

Immunohaematology

Code: 43318
ECTS Credits: 10

Degree	Type	Year	Semester
4314643 Transfusion Medicine and Advanced Cell Therapies	OB	0	1

Contact

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Use of Languages

Principal working language: english (eng)

Other comments on languages

The working language is English but the use of Spanish is also allowed. The course material will also be in English.

Teachers

Eduardo Muñoz Díaz

Masja de Haas

Prerequisites

Level B2 or equivalent in English.

Objectives and Contextualisation

In this module on IH we will study blood groups, their classification, structure and function. We will also study the clinical immunity complications mediated by antierythrocyte antibodies (haemolytic disease in newborns), platelets (foetal/neonatal alloimmune thrombocytopenia, post transfusion purpura) and granulocytes (neonatal alloimmune and autoimmune neutropenia, TRALI).

We will review the techniques used for determining antibodies against different blood cells and for the classification (serological, molecular) of blood groups. Finally we will look at the HLA systems and the clinical implications will be reviewed in the field of transplants.

Competences

- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Continue the learning process, to a large extent autonomously.
- Define laboratory strategies for the diagnosis of haemolytic disease, immune and haematologic cytopenias, and other immune-(adverse) effects of the transfusion.
- Design and develop research using appropriate methodologies.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.

- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

Learning Outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
2. Continue the learning process, to a large extent autonomously.
3. Create an algorithm for each case.
4. Design and develop research using appropriate methodologies.
5. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
7. Understand the basics of immunohaematology and basic techniques used to diagnose immune processes related to erythrocytes, granulocytes and platelets.
8. Understand the use of the HLA system and its relationships in the context of distinct diseases.
9. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.

Content

1. Introduction.
 - 1.1 Key concepts in immunohematology.
2. IH-Erythrocyte.
 - 2.1 Systems of blood groups of erythrocytes.
 - 2.2 Biological importance of blood groups of erythrocytes.
 - 2.3 Molecular techniques in immunohematology.
 - 2.4 Autoimmune haemolytic anaemia.
 - 2.5 Haemolytic disease in newborns: diagnosis and prevention.
3. IH-platelet.
 - 3.1 Systems of platelet blood groups and study techniques.
 - 3.2 Thrombocytopenia: diagnosis and prevention.
 - 3.3 Post-transfusion purpura and other aloimmune thrombocytopaenia.
 - 3.4 Refractoriness in platelet transfusion.
4. IH-Granulocyte.
 - 4.1 Systems of blood groups of granulocytes and study techniques.
 - 4.2 Aloimmune neonatal granulocytopenia and autoimmune granulocytopenia.
 - 4.3 Transfusion related lung injury (TRALI).
5. HLA system.
 - 5.1. HLA molecules. Structure and function.

5.2 Aloreognition and rejection.

5.3 Classification techniques.

5.4 HLA and transplant.

5.5 HLA and disease.

Methodology

The methodology for this course is active and constructive. It does not only contemplate the content but also reading, reflecting and applying knowledge to reasonably close situation to create meaningful learning.

Students will work on real life examples and case studies, reflecting on complex and relatively unstructured situations to find adequate solutions.

Faithful to the proposed methodology, students form the centre of the learning process and generate knowledge by interacting significantly with their peers, with the teaching materials and with the environment. This programme not only teaches training in a virtual environment but also allows them to experience their learning every day.

At the beginning of the unit, the teacher will present a learning plan to the group with specific objectives, learning activities, the necessary resources and recommended deadlines for each activity.

The dates for carrying out the activities are recommended in order to be able to follow the course. The only fixed dates are the beginning and end of each teaching unit. This means that students can do their own planning but they must respect the dates for the beginning and the end of each unit.

Students are recommended to work in a continuous and consistent manner and not allow tasks to accumulate around the deadlines, which may lead to haste, undue time pressure and not allow the students to enjoy their learning or carry out additional reflections. Also the course offers group activities which require synchronisation among the group.

