



UNIVERSITY OF JAMMU

NOTIFICATION

(10/June/Gen./ 23)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the competent authority, is pleased to authorize adoption of the Syllabi & Courses of Study for MD Immunohematology & Blood Transfusion (given in annexure) for the examinations to be held in the years 2010, 2011 and 2012.

Sd/-

REGISTRAR

No. F.Acd/II/116/10/ 3641-51

Dated:- 06-07-2010

**DEPARTMENT OF IMMUNOHEMATOLOGY AND BLOOD TRANSFUSION
MEDICINE GOVERNMENT MEDICAL COLLEGE JAMMU
CURRICULUM FOR MD (IMMUNOHEMATOLOGY & BLOOD
TRANSFUSION)**

I HISTORY OF TRANSFUSION MEDICINE

- 1.1 Scientific landmarks in its development
- 1.2 Impact of world wars on its development
- 1.3 Development of PVC bags

II SCIENTIFIC BASIS OF TRANSFUSION

A Biochemistry & physiology of elements of blood

- 2.0 Process of cell production and life span
 - 2.1 Red cells
 - 2.2 White blood cells
 - 2.3 Platelets
- 3.0 Red cells
 - 3.1 Hemoglobin structure & function
 - 3.2 Metabolic pathways
 - 3.3 Membrane structure & function
- 4.0 White cells
 - 4.1 Structure, function & kinetics
- 5.0 Platelets
 - 5.1 Structure, function & kinetics
- 6.0 Physiology of Hemostasis
 - 6.1 Role of platelets
 - 6.2 Coagulation pathways
 - 6.3 Fibrinolysis
- 7.0 Hemodynamics of blood flow & volume
- 8.0 Iron metabolism
- 9.0 Bilirubin metabolism

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B Immunology

- 10.0 Principles of basic immunology
 - 10.1 Antigen, Antibody, Complement, Immunoglobulin
 - 10.2 Antigen / antibody reaction
 - 10.3 Lymphocytes in humoral & cellular immunity
- 11.0 Role of Hybridoma technology in immunohematology
- 12.0 Immunology of transplantation
- 13.0 HLA & genetic control of immune response

C Genetics

- 14.0 Principles of basic genetics
- 15.0 Genetics of blood groups
 - 15.1 Phenotypes & genotypes
 - 15.2 Principles of blood group inheritance
 - 15.3 Population genetics of blood groups

III **ANTIGEN SYSTEMS IN FORMED ELEMENTS OF BLOOD**

- 16.0 Red cell antigens
- 17.0 Leucocyte antigens
- 18.0 Platelet antigens

IV **BLOOD COLLECTION, PROCESSING, COMPONENT PREPARATION**

A Management of blood donation

- 19.0 Donor recruitment
 - 19.1 Voluntary blood donation system
 - 19.2 Categories of blood donors
 - 19.3 Education & awareness of prospective donor
- 20.0 Acceptability criteria of blood donor

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21.0 Care of blood donors

- 21.1 Pre-donation
- 21.2 Mid-donation
- 21.3 Post-donation
- 21.4 Prevention & management of complications of blood donation

22.0 Blood collection

- 22.1 Anticoagulants & preservatives
- 22.2 Procedure
- 22.3 Blood donation camps

B Blood components

23.0 Components

- 23.1 Types
- 23.2 Methods of preparation
- 23.3 Indications, dosage & administration
- 23.4 Leuco-depletion
 - 23.4.1 various methods
 - 23.4.2 quality control

24.0 Storage of blood & components

- 24.1 Whole blood
- 24.2 Red cell concentrate
- 24.3 Plasma
- 24.4 Granulocyte
- 24.5 Cryoprecipitate
- 24.6 Stem cells
 - 24.6.1 peripheral blood stem cell
 - 24.6.2 cord blood

25.0 Plasma fractionation

V **PRE-TRANSFUSION TESTING**

26.0 Compatibility testing

- 26.1 ABO grouping & Rh typing
- 26.2 Antibody screening
- 26.3 Methods of cross matching
- 26.4 Newer methods of cross matching
 - 26.4.1 solid phase
 - 26.4.2 gel technology

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27.0 Screening for transfusion transmitted infections

- 27.1 Methodology
- 27.2 Nucleic acid amplification techniques
- 27.3 Newer emerging pathogens
 - 27.3.1 Prions
 - 27.3.2 C J disease
 - 27.3.3 Lyme disease
 - 27.3.4 others

