



# Australian and New Zealand College of Veterinary Scientists

## Fellowship Examination

June 2016

## Veterinary Dermatology Paper 1

Perusal time: **Twenty (20)** minutes

Time allowed: **Three (3)** hours after perusal

**Section A:** Answer **ALL THIRTY (30)** questions

**Section B:** Answer **ALL FOUR (4)** questions

**Section C:** Answer **ALL THREE (3)** questions

**Section B: question 2 c)** requires completion of the table located in the answer booklet you have been provided.

Section A: **THIRTY** very short answer questions each worth 1 mark .....total 30 marks

Section B: **FOUR** short-answer questions each worth 15 marks .....total 60 marks

Section C: **THREE** long-answer questions each worth 30 marks .....total 90 marks

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# Paper 1: Veterinary Dermatology

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## Section A: Answer ALL thirty (30) very short-answer questions

1. List **two (2)** keratins that are expressed in hyperproliferative keratinocytes. (1 mark)
2. Name the defective integrin associated with junctional epidermolysis bullosa (JEB) in Charolais calves. (1 mark)
3. List **two (2)** glycoprotein cell surface receptors (integrins) expressed in the epidermis. (1 mark)
4. Name **two (2)** functions of canine Merkel cells. (1 mark)
5. List **two (2)** key functions of epidermal Langerhans cells. (1 mark)
6. Name the mineral that determines the hardness of the claw in German shepherd dogs. (1 mark)
7. Name the glycosaminoglycan responsible for the phenotypic appearance of the Chinese Shar pei dog. (1 mark)
8. Name a resident dermal cell that contains abundant vimentin. (1 mark)
9. Name **one (1)** CD marker that is positive in dermal dendritic cells and negative in Langerhans cells. (1 mark)

**Section A continued over page**

10. Name **two (2)** cutaneous cells dependent on stem cell factor for embryologic development. *(1 mark)*
11. Name the term used to define hairless telogen. *(1 mark)*
12. Name **two (2)** fatty acids that are components of sebum. *(1 mark)*
13. Name the location of merocrine sweat glands in ungulates. *(1 mark)*
14. Name **one (1)** histochemical marker of neoplastic epidermal proliferation. *(1 mark)*
15. List **two (2)** major growth factors involved in epidermal wound healing. *(1 mark)*
16. Name **two (2)** enzymes released from canine mast cells after IgE mediated activation. *(1 mark)*
17. Name **two (2)** key cytokines that initiate a pro-inflammatory response in the innate immune system. *(1 mark)*
18. Name the keratinocyte surface receptor that recognises chitin in the exoskeleton of *Demodex canis*. *(1 mark)*
19. Name the receptor on a cytotoxic T cell that interacts with the major histocompatibility complex (MHC) class I receptor. *(1 mark)*
20. Name the ligand and receptor required for T helper 2 (Th2) lymphocyte activation by dermal dendritic cells in association with the MHC class II molecule. *(1 mark)*

**Section A continued over page**

21. Name the equine skin condition in which the cytokine thymic stromal lymphopoeitin (TSLP) is overexpressed. (1 mark)
22. Name the molecular structure that is the target of autoantibodies in human autoimmune urticaria. (1 mark)
23. Name the antibody isotype that has a dimeric structure. (1 mark)
24. Name the genetic disease in which mutations of **two (2)** separate genes (LAMC2 and LAMA3) cause an identical phenotype in the horse. (1 mark)
25. Name the iron binding protein that inhibits the growth of *Malassezia pachydermatis* in vitro. (1 mark)
26. Define the term 'koilocyte'. (1 mark)
27. List **two (2)** mechanisms by which glucocorticoids alter thyroid hormone physiology to induce euthyroid sick syndrome. (1 mark)
28. Name the organ where conversion of thyroxine (T4) to triiodothyronine (T3) occurs. (1 mark)
29. Name the step in the cholesterol to cortisol pathway catalysed by 3 beta-hydroxysteroid dehydrogenase. (1 mark)
30. Name the precursor of adrenocorticotrophic hormone (ACTH) and melanocyte stimulating hormone (MSH). (1 mark)

