Australian and New Zealand College of Veterinary Scientists

Fellowship Examination

June 2018

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** **SIX (6)** questions

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

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

Section B: **SIX (6)** short-answer questions, each worth 10 marks .....total 60 marks

Section C: **THREE (3)** long-answer questions, each worth 30 marks.....total 90 marks

Paper 1: Veterinary Dermatology

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

1. Spontaneous hyperadrenocorticism in the dog is most commonly due to (write the letter corresponding to your chosen answer in your answer booklet): *(1 mark)*

   a) microadenoma of the Type A cells of the pars intermedius

   b) microadenoma of the Type B cells of the pars intermedius

   c) chromophobe adenoma of the pars distalis

   d) adenoma of the cells of the zona fasciculata

   e) adenoma of the cells of the zona glomerulosa.

2. Name the enzyme that is expressed and assembled onto the plasma membrane during the formation of the cornified cell envelope. *(1 mark)*

3. Name the essential fatty acid for dogs and cats that is found in ceramide 1, ceramide 4 and ceramide 9. *(1 mark)*

4. Name the group of adhesion structures that span the plasma membrane **and** link the actin within the keratinocyte cytoskeleton to the surrounding basement membrane extracellular matrix. *(1 mark)*

5. State the type of mechanoreceptor associated with the Merkel cell nerve ending. *(1 mark)*

Section A continued over page

6. Name the main type of collagen present in the dermis. *(1 mark)*

7. Name the major cell surface receptor, expressed by mast cells, that is associated with mediation of allergic responses. *(1 mark)*

8. Name the **three (3)** components of the inner sheath of the hair follicle. Components must be listed in order from innermost to outermost layers. *(1 mark)*

9. Name the hair cycle phase that is characterised by the cessation of mitotic activity of the matrix cells and coordinated apoptosis in the inferior segment of the hair follicle. *(1 mark)*

10. Name the receptor, located in the posterior root of the spinal cord in mice, that is exclusively responsible for the transmission of the perception of pruritus, but **not** temperature or pain perception. *(1 mark)*

11. Name **two (2)** cytokines involved in the recruitment of eosinophils. *(1 mark)*

12. State the minimum molecular size required for dietary antigens to elicit IgE-mediated reactions. Express your answer in kilodaltons (kD). *(1 mark)*

13. Name the dominant immunoglobulin isotype that is found in the positive lupus band test in German shepherd dogs with mucocutaneous lupus erythematosus. *(1 mark)*

14. Name the chromosomal linkage identified in German shorthaired pointers with exfoliative cutaneous lupus erythematosus (ECLE). *(1 mark)*

15. Name **two (2)** auto-antibody targets that have been identified in mucous membrane pemphigoid in dogs. *(1 mark)*

Section A continued over page

16. Name the auto-antibody target identified in canine epidermolysis bullosa acquisita. *(1 mark)*

17. Name the T-cell subset demonstrated to infiltrate follicular bulbs in canine alopecia areata. *(1 mark)*

18. Name the major soluble mediator of widespread apoptosis in toxic epidermal necrolysis. *(1 mark)*

19. Describe the mechanism of keratinocyte-induced apoptosis in erythema multiforme. *(1 mark)*

20. What is the mechanism of zoonotic transmission of *Dermatophilus congolensis?* *(1 mark)*

21. Name the group of cell wall lipids that are characteristic of all *Mycobacterial* spp. *(1 mark)*

22. In the initial phase of dermatophyte infection, the hyphae grow down the follicle to the zone of Adamson's fringe. State why deeper follicular invasion is not possible. *(1 mark)*

23. How does the composition of the Pythium cell wall differ from that of dermatophytes? *(1 mark)*

24. List **two (2)** virulence factors of *Cryptococcus*. *(1 mark)*

25. State how the **two (2)** major T lymphocyte subsets change in dogs with generalised demodicosis. *(1 mark)*

Section A continued over page

26. List **two (2)** stimuli that trigger the emergence of the developed adult flea (*Ctenocephalides felis*) from its cocoon. *(1 mark)*

