

REFERENCES

1. Aikawa, M. (1988). Human cerebral malaria. *American Journal of Tropical Medicine and Hygiene* **39**: 3-10.
2. Aikawa, M., Pongponratn, E., Tegoshi, T., Nakamura, K., Nagatake, T., Cochrane, A., and Ozaki, L. S. (1992). A study on the pathogenesis of human cerebral malaria and cerebral babesiosis. *Memorias do Instituto Oswaldo Cruz* **87**: 297-301.
3. Aikawa, M., Rabbege, J., Uni, S, Ristic, M., and Miller, L. H. (1985). Structural alterations of the membrane of erythrocytes infected with *Babesia bovis*. *American Journal of Tropical Medicine and Hygiene* **34**: 45-49.
4. Aikawa, M., Suzuki, M., and Gutierrez, Y. (1980) Pathology of Malaria. in: *Malaria Vol. 2*, Kreier, J. P. (eds.). Academic Press. New York. p: 47-102.
5. Basson, P. A. and Pienaar, J. G. (1965) Canine babesiosis: A report on the pathology of three cases with special reference to the "cerebral" form. *Journal of the South African Veterinary Medical Association* **36**: 333-341.
6. Botha, H. (1964). The cerebral form of babesiosis in dogs. *Journal of the South African Veterinary Medical Association* **35**: 27-28.
7. Brierley, J. B, Brown, A. W., and Meldrum, B. S. (1971). The nature and time course of the neuronal alterations resulting from oligoemia and hypoglycaemia in the brain of *Macaca mulatta*. *Brain Research* **25**: 483-499.
8. Brierley, J. B, Meldrum, B. S., and Brown, A. W. (1973). The threshold and neuropathology of cerebral "anoxic-ischemic" cell change. *Archives of Neurology* **29**: 367-374.
9. Brown, A. W. (1977). Structural abnormalities in neurones. *Journal of Clinical Pathology* **30, Supplement**: 155-169.
10. Brown, A. W. and Brierley, J. B. (1968). The nature, distribution and earliest stages of anoxic-ischaemic nerve cell damage in the rat brain as defined by the optical microscope. *The British Journal of Experimental Pathology* **49**: 87-106.
11. Brumpt, E. (1919). Transmission de la piroplasmose canine française par le *Dermacentor reticulatus*. Embolies parasitaires dans les capillaires de l'encephale. *Bulletin de la Societe de Pathologie Exotique* **12**: 651-664.
12. Clark, I. A., Hunt, N. H., and Cowden, W. B. (1986). Oxygen derived free radicals in the pathogenesis of parasitic disease. *Advances in Parasitology* **25**: 1-30.

13. Colly, L. P. and Nesbit, J. W. (1992). Fatal acute babesiosis in a juvenile wild dog (*Lycaon pictus*). *Journal of the South African Veterinary Association* **63**: 36-38.
14. Commins, M. A., Goodger, B. V., Waltisbuhl, D. J., and Wright, I. G. (1988). *Babesia bovis*: studies of parameters influencing microvascular stasis of infected erythrocytes. *Research in Veterinary Science* **44**: 226-228.
15. Cooke, B. M., Berendt, A. R., Craig, A. G., and MacGregor, J. (1994). Rolling and stationary cytoadhesion of red blood cells parasitised by *Plasmodium falciparum*: separate roles for ICAM-1, CD36 and thrombospondin. *British Journal of Haematology* **87**: 162-170.
16. Cuillé, M. J. and Darraspen, E. (1927). Formes atypiques et formes chroniques de la piroplasmose du chien. *Revue Generale de Medicine Veterinaire* **36**: 433-443.
17. Dale, J., Ohlsson, K., Nordstoga, K., and Aasen, A. O. (1980). Intravascular hemolysis and ultrastructural changes of erythrocytes in lethal canine endotoxin shock. *European Surgical Research* **12**: 39-51.
18. Dürck, H. (1917). Über die bei Malaria perniciosa comatosa auftretenden Veränderungen des Zentralnervensystems. *Archiv für Schiffs- und Tropen-Hygiene* **21**: 117-132.
19. Farber, J. L., Kyle, M. E., and Coleman, J. B. (1990). Mechanisms of cell injury by activated oxygen species. *Laboratory Investigation* **62**: 670-679.
20. Fridovich, I. (1983). Superoxide radical: An endogenous toxicant. *Annual Review of Pharmacology and Toxicology* **23**: 239-257.
21. Garcia, J. H. and Anderson, M. L. (1991) Circulatory disorders and their effects on the brain. in: *Textbook of Neuropathology*, 2. ed., Davis, R. L. and Robertson, D. M. (eds.). Williams and Wilkins. Baltimore. p: 621-718.
22. Garcia, J. H., Kamijyo, Y., Kalimo, H., Tanaka, J., Vilorio, J. E., and Trump, B. F. (1975). Cerebral ischaemia: The early structural changes and correlation of these with known metabolic and dynamic abnormalities. Whisnant, J. P. (eds.). p: 313-323.
23. Graham, D. I. (1992) Hypoxia and vascular disorders. in: *Greenfield's Neuropathology*, 5. ed., Adams, J. H. and Duchon, L. W. (eds.). Edward Arnold. London. p: 153-268.
24. Griffiths, J. A. (1922). Studies on animal diseases in south-central Africa. 1. A review of the clinical aspects of canine piroplasmosis. Royal College of Veterinary Surgeons. Fellowship of the Royal College (Dissertation, unpublished). 4-22.
25. Gutierrez, Y., Aikawa, M., Fremount, H. N., and Sterling, C. R. (1976). Experimental infection of *Aotus* monkeys with *Plasmodium falciparum*. Light and electron microscopic changes. *Annals of Tropical Medicine and Parasitology* **70**: 25-44.

26. Hariri, R. J. (1994). Cerebral Oedema. *Neurosurgery Clinics of North America* **5**: 687-706.
27. Heeringa, P., Foucher, P., Klok, P. A., Huitema, M. G., Tervaert, J. C., Weening, J. J., and Kallenberg, C. G. M. (1997). Systemic injection of products of activated neutrophils and H₂O₂ in myeloperoxidase-immunized rats leads to necrotizing vasculitis in the lungs and gut. *American Journal of Pathology* **151**: 131-140.
28. Hemmer, R. M., Wozniak, E. J., Lowenstine, L. J., Plopper, C. G., Wong, V., and Conrad, P. A. (1999). Endothelial cell changes are associated with pulmonary edema and respiratory distress in mice infected with the WA1 human *Babesia* parasite. *Journal of Parasitology* **85**: 479-489.
29. Hicks, S. P. (1968) Vascular pathophysiology in acute and chronic oxygen deprivation. in: *Pathology of the Nervous System*, Minckler, J. (eds.). McGraw-Hill. New York. p: 341-350.
30. Hildebrandt, P. K. (1981) The organ and vascular pathology of babesiosis. in: *Babesiosis*, Ristic, M. and Kreier, J. P. (eds.). Academic Press. London. p: 459-473.
31. Hoff, E. J. and Vandevelde, M. (1981). Case Report: Necrotizing vasculitis in the central nervous system of two dogs. *Veterinary Pathology* **18**: 219-223.
32. Ibiwoye, M. O., Howard, C. V., Sibbons, P., Hasan, M., and van Velzen, D. (1993). Cerebral malaria in the rhesus monkey (*Macaca mulatta*): Observations on host pathology. *Journal of Comparative Pathology* **108**: 303-310.
33. Ikeda, Y. and Long, D. M. (1990). The molecular basis of brain injury and brain oedema: the role of oxygen free radicals. *Neurosurgery* **27**: 1-11.
34. Irwin, P. J. and Hutchinson, G. W. (1991). Clinical and pathological findings of *Babesia* infection in dogs. *Australian Veterinary Journal* **68**: 204-209.
35. Ito, U., Ohno, K., Nakamura, R., Sukanuma, F., and Inaba, Y. (1979). Brain edema during ischemia and after restoration of blood flow. Measurement of water, sodium, potassium content and plasma protein permeability. *Stroke* **10**: 542-547.
36. Jacobson, L. S. and Clark, I. A. (1994). The pathophysiology of canine babesiosis: new approaches to an old puzzle. *Journal of the South African Veterinary Association* **65**: 134-145.
37. Jacobson, L. S., Lobetti, R. and Vaughan-Scott, T. (2000). Blood pressure changes in dogs with babesiosis. *Journal of the South African Veterinary Association* **71**: 14-20.
38. Janzer, R. C. (1993). The blood-brain barrier: cellular basis. *Journal of Inherited Metabolic Diseases* **16**: 639-647.

39. Jardine, J. E. (1996). Personal communication. Department of Pathology, Faculty of Veterinary Science, University of Pretoria.
40. Jenkins, L. W. (1979). Complete cerebral ischaemia. An ultrastructural study. *Acta Neuropathologica* **48**: 113.
41. Jones, T. H., Morawetz, R. B., Crowell, R. M., Marcoux, F. W., FitzGibbon, S. J., DeGirolami, U., and Ojemann, R. G. (1981). Thresholds of focal cerebral ischemia in awake monkeys. *Journal of Neurosurgery* **54**: 773-782.
42. Jubb, K. V. F. and Huxtable, C. R. (1993) The nervous system. in: *Pathology of Domestic Animals*, 4. ed., vol:1. Jubb, K. V. F., Kennedy, P. C., and Palmer, N. (eds.). Academic Press Inc. New York. p: 336.
43. Jubb, K. V. F. and Huxtable, C. R. (1993) The nervous system. in: *Pathology of Domestic Animals*, 4. ed., vol:1. Jubb, K. V. F., Kennedy, P. C., and Palmer, N. (eds.). Academic Press Inc. New York. p: 305-306.
44. Kamijyo, Y., Garcia, J. H., and Cooper, J. (1977). Temporary regional cerebral ischemia in the cat. A model of haemorrhagic and subcortical infarction. *Journal of Neuropathology and Experimental Neurology* **36**: 338-350.
45. Knuth, P. and du Toit, P. J. (1921) Tropen-krankheiten der Haustiere. in: *Handbuch der Tropenkrankheiten*, 2. ed., Mense, C. (eds.). Johann Ambrosius Barth, Leipzig. p: 411-421.
46. Koshu, K., Seki, H., Yoshimoto, T., and Suzuki, J. (1981). Experimental hemorrhagic thalamic infarction in the dog. *Surgical Neurology* **16**: 274-279.
47. Kreier, J. P. (1980) Preface. in: *Malaria*, 1. ed., vol:2. Kreier, J. P. (eds.). Academic Press. New York. p: xii.
48. Landis, D. M. D. (1994). The early reactions of non-neuronal cells to brain injury. *Annual Review of Neuroscience* **17**: 133-151.
49. Laureno, R., Shields, R. W., and Narayan, T. (1987). The diagnosis and management of cerebral embolism and haemorrhagic infarction with sequential computerized cranial tomography. *Brain* **110**: 93-105.
50. Leisewitz, A. L., Guthrie, A. J., and Berry, W. L. (1996). Evaluation of the effect of whole-blood transfusion on the oxygen status and acid-base balance of *Babesia canis* infected dogs using the oxygen status algorithm. *Journal of the South African Veterinary Association* **67**: 20-26.
51. Lewis, B. D., Penzhorn, B. L., Lopez-Rebollar, L. M., and De Waal, D. T. (1996). Isolation of a South African vector-specific strain of *Babesia canis*. *Veterinary Parasitology* **63**: 9-16.