Some of the activities must be send online to the teacher for assessment and receive feedback of progress. Teachers will return the work with comments and together the students can continue to think and learn. The deadline for each of these activities is the end of the teaching unit. Other activities will consist in discussion and working together in shared spaces.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Discussions in the Virtual Campus	30	1.2	8, 3, 4, 5, 6, 1, 2, 9
Type: Supervised			
Elaboration of projects	22.5	0.9	8, 3, 4, 5, 6, 1, 2, 9
Virtual cases/Problem solving	22.5	0.9	8, 3, 4, 5, 6, 1, 2, 9
Type: Autonomous			
Personal study	25	1	7, 8, 3, 4, 5, 6, 1, 2, 9
Reading articles/Reports of interest/Videos	25	1	7, 8, 3, 4, 5, 6, 1, 2, 9
Test/Scheme	25	1	7, 8, 3, 4, 5, 6, 1, 2, 9

Assessment

The module will be assessed on the following activities:

1. Exercise 1: Design a comparative study of the prophylactic programmes with anti-D immunoglobulin in different countries. This activity counts for 5% of the final grade.
2. Exercise 2: Describe the procedures for prenatal testing in the country of the student. This activity counts for 9% of the final grade.
3. Exercise 3: Two case studies (AIHA and HDN). This activity counts for 13.5% of the final grade.
4. Exercise 4: Individual multiple choice test. 13.5 % of the final grade.
5. Exercise 5: Open discussion. This activity counts for 9% of the final grade.
6. Exercise 6: Two case studies (FNAIT and RPT). This activity counts for 4% of the final grade.
7. Exercise 7: Open discussion. This activity counts for 8% of the final grade.
8. Exercise 8: Individual multiple choice test. This test counts for 4% of the final grade.
9. Exercise 9: Open discussion. This activity counts for 4% of the final grade.
10. Exercise 10: Case study (ANG). This activity counts for 5% of the final grade.
11. Exercise 11: Individual multiple choice test. This test counts for 5% of the final grade.
12. Exercise 12: Individual multiple choice test. This test counts for 20% of the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exercise 1, 2, 3 and 4	45%	10	0.4	7, 4, 5, 6, 1, 2, 9
Exercise 12	20%	20	0.8	3, 4, 5, 6, 1, 2, 9
Exercise 5, 6, 7 and 8	20%	40	1.6	8, 3, 4, 5, 6, 1, 2, 9
Exercise 9, 10 and 11	15%	30	1.2	8, 4, 5, 6, 1, 2, 9

Bibliography

Daniels G: Blood group antibodies in haemolytic disease of the fetus and newborn; in: Hadley A, Soothill P (eds.): Alloimmune disorders of pregnancy. Anaemia, thrombocytopenia and neutropenia in the fetus and newborn. Cambridge, Cambridge university press, 2002.

Mollison PL, Engelfriet CP, Contreras M.: Haemolytic disease of the fetus and the newborn; in: Mollison PL, Engelfriet CP, Contreras M (eds): Blood transfusion in clinical medicine, ed. 11th ed., Oxford Blackwell Science, 2005.

Franklin IM: Prevention of rhesus haemolytic disease of the fetus and newborn. Lancet 2009; 373(9669):1082.

Moise KJ, Jr.: Management of rhesus alloimmunization in pregnancy. Obstet Gynecol 2008; 112(1):164-176.

Moise KJ: Fetal anemia due to non-Rhesus-D red-cell alloimmunization. *Semin Fetal Neonatal Med* 2008; 13(4):207-214.

Koelewijn JM, Vrijkotte TG, van der Schoot CE, Bonzel GJ, de HM: Effect of screening for red cell antibodies, other than anti-D, to detect hemolytic disease of the fetus and newborn: a population study in the Netherlands. *Transfusion* 2008; 48(5):941-952.

Dajak S, Stefanovic V, Capkun V: Severe hemolytic disease of fetus and newborn caused by red blood cell antibodies undetected at first-trimester screening (CME). *Transfusion* 2011; 51(7):1380-1388.

Koelewijn JM, de HM, Vrijkotte TG, Bonzel GJ, van der Schoot CE: One single dose of 200 microg of antenatal RhIG halves the risk of anti-D immunization and hemolytic disease of the fetus and newborn in the next pregnancy. *Transfusion* 2008; 48(8):1721-1729.