27. State **two (2)** mechanisms involved in thyroid hormone formation that are affected by sulphonamides. *(1 mark)*

28. The production of ACTH by the pituitary has **three (3)** negative feedback mechanisms. The first is via the concentration of ACTH itself within the blood. State what the other **two (2)** mechanisms are. *(1 mark)*

29. List **two (2)** hormones that are deficient in German shepherd dogs affected by pituitary dwarfism. *(1 mark)*

30. Name the major cell type present in xanthomas. *(1 mark)*

Section B starts over page

Section B: Answer all six (6) short-answer questions

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

    a) List the keratin intermediate filaments that are expressed in **each** of the following: *(5 marks)*

        i. basal keratinocytes

        ii. suprabasal keratinocytes

        iii. palmoplantar skin

        iv. hyperproliferative epidermis

        v. stratum corneum.

    b) Describe the assembly of the keratin intermediate filament. *(5 marks)*

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

    a) Describe the unique structural characteristics of integrins. (*1 mark)*

    b) List the ligands of α6β4 integrin in the basement membrane zone *(2 marks)* **and** describe the major functions of the α6β4 integrin. *(4 marks)*

    c) State the origin, locations within the basement membrane zone **and** the primary function of collagen VII. *(3 marks)*

Section B continued over page

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

a) List the known activators of complement for **each** of the following pathways:

i. classical *(3 marks)*

ii. lectin *(2 marks)*

iii. alternate. *(2 marks)*

b) Briefly describe the major functions of complement activation. *(3 marks)*

4. Discuss the major mechanisms by which bacteria develop antibiotic resistance. Include in your answer the mechanism of resistance to the following antimicrobials: methicillin, rifampin, clindamycin, aminoglycosides and fluoroquinolones. *(10 marks)*

5. List the steps **or** phases in the pathogenesis of allergic contact dermatitis (ACD). *(10 marks)*

6. In relation to the genus *Malassezia*:

a) Name **five (5)** species of *Malassezia* that have been reported to colonise human or animal skin. *(2.5 marks)*

b) Name **five (5)** enzymes or other factors that are produced by *Malassezia* species that may contribute to the clinical signs of skin disease associated with *Malassezia* overgrowth. *(2.5 marks)*

c) Briefly describe the antibody responses to *Malassezia* that have been reported in healthy dogs, atopic dogs and those with *Malassezia* overgrowth. *(5 marks)*

Section C starts on the next page

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

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

   a) Describe the embryological **and** physical process of melanin production, beginning with the precursor cells and ending with the degradation of melanin pigment in the skin. *(12 marks)*

   b) Outline the key steps in the enzymatic production of melanin in dogs, starting with tyrosine and ending with the two main types of completed melanin. It is acceptable to provide a diagram. *(10 marks)*

   c) Describe the genetic abnormality responsible for Waardenburg syndrome. *(1 mark)*

   d) Describe **one (1)** example of Waardenburg syndrome in **each** of the dog, cat and horse. *(3 marks)*

   e) Describe the mechanisms by which melanocytes are photoprotective. *(4 marks)*

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

   a) Discuss the genetic factors that have been reported to predispose to canine atopic dermatitis. *(5 marks)*

   b) Describe the immunological steps that take place in canine atopic dermatitis in order for the adaptive immune response to occur, starting from the initial contact with an environmental allergen. *(25 marks)*

Section C continued over page

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

a) Describe **and** discuss the cutaneous bacterial microbiome that has been identified on the dog using culture-independent techniques. Briefly contrast these results to the results of earlier studies using culture-dependent techniques. Your answer should describe how the cutaneous microbiome varies in normal **and** atopic dogs. *(10 marks)*

b) List **and** briefly discuss the mode of action of the various virulence factors of *Staphylococcus pseudintermedius.* *(20 marks)*

End of paper

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Paper 2

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

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

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

Section B: Answer **ALL** **SIX (6)** questions

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

Section B, Question 5 requires completion of the table located in the answer booklet that has been provided to you.