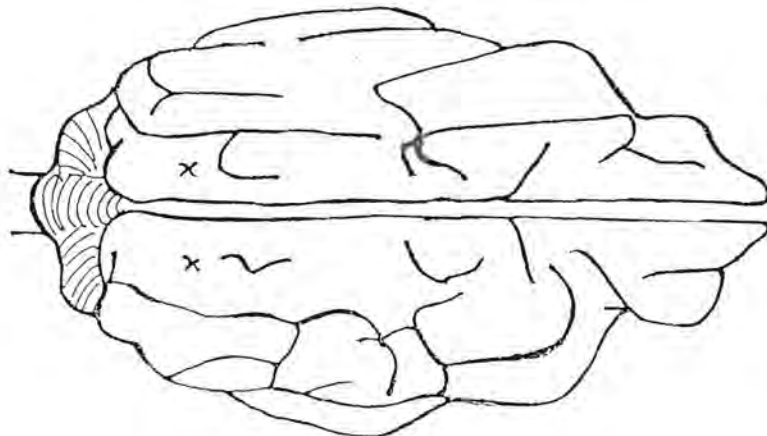
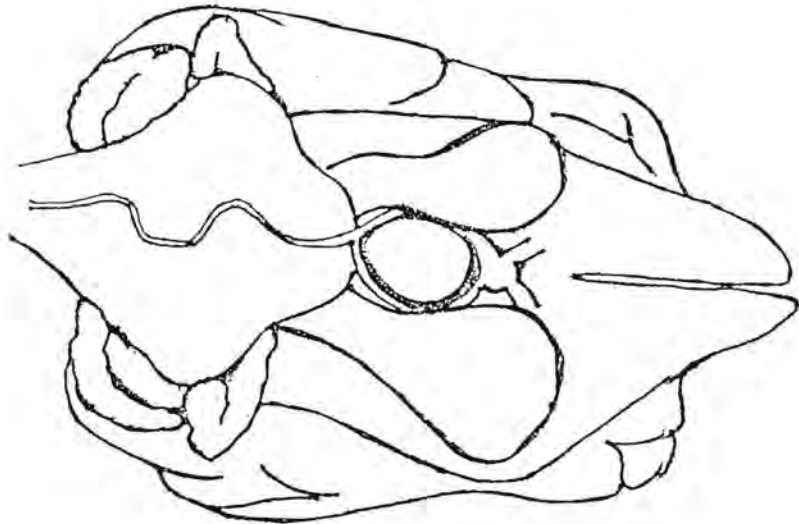
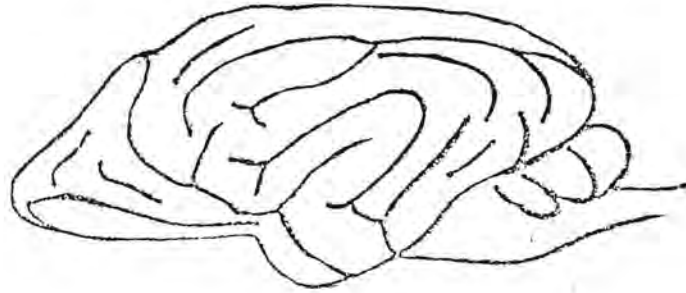
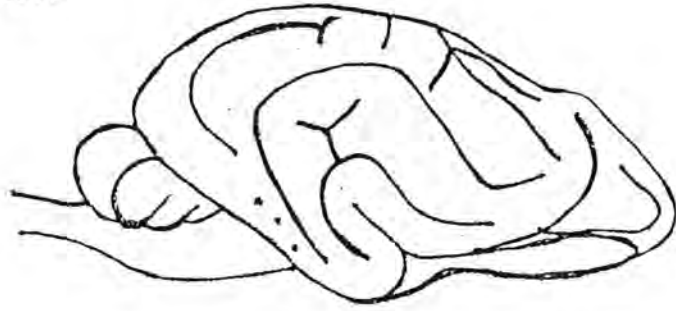
52. Lobetti, R. G. (1994). The comparative role of haemoglobinaemia and hypoxia in the development of nephropathy in the dog. University of Pretoria. MMedVet(Med).
53. Macpherson, G. G., Warrell, M. J., White, N. J., Looareesuwan, S., and Warrell, D. A. (1985). Human Cerebral Malaria. *American Journal of Pathology* **119**: 385-401.
54. Maegraith, B., Gilles, H. M., and Devakul, K. (1957). Pathological process in *Babesia canis* infections. *Zeitschrift für Tropenmedizin und Parasitologie* **8**: 485-514.
55. Malherbe, W. D. (1956). The manifestations and diagnosis of *Babesia* infections. *Annals of the New York Academy of* **64**: 128-146.
56. Malherbe, W. D. and Parkin, B. S. (1951). Atypical symptomatology in *Babesia canis* infection. *Journal of the South African Veterinary Medical Association* **22**: 25-36.
57. McCord, J. M. (1985). Oxygen-derived free radicals in postischemic tissue injury. *The New England Journal of Medicine* **312**: 159-163.
58. Miller, J. D. and Adams, J. H. (1992) The pathophysiology of raised intracranial pressure. in: *Greenfield's Neuropathology*, 5, ed., Adams, J. H. and Duchen, L. W. (eds.). Edward Arnold. London. p: 69-105.
59. Montgomery, D. L. (1994). Astrocytes: form, functions, and roles in disease. *Veterinary Pathology* **31**: 145-167.
60. Moore, D. J. and Williams, M. C. (1979). Disseminated intravascular coagulation: a complication of *Babesia canis* infection in the dog. *Journal of the South African Veterinary Association* **50**: 265-275.
61. Naudé, T. W., Basson, P. A., and Pienaar, J. G. (1970). Experimental diamidine poisoning due to commonly used babesiacides. *Onderstepoort Journal of Veterinary Research* **37**: 173-184.
62. O'Connor, R. M., Lane, T. J., Stroup, S. E., and Allred, D. R. (1997). Characterization of a variant erythrocyte surface antigen (VESA1) expressed by *Babesia bovis* during antigenic variation. *Molecular and Biochemical Parasitology* **89**: 259-270.
63. Okoh, A. E. (1978). A case of cerebral babesiosis in the dog. *Bulletin of Animal Health and Production in Africa* **26**: 118-119.
64. Oo, M. M., Aikawa, M., Thjan, T., Aye, T. M., Myint, P. T., Igarashi, I., and Schoene, W. C. (1987). Human cerebral malaria: a pathological study. *Journal of Neuropathology and Experimental Neurology* **46**: 223-231.
65. Piercy, S. E. (1947). Hyper-acute canine babesia. *Veterinary Record* **59**: 612-613.
66. Purchase, H. S. (1947). Cerebral babesiosis in dogs. *Veterinary Record* **59**: 269-270.

67. Purnell, R. E. (1981) Babesiosis in various hosts. in: *Babesiosis*, Ristic, M. and Kreier, J. P. (eds.). Academic Press. New York. p: 45-48.
68. Reuße, U. (1954). Zur klinik und patologie der hunde-babesiose. *Zeitschrift für Tropenmedizin und Parasitologie* **5**: 451-469.
69. Reyers, F., Leisewitz, A. L., Lobetti, R. G., Milner, R. J., Jacobson, L. S., and van Zyl, M. (1998). Canine babesiosis in South Africa: more than one disease. Does this serve as a model for falciparum malaria? *Annals of Tropical Medicine and Parasitology* **92**: 503-511.
70. Rowe, J. A., Moulds, J. M., Newbold, C. I., and Miller, L. H. (1997). *P. falciparum* rosetting mediated by a parasite-variant erythrocyte membrane protein and complement-receptor 1. *Nature* **388**: 292-295.
71. Schetters, T. P. M., Kleuskens, J., Scholtes, N., and Bos, H. J. (1995). Strain variation limits protective activity of vaccines based on soluble *Babesia canis* antigens. *Parasite Immunology* **17**: 215-218.
72. Schetters, T. P. M., Kleuskens, J., Scholtes, N., and Gorenflot, A. (1998). Parasite localization and dissemination in the *Babesia*-infected host. *Annals of Tropical Medicine and Parasitology* **92**: 513-519.
73. Schetters, T. P. M., Kleuskens, J., Scholtes, N., Pasman, J. W., and Bos, H. J. (1993). Vaccination of dogs against *Babesia canis* infection using antigens from culture supernatants with emphasis on clinical babesiosis. *Veterinary Parasitology* **52**: 219-233.
74. Smith, J. D., Chitnis, C. E., Craig, A. G., Roberts, D. J., Hudson-Taylor, D. E., Peterson, D. S., Pinches, R., Newbold, C. I., and Miller, L. H. (1995). Switches in expression of *Plasmodium falciparum* var genes correlate with changes in antigenic and cytoadherent phenotypes of infected erythrocytes. *Cell* **82**: 101-110.
75. Stewart, P. A., Hayakawa, K., Farrell, C. L., and DelMaestro, R. F. (1987). Quantitative study in microvessel ultrastructure in human peritumoral brain tissue. *Journal of Neurosurgery* **67**: 697-705.
76. Suzuki, J., Yoshimoto, T., Tnanka, S., and Sakamoto, T. (1980). Production of various models of cerebral infarction in the dog by means of occlusion of intracranial trunk arteries. *Stroke* **11**: 337-341.
77. Udomsangpetch, R., Taylor, B. J., Looareesuwan, S., White, N. J., Elliot, J. F., and Ho, M. (1996). Receptor specificity of clinical *Plasmodium falciparum* isolates: Nonadherence to cell-bound E-selectin and vascular cell adhesion molecule-1. *Blood* **88**: 2754-2760.
78. Uilenberg, G., Franssen, F. F. J., Perie, N. M., and Spanjer, A. A. M. (1989). Three groups of *Babesia canis* distinguished and a proposal for nomenclature. *Veterinary Quarterly* **11**: 33-40.
79. Valli, V. E. O. (1993) The Haemopoietic System. in: *Pathology of Domestic Animals*, 4. ed., vol:3. Jubb, K. V. F., Kennedy, P. C., and Palmer, N. (eds.) Academic Press Inc. New York. p: 190.