NICE: NICE issues guidance for RhD-negative women during pregnancy. 2002. Report No.: 2002/024 ed.

Joy SD, Rossi KQ, Krugh D, O'Shaughnessy RW: Management of pregnancies complicated by anti-E alloimmunization. *Obstet Gynecol* 2005; 105(1):24-28.

Hackney DN, Knudtson EJ, Rossi KQ, Krugh D, O'Shaughnessy RW: Management of pregnancies complicated by anti-c isoimmunization. *Obstet Gynecol* 2004; 103(1):24-30.

McKenna DS, Nagaraja HN, O'Shaughnessy R: Management of pregnancies complicated by anti-Kell isoimmunization. *Obstet Gynecol* 1999; 93(5 Pt 1):667-673.

Alcock GS, Liley H: Immunoglobulin infusion for isoimmune haemolytic jaundice in neonates. *Cochrane Database Syst Rev* 2002; (3):CD003313.

Mainie P: Is there a role for erythropoietin in neonatal medicine? *Early Hum Dev* 2008; 84(8):525-532.

Crowther C, Middleton P: Anti-D administration after childbirth for preventing Rhesus alloimmunisation. *Cochrane Database Syst Rev* 2000; (2):CD000021.

Engelfriet CP, Reesink HW, Judd WJ, Ulander VM, Kuosmanen M, Koskinen S, Rouger P, Morelati F, Tantaló V, Fujii T, de HM, van der Schoot CE, Overbeeke M, Koelewijn J, Bonzel G, Vrijkotte T, Zupanska B, Martín-Vega C, Parra LR, de SM, Contreras M, Panzer S, Ulm B, Mayr WR: Current status of immunoprophylaxis with anti-D immunoglobulin. *Vox Sang* 2003; 85(4):328-337.

Kumpel BM: On the immunologic basis of Rh immune globulin (anti-D) prophylaxis. *Transfusion* 2006; 46(9):1652-1656.

Clausen FB, Christiansen M, Steffensen R, Jorgensen S, Nielsen C, Jakobsen MA, Madsen RD, Jensen K, Krog GR, Rieneck K, Sprogø U, Homburg KM, Grønnet N, Dziegiel MH: Report of the first nationally implemented clinical routine screening for fetal RHD in D- pregnant women to ascertain the requirement for antenatal RhD prophylaxis. *Transfusion* 2012; 52(4):752-758.

West K, Anderson D, McAlister V et al. Alloimmune thrombocytopenia after organ transplantation. *N Engl J Med* 1999; 341:1504-1507.

Lubenow N, Eichler P, Albrecht D. et al. Very low platelet counts in post-transfusion purpura falsely diagnosed as Heparin-induced thrombocytopenia: report of four cases and review of literature. *Thrombosis Research* 2000; 100: 115-125.

Metcalfe P, Watkins NA, Ouwehand WH et al. Nomenclature of human platelet antigens. *Vox Sanguinis* 2003; 85: 240-245.

Welling KL, Taaning E, Lund BV, Rosenkvist J, Heslet L. Post-transfusion purpura (PPT) and disseminated intravascular coagulation (DIC). *Eur J Haematol* 2003; 71: 68-71.

Morishita K, Wakamoto S, Miyazaki T et al. Life-threatening adverse reaction followed by thrombocytopenia after passive transfusion of fresh frozen plasma containing anti-CD-36 (Nak) isoantibody. *Transfusion* 2005; 45:803-806.

Pavensky K, Webert KE, Goldman M. Consequences of transfusion platelet antibody: A case report and literature review. *Transfusion* 2008; 48:1981-1989.

Barba P, Pallarés P, Nogués N, Canals C, Gracia M, Vinyets I, Muñiz-Diaz E. Post-transfusion purpura caused by anti-HPA-3a antibodies that are only detectable using whole platelets in the platelet immunofluorescence test. *Transfus Med* 2009; 20: 200-202.

Lynce F, Yin F, Alcorn K, Malkosvka V. Post-transfusion purpura in an African-American man due to human platelet antigen-5b alloantibody: a case report. *J of Case Med Reports* 2012 6: 420.