



The Royal College of Pathologists

Pathology: the science behind the cure

Part 1 examination

Immunology: First paper

This paper is for both medically qualified and clinical scientist candidates

Tuesday 22 September 2009

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

- 1 Write short notes on the interaction of genetic, environmental and immunological factors in the pathogenesis of each of the following diseases:
 - a) Coeliac disease
 - b) Reiter's syndrome
 - c) Rheumatoid arthritis

- 2 Write short notes on the importance of each of the following in the synthesis of IgE. Use examples from allergic disease or immune deficiency disorders to justify your answer.
 - a) Epidermal and mucosal structural proteins
 - b) Co-stimulatory molecules
 - c) Cytokines
 - d) Enzymes and transcription factors involved in immunoglobulin class switching

Please turn over for Questions 3, 4 & 5

- 3 Briefly describe the classical, alternative, and third pathways of complement activation, with particular reference to the differences in the mechanisms for initiation and control of these pathways. How do defects in these pathways contribute to each of the following?
- a) Recurrent meningococcal meningitis.
 - b) Atypical haemolytic uraemic syndrome.
 - c) Paroxysmal nocturnal haemoglobinuria.
- 4 Describe the key molecular events and phenotypic changes that can be identified in B lymphocytes as they develop from stem cell to mature naïve B cells. How do genetic defects of this pathway cause human disease? Describe the typical abnormal laboratory findings in these diseases.
- 5 Using a short note format answer both parts of this question.
- a) Briefly describe the processes involved in antigen presentation. How do inherited genetic defects of antigen presentation cause disease, and how do these present?
 - b) What are the causes of renal transplant rejection, and how can these be prevented or treated?



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Tuesday 24 March 2009

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Answer both parts of the question.
 - a) Briefly outline the key molecular events which take place in the germinal centre resulting in the development of the secondary antibody repertoire.
 - b) Explain how knowledge of these molecular events has helped in the understanding of primary immunodeficiency associated with a defective secondary antibody repertoire.

2. Using short notes, describe the disease association between infectious agents and host factors in each of the following three situations:
 - a) Guillain-Barré syndrome following *Campylobacter jejuni* infection.
 - b) Immune evasion of natural killer cells in cytomegalovirus infection.
 - c) Recurrent meningococcal meningitis.

Please turn over for Questions 3, 4 & 5

3. Write short notes outlining the genetic defects, the immunological mechanisms underlying the development of disease, and the clinical phenotype in each of the three following conditions:
 - a) Autoimmune polyendocrinopathy, candidiasis and ectodermal dystrophy (APECED).
 - b) TNF receptor associated periodic syndrome (TRAPS).
 - c) Monogenetic susceptibility to herpes simplex virus (HSV) encephalitis.

4. Write short notes on each of the following:
 - a) Anti-IgE therapy.
 - b) Compare and contrast the mechanism of action of azathioprine and mycophenolate mofetil. Does this have any practical implication for the use or monitoring of these agents?
 - c) Discuss the human papillomavirus UK vaccination programme with reference to the immune response generated by the vaccine.

5. Critically discuss the interplay between cutaneous barrier integrity, *Staphylococcus aureus* and T cells in the pathogenesis of atopic dermatitis (eczema).



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Tuesday 23 September 2008

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Discuss how the underlying molecular defects cause the associated clinical phenotypes in each of the following conditions:
 - a) immune dysregulation, polyendocrinopathy, enteropathy, X-linked (IPEX)
 - b) chronic granulomatous disease
 - c) autoimmune lymphoproliferative syndromes (ALPS)

2. Describe how (a) eosinophils and (b) natural killer cells contribute to host defence in man. Discuss the role of each of the above cell types in the pathogenesis of human disease (excluding haematological malignancy).