80. van der Lugt, J. J. and Jardine, J. E. (1994). Cerebral Lesions. Hoechst canine babesiosis symposium. *Proceedings of the XIXth World Congress of the World Small Animal Veterinary Association* . Verstraete, F. J. M. (eds.). p: 758.
81. Weiss, H. J. (1995). Flow-related platelet deposition on subendothelium. *Thrombosis and Haemostasis* **74**: 117-122.
82. Westergaard, E., Go, G, Klatzo, I., and Spatz, M. (1976). Increased permeability of cerebral vessels to horseradish peroxidase induced by ischemia in Mongolian gerbils. *Acta Neuropathologica* **35**: 307-325.
83. Wozniak, E. J., Lowenstine, L. J., Hemmer, R., Robinson, T., and Conrad, P. A. (1996). Comparative pathogenesis of human WA1 and *Babesia microti* isolates in a syrian hamster model. *Laboratory Animal Science* **46**: 507-515.
84. Wright, I. G. (1972). An electron microscopic study of intravascular agglutination in the cerebral cortex due to *Babesia argentina* infection. *International Journal for Parasitology* **2**: 209-215.
85. Yoshimoto, T., Sakamoto, T., and Suzuki, J. (1978). Experimental cerebral infarction Part I: Production of thalamic infarction in dogs. *Stroke* **9**: 211-214.
86. Yu, W. A., Yu, M. C., and Young, P. A. (1974). Ultrastructural changes in the cerebrovascular endothelium induced by a diet high in linoleic acid and deficient in vitamin E. *Experimental and Molecular Pathology* **21**: 289-299.



APPENDIX A



APPENDIX B

Haematoxylin – Eosin Staining technique

Solutions

| | |
|---------------------------------------|------------------|
| 1. <u>Haematoxylin</u> (Lillie-Mayer) | <u>10 liters</u> |
| Distilled water | 7000 ml |
| Haematoxylin (Merck) | 50 gm |
| Ammonium Alum | 500 gm |
| Glycerol | 3000 ml |
| Acetic Acid (Glacial) | 200 ml |
| Sodium Iodate (NaIO ₃) | 5 gm |

Heat the water to approximately 40° C, then add and dissolve each ingredient in the sequence as given above. The stain will be ready for use in 18-24 hrs.

| | |
|--|--|
| 2. <u>Acid-Alcohol</u> | |
| 10ml HCl (concentrated) in 1000 ml 70% alcohol | |

| | |
|-----------------|---------|
| 3. <u>Eosin</u> | |
| Distilled water | 1400 ml |
| 96% alcohol | 3600 ml |
| Eosin (Merck) | 25 gm |

When dissolved, add Glacial Acetic Acid 25 ml

Method

Formalin fixed – paraffin sections – 4 micron

| | |
|---------------------------------------|----------------|
| 1. Deparaffinate & hydrate | |
| 2. Stain in Haematoxylin (Solution 1) | 8-10 mins. |
| 3. Rinse in tap water | |
| 4. Differentiate in solution 2 | 10-15 secs. |
| 5. Blue in running tap water | 10 mins |
| 6. 70% alcohol | rinse |
| 7. Eosin (solution 3) | 2.25-2.5 mins. |
| 8. 96% alcohol | 1.5 mins. |
| 9. Absolute alcohol | 3 mins. |

10. Xylol

11. Mount in Pernount

Results

Nuclei – blue

Cytoplasm – pink

Giemsa for sections

Solutions

1. Giemsa stain

80 ml H₂O + 10 ml acetone. Add this to 10 ml Giemsa solution.

2. Differentiating solution

1-2 ml of a saturated solution of Collophonium resin in acetone per 100 ml 96% alcohol.

Method

1. Deparaffinize and hydrate
2. Stain in solution 1 for 3-4 hours at 37°C
3. Without decanting, wash off stain with running tap water. Leave sections here. *From this point onwards, sections are handled singly.*
4. Rinse in H₂O.
5. Rinse in 96% alcohol for 1 minute.
6. Differentiation: Set up 3 coplin jars with solution 2. Transfer sections from step 5 to the first of these where most of the stain is washed out. Transfer to second jar for further differentiation and then to the third jar. In this way, final differentiation is done in a clear solution. Differentiate until section background is a light pink.
7. 100% alcohol for 1-2 mins.
8. Xylol and mount with Permout.

Results

Nuclei – blue

Cytoplasm – pink

APPENDIX C

FULL GROSS PATHOLOGY RESULTS TABLE

Abbreviations

ID no: identification number

Macro: gross pathology classification

s/a: subacute

GIT: gastro-intestinal form.

Haemoconc: Haemoconcentration form.

s/clinical: subclinical

MOF: multiple organ failure

Histo: histopathology classification

n/c: not cerebral

C: cerebral

Clinical signs:

ARDS: acute respiratory distress syndrome

ARF: acute renal failure

IMHA: immune-mediated haemolytic anaemia

SIRS: systemic inflammatory response syndrome

MODS: multiple organ dysfunction syndrome

HBC: hit by car

Neuro signs: clinical neurological signs.

Rx: antibabesial therapy

U: untreated

T: Trypan Blue

B: diminazene aceturate

F: imidocarb

Ht: haematocrit

Par: parasitaemia

Y: present

N: absent

E/D:

E: euthanasia

D: died

ISA: in-saline agglutination

P: positive

N: negative

Tfn: blood transfusion

Y: yes

N: no

Breed

Staffie: Staffordshire bull terrier

Dob/Pin: doberman pinscher

MinPin: miniature pinscher

Boston Ter: Boston terrier

GSD: German shepherd dog

Age:

W: weeks

M: months

Y: years

A: adult

Sex:

F: female

M: male

Included:

M: gross pathology study

H: histopathology study

S: sequestration study

Final classification:

N/C: not cerebral

C: cerebral

comp: other complications of babesiosis concurrently present

| ID no | PM No | Macro | S No | Histo | F No | History | Neuro signs | Rx | Ht | Par | SI | E/D | ISA | Tfn | Breed | Age | Sex | Owner | Included | Final classification |
|-------|---------|----------------------|---------|-------|-------|--------------|-------------|----|----|-----|----|-----|-----|-----|-------------|-----|-----|----------------|----------|----------------------|
| 1 | 598.96 | s/a | 1692.96 | 0 | P | found dead | unknown | U | 0 | Y | 0 | D | 0 | 0 | Staffie | 0 | F | Q Withfield | M | N/C |
| 2 | 619.96 | pallor, s/a | 742.96 | n/c | P | 0 | 0 | U | 0 | Y | 0 | 0 | 0 | 0 | Dob/Pin | 1Y | F | van der Wahl | M,H | N/C |
| 3 | 646.96 | s/a | 1800.96 | 0 | 58962 | s/a | 0 | T | 16 | 0 | 0 | D | 0 | 0 | Staffie | 4Y | F | P S Roos | M | N/C |
| 4 | 736.96 | s/a | 1994.96 | 0 | 0 | s/a | 0 | 0 | 0 | 0 | 0 | D | 0 | 0 | Staffie | A | F | de Jager | M | N/C |
| 5 | 754.96 | s/a | 0 | 0 | 0 | s/a | 0 | U | 28 | 0 | 0 | D | 0 | 0 | Maltese | 3Y | M | 0 | M | N/C |
| 6 | 838.96 | GIT | 2242.96 | 0 | 5946 | GIT | 0 | T | 12 | 0 | 0 | 0 | 0 | Y | Maltese | 7M | M | W A Richards | M | N/C comp |
| 7 | 886.96 | haemo-c | 2477.96 | 0 | 59575 | haemo-c | 0 | T | 60 | 0 | 0 | D | 0 | 0 | MinPin | 1Y | F | T J van Wyk | M | N/C comp |
| 8 | 915.96 | s/clinical | 2568.96 | 0 | 58947 | HBC | No | U | 0 | Y | 0 | 0 | 0 | 0 | Maltese | 5Y | M | W J Bergh | M | N/C |
| 9 | 947.96 | oedema | 2641.96 | 0 | 0 | s/a | 0 | U | 0 | Y | 0 | E | 0 | 0 | Fox Terrier | 1Y | F | Vermaak | M | N/C comp |
| 10 | 985.96 | pulmonary | 2788.96 | 0 | 51372 | s/a ARDS | 0 | U | 0 | 0 | 0 | D | 0 | 0 | Pekingese | A | M | M J Eybers | M | N/C comp |
| 11 | 996.96 | pallor | 2849.96 | 0 | 58640 | s/a | 0 | U | 11 | Y | 0 | E | 0 | 0 | Fox Terrier | 3Y | M | M L van Biljon | M | N/C |
| 12 | 1038.96 | pulmonary | 2953.96 | n/c | 0 | ARDS | No | B | 52 | Y | 0 | D | 0 | 0 | Boston Ter | 2Y | M | Papenfus | M | N/C comp |
| 13 | 1069.96 | pulmonary | 3016.96 | 0 | 60106 | ARDS | No | T | 16 | Y | 0 | D | N | Y | Chihuahua | 0 | M | J H Liebenberg | M | N/C comp |
| 14 | 1144.96 | s/a pulmonary | 3224.96 | 0 | 0 | s/a | No | T | 18 | Y | 0 | D | 0 | 0 | Chihuahua | 7Y | M | Wallace | M | N/C comp. |
| 15 | 1146.96 | MOF | 3226.96 | n/c | P | s/a and IMHA | No | T | 28 | Y | 0 | D | P | 0 | GSD | 0 | F | De Gough | M,H | N/C comp |
| 16 | 1165.96 | s/a | 3285.96 | n/c | 49962 | IMHA | No | B | 27 | Y | 0 | D | P | 0 | Rottweiler | 5Y | M | H Breedt | M | N/C |
| 17 | 1221.96 | s/a pulmonary oedema | 3282.96 | 0 | P | found dead | unknown | U | 0 | Y | 0 | D | 0 | 0 | Staffie | 3Y | F | M Bester | M | N/C comp |