28.0 Selection of blood, components & plasma products for transfusion

ADVERSE EFFECTS OF BLOOD TRANSFUSION

29.0 Clinical presentation, pathophysiology, investigations, management

- 29.1 Hemolytic transfusion reaction
- 29.2 Non hemolytic transfusion reaction

30.0 Transfusion transmitted infections

31.0 Transfusion associated graft versus host disease

32.0 Transfusion related acute lung injury

33.0 Others

- 33.1 Hemosiderosis
- 33.2 Volume overload

II APHERESIS

34.0 Technology of apheresis and various machines

35.0 Hemapheresis (platelets, granulocytes, plasma)

- 35.1 Donor selection
- 35.2 Procedure
- 35.3 Complications

36.0 Therapeutic apheresis

- 36.1 Indications, procedure & complications
- 36.2 Plasma exchange, red cell exchange
- 36.3 Newer methods for immunoadsorption

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AUTOLOGOUS TRANSFUSION

- 37.0 Basic principles, indications, contra-indications
 - 37.1 Pre-deposit
 - 37.2 Hemodilution
 - 37.3 Intra-operative blood salvage including equipment
 - 37.4 Directed donation

ANTENATAL & NEONATAL TRANSFUSION PRACTICE

- 38.0 Pathophysiology, diagnosis & management
 - 38.1 Rh incompatibility
 - 38.2 ABO & other blood group incompatibility
- 39.0 Exchange transfusion
 - 39.1 Indications, methodology & complications
- 40.0 Neonatal transfusion practice

IMMUNOHEMATOLOGY

- 41.0 Classification, diagnosis and management
 - 41.1 Immune hemolytic anemia
 - 41.2 Immune thrombocytopenia
 - 41.3 Immune neutropenia
- 42.0 Immunohematological problems in multi-transfused patients

II HEMOTHERAPY

- 43.0 Pathophysiology, diagnosis and management of anemia
 - 43.1 Anemia
 - 43.1.1 Iron deficiency anemia
 - 43.1.2 Megaloblastic anemia
 - 43.1.3 Aplastic anemia
 - 43.1.4 Anemia of uremia
 - 43.2 Hemoglobinopathies
 - 43.2.1 Thalassemia
 - 43.2.2 Sickle cell anemia

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44.0 Pathophysiology, diagnosis and management of hemostatic disorders

- 44.1 Hemophilia
- 44.2 Von willebrands disease
- 44.3 Platelet disorders
 - 44.3.1 Qualitative disorders
 - 44.3.2 Quantitative disorders
- 44.4 DIC

45.0 Pathophysiology, diagnosis and transfusion support in acute blood loss

- 45.1 Shock
- 45.2 Massive transfusion

46.0 Transfusion support in cardiac surgery

47.0 Classification & transfusion support in Oncology

- 47.1 Leukemia
- 47.2 Lymphoma
- 47.3 Marrow failure

XII TRANSPLANTATION

48.0 Transfusion support in transplantation

48.1 Peripheral blood stem cell transplantation

- 48.1.1 Harvesting
- 48.1.2 Cryopreservation
- 48.1.3 CD34 counting

48.2 Bone marrow transplantation

- 48.2.1 Harvesting
- 48.2.2 Processing
- 48.2.3 Immunohematological problems in ABO mismatched BMT

48.3 Transfusion support specialized conditions

- 48.3.1 Renal transplantation
- 48.3.2 Liver transplantation
- 48.3.3 Others

49.0 Irradiation of blood products

- 49.1 Indications, dosage, adverse effects

50.0 Tissue banking

XIII BLOOD SUBSTITUTES & HEMOPOIETIC AGENTS

- 51.0 Crystalloid & colloids
- 52.0 Oxygen carrying compounds
- 53.0 Hemopoietic growth factors
- 54.0 Albumin

XIV MEDICOLEGAL CONSIDERATIONS IN TRANSFUSION MEDICINE

- 55.0 Ethical & legal considerations pertaining to transfusion practice
- 56.0 Identification of blood stains
- 57.0 Paternity testing
- 58.0 Donor notification and counseling
- 59.0 Look back program
- 60.0 Drugs & Cosmetics act, Accreditation

XV TOTAL QUALITY MANAGEMENT

- 61.0 Development of standard operating procedures (SOP) manual
- 62.0 Quality control
 - 62.1 Reagents
 - 62.2 Instruments
 - 62.3 Personnel
 - 62.4 Blood & components
- 63.0 Quality assurance
 - 63.1 Internal quality control
 - 63.2 External quality assurance
- 64.0 Hospital transfusion committee
- 65.0 Medical audit

