1. Library Formation is a step in HLA typing by which method
    a. Sequence Based Typing
    b. Sequence-Specific Oligonucleotide Probes
    c. Sequence-Specific Primers
    d. **Next Generation Sequencing**

2. In the SSOP system, if the probes are fixed on the platform used for typing this is called
    a. **Reverse SSOP**
    b. Amplified SSOP
    c. NGS-SSOP
    d. SSOP-Extend

3. Which of the following are Pseudogenes?
    a. HLA-DRB1
    b. **HLA-DRB2**
    c. HLA-DRB3
    d. HLA-DRB4

4. The last alphabetical suffix in HLA typing report by NGS (e.g. the alphabet N in the example below) provides information on:

HLA-A*02:101:01:02 N

    a. Immunogenicity
    b. Pathogenicity
    c. **HLA expression**
    d. Complement Fixing Ability

5. The isolation of lymphocytes for the CDC crossmatch are usually done by
    a. Immune tagging method
    b. **Density Gradient method**
    c. Cell Sorting method
    d. Electro-gradient separation method

6. The fluorescent molecule used for detection and quantifying alloantibodies in recipient serum is called
    a. **FITC (Fluorescein isothiocyanate)**
    b. Anti-human IgG
    c. Tc-99 tagged CD-3 and CD-20
    d. Phycoerythrin (PE)

7. Flowcytometric Crossmatch can detect all EXCEPT
    a. IgG anti-HLA Donor Specific Antibody
    b. IgM anti-HLA Donor Specific Antibody
    c. IgG Non-HLA Donor Specific Antibody
    d. **IgG anti-HLA Non-Donor Specific Antibody**

8. A negative control serum used for CDC or Flow crossmatches are generally derived from

a. Commercially available serum
b. **AB-Positive healthy blood donors**
c. Sensitized patient's serum after pronase treatment
d. Complement treated rabbit serum

9. Low strength Class I Donor Specific Antibodies can cause a POSITIVE
    a. T cell Flow crossmatch
    b. **B cell Flow crossmatch**
    c. CDC crossmatch
    d. Auto-crossmatch

10. In HLA typing the alphabets A, B, C, DR, DQ, DP etc stand for
    a. Alleles
    b. **Loci**
    c. Haplotype
    d. Chromosomes

11. False positive CDC Crossmatch can result from
    a. Low incubation period
    b. Low incubation temperature
    c. Too many lymphocytes
    d. **Poor viability of donor cells**

12. Auto-Crossmatch is useful in scenario of
    a. Suspected Donor Specific Antibodies (DSA)
    b. Suspected Non-HLA DSA
    c. Suspected Non-DSA Anti-HLA antibodies
    d. **Crossmatch positive in the absence of documented DSA**

13. Repeating Crossmatches in dilutions is done to prevent
    a. Non-specific binding of antibodies to B cell
    b. Rituximab related False positive crossmatch
    c. Binding of Autoantibodies
    d. **Prozone phenomena**

14. Acid treatment of beads in Single Antigen Bead (SAB) assays is a technique used for
    a. **Preventing interference from denatured antigen**
    b. Increasing sensitivity of the SAB assay
    c. Differentiating complement fixing antibodies
    d. Standardizing antigen expression on beads

15. Why are the same MFI cut-offs not valid for all SAB Beads
    a. The antigen expression on the different beads are different
    b. The antigen expression on the beads and on cell surface are different
    c. The pathogenicity of different antibodies are different
    d. **All of the above**

16. Which of the following is **NOT** recommended as a part of routine pre-transplant immunological evaluation:
    a. HLA typing of Donor and Recipient
    b. Assessment of Anti-HLA antibodies using a solid phase assay

c. Flowcytometric or a CDC crossmatch
d. Non-HLA antibody assessment

17. Which type of sensitization is short-lived?
a. Blood transfusion
b. Pregnancy
c. Previous Transplant
d. Post-Infections

18. Beads of the Single Antigen Bead assay are microspheres made of
a. **Polystyrene**
b. Latex
c. PMMA
d. Polysulphone

19. Thermal Cycler is used in tissue typing lab to
a. Purify the DNA isolated
b. **Amplify the DNA isolated**
c. Quantify the DNA isolated
d. Isolate primer-DNA complex

20. Which B-cell development stages are NOT targeted by rituximab (anti-CD20 antibody)?
a. Peripheral B cells
b. Pre-B cell
c. Memory B cell
d. **Plasma cells**

21. Which therapeutic options are NOT used in desensitization
a. Intravenous Immunoglobulin (IVIg)
b. Plasma Exchange
c. **Thymoglobulin**
d. Tocilizumab

22. Calculated PRA needs
a. **HLA data of multiple donors with and SAB of prospective recipients**
b. HLA data of multiple recipients and SAB of donors
c. Multiple CDC/Flow crossmatches to be run
d. Commercially available kits

23. HLA-EMMA Stands for
a. Named after Dr. Joanne Emma who created this algorithm
b. Electronic Mismatch Algorithm
c. **Epitope Mismatch Algorithm**
d. Epitope MatchMaker Algorithm

24. Which statement best describes the main purpose of the C1q binding assay in transplant immunology?
a. To detect cytokine release from activated T cells
b. **To measure antibody ability to fix complement via the classical pathway**
c. To quantify total immunoglobulin levels in serum

d. To assess cell-mediated cytotoxicity

25. Look at the following HLA typing results for a young male of 28 years who has 2 possible donors, his father and his sister. The mother was also HLA typed but she was found to have mild proteinuria.