| ID no | PM No | Macro | S No | His to | F No | History | Neuro signs | R x | Ht | P a r | S i | E / D | I S A | T f n | Breed | Age | Sex | Owner | Includ ed | Final classifi cation |
|-------|---------|---|---------|--------|------------------|-------------------|--------------------|-----|----|-------|-------|-------|-------|-------|---------------------|------|-----|----------------------|-----------|-----------------------|
| 18 | 1239.96 | subacute; pulmonary | 3407.96 | 0 | 60584 | myocardial | No | T | 15 | N | 0 | D | 0 | Y | Dachshund | 4Y | M | M Janse van Rensburg | M | N/C comp |
| 19 | 1260.96 | s/a | 3482.96 | 0 | 60667 O/P | s/a | No | U | 0 | Y | 0 | E | 0 | 0 | Toy Pom | 17Y | F | J P Fourie | M | N/C |
| 20 | 87.97 | s/a | 184.97 | n/c | 61115 | subacute | No | B | 34 | Y | 0 | 0 | 0 | Y | Boer bull | 3W | M | Stoltz | M,H | N/C |
| 21 | 154.97 | s/a | 0 | 0 | O/P | collapse, ARDS | No | U | 0 | Y | 0 | D | 0 | 0 | Cocker Spaniel | 9M | M | E Bronkhorst | M | N/C comp |
| 22 | 182.97 | acute, pulmonary | 511.97 | 0 | 53607 | haemo-c. collapse | N | T | 55 | Y | 0 | 0 | 0 | 0 | Dachshund | 1Y | F | D van Staden | M | N/C comp |
| 23 | 283.97 | pulmonary | 1959.97 | n/c | 0 | ARDS | No | U | 5 | Y | 0 | E | 0 | 0 | Fox Terrier | 1Y | F | G W Heck | M,H | N/C comp |
| 24 | 405.97 | MOF | 1215.97 | n/c | 62025 | SIRS;MODS;DIC | No | B | 11 | Y | 0 | 0 | N | Y | Boerbull | 1Y | F | P du Toit | M,H | N/C comp |
| 25 | 536.97 | pulmonary | 1618.97 | n/c | 59565 | ARDS | No | F | 8 | Y | 0 | 0 | 0 | 0 | Rottweiler | A | M | H Crafford | M,H | N/C comp |
| 26 | 541.97 | subacute | 1635.97 | n/c | 48688 | IMHA | No | B | 9 | Y | 0 | 0 | P | 0 | Bull Terrier | 8Y | M | G Collyer | M,H | N/C comp |
| 27 | 847.97 | pulmonary | 2427.97 | 0 | 63217 | MODS | No | 0 | 0 | Y | 0 | E | 0 | 0 | Boxer | 1Y | F | Jacobs | M | N/C comp |
| 28 | 890.97 | s/a | 2517.97 | 0 | P | s/a | No | F | 0 | Y | 0 | D | 0 | 0 | GSD | 6W | M | Delport | M | N/C |
| 29 | 913.97 | s/a | 2573.97 | 0 | 63457 | s/a | No | U | 13 | Y | 0 | 0 | N | 0 | GSD | 4M | M | J J Venter | M | N/C |
| 30 | 1086.97 | pulmonary | 3052.97 | 0 | 40334 | ARDS | No | B | 10 | Y | 0 | 0 | 0 | Y | Staffie | 5Y | M | RMJ Britz | M | N/C comp |
| 31 | 687.97 | haemo-c. | 2535.97 | n/c | 62765 | haemo-c. | No | 0 | 0 | Y | 0 | 0 | 0 | 0 | Rottweiler | 3Y | M | J A Jordaan | M,H | N/C comp |
| 32 | 538.98 | s/a | 1391.98 | 0 | P1307 85 Medunsa | ARDS | No | T | 10 | Y | 0.8 3 | 0 | 0 | 0 | Crossbred | 0 | F | Lebeloane | M,S | N/C comp |
| 33 | OPT II | subacute | 672.98 | n/c | 0 | s/a | Unknown | U | 9 | Y | 0.9 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M,H,S | N/C |
| 34 | OPT III | cardiac | 1344.98 | 0 | P | s/a | No | U | 0 | Y | 0.7 6 | 0 | 0 | 0 | Chow chow | 3M | M | 0 | M,S | N/C comp |
| 35 | 668.96 | s/a; cerebellar prolapse | 0 | 0 | 59016 | | No | T | | Y | 0 | | | | Maltese x Collie | 10 W | M | Beyleveldt | 0 | cerebral |
| 36 | 842.96 | muscle | 0 | 0 | 0 | 0 | yes | U | 12 | Y | 0 | 0 | 0 | 0 | Boer bull | 8M | F | 0 | M | cerebral comp. |
| 37 | 857.96 | cerebral | 201.98 | C | 0 | haemo-c. | yes | T | 46 | Y | 0 | D | 0 | 0 | Labrador | 4M | M | J H Murray | M,H | cerebral comp. |
| 38 | 1074.96 | mild congestion | 3024.96 | C | 60120 | ARDS | No | U | 0 | Y | 0 | E | 0 | 0 | Staffie | 6Y | F | WS Humphries | M | cerebral |
| 39 | 1130.96 | Cerebral | 3157.96 | C | O/P | haemo-c. | none noted | T | 61 | Y | 0 | 0 | 0 | 0 | Labrador, crossbred | 5Y | M | H J Sléyn | M,H | cerebral |
| 40 | 1148.96 | Cerebral oedema and pallor. Subacute, pulmonary | 3228.96 | C | 60336 | weakness | Yes, not specified | U | 6 | Y | 0 | D | N | 0 | Labrador | 2M | F | | M,H | cerebral comp. |
| 41 | 1163.96 | s/a; cerebral oedema and pallor | 3264.96 | 0 | P | 0 | 0 | U | 0 | Y | 0 | D | 0 | 0 | Rottweiler | A | M | Fitzpatrick | M | cerebral |

| ID no | PM No | Macro | S No | His to | F No | History | Neuro signs | R x | Ht | P a r | S I | E / D | I S A | T n | Breed | Age | Sex | Owner | Included | Final classification | |
|-------|---------|--|---------|--------|-------|---|--|-----|----|-------|------|-------|-------|-----|----------------|--------------|-----|-----------------|-------------|----------------------|----------------|
| 42 | 7.97 | cerebral and muscle | 4.97 | C | 80629 | collapse | No | T | 0 | Y | 0 | 0 | 0 | 0 | GSD | 2M | F | J Heyns | M,H | cerebral comp. | |
| 43 | 178.97 | cerebral and haemo-c.entrated | 460.97 | 0 | 61385 | MODS | Yes: seizures | B | 40 | Y | 0 | D | 0 | 0 | Chow chow | 2Y | F | L Barkhuizen | M | cerbral comp. | |
| 44 | 205.97 | pulmonary | 551.97 | 0 | O/P | acute cerebral | Yes: seizures | U | 0 | Y | 0 | E | 0 | 0 | Fox terrier | 1Y | M | Vermaak | M,H | cerebral comp. | |
| 45 | 231.97 | GIT | 598.97 | C | 61514 | GIT | semi-coma | T | 24 | Y | skin | D | N | Y | Husky | 6M | F | van Bosch | M,H | cerebral comp. | |
| 46 | 237.97 | cerebral and pulmonary | 975.97 | C | 37680 | depression | Yes; depression and disorientation | F | 28 | Y | 0 | D | 0 | 0 | Cocker Spaniel | 3M | M | Swanepoel | M,H | cerebral comp. | |
| 47 | 268.97 | subacute with cerebral pallor and generalised oedema | 1391.97 | C | O/P | subacute cerebral | Yes: opisthotonus and extensor rigidity | U | 8 | Y | 0 | 0 | 0 | 0 | GSD | 4M | M | B du Preez | M,H | cerebral comp. | |
| 48 | 284.97 | acute | 1960.97 | C | 57775 | cerebral | Yes: coma | B | 31 | Y | 0 | E | 0 | 0 | Chihuahua | 3Y | F | F Els | M,H | cerebral | |
| 49 | 314.97 | cerebral and pulmonary | 923.97 | C | 61737 | MODS : cerebral and pulmonary | Yes: coma | U | 0 | Y | 0 | D | 0 | 0 | Crossbred | 1Y | M | N Roelofse | M,H | cerebral comp. | |
| 50 | 338.97 | cerebral and spinal fracture | 965.97 | C | 61662 | Haemo-c. Spinal fracture and history of babesiosis that was treated. Berenil given. | Yes: Opisthotonus, vertical nystagmus and generalised seizures | B | 51 | N | 0 | D | 0 | 0 | Borzai | 7Y | M | B C Stoop | M,H | cerebral comp. | |
| 51 | 466.97 | Cerebral and pulmonary | 1430.97 | n/c | 60988 | IMHA | No | F | 16 | Y | 0 | D | P | Y | Bull Terrier | 9M | M | H L Terblanche | M,H | cerebral comp. | |
| 52 | 682.97 | Congestive brain swelling and thalamic petechiae. Haemo-c. | 0 | 0 | 58197 | ARDS, ARF, anuria, IMHA | No | B | 50 | Y | 0 | D | P | N | Bulldog | 2Y | M | MC Jacobs | M | cerebral | |
| 53 | 918.97 | cerebral and pulmonary | 2575.97 | C | O/P | subacute bab | Yes: coma | B | 10 | Y | 0.9 | D | 0 | 0 | Border collie | 5W | F | Pearson | M,H,S | cerebral comp. | |
| 54 | 983.97 | cerebral and myocardial | 2709.97 | n/c | 658 | babesiosis | Yes: head pressing | B | 37 | Y | 0 | E | 0 | 0 | Bull Terrier | 3Y | M | I G van Aswegen | M,H | cerebral comp. | |
| 55 | 1046.97 | cerebral and haemo-c. | 2868.97 | C | 63844 | peracute with haemo-c. | No: none recorded | B | 55 | Y | 0.6 | 9 | 0 | 0 | Chow chow | A | M | P Moltasi | M,H,S | cerebral comp. | |
| 56 | 1085.97 | cerebral and haemo-c. | 3051.97 | C | 57182 | MODS with haemo-c. | No, none recorded | B | 44 | Y | 0.9 | 3 | E | 0 | 0 | Bull Terrier | 8Y | F | L Kruger | M,H,S | cerebral comp. |
| 57 | 1.98 | cerebral and haemo-c. | 4.98 | C | 50986 | acute | None noted | U | 60 | Y | 0 | D | N | N | Cocker spaniel | 10Y | M | T J Potgieter | M,H | cerebral comp. | |
| 58 | 13.98 | cerebral Disseminated petechiation | 24.98 | C | 58590 | acute babesiosis - suspected cerebral babesiosis terminally. | Suspected cerebral babesiosis terminally, but no neurological signs specified. | B | 35 | Y | 0.8 | 7 | E | 0 | 0 | Boxer | 6M | M | JS Prinsloo | M,H,S | cerebral |
| 59 | 50.98 | cerebral | 150.98 | C | 58513 | acute, cerebral signs. ARDS | opisthotonus progressing to coma | B | 45 | Y | 0.9 | 3 | D | N | 0 | Boxer | 9M | F | F de Kock | M,H,S | cerebral comp. |