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

Section B: **SIX (6)** short-answer questions, each worth 10 marks .....total 60 marks

Section C: **THREE (3)** long-answer questions, each worth 30 marks.....total 90 marks

Paper 2: Veterinary Dermatology

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

1. Name a diagnostic test **and** the ideal diagnostic sample required for this test that, in conjunction with histopathology, may allow the definitive diagnosis of canine or equine pythiosis. *(1 mark)*

2. Name **one (1)** reservoir host for feline poxvirus. *(1 mark)*

3. Name the most specific diagnostic test with high sensitivity for the definitive diagnosis of feline herpes viral dermatitis. *(1 mark)*

4. Name a mammal that has been documented to have acquired leishmaniasis within Australia. *(1 mark)*

5. List **three (3)** cat breeds that are documented as predisposed to atopic dermatitis in some geographical regions. *(1 mark)*

6. State the irritant threshold concentration, in protein nitrogen units/ml (PNU/ml), for *Cynodon dactylon* (Bermuda grass) in clinically healthy non-allergic cats. *(1 mark)*

7. Indicate why standard human patch-testing kits are **not** suitable for evaluating contact hypersensitivity in dogs. *(1 mark)*

8. State the percentage of dogs with food hypersensitivity to chicken that reacted to the partially hydrolysed chicken-based commercial dog food (Hill's z/d ultra), but **not** to the completely hydrolysed poultry-feather commercial dog food (Royal Canin Anallergenic), in a recent study. *(1 mark)*

Section A continued over page

9. Name **three (3)** lesions, in their order of occurrence, that are documented to progressively develop after a mosquito bite in a cat with feline mosquito bite hypersensitivity. *(1 mark)*

10. List **two (2)** environmental control measures for a horse with insect bite hypersensitivity. *(1 mark)*

11. What are the **three (3)** phases of Vogt-Koyanagi-Harada disease in people? *(1 mark)*

12. Name **two (2)** diseases in which paroxysmal (not persistent) cutaneous flushing can be seen. *(1 mark)*

13. Which allele on the MLPH gene primarily influences the development of colour dilution alopecia? *(1 mark)*

14. List **two (2)** neoplastic disorders that are reported to be associated with feline paraneoplastic alopecia. *(1 mark)*

15. Name the keratin that is decreased in Norfolk terriers with congenital ichthyosis. *(1 mark)*

16. Describe the characteristic cytoplasmic feature found in the neutrophils **and** macrophages of cats affected by Chediak-Higashi syndrome. *(1 mark)*

17. State the type of leukocyte that is affected in dogs with canine cyclic haematopoiesis. *(1 mark)*

Section A continued over page

18. Traditional immunosuppressive drugs and surgical ligation of deep arteries are two listed treatments for nasal philtrum arteritis in the Saint Bernard. Name **another** therapy that has been reported to be successful. *(1 mark)*

19. Lethal acrodermatitis is seen in Bull terriers. Name **another** breed in which this disease has been reported. *(1 mark)*

20. Name the dog breed in which tyrosinase deficiency has been reported. *(1 mark)*

21. When a hypothyroid dog is started on an appropriate dose of thyroxine supplementation, indicate **how long** it would take for behavioural changes to correct after treatment commences. *(1 mark)*

22. Name the **two (2)** stages of the hair follicle cycle that predominate in Alopecia X of Pomeranians. *(1 mark)*

23. Briefly describe the characteristic histological changes that are seen within the skin of a dog with necrolytic migratory erythema. *(1 mark)*

24. Name **one (1)** biochemical parameter that is typically elevated in dogs with canine xanthomas. *(1 mark)*

25. State why fipronil is **not** appropriate for the treatment of *Psoroptes cuniculi* in a three-month-old rabbit. *(1 mark)*

26. Lomustine (CCNU) may cause progressive bone marrow suppression. Name **one (1)** other well-recognised serious side effect when this drug is administered to dogs. *(1 mark)*

Section A continued over page

27. Name **two (2)** histopathological features that distinguish keratoacanthomas from inverted papillomas. *(1 mark)*

28. A recent review article assessed the efficacy of Lomustine (CCNU) in the treatment of cutaneous epitheliotropic lymphoma in the dog. State the rate of complete remission that was reported in this article. *(1 mark)*

