homologous to what class II HLA domain?*
- $\alpha 1$
  - $\alpha 2$
  - $\alpha 3$
  - $\alpha 4$

## ClinImmune Labs CHT/CHS Practice Exam

192. *A major source of background in the flow crossmatch is...*
- CD4
  - FcR
  - CD8
  - HLA class II
193. *Which of the below dye/color combinations is commonly used to measure anti-donor antibodies in the flow crossmatch?*
- AO/Green
  - FITC/Green
  - PE/Blue
  - EtBr/Red
194. *An HLA-Cw allele has a deleted nucleotide within exon 3. What situation would be diagnostic for the deletion during heterozygous SBT?*
- A slight abundance of one nucleotide over the other three in compiled nucleotide frequency statistics
  - A position of the electropherogram without a nucleotide on both forward and reverse strands
  - A position of the electropherogram without a nucleotide on the forward strand but not the reverse strand
  - Normal sequence on the forward and reverse strands followed by a region of consecutive mostly heterozygous positions continuing to the end of the exon
195. *Thrombin or CaCl<sub>2</sub> are typically used for...*
- Clotting anti-coagulated plasma
  - Selectively removing macrophages
  - Isolating DNA
  - "Reviving" dead donor cells for an AHG crossmatch
196. *Per ASHI standards (2005), which of the following MUST be on an HLA typing report?*
- The laboratory's address
  - The names of all directors and supervisors
  - The IMGT library used to assign alleles
  - The diagnosed disease state of the patient
197. *Per ASHI standards (2005), what is required of labs used for referral HLA testing?*
- Use sequence-based typing if reporting high-resolution results
  - Have reference letters from all clients documenting satisfactory performance
  - Be ASHI accredited
  - Participate in three different proficiency programs
198. *Per ASHI standards (2005), what type of monitoring is required for refrigerators and freezers?*
- Temperatures twice per day
  - Continuous alarm monitoring only
  - Continuous temperature monitoring
  - Continuous alarm and temperature monitoring

## ClinImmune Labs CHT/CHS Practice Exam

199. *Per ASHI standards (2005), what is required when reconstituting lyophilized antibodies for use in flow cytometry?*
- Reconstituted with sterile, azide-free PBS
  - Microaggregates must be removed
  - Mixing must occur for 20 seconds using a high-speed vortexer
  - The expiration date is only 3 months from reconstitution
200. *Per ASHI standards (2005), how many sera must be used to define a class I antigen by microcytotoxicity?*
- Five
  - Four
  - Two operationally monospecific antisera or monoclonal antibodies or at least three partially nonoverlapping multispecific antisera or monoclonal antibodies.
  - At least three operationally monospecific sera for common antigens and two operationally monospecific sera for rare antigens
201. *A colleague sends you a potentially novel allele. Which HLA typing technology provides the most predictable (not "better" but predictable!) results for this allele?*
- Serology
  - SSCP
  - ARMS SSP
  - SBT
202. *What is true regarding dUTP?*
- DNA nucleotide
  - Similar to dCTP in base-pairing
  - RNA sugar
  - dUTP can be substituted for dTTP in PCR
203. *What is the effect of heterophile antibodies in rabbit complement in the AHG-CDC assay?*
- Rabbit complement does not contain appreciable amounts of heterophile antibodies
  - Enhances the effectiveness of the complement
  - Blocks complement inhibitors in human serum
  - Blocks non-specific CYNAP antibodies
204. *Human serum accidentally contaminates the AHG stock solution. What is the expected effect in the AHH-CDC assay?*
- No effect
  - Decreased specificity and many false positive reactions
  - Many false negative reactions
  - Decreased CYNAP effect
205. *Which is a valid separation technology?*
- T cells via surface IgM binding to magnetic beads
  - Macrophages via uptake of iron filings
  - B cells via CD8 binding to magnetic beads
  - Neutrophils via segregation into the buffy coat layer of a standard ficoll-hypaque gradient

## ClinImmune Labs CHT/CHS Practice Exam

206. Which of the following would substantially (and always) interfere with a 3-color flow crossmatch?
- Patient undergoing treatment with IVIg
  - Patient undergoing treatment with anti-CD20 monoclonal antibody
  - Patient has leukemia
  - Patient previously had solid organ transplant and is now preparing for stem cell transplant
207. An AML patient in blast crisis types heterozygous for HLA-A,B by serology but homozygous by molecular SBT. The molecular and serological typings both started from freshly drawn ACD tubes and both typings meet all interpretive criteria without apparent anomaly. Which explanation best explains the data?
- Patient received a recent transfusion
  - Patient has deranged lymphocytes that express extra HLA's
  - Patient has recently received anti-proliferative chemotherapy
  - Patient's AML cells differ from patient's lymphocytes in HLA expression

## ClinImmune Labs CHT/CHS Practice Exam Answer Key

1. b	49. d	93e. t
2. d	50. a	93f. t (mostly)
3. b	51. d	93g. f
4. b	52. c	93h. f
5. c	53. c	93i. f
6. b	54. b	93j. f
7. c	55. b	93k. t
8. b	56. d	93l. f
9. a	57. e	93m. t
10. c	58. a	93n. t
11. e	59. d	93o. t
12. c	60. b	93p. f
13. e	61. c	93q. f
14. b	62. a	93r. f
15. a	63. e	93s. t
16. d	64. c	93t. t
17. e	65. a	94. c
18. c	66. c	95. d
19. e	67. b	96. a
20. c	68. e	97. c
21. e	69. c	98. d
22. c	70. e	99. d (but "a" in practice)
23. d	71. d	100. d
24. e	72. c	101. a
25. b	73. a	102. a
26. d	74. b	103. d
27. d	75. d	104. c
28. c	76. c	105. d
29. a	77. a	106. c
30. d	78. c	107. b
31. c	79. e	108. c
32. b	80. e	109. d
33. e	81. d	110. a
34. b	82. d	111. d
35. d	83. b	112. c
36. a	84. e	113. d
37. d	85. e	114. b
38. a	86. e	115. c
39. c	87. c	116. a
40. c	88. b	117. a
41. c	89. b	118. c
42. a	90. c	119. c
43. c	91. d	120. a
44. d	92. d	121. c
45. b	93a. t	122. c
46. c	93b. f	123. d
47. a	93c. t	124. b
48. e	93d. t	125. d

## ClinImmune Labs CHT/CHS Practice Exam Answer Key

126. b	174. c
127. d	175. a
128. c	176. d
129. b	177. b
130. a	178. a
131. d	179. b
132. b	180. c
133. d	181. d
134. b	182. d
135. c	183. c
136. b	184. b
137. c	185. c
138. d	186. c
139. d	187. c
140. a	188. b
141. b	189. a
142. c	190. d
143. a	191. b
144. d	192. b
145. b	193. b
146. d	194. d
147. c	195. a
148. a	196. a
149. c	197. c
150. c	198. d
151. a	199. b
152. c	200. c
153. c	201. d
154. d	202. d
155. c	203. b
156. d	204. c
157. c	205. b
158. a	206. b
159. d	207. d
160. b	
161. d	Comments?
162. c	
163. c	Questions?
164. b	
165. b	Suggestions?
166. c	
167. d	
168. a	Michael.aubrey@uchsc.edu
169. b	
170. b	
171. a	
172. c	
173. d	