| Id no | PM No | Macro | S No | His to | F No | History | Neuro signs | R x | Ht | P a r | SI | E / D | I S A | Tf n | Breed | Age | Sex | Owner | Includ ed | Final classification |
|-------|--------|--|---------|--------------|--------|---|--------------------------------------|-----|----|-------|------|-------|-------|------|-------------------|-----|-----|----------------|-----------|----------------------|
| 60 | 70.98 | GIT with cerebral pallor | 152.98 | n/c | 746 | MODS | coma | B | 25 | Y | 0.99 | 0 | 0 | 0 | Bull terrier | 4Y | F | CR Fourie | M,H,S | cerebral comp. |
| 61 | 105.98 | GIT with cerebral oedema | 307.98 | n/c | 54445 | ARDS and cerebral signs | opisthotonus, collapse and trembling | B | 21 | Y | -4 | D | N | Y | Boerbull | 4Y | F | MM Botha | M,H,S | cerebral comp. |
| 62 | 106.98 | s/a | 305.98 | C | P | found dead | Unknown | U | 0 | Y | 0.96 | D | 0 | 0 | Rotweiler | 6M | | G Strauss | M,H,S | cerebral |
| 63 | 113.98 | cerebral with haemo-c. | 331.98 | C | 64395 | haemo-c. and ARDS | not noted | B | 60 | Y | 0.97 | E | 0 | N | Bulldog | 3Y | M | M Weber | M,H,S | cerebral comp. |
| 64 | OPT. I | cerebral | 274.98 | C | 0 | subacute babesiosis | unknown | 0 | 0 | Y | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M,H,S | cerebral subac. |
| 65 | 119.98 | cerebral and myocardial | 348.98 | C | 49397 | cerebral | seizures | B | 0 | Y | -15 | D | 0 | 0 | Pug | 1Y | M | J van Rensburg | M,H,S | cerebral comp. |
| 66 | 148.98 | cerebral and muscle | 426.98 | C | 64495 | MODS: haemo-c. and ARF | apparent blindness | B | 58 | Y | 0.83 | D | 0 | N | Chow chow | 2Y | F | Adam | M,H,S | cerebral comp. |
| 67 | 186.98 | cerebral and pulmonary | 815.98 | C | P | none | unknown | U | 0 | Y | 0 | D | 0 | N | Staffie crossbred | 0 | 0 | van Rooyen | M,H | cerebral comp. |
| 68 | 311.98 | cerebral and muscle; acute babesiosis | 875.98 | C | O/P | haemo-c | no neurological signs noted | U | 0 | Y | 0.15 | 0 | 0 | 0 | Pug | 1Y | F | WA Engelbrecht | M,H,S | comp. cerebral |
| 69 | 325.98 | acute cerebral and muscle | 925.98 | C | 0 | MODS: renal and GIT | None noted | T | 0 | Y | 0 | 0 | 0 | 0 | crossbred | 8M | F | Boucher | M,H | comp. cerebral |
| 70 | 384.98 | haemo-c. with cerebral lesions | 1094.98 | C | 0 | peracute | ataxia, blindness and head pressing | B | 37 | N | 0 | D | 0 | 0 | Staffie | 4Y | M | Kitching | M,H | comp. cerebral |
| 71 | 397.98 | acute cerebral babesiosis with cerebral oedema and cerebral flush; haemo-c. form | 1112.98 | C | 102650 | cerebral babesiosis | seizures | B | 58 | Y | 1 | D | 0 | N | Bull Mastiff | 1Y | F | D.C Spooner | M,H,S | acute cerebral |
| 72 | 450.98 | pulmonary | 1207.98 | pre-cerebral | O/P | acute | No | B | 0 | Y | 0.45 | 0 | 0 | 0 | Maltese | 11M | F | van Staden | M,H,S | cerebral comp. |
| 73 | 452.98 | cerebral and haemo-c. | 1214.98 | 0 | 0 | suspected poisoning; in retrospect this was peracute babesiosis | seizures | U | 0 | Y | 0.84 | D | 0 | 0 | Boerbull | A | F | I H Willemse | M,S | cerebral comp. |
| 74 | 473.98 | cerebral and pulmonary; severe cerebral oedema pressure on the cerebellum | 1268.98 | C | 103281 | Bite wounds on head | collapse and coma | B | 27 | Y | 0 | 0 | 0 | 0 | Ridgeback | 4M | M | JA Rademeyer | M,H,S | cerebral comp. |
| 75 | 475.98 | oedema form with pulmonary lesions. No macroscopically visible cerebral lesions | 1270.98 | n/c | 103306 | cerebral and ARDS | seizures and blindness | B | 11 | Y | 0 | 0 | N | Y | crossbred | 2M | M | A Brits | M,H | cerebral comp. |
| 76 | 564.98 | Congestive brain swelling. Cerebral and GIT. | 1480.98 | 0 | P | found dead | unknown | U | 0 | Y | 0.85 | D | 0 | N | Staffie | 5Y | F | S Sheppard | M,H,S | cerebral comp. |

APPENDIX C

REGIONAL LESIONS TABLE

Key to Abbreviations:

Lesion Type

- G global lesion
- R regional lesion

Lesion Symmetry

- A asymmetrical lesion
- B bilateral lesion
- S symmetrical lesions
- U unilateral lesion

Treatment

- D diminazene aceturate
- I imidocarb
- T trypan blue
- U untreated
- 0 treatment status unknown

Macro group

- CBS congestive brain swelling
- E ecchymosis(es)
- H haemorrhage
- Hy hydrocephalus
- M malacia
- O oedema
- Pet petechiae

Cerebral cortex (Site of lesions)

- B bilateral

- E ecchymosis(es)
- GC lesions in gyral crests
- H haemorrhage
- LCN laminar cortical necrosis
- M malacia
- Pet petechiae
- SF lesions in sulcal floors
- U unilateral

Lobe

- F frontal lobe
- O occipital lobe
- P parietal lobe
- T temporal lobe

Olfactory tract

- Ped olfactory peduncle
- Tub olfactory tubercle

Border Zone

- r/m rostral-middle cerebral arteries
- r/c rostral-caudal cerebral arteries
- m/c middle-caudal cerebral arteries

Artery

- C caudal cerebral artery
- M middle cerebral artery
- R rostral cerebral artery

- rc rostral cerebellar artery
- cc caudal cerebellar artery
- v vertebral artery

| ID no | PM no. | Lesion type | Lesion symmetry | treatment | Macro group | Site of lesions | | | | | | | | | | | | | | |
|-------|---------|-------------|-----------------|-----------|-----------------------------|---|------------------|---|-------------------------------|------------|----------|----------------|----------------------------|------------|-------------------|-----------------|--------------|--------|-------------------|---------|
| | | | | | | Cerebral cortex | Lobe | Cerebellum | Caudate nucleus | Colliculus | Thalamus | Pyriform lobes | Lateral geniculate nucleus | Hypophysis | Medulla oblongata | Olfactory tract | Border Zones | Artery | | |
| 1 | 857.96 | R | B A | T | M H | SF GC H. infarct frontal lobe malacia | F P T O | Rostral vermis: central culmen | U Caput corpus | caudal | | | | | | | Ped Tub | r/c | R M C rc | |
| 2 | 1130.96 | R | B A | T | M H | SF, GC, E frontal lobe LCN, Sub- ventricular M (Occipital lobe) no H | F O | | B Caput cauda | | | | | | | | Tub | | R M | |
| 3 | 1148.96 | G | | U | Pallor Oedema | | | | | | | | | | | | | | | |
| 4 | 7.97 | R | B & S | T | M H Oedema Mild Hy | E Pet GC | F P T | Caudal vermis Nodulus uvula | B caput corpus cauda | | | | | | | | Pet | Tub | r/m B | M cc |



Site of lesions

| | R, M C cc | R M C cc | M rc v | R M C | C M rc |
|----------------------------|------------------------------------|-------------------------------------|------------------|-----------------|-------------------------------|
| Artery | | | | | |
| Border Zones | R/m | r/m | | | |
| Olfactory tract | | | | | |
| Medulla oblongata | | | Pet | | |
| Hypophysis | | | | | |
| Lateral geniculate nucleus | | | | | |
| Pyramiform lobes | | | | | |
| Tthalamus | Pet | | Pet | Pet | |
| Colliculus | | U caudal | Pet caudal | | Dorsal rostrals Caudals |
| Caudate nucleus | B Corpus | | E cauda | | U E cauda |
| Cerebellum | Nodulus Uvula Ansiform | Ventral paramedi an lobe M | E lingula | | Pet lingula |
| Lobe | F P T/ O | F O | | | O |
| Cerebral cortex | SF splenial GC Rhinal sulcus | SF GC M | spared | | GC (tectum) |
| Macro group | M H | M H | Pallor M H | Normal brain | CBS |
| Antibabesial Treatment | I | U | I | 0 | D |
| Symmetry | B A rostr S caud | B A | B S | | B A |
| Lesion Type | R | R | R | G R | R |
| PM no | 237.97 | 314.97 | 466.97 | 624.97 | 682.97 |
| ID no | 5 | 6 | 7 | 8 | 9 |
| | | | | | 10 |