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7

66.0 Good manufacturing practice (GMP)

67.0 Turnaround time

68.0 ISO 9000

XVI ORGANISATION & MANAGEMENT OF TRANSFUSION SERVICES

69.0 Organisation & function of blood services & hospital transfusion practice

69.1 Donor recruitment & motivation

69.2 Operation of blood mobile

69.3 Development of transfusion service

69.4 Inventory control

69.5 Development of forms, labels, records etc

XVII BLOOD SAFETY

70.0 Sterilization

71.0 Disposal of bio-hazardous material

XVIII MODERN BIOLOGICAL TECHNIQUES

72.0 Principles, methods, relevance in transfusion medicine

72.1 Western blot

72.2 Polymerase chain reaction

72.2.1 SSCP

72.2.2 SSOP

72.3 Dot blot hybridization

XIX AUTOMATION & COMPUTERIZATION

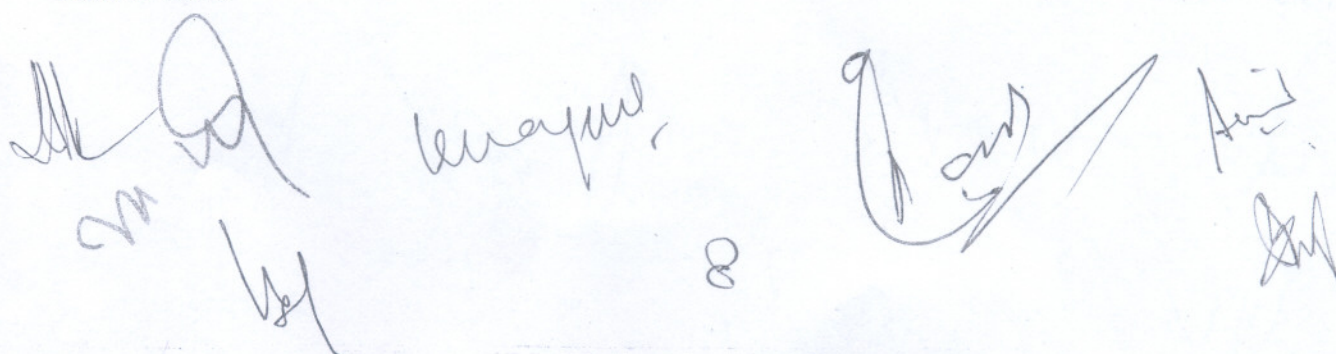
73.0 Automated blood grouping & processing

74.0 Instrumentation & use of bar codes

75.0 Use of computers in blood banking

XX

In addition to the prescribed curriculum, the candidates will be required to take basic courses in Biostatistics, Computers, Medical ethics etc organised by the Institute from time to time.

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TRAINING PROGRAMME: [Department posting]

The candidates will be rotated through various sections of the department as under.

- | | | |
|-----------|--|-----------------|
| A) | Blood donor management
Donor recruitment & motivation
Blood donor selection
Phlebotomy
Post donation care of donor
Apheresis
Donor apheresis
Therapeutic plasma exchange
Outdoor blood donation camps | 6 months |
| B) | Component preparation & Quality Control
Preparation of various blood components
PRBC, FFP, PC, Cryo, Leuco-poor
Irradiation of blood components
Storage & quality control | 5 months |
| C) | Transfusion transmitted infection screening
Screening for various markers
HIV, HCV, HbsAg, Syphilis
Methodology
ELISA, Spot, Rapid, Automated analyser
Molecular techniques | 5 months |
| D) | Immunohematology
Diagnosis & Transfusion support in
AIHA
PNH
Transfusion reaction
Antenatal serology
Multi-transfused patients
Secretor status
Minor red cell antigen typing | 6 months |
| E) | Pre transfusion testing & Cross matching
ABO grouping & Rh typing
Du testing, genotyping
Irregular antibody screening & identification
Cross-matching | 6 months |
| F) | Quality control / computers / records | 2 months |