3. Answer both parts of the question. *Part (a) is awarded two thirds of the marks and part (b) one third of the marks for this question.*
 - a) Describe the role played by mast cells in type 1 hypersensitivity reactions
 - b) Discuss the therapeutic strategies which can be used in the treatment of type 1 hypersensitivity diseases

Please turn over for Questions 4 & 5

4. Write short notes on each of the following:
 - a) How does the HIV virus affect T cell counts and function?
 - b) The oral allergy syndrome
 - c) Discuss the role of dendritic cells in the immune response

5. Critically discuss current concepts concerning the immunopathogenesis of systemic lupus erythematosus.



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Part 1 examination

Immunology: First paper

Tuesday 18 March 2008

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

- 1 Write short notes on BOTH of the following, including human examples of failures of these processes:
 - a Mechanisms of central and peripheral T cell tolerance
 - b Immunoglobulin class switching

- 2 Write short notes on all of the following:
 - a The mechanisms of action of Ciclosporin and Sirolimus
 - b Interleukin 17 (IL-17)
 - c Mechanisms of action of monoclonal antibodies used in the treatment of rheumatic diseases.

Please turn over for Questions 3, 4 and 5

3 Write short notes on the molecular pathogenesis of:

- a The autoimmune lymphoproliferative syndromes
- b The Hyper IgE syndromes
- c Ectodermal dysplasia with immunodeficiency
- d Hereditary angioedema

4 Answer both parts of this question using a short notes format:

- a Briefly outline mechanisms of immunity that protect humans from infections caused by *Staphylococcus aureus*. What conditions may impair immunity to this organism?
- b The role of allergen desensitisation in the treatment of allergic rhinitis. (Your answer should include indications, potential adverse effects and current views of their mechanism of action).

5 Please answer both parts of this question:

- a Outline the immunological mechanisms involved in rejection of renal allografts.
- b Describe the ways in which rejection of renal transplants can be prevented or treated.



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Part 1 examination

Immunology: First paper

Tuesday 25 September 2007

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

- 1 A healthy 25 year old man steps on a rusty nail and experiences a penetrating injury to his foot. Three days later, he goes to his GP with a painful foot, fever and rigors. Discuss how his immune response will have been mobilised in the intervening 72 hours.

- 2 Write short notes on each of the following:
 - a. Molecular mimicry in the pathogenesis of autoimmune disease.
 - b. DNA repair defects leading to immunodeficiency.

- 3 Write short notes on each of the following:
 - a. The immunological basis for sublingual immunotherapy to grass pollen allergens.
 - b. The role of co-stimulatory molecules in the induction of CD4 T cell responses.

Please turn over for Questions 4 and 5

- 4 Answer both parts of this question using a short-notes format.

- a. Discuss the evidence that genetic factors influence the development of inflammatory bowel disease (IBD).
- b. Outline immune defence mechanisms mobilised during pneumococcal infection. How can specific genetic defects lead to susceptibility to severe pneumococcal sepsis?

5 Write short notes on each of the following:

- a. Antibodies to cyclic citrullinated peptides.
- b. B cell activating factor (BAFF).
- c. The pathogenesis of skin lesions in pemphigus vulgaris and pemphigoid. Indicate how the immunology laboratory can help in the diagnosis of these two diseases.



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Immunology: First paper

Tuesday 27 March 2007

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Give a brief overview of anti-viral immunity. Discuss how primary immunodeficiencies characterised by increased susceptibility to latent viruses have added to our understanding of protective immunity to viruses
2. Outline the molecular mechanisms known to result in primary antibody deficiency. How does this knowledge contribute to our understanding of mechanisms of immunoglobulin class switching?
3. Outline a classification of:
 - a) urticaria
 - b) angiooedema.

Using examples from your classification explain our current understanding of the pathophysiology of urticaria and angiooedema. Briefly outline the pharmacological interventions that can counteract the mechanisms underlying urticaria and angioedema. You may use a tabulated format in this answer.

Please turn over for Questions 4 and 5

4. What is meant by chemotaxis? Name three chemotactic agents and indicate their origin. Briefly describe the process of neutrophil chemotaxis. Briefly outline how different types of primary immunodeficiency diseases can impair chemotaxis.

5. Discuss the use of biological agents in the treatment of immunologically mediated diseases. Illustrate your answer with reference to anti-TNF agents, anti-IL1, recombinant Cytokines, Anti-IgE, and anti-CD20. You should include in your answer, evidence-based uses, current understanding of their mechanisms of action and principal adverse effects.