Site of lesions

| Artery | R M C | M v | R M rc cc v | R M C cc | R M C cc rc |
|----------------------------|-------------|---|-------------------------|---|--|
| Border Zones | r/m r/c | | cc/rc | m/r | r/m |
| Olfactory tract | | | | Tub | |
| Medulla oblongata | | Pet | Pet | | |
| Hypophysis | E | | | | |
| Lateral geniculate nucleus | | Pet | Pet | Pet | |
| Pyramidal lobes | | | | iii | |
| Thalamus | E | Pet | | | |
| Colliculus | | Rostral caudal | rostral | Caudal rostral tectum | |
| Caudate nucleus | | B caput | B corpus | B Corpus Left cauda | B corpus |
| Cerebellum | | | Focal E | Uvula nodulus (floculo- dular lobe) | Nodulus Uvula L paramedi- an lobule R central lobule E |
| Lobe | F P O | | F | F P T O | F P O |
| Cerebral cortex | SF GC | | SF GC | Frontal Ventral SF GC | SF GC Frontal haematoma |
| Macro group | M H | moderate congestion of surface. M, H | M H | M H Dissemina- ted Pet E | M H Pet, E |
| Antibabesil Treatment | D | D | U | D | D |
| Symmetry | B A | B S | U | B | B A |
| Lesion Type | R | R | R | R | R |
| PM no | 1046.97 | 1085.97 | 1.98 | 13.98 | 50.98 |
| ID no | 11 | 12 | 13 | 14 | 15 |



Site of lesions

| | | | | | |
|----------------------------|--------|-----------------------|-------------------------------------|--------|------------|
| Artery | | M | M | R | R M C |
| Border Zones | | | | | r/c r/m |
| Olfactory tract | | | | | Ped |
| Medulla oblongata | | | | | |
| Hypophysis | | | Focal E | | |
| Lateral geniculate nucleus | | M | | | |
| Pyramidal lobes | | | | | |
| Thalamus | | | | | |
| Colliculus | | | | | |
| Caudate nucleus | | | B caput | | |
| Cerebellum | | | | | |
| Lobe | | P | | F | F P T |
| Cerebral cortex | | SF | | | GC SF |
| Macro group | Pallor | Pallor Oedema M | M, H Pallor Oedema Mod. Hy | M H | M H |
| Antibabesil Treatment | D | D | D | D | D |
| Symmetry | | U | B S | | B A |
| Lesion Type | G | G R | R | R | R |
| PM no | 70.98 | 105.98 | 113.98 | 119.98 | 148.98 |
| ID no | 16 | 17 | 18 | 19 | 20 |



| Site of Lesion | | Artery | M | R M | R M C cc | |
|-----------------------|------------------|----------------------------|---|-------------|--|--|
| | | Border Zones | | r/m r/c | r/c r/m | |
| | | Olfactory tract | | | | |
| | | Medulla oblongata | | | | |
| | | Hypophysis | | | | |
| | | Lateral geniculate nucleus | | | | |
| | | Pyriform lobes | | | | |
| | | Tthalamus | U M E | B M | | |
| | | Colliculus | | B caudal | | |
| | | Caudate nucleus | B M H | | | |
| | | Cerebellum | | | Pet Caudal lobe Pyramis Uvula | |
| | | Lobe | T | F P T | F P | |
| | | Cerebral cortex | No superficial lesions SF Focal M | SF GC | SF (GC) E, Pet | |
| Macro group | Pallor M H | M H | M H | | | |
| Antibabesil Treatment | 0 | U | T | | | |
| Symmetry | B A | B A (S) | B A (S) | | | |
| Lesion Type | R | R | R | | | |
| PM no | 186.98 | 311.98 | 325.98 | | | |
| ID no | 21 | 22 | 23 | | | |

| ID no | PM no | Lesion Type | Symmetry | Antibabesii Treatment | Macro group | Site of Lesion | | | | | | | | | | | | | |
|-------|--------|-------------|---------------|-----------------------|---|---|------------------|--|-----------------------------------|--|---------------|-----------------|----------------------------|------------|-------------------|---------------------------|--------------|-------------------|-------------------|
| | | | | | | Cerebral cortex | Lobe | Cerebellum | Caudate nucleus | Colliculus | Thalamus | Pyriiform lobes | Lateral geniculate nucleus | Hypophysis | Medulla oblongata | Olfactory tract | Border Zones | Artery | |
| 24 | 384.98 | R | B S (A) | D | M H Oedema Mod U Hy | SF (congestion) | P | compress ion | B Caput corpus | | | | | | | Severe compressi on | Tub Ped | | M |
| 25 | 397.98 | G R | B S | D | CBS M H Severe oedema Mild Hy | SF & sides GC E & P | F P T O | Severe compress ion Focal E lingua | B Corpus U Caput left | Rostral, right Caudal right E | Pet | | | | | | | r/m r/c m/c | R M C rc |
| 26 | 473.98 | R | B S | D | H M Oedema Mild Hy | Total cortical haemorrhage. GC SF E S | F P T O | Paramedi an lobule (uvula) E | B Caput cauda | U Caudal right | Pet E B | | | | | | Tub | r/c | R M cc |
| 27 | 475.98 | G | | D | Pallor | | | | | | | | | | | | | | |
| 28 | OPT I | R | B S (A) | 0 | Pallor M H Mild Hy | No superficial lesions. SF | F P O | | B Caput cauda | U Caudal left | M E | B E | | | | | | r/m | R M |



APPENDIX C

Histopathology Results Table

| | | | | | |
|------|-------------------------------|-------|-----------------------------|-----------|------------------------------|
| Key: | | | | | |
| a-O: | autolysis minimal. | ICC: | ischaemic cell change. | sc: | spinal cord. |
| A2: | Alzheimer Type 2 astrocytes. | imp: | immunoperoxidase staining. | uvf: | uneven vascular filling. |
| CBS: | congestive brain swelling. | ivFt: | intravenous fibrin thrombi. | S-a: | severe autolysis. |
| ens: | endothelial nuclear swelling. | m-a: | mild autolysis. | SNC: | severe neuronal change. |
| evF: | extravascular fibrin. | M-a: | moderate autolysis. | svn: | segmental vascular necrosis. |
| fc: | foamy pericytes. | M+A: | margination and adhesion. | VR-space: | Virchow-Robbins space. |
| H: | haemorrhage. | Mlk: | monocytic leukostasis. | | |
| HE: | echthymosis | NN: | neuronal necrosis. | | |
| HM: | microvascular haemorrhage. | Og: | oedema of grey matter. | | |
| | HP: petechiae | Os: | oedema of white matter | | |
| HR: | perivascular haemorrhage. | pRBC: | parasitised erythrocytes. | | |
| HC: | homogenising change | RCC: | red cell changes | | |

| | | | | |
|----|---------|--|----|-------------|
| 1 | 48.96 | Multifocal ens. RCC. Monocytes, plasma cells, lymphocytes. HM. ivFt. uvf. E. canis | ++ | n/c Ex |
| 2 | 248.96 | RCC. Os. Mlk. M+A. M-a. E. Canis | ++ | n/c Ex |
| 3 | 808.96 | RCC. Mlk. Lymphocyt +. M+A. uvf. | + | n/c (histo) |
| 4 | 1438.96 | ens. Microvascular congestion. uvf. Mlk. RCC. Sludge in microvessels. Og. HM. HP. Neutrophil invasion. Focal ischaemia. M-a. | - | C |
| 5 | 1679.96 | Severe congestion. uvf. ens. Mlk. Few plasma cells. Lymphocytosis. fc. Os. RCC. ivFt. HM. M-a E. canis. | + | n/c Ex |
| 6 | 1682.96 | Ens and necrosis. svn and vasculitis: cortex and subcortex, caudal colliculus, thalamus, brain stem. evF. HR. HP. HE. Mlk. Severe neutrophilia and neutrophil infiltration. Astrocytosis. Microgliosis. NN. ICC. HC. Og. ivFl. | - | C |
| 7 | 1767.96 | Died on day of treatment. Moderate acute purulent myelitis and septicaemic microabscessation. Septicaemia. | - | n/c Ex |
| 8 | 1742.96 | Ens. Mlk. M+A. RCC. fc. Purkinje cells. HC. m-a. ivFt. | ++ | n/c |
| 9 | 1778.96 | Mlk. Neutrophilia. RCC. Multi-focal grey matter oedema and mild microglial reaction. perivascular. ivFl. m-a. Phagocytosis of parasites by neutrophils. Parvo. | + | n/c Ex |
| 10 | 1780.96 | ens. fc. uvf. Mlk. Sludging in microvasculature. High protein serum. iv. M-a. | - | n/c |
| 11 | 1785.96 | uvf. Mlk. ivFl. m-a. Parvo. | - | n/c Ex |
| 12 | 2104.96 | ens. Mlk. uvf. Margination of unparasitised erythrocytes. Microvacuolation. Rare neutrophil in circulation. Monocytic and neutrophilic cuff. HR. Ischaemia. Very fresh. | - | n/c |
| 13 | 2612.96 | Multifocal HM - artifact. M-a. Os. Suspected diamidine toxicity. | | n/c Ex |
| 14 | 2788.96 | Mlk. M+A. Mild RCC. M-a. HM of sc. | ++ | n/c |
| 15 | 2849.96 | Ens. Mild RCC. Rare monocytes and lymphocytes | ++ | n/c |