Total

30 months

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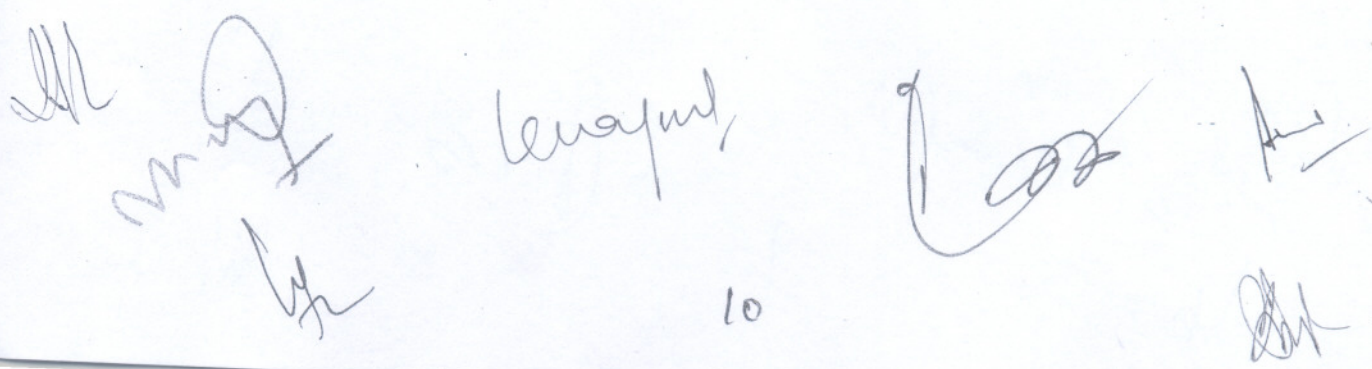
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aining in allied departments

A)	Dept of Pathology (Hematology division) Complete Hemogram Reading of peripheral smear Coagulation work up	1 month	
B)	Dept of Genetics HLA typing Transfusion in thalassemia	1 month	2
C)	Dept of Immunology Isolation of Lymphocytes Immunophenotyping CD 4 / CD 8 counts Immunofluoresence PBSCT Harvest CD 34 counts Cryopreservation	1 month	2
D)	Dept of Microbiology Bacterial culture Grams staining Special molecular techniques	1 month	3 weeks
E)	Dept of Anesthesiology Intra-operative hemodilution Operation of cell saver Intra operative transfusion	1 month	1 week
F)	National Plasma Fractionation Center, Mumbai Fractionation Advanced serology	1 month	
G)	Dept of Clinical Hematology & BMT		2 weeks

Total 6 month



 10

PRACTICAL EXAMINATION PATTERN FOR APPROVAL:

1ST DAY

1. Long Immunohematology exercise: (one) Shall include followings
Antenatal serology, Alloantibody & Autoantibody detection, identification,
Transfusion reaction work-up, Massive transfusion and their management.
This will be followed by viva-voce
2. Short exercises (Two) Shall consist of the followings
 - a) Operation of BTS (Donor management, inventory, apheresis)
 - b) Short exercise (Reagents, Blood group discrepancy, component preparation, quality control, Transfusion transmitted infections screening,)Both exercises will be followed by viva-voce
3. Clinical discussion (Two) : Hemotherapy exercises

2ND DAY

1. Short exercises (total 2) It shall consist
 - a) Basic hematology – Hb, HCT, PLT count, PS reading, WBC Count etc
 - b) Coagulation work up – BT/CT, PT/APTT etcBoth exercises will be followed by viva-voce.
2. SPOTS
3. Grand viva + thesis discussion

INTERNAL ASSESSMENT OF THE CANDIDATE

The Board of studies in its meeting held on 17th may 2000 recommended that there should be periodic internal assessment of the candidate by the department. The pattern if the assessment & its format will be according to the institution norms in this regard.

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11

BOOKS

1. Blood transfusion in clinical medicine.
Ed. PL Mollison, 8th edition, Blackwell Sci. Pub. Oxford
2. Transfusion Medicine
Ed. WH Churchill, SR Kurtz, Blackwell Sci, Pub, Oxford, 1988
3. Clinical Practice of Transfusion Medicine
Ed. L Petz, Swisher, 2nd edition, Churchill Livingstone, New York, 1989
4. Blood transfusion therapy: A problem oriented approach
Ed. JAF Napier, John Willey & Sons, Chichester, 1987
5. Principles of transfusion medicine
Ed. EC Rossi, TL Simon, GS Moss, William & Wilkins, Tokyo, 1991
6. Modern blood banking & transfusion practices.
Ed. Denise M Harmonge, 4th edition, FA Davis, PA 1994
7. Transfusion immunology & medicine
Ed. Carel J van Oss, Marcel Dekker, New York, 1990
8. Blood separation & plasma fractionation
Ed. J Robinson, Harris, Willey Liss, New York, 1990
9. Blood groups in man
Ed. RR Race, R Singer, Blackwell Scientific Pub, Oxford, 8th edition
10. Applied blood group serology
Ed. PD Issit, Montogmerry Sci. Pub Florida, 1994
11. Practical blood transfusion
Ed. DW Huestis, JR Bove, J Case, Little Brown & Com, Boston 1987
12. Progress in transfusion medicine
Ed. JD Case, Vil I, II, III, Churchill Livingstone, London
13. Blood component therapy in clinical practice.
Ed RW Beal, JP Isbister, Blackwell Science Pub, Oxford
14. Transfusion medicine : Recent technological advances
Ed K Murawski, F Poetooni, Blackwell Sci Pub, Oxford