	A		B		DRB1		DQB1		Status
Patient	01:01	33:01	57:01	58:01	03:01	07:01	02:01	03:03	
Father	01:01	**02:01**	**37:01**	58:01	07:01	**13:01**	03:03	**06:03**	**Fit**
Mother	**26:01**	33:01	57:01	58:01	03:01	**13:01**	06:03	**03:03**	**Unfit**
Sister	01:01	**26:01**	**37:01**	57:01	**13:01**	**-**	**06:03**	**-**	**Fit**

Which statements are TRUE regarding HLA mismatch status

a. Both the father and the sister are Haplomatched with the patient
b. Both the father and the mother are Haplomatched with the patient
c. The sister has more HLA matching as some alleles are not typed
d. The sister is homozygous at HLA-DRB1 and DQB1 loci

26. In the above example, the SAB profile of the patient shows the following antibodies: **A*02:01**-9500, **A*24:02**-8800, **B*08:01**-6600, **DRB1*12:02**-5500. What is TRUE for the approach in this situation?

a. **In view of the presence of high DSA, father should be avoided even if the crossmatch is negative**
b. In view of better matching, father would still be first choice - We should desensitize and transplant
c. It will depend on the crossmatch: If the crossmatch is negative, the father is a better choice
d. Class I antibodies don't cause immediate rejection

27. A 27 year female has been worked up for transplant with mother (50 years) donor. She has history of 1 pregnancy and 3 units blood transfusion. The SAB Assay shows Donor Specific Antibodies to the mother (DSA at HLA*B08:01, MFI 5300). The Flow crossmatch is positive, both T cell and B cell crossmatches. The CPRA is 3%. What is the best way forward?

a. Transplant with 2-3 plasma-exchanges and r-ATG induction
b. Desensitize with Rituximab and IVIg
c. **Opt for Swap (as CPRA is low)**
d. Enlist for Deceased donor transplant

28. The approach to desensitization in deceased donor kidney transplant depends on all EXCEPT

a. Estimated waiting time for kidney offer
b. Relative Intensity Score
c. **Native Kidney Disease**
d. Pattern of antibodies (width and strength of sensitization) over time

29. The Single Antigen Bead assay of a 34-year female, planned for a 2nd transplant with a deceased donor is presented below.

Positive CON MFI: 19246 **Negative CON MFI:** 210 **Analysis Mode:** Manual

Antigen ID	Cut-off	Raw Value	MFI/LRA	BG Adjusted	AD-MFI	AD-BG Adjusted	A	B	C	Bw
118	3.96	19410	147.05	19216	13027	12897	***A*29:02***			
117	4.07	19240	145.76	19006	15197	15013	***A*29:01***			
134	4.32	19119	110.20	18864	12944	12772		***B*07:02***		***Bw6***
177	3.47	19077	109.95	18939	11478	11395		***B*67:01***		***Bw6***
126	4.00	19075	144.50	18851	15546	15363	***A*43:01***			
150	3.41	19021	109.63	18898	10603	10534		***B*27:08***		***Bw6***
173	3.98	19011	109.57	18751	14413	14216		***B*56:01***		***Bw6***
159	4.06	18776	108.22	18585	13556	13418		***B*42:01***		***Bw6***
181	3.94	18730	107.95	18501	13782	13614		***B*82:02***		***Bw6***
171	4.11	18561	106.98	18311	13401	13221		***B*54:01***		***Bw6***
180	3.87	18267	105.29	18048	13314	13154		***B*81:01***		***Bw6***
172	4.45	17665	101.82	17386	15388	15145		***B*55:01***		***Bw6***

Which of the statements is FALSE

a. The positive and the negative controls are proper
b. The RAW values can be used for assigning unacceptable antigen
c. We should avoid a donor with HLA-A*29:01/B*07:02
d. We should avoid a donor who is Bw4 positive

30. A young female with CKD due to resistant lupus nephritis has presented with her mother as a prospective donor. She is Haplomatched with her mother

	A		**B**		**DR**		**DQ**	
Patient	02:11	11:01	07:02	57:01	03:01	07:01	02:02	-
Mother	02:11	**03:01**	07:02	**08:01**	**01:01**	03:01	**05:01**	-

Crossmatch	**CDC**	**CDC-AHG**	**Auto**	**DTT**	**T cell**	**B cell**
Result	40%	60%	30%	10%	30 MCS	270 MCS
Interpretation	Pos	Pos	Pos	Neg	Neg	Pos

SAB Assay shows DSA: **HLA*B 08:01** 5200 MFI. What will be MOST APPROPRIATE regarding the interpretation and approach.

a. CDC positive is a contraindication. We should look for alternate donor
b. CDC positive with Auto and DTT positive means IgM autoantibodies, we can proceed for transplant
c. With DSA and a positive flow crossmatch, we should not transplant
d. B cell crossmatch can often be false-positive. Although there is DSA of 5200 MFI but a negative T cell crossmatch is good evidence that it is safe to transplant.