| | | | | |
|----|---------|---|-----------|--------------------|
| 16 | 2953.96 | Ens. M+ but no adhesion. RCC. Mik. fc. | + | n/c |
| 17 | 2965.96 | Multifocal HE + malacia ICC | ++ | C |
| 18 | 3024.96 | Ens. Svn M+A. RCC. Severe congestion. HP. ICC. A2. E. canis | + | C Ex |
| 19 | 3066.96 | ens. HM. HP. Severe congestion. Mik. fc. Focal infarction. ICC + H. HP. sulcal depths and gyral crests. uvf. some arterioles empty. Hypoxia. CBS. E. canis. | - | C Ex |
| 20 | 3067.96 | Lymphoplasmacytic meningitis. E. canis. | - | n/c Ex. |
| 21 | 3157.96 | Focal ens. fc. RCC. M+A. Mik. Os. svn. Og. HE deep sulcal cortex. Neutrophil infiltration. ICC. HC. Astrogliosis. evF. Cerebellum. vasculitis, HE, HC Purkinje cells, ivFl. a-0. sc: HP & HC. | + | C |
| 22 | 3168.96 | Multifocal HE + ICC. Protein rich oedema. Neutrophil cuffs. Few lymphocytes. | + | C |
| 23 | 3226.96 | Endothelial nuclear swelling (ens). Margination and adherence (M+A). Red cell changes + (RCC). Foamy cells (fc). uvf. Mik. Neutrophilia. SNC. Moderate autolysis. M-a | +++ | n/c |
| 24 | 3228.96 | Multifocal ens + svn. SNC + ICC + HC. Cerebellar + periventricular HP. Os. uvf. sc: HP. m-a. | ++++ + | C |
| 25 | 3285.96 | Multifocal ens, RCC. uvf. Mijd Os. Monocytosis and neutrophilia - mild. fc. ivFl. m-a. | + | n/c |
| 26 | 3427.96 | E. canis | 0 | n/c (histo) Ex |
| 27 | 3542.96 | Organisms in depths of sulci. HP - multifocal to coalescing. Monocytic leukostasis (Mik). E. canis | | C Ex |
| 28 | 4.97 | Mik. RCC. HR. HE. HP. Advanced lesions. svn. A2. ICC also with incrustations. HC. Large granular lymphocytes. Og. Free organisms. Cerebellar sulcal depths. ivFl. HM subcortex. | ++++ | C |
| 29 | 184.97 | Severe congestion. Mik. RCC. HM. HR. ivFl. S-a. | +++ | n/c |
| 30 | 424.97 | Granulomatous meningo-encephalitis. B. canis - associated? | - | n/c Ex |
| 31 | 559.97 | E. canis | - | n/c Ex |
| 32 | 598.97 | Mik. uvf. svn. HM with extravasation of pRBC. Early lesions. HM sc. ivFl. putrefaction. S-a. Hypophyseal adenitis and necrosis (true cerebral lesion). | + | pre-cerebral |
| 33 | 702.97 | Mik. HE. ICC. Perivascular neutrophilic cuffing and neutrophil infiltration. S-a. E. canis | - | C Ex |
| 34 | 923.97 | ens. svn. Margination. RCC. Mik. Microvascular congestion. HM. HR. HP. Og. ICC but no neutrophils, monocytes or gliosis. M-a | + | C |
| 35 | 946.97 | Mik. fc. Margination. svn. Og. HR Subcortex necrosis of neuropil. HM hippocampus. M-a. E. canis | + | pre-cerebral Ex |
| 36 | 965.97 | Severe congestion of microvasculature. fc. Os. Mik. HP white matter. sc: HE. Spinal injury | - | n/c Ex |
| 37 | 974.97 | Mik. RCC. M+A. Lymphocytes. Neutrophils. HM. Multiple parasites in erythrocytes. Severe congestion. | ++++ + | n/c (histo) |
| 38 | 975.97 | RCC. M+A. HE. HR. HP deep sulcal. Perivascular neutrophilic cuffing. Rare monocytes. SNC. Advanced lesion caudate nucleus. sc: HM. | + | C |
| 39 | 1215.97 | Mik. Moderate congestion. RCC. sc perivascular lymphoplasmacytic cuffing & HM. | ++ | n/c |
| 40 | 1216.97 | E. canis | | Ex |
| 41 | 1391.97 | Ens. Mik. RCC. Margination. uvf. Os. Og. Neutrophilia. Svn. HM. Early cerebral lesions. M-a. | ++ | C |
| 42 | 1430.97 | Multifocal ens. Mik. Lymphocytosis. ivFl. HM. RCC. M+A. Os. sc: HM. | ++++ + | n/c |
| 43 | 1484.97 | Focal ens. HM. Lymphoplasmacytic perivascular cuffing. Mild lymphoplasmacytic meningitis. E. canis | + | n/c Ex |
| 44 | 1503.97 | Multifocal ens. svn. RCC. Mik. Lymphocytosis. Plasma cells. uvf. HM. ivFl. m-a. Margination of neutrophils. E. canis | ++ | n/c Ex |
| 45 | 1553.98 | Focal ens. RCC. uvf. ICC (hypoxia). M-a. Intussusception Recovered from B. canis | - | n/c Ex |



| | | | | |
|----|---------|--|------|-----------|
| 46 | 1618.97 | Multifocal ens. RCC. M+A. Deep sulcal and meningeal margination. Multiple organisms in individual cells HM. Free organisms. | ++++ | n/c |
| 47 | 1635.97 | uvf. HP. HM. ivF1. | + | n/c |
| 48 | 1636.97 | ens. Mik. M+A. HM. Oedema. uvf. RCC. ivF1. M-a. Focal malacia in sulcus. Gitter cells and gemistocytes. Microglial and astroglial infiltration. Lesion of long duration. E. canis | + | C Ex |
| 49 | 1800.97 | Mik. RCC. ens. uvf. Lymphocytic leukostasis. HM. Septicaemia | - | n/c Ex |
| 50 | 1835.97 | ens. RCC. M+A. Mik. Lymphoplasmacytosis. uvf. Og. HM cerebellum, subcortex and hippocampus. Early lesions. SNC. m-a. E. canis | ++ | C Ex |
| 51 | 1839.97 | RCC. HM. Os. Mik. Microvascular congestion. E. canis | ++ | n/c Ex |
| 52 | 1953.97 | S-a. Mik. E. canis | - | n/c Ex |
| 53 | 1959.97 | ens. Microvascular congestion. Mik. | - | n/c |
| 54 | 1960.97 | RCC. Margination. Microvascular congestion. Perivascular lymphocytic cuffing. iv haemoglobin globules. Og. Multiple parasites in individual cells. HE. Distemper imp negative. | +++ | C |
| 55 | 1970.97 | svn. Moderate microvascular congestion. fc. Mik. Os. M+A. HM. HP. HR. Neutrophil infiltration. A2. Og. pRBC in haemorrhage. | ++ | C |
| 56 | 2005.97 | Mik. Plasma cells. RCC. HE. Many free parasites. Sever haemorrhage and coagulative necrosis of hypophysis (advanced lesion). E. canis | ++++ | C Ex |
| 57 | 2098.97 | E. canis and metastatic neoplasia (to CNS) | - | Ex |
| 58 | 2203.97 | M-a. Lymphoplasmacytic infiltration. Distemper imp negative. Suspect E. canis. | - | Ex |
| 59 | 2534.97 | Mik. Lymphocytosis. Neutrophilia. Margination. HM. A2?. Early lesions. Perivascular lymphoplasmacytic meningitis. E. canis | + | C Ex |
| 60 | 2535.97 | RCC. Advanced lesion HE. Og. SNC. ICC. NN and gemistocytes. | - | C (histo) |
| 61 | 2560.97 | Moderate microvascular congestion. RCC. Mik. Os. Intravascular protein droplets. uvf. HM. ivF1. svn in hypophysis. E. canis | - | n/c Ex |
| 62 | 2567.97 | RCC. Advanced lesions with Gitter cells and gemistocytes. Vasculitis. Axonal degeneration and necrosis. HE. HM. E. canis | - | C Ex |
| 63 | 2575.97 | ens. Margination. RCC. HP cerebellum. Spinal cord early lesion HM. HE caudal colliculus. Mik. Lymphocytic infiltration. | ++++ | C |
| 64 | 2600.97 | Mik. svn. HM. HR. Lymphocytes. Oedema. Margination. E. canis | ++ | C Ex |
| 65 | 2611.97 | RCC. Margination. uvf. svn. Og. Mik. HM of white matter. Few plasma cells. Lymphocytes. Neutrophilia. ivF1. M-a. | +++ | n/c |
| 66 | 2709.97 | Ens. RCC. Mik. fc. HP & HM in white matter of occipital lobe. Og. Lymphocytes. Neutrophils. | - | n/c |
| 67 | 2868.97 | Ens. Microvascular congestion. Mik. fc. RCC. Margination. Os. Svn. Og. HP. HE. HM. Perivascular neutrophilic cuffing. Intermediate lesions. Neutrophil infiltration. Advanced lesions. ICC. NN. no svn on edge of lesion. Paired parasites in red cells. | + | C |
| 68 | 3051.97 | Mild ens. Severe congestion of meninges. RCC. Mik. fc. HP. HM. Grey-white junction. svn. HE olfactory bulb. Advanced lesion ICC, HC. ivF1. E. canis | ++ | C Ex |
| 69 | 4.98 | Mik. Monocytic cuffing. Monocytic infiltration. Free parasites. Margination. ens. uvf. HM. HR. HP. HE. Og. ICC. | +++ | C |
| 70 | 24.98 | ens. Mik. Margination. RCC. HP. svn. Neutrophilia and neutrophil invasion of parenchyma. ICC on periphery of haemorrhagic area. M-a. Single area parasitaemia 4+. | + | C |
| 71 | 150.98 | Meningeal congestion. ens. Mik. svn. HP. HE. Og. Os. Neutrophil infiltration. Necrosis of the subcortex. ICC. Leukocytoclastic vasculitis. A2. Gemistocytes. Flattening of gyri. Haemorrhage does not penetrate white matter tracts in some sites, in others, HE. pRBC do not extravasate, or are confined to VR-spaces. | +++ | C |
| 72 | 151.98 | ens. Moderate microvascular congestion. fc. HM. Os. Parasitic proliferation in capillaries of white matter. svn. E. canis | ++ | n/c Ex |
| 73 | 152.98 | Ens. uvf. Mik. RCC. Congestion of larger caliber vessels. fc. ivF1. HM. HR. Sulcal haemorrhage. | +/- | n/c |
| 74 | 201.98 | RCC. Mik. uvf. fc. Og. Os. svn. Vasculitis. HM. HP. HE. HR in white matter. Perivascular monocytic and neutrophilic cuffing. Neutrophil infiltration. Vascular necrosis with no neuronal change and no haemorrhage in cerebellum. SNC in deep sulcal cortex. M-a. | + | C |