15. Clinical Blood Transfusion
Ed LA Kay, ER Huehns, Churchill Livingstone, London, 1986
16. Blood transfusion (Methods in hematology, Vol 17).
Ed. TJ Greenwalt, Churchill Livingstone, London, 1986
17. Blood transfusion: A conceptual approach
Ed. JG Kelton, N Heddle, M Blajchman, Churchill Livingstone, 1984
18. The human blood groups.
Ed PH Anderson, CC Thomas, Springfield, USA
19. Plasma fractionation & blood transfusion
Ed CTS Sibinga, PC Das, S Seidl, Martinus Nijhoff Pub, Boston 1985
20. Transplantation & blood transfusion
Ed CTS Sibinga, PC Das, G Opel, Martinus Nijhoff Pub, Boston, 1985
21. Future developments in blood banking
Ed. CTS Sibinga, PC Das, TJ Greenwalt, Martinus Nijhoff Pub, Boston 1984
22. Quality assurance in blood banking & its impact
Ed. CTS Sibinga, PC Das, HF Tassel, Martinus Nijhoff Pub Boston 1984
23. Microbiology in blood transfusion
Ed JJ Barbara, PSG Wright, Bristol 1983
24. The human blood groups
Ed. C Salmon, Year Book Medical Pub, New York, 1984
25. The text book of blood sciences
Ed. CM Zmijewski, WE Haesler, Appleton Century Crofts, New York 1982
26. Transfusion therapy: Principles & procedures
Ed. RC Rutman, WV Miller, Aspen Publication Rockville, 1985
27. Fundamentals of immunohematology: Theory & techniques
Ed. ML Turgeon, Lea & Febiger, PA 1989
28. Transfusion transmitted infections
Ed. DM Smith, RY Dodd,
29. Blood loss replacement
Ed M Marshall, T Bird

31. Bone marrow & stem cell processing: A manual of current techniques
Ed. EM Areman, HJ Deeg, RA Sacher, FA Davis PA, 1994
32. Scientific basis of transfusion medicine: Implications for clinical practice
Ed Anderson, PM Ness, Saunders, 1994

BOOKS FROM AMERICAN ASSOCIATION OF BLOOD BANKS (AABB)

1. Technical manual, ed FK Widman
2. Donor room procedures, ed TS Green, D Steckler
3. Blood transfusion therapy: A Physicians handbook, ed EL Snyder, MS Kennedy
4. Accreditation requirement manual, ed RE Klein
5. Standards for blood banks & transfusion service, ed PV Hollan, PJ Schmidt
6. Therapeutic apheresis, ed J Kolins, JM Jones
7. Legal issues in transfusion medicine, ed GM Clark
8. New frontiers in blood banking, ed CH Wallas, LJ McCarthy
9. Autologous transfusion, ed SG Sandler, AJ Slivergleid
10. Autologous transfusion & hemotherapy, ed HF Tasswell, AA Pineda
11. Platelets, ed DM Smith, SH Summers
12. Blood groups system : Rh, ed W Tyler, SR Pierce
13. Blood groups system: MN, ed BL Fryer, J Levitt, C Daniel
14. Blood groups system: Duffy, Kidd, Lutheran, ed, SR Pierce, CR Macpheroo
15. Computers in blood banks, ed LK Wilson, DM Eliot
16. Competition in blood services, ed GM Clark
17. Educational programmes in transfusion medicine, ed CH Wallas, TL Simon
18. Plasmapheresis, ed Y Nose, J Smith, RS Krakeur

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LIST OF JOURNALS

1. Lancet
2. Nature
3. British Medical Journal
4. British journal of hematology
5. Blood
6. Journal of clinical pathology
7. American journal of clinical pathology
8. Annals of hematology
9. American journal of hematology
10. Vox sanguinis
11. Transfusion
12. Transfusion medicine review
13. Transfusion medicine
& Apheresis
14. Transfusion science
15. Journal of clinical apheresis
16. Thrombosis & hemostasis
17. Seminars in hematology
18. Seminars in thrombosis & hemostasis
19. European journal of hematology

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