**Section B starts on the next page**

**Section B: Answer ALL four (4) short-answer questions.**

1. Answer **all** parts of this question:

- a) Briefly describe the key steps involved in the synthesis and degradation of filaggrin during terminal differentiation of the epidermis (*3 marks*). Define the structure and function of filaggrin (*2 marks*).
- b) Briefly describe the key steps involved in the synthesis and degradation of ceramides in the epidermis. A diagram may be used. (*5 marks*)
- c) List the major functions of ceramides and briefly discuss the evidence for ceramide abnormalities in canine atopic dermatitis. (*5 marks*)

2. Answer **all** parts of this question:

- a) Briefly describe the **four (4)** mechanisms involved in the transfer of melanin to keratinocytes. (*8 marks*)
- b) Define the abnormality of melanisation associated with Chediak–Higashi syndrome. (*2 marks*)
- c) Complete the table provided in the answer booklet for the intrinsic factors that influence hair growth. (*5 marks*)

3. Answer **all** parts of this question:

- a) List the molecular components (including associated ligands) of anchoring filaments of the normal basement membrane. (*6 marks*)
- b) Name **one (1)** acquired disease of anchoring filaments and the associated molecular target. (*2 marks*)
- c) Briefly describe the outcome of interleukin 17 A (IL-17 A) activation of canine keratinocytes (*2 marks*) and the potential role of IL-17 A in the development of canine atopic dermatitis (*5 marks*).

**Section B continued over page**

4. Answer **all** parts of this question:

- a) Briefly describe the development of immunological tolerance to ingested antigens in the normal dog. (5 marks)
- b) List factors that may reduce antigen exclusion to ingested antigens promoting a loss of oral tolerance. (5 marks)
- c) Discuss mechanisms that could explain why hypersensitivity to an ingested antigen may induce cutaneous rather than gastrointestinal disease. (5 marks)

**Section C starts on the next page**

**Section C: Answer ALL three (3) long-answer questions**

1. The desmosome.

Answer **all** parts of this question:

- a) Draw and label a diagram to illustrate the molecular structure of a desmosome. (5 marks)
- b) Briefly describe the function of a desmosome. (4 marks)
- c) List the major desmosomal cadherins and their subtypes. (2 marks)
- d) Briefly discuss the proposed pathomechanism of blister/pustule formation in the pemphigus complex. (5 marks)
- e) Briefly discuss the evidence supporting the current understanding of the target autoantigen/s of canine pemphigus foliaceus (PF) (8 marks). Compare this with the autoantigen/s of human PF (1 mark).
- f) Name the target autoantigen/s in pemphigus vulgaris (1 mark). Briefly describe the correlation between the location of the autoantigen and the clinical and histopathologic disease (2 marks).
- g) List the target autoantigens reported in canine paraneoplastic pemphigus. (2 marks)

**Section C continued over page**

2. Collagen.

Answer **all** parts of this question:

- a) Describe the structure of collagen 1 (a labelled diagram is acceptable). (3 marks)
- b) List the key post-translational steps in the synthesis of collagen 1. Include the stages that occur in the intracellular (10 marks) and the extracellular space (5 marks).
- c) Briefly describe **four (4)** molecular mechanisms that regulate collagen homeostasis in normal skin. (4 marks)
- d) Briefly describe the abnormality in collagen synthesis in the following clinical conditions:
  - i. scurvy (2 marks)
  - ii. dermal atrophy following glucocorticoid administration (2 marks)
  - iii. dermatosparaxis in cattle (2 marks)
  - iv. hereditary equine regional dermal asthenia (HERDA). (2 marks)

3. Answer **all** parts of this question:

- a) Discuss the genetic aspects of antimicrobial resistance to *Staphylococcus pseudintermedius*; in your answer discuss the mechanisms that confer increased resistance to tetracycline, beta-lactam and fluoroquinolone antibiotics. (10 marks)
- b) Discuss the stages of biofilm formation and **five (5)** mechanisms of a biofilm that confer increased antimicrobial resistance. (10 marks)
- c) Describe and discuss the bacterial microbiome that has been identified on the dog using culture-**dependent** techniques. Your answer should include how this varies in normal and atopic individuals (8 marks). Briefly contrast this with the bacterial microbiome identified with culture-**independent** techniques (2 marks).

**End of paper**