| | | | | |
|----|---------|---|-----------|--------------|
| 75 | 274.98 | ens. Mlk. RCC. uvf. Os. Svn. HE. ICC. Neutrophil infiltration. Og. A2. Vascular necrosis with adjacent normal neurons. No haemorrhage in white matter. M-a. | ++ | C |
| 76 | 305.98 | ens. Og. uvf. RCC. Moderate microvascular congestion. Os. HM. HP. HE. ICC. Neutrophilic leukostasis. Neutrophil infiltration. Petechiation of the grey/white junction. M-a. | +++ | C (histo) |
| 77 | 307.98 | Mild ens. focal. Mlk. RCC. uvf. Os. Og-focal, deep sulcal. ivFt. Focal periventricular cyst in white matter with gemistocytes, microglial infiltration. Survival post-infarction. M-a. | + | n/c |
| 78 | 331.98 | ens. Mlk. Fc. svn. Advanced lesions. HE. ICC. Vasculitis. Neutrophil infiltration. A2. Microglial rod cells. SNC. Og. | ++ | C |
| 79 | 348.98 | Mlk. ens. HM. RCC but no sludging. M+A. Neutrophil leukostasis. Os. Og. HP. Neutrophil infiltration. ICC. No ICC present in haemorrhagic site where neutrophil extravasation was absent. HR in grey matter. | + | C |
| 80 | 425.98 | ens. Mlk. RCC. M+A. svn. Og. Os. Leukocytoclastic vasculitis, endothelial cells ok. Advanced lesions. HP. HE. ICC. NN. A2. Cerebellar Purkinje cells ICC, HCC. Spinal cord advanced lesion. "Venous infarction" | + | C |
| 81 | 427.98 | Mild microvascular congestion. Mild ens. fc. Mlk. M+A. RCC. Os. Toxic neutrophilia. HM. Pancreatitis | - | n/c Ex |
| 82 | 672.98 | Ens. uvf. Os. ivFt. M+A. RCC. | +++ | n/c |
| 83 | 815.98 | RCC. Margination. Os. Og. HE. Neutrophil infiltration. Empty vessels. Advanced lesions with HE. neutrophils. Gitter cells. A2, cystic lesions. S-a | +++ | C |
| 84 | 875.98 | Ens. Mlk. Svn. RCC. Margination. Necrosis of pial vessels. Congestion of meninges. Advanced lesions. HE. Neutrophil infiltration. ICC. NN. Vascular necrosis. ivFt. "Venous infarction". | ++++ + | C |
| 85 | 925.98 | Ens. Mlk. RCC. fc. HP. svn. Vasculitis. HE. Astrogliosis (sulcal floors). Neutrophil infiltration but no neuronal necrosis (mod MSB/LFB Holmes, LFB PAS). ivFt. Primary vasculitis. | ++ | C |
| 86 | 1031.98 | ens. Mlk. Mild congestion. Neutrophilia. HM. HR. HP. RCC. Axonal injury in spinal cord. E. canis | + | n/c Ex |
| 87 | 1094.98 | Ens. Mlk. Mild congestion. Severe Os and cerebellar compression. fc. HE lenticular nucleus with sparing of internal capsule. Leukocytoclastic vasculitis. Svn. ICC. NN. HR in grey matter. Og. ivFt. | - | C |
| 88 | 1112.98 | RCC. Severe multifocal microvascular congestion (lesion associated). fc. Svn. Og. Os. HR. Arterial congestion is a feature of this case. Caudal colliculus - advanced lesion. HE. Neutrophil infiltration. ICC. NN. Severe og. Mlk. Vascular wall necrosis. | + | C |
| 89 | 1207.98 | Severe congestion. ens. fc. RCC. Mlk. svn. HP. HM. Granule cell layer has HP. ivFt. Og. Early lesion. capillary necrosis and associated oedema. | ++ | pre-cerebral |
| 90 | 1268.98 | Mlk. ens. RCC. svn. HP. Og. Perivascular monocytic cuffing. Advanced lesion. HE. Neutrophil infiltration. ICC. EvFt. A2. Caudal compression of cerebellum. Low parasite density in capillaries. ivFt. | +++ | C |
| 91 | 1270.98 | Mlk. ens. RCC. M+A. Moderate congestion. pRBC abundant in capillaries but not in larger vessels. HM. Mild Os. m-a | +++ | n/c |

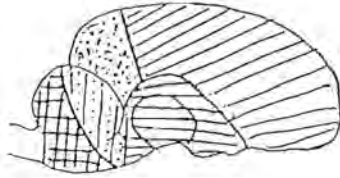
APPENDIX C FULL RESULTS TABLE - ULTRASTRUCTURE

| CASE | EM NUMBER | HISTORY | MACROSCOPIC PATHOLOGY | HISTOPATHOLOGY | ULTRASTRUCTURAL PATHOLOGY |
|------|-----------|---|---|---|--|
| 1 | 26.96 | Peracute haemoconcentrating babesiosis with central nervous excitation. Archival case. | Severe cerebral oedema and congestion. | Congestion and endothelial activation. | Endothelial - erythrocyte contact. Intererythrocytic contact. Necrosis of neuropil, with free erythrocytes, mitochondrial and other organellar debris and swelling of astrocyte foot processes. |
| 2 | 27.96 | Cerebral babesiosis. Archival case. | Eccymotic haemorrhage of brain stem and spinal cord. | Perivascular haemorrhage and vascular necrosis of brain stem. Neuronal necrosis. | Advanced neuronal ischaemic cell changes, immersion artifacts in neurons. Endothelial cell necrosis and autolysis in some cells. Severe astrocytic swelling. Intravascular inter-erythrocytic sites of contact. |
| 3 | 6.97 | Peracute babesiosis with no neurological signs clinically. Glutaraldehyde fixed (direct). | Bilateral, asymmetrical haemorrhage in caudate nuclei. Locally extensive myocardial necrosis. | Segmental vascular necrosis. Advanced lesions with ischaemic cell change and foci of malacia. | Severe vascular injury with exposure of basement membrane, loss of plasma into perivascular space, intact tight junctions, endothelial cell necrosis. Microvascular vasoconstriction. Swelling of pericyte nuclei causing luminal obstruction. Fibrin degradation products. Inter-erythrocytic contact points. Cytoplasmic vesicles on erythrocyte membranes. Intravascular monocytic activation. Neutrophilia. |
| 4 | 1.98 | Severe generalised seizures. | Multifocal cerebral haemorrhage. Cardiac form. | Erythrocyte margination and adherence. Multifocal petechiation with perivascular oedema of grey matter. Mild focal neutrophilic perivascular cuffing. No neuronal necrosis. Low endothelial reactivity. | Marked plastic deformation of erythrocytes. Loss of electron density. Erythrocyte fragmentation. Inter-erythrocytic contact points: amorphous granules. Endothelio-erythrocytic contact points. Focal endothelial necrosis. Focal endothelial nuclear swelling with microvascular occlusion. Endothelial pseudopodia formation - luminal aspect. Phagocytosed erythrocyte fragments. Plasma in perivascular space. Loss of swollen astrocyte foot-process contact with basement membrane. Condensation of organelles in endothelial cells. Individual endothelial cell necrosis. Neuronal changes very variable: From intact, through early reversible change to irreversible change with loss of nucleoli, nuclear swelling, loss of ribosomes and presence of mitochondrial dense bodies. Astrocytic syncytial swelling observed adjacent to intact neurons. Oedema of myelin sheaths. |

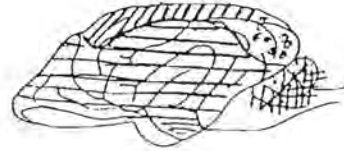
| CASE | EM NUMBER | HISTORY | MACROSCOPIC PATHOLOGY | HISTOPATHOLOGY | ULTRASTRUCTURAL PATHOLOGY |
|------|-----------|---|---|---|--|
| 5 | 3.98 | Cerebral babesiosis | Multifocal cerebral haemorrhage and muscle form. | Severe vascular necrosis with vasculitis. Neuronal necrosis could not be demonstrated using modified MSB, LFB-Holmes or LFB PAS stains. Perivascular neutrophilic cuffs and focal infiltration. | Endothelial-erythrocytic contact. Membrane stacks between erythrocytes and endothelial cells. Margination of erythrocytes against endothelium with apparent fusion of erythrocyte and endothelial membranes. Sludging of erythrocytes with apparent fusion of adjacent membranes. Endothelial cell retraction with exposure of underlying basement membranes. Endothelial cell necrosis. Perivascular polymerisation of fibrin with complete necrosis of endothelial cells. Tight junctions morphologically intact, lysis of organelles. |
| 6 | 4.98 | Subacute babesiosis with respiratory distress. Glutaraldehyde fixed (direct). | Pulmonary oedema. | Very high parasitaemia, rare microhaemorrhage. Margination of parasitised erythrocytes and swelling of endothelial nuclei. | Erythrocyte sludging, loss of electron density and inter-erythrocytic contact. Endothelial-erythrocyte contacts. Severe nuclear swelling. Focal endothelial necrosis. Retraction of endothelial cells with exposure of basement membrane. |
| 7 | 5.98 | Subacute babesiosis. AIHA. | External pallor, internal bilateral ecchymoses of caudate nuclei. Pulmonary form. | Sludging, margination of erythrocytes. Very high parasitaemia. Microhaemorrhage. | Apparent fusion of adjacent erythrocyte membranes. Erythrocyte squaring in capillaries, or marginating. Apparent fusion of erythrocyte-endothelial plasmalemma. Endothelial necrosis with condensation of organelles. Intravascular fibrin polymerisation. Endothelial pseudopodia. Endothelial-erythrocyte contact. |

APPENDIX D

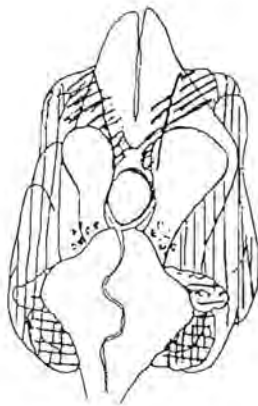
ARTERIAL SUPPLY FIELDS OF THE CANINE BRAIN.



Medial



Lateral




Ventral





Dorsal


Key:

Rostral cerebral artery 

Middle cerebral artery 

Caudal cerebral artery 

Rostral cerebellar artery 

Caudal cerebellar artery 

APPENDIX E