29. Ipilimumab (Yervoy®) is an immune checkpoint monoclonal antibody (mAb) that is used for the treatment of disseminated melanoma in humans. Name the target surface molecule for this treatment. *(1 mark)*

30. Griscelli syndrome in humans resembles which hair follicle disorder in dogs? *(1 mark)*

Section B starts on the next page

Section B: Answer all six (6) short-answer questions

1. Discuss the causes of zinc deficiency in dogs. Include in your answer a description of the pathogenesis of canine syndrome I and syndrome II zinc-responsive dermatosis, the clinical sequelae **and** the treatment for these syndromes. *(10 marks)*

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

   a) Answer **both** parts of this sub-question:

      i Name **one (1)** azole antifungal **and** describe **two (2)** mechanisms of action for that drug. *(3 marks)*

      ii State **two (2)** drugs known to interact with that azole drug. *(1 mark)*

   b) Answer **both** parts of this sub-question:

      i Name **one (1)** allylamine antifungal **and** describe the mechanism of action for that drug. *(2 marks)*

      ii State **two (2)** drugs known to interact with that allylamine drug. *(1 mark)*

   c) Explain why azole and allylamine antifungal medications have poor efficacy in the treatment of disease caused by oomycete, such as pythiosis. *(3 marks)*

Section B continued over page

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

   a) Describe the mechanism of action of isoxazolines and ivermectin that result in their administration being toxic to demodex mites, whilst being comparatively safe in mammals. *(6 marks)*

   b) Briefly describe why ivermectin may be severely toxic in some dogs. Include in your answer any potential interactions of ivermectin with other medications. *(4 marks)*

4. List and describe the diagnostic tests that may be utilised to diagnose cutaneous dermatophilosis. Include in your answer the relevant value of **each** test, any methods required to maximise sensitivity and pertinent diagnostic findings for **each** test. *(10 marks)*

5. Complete the details in the table provided in your answer booklet to compare hereditary equine regional dermal asthenia (HERDA) to other recognised forms of cutaneous asthenia. The fields that are to be completed in the table are indicated by a dotted line. *(10 marks)*

6. Discuss the clinical presentations **and** the causative agents in the diseases associated with feline papillomavirus. Include in your answer the most specific diagnostic test for these diseases. *(10 marks)*

Section C starts on the next page

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

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

   a) Describe the dermatophyte species, sources **and** mode of transmission of dermatophytosis in dogs, cats, horses and cattle. *(5 marks)*

   b) List **eight (8)** common clinical signs seen with dermatophytosis in dogs. *(4 marks)*

   c) Describe the classic clinical characteristics of a dermatophyte pseudomycetoma lesion and the histopathologic changes expected for a dermatophyte pseudomycetoma. List the breed dispositions for dermatophyte pseudomycetomas in dogs **and** cats. *(6 marks)*

   d) Discuss the prevalence, risk factors for dermatophytosis in dogs and cats, **and** the recognised clinical presentation and species of dermatophytosis associated with Persian cats, Yorkshire terrier dogs **and** hunting dog breeds. *(5 marks)*

   e) Discuss the pathogenesis of dermatophytosis, including the host immune response. *(10 marks)*

Section C continued over page

2. Discuss in detail your rationale for the use of the following treatment modalities for canine atopic dermatitis **and make** specific reference to mechanisms of action, efficacy and safety for oclacitinib maleate and allergen-specific immunotherapy.

Treatment modalities for canine atopic dermatitis:

a) oclacitinib maleate *(10 marks)*

b) allergen-specific immunotherapy *(10 marks)*

c) antimicrobial therapy. *(10 marks)*

3. Answer **both** parts of this question.

a) List the diseases that can result in the presence of acantholytic keratinocytes on surface cytology or histopathology from a dog. For **each** of these diseases, describe the aetiopathogenesis of the disease **and** the mechanism of acantholysis. *(15 marks)*

b) Discuss ciclosporin and prednisolone as treatment options for pemphigus foliaceus in dogs. Include a discussion of the mechanism of action for **each** of the treatments **and** the possible side effects of **each**. *(15 marks)*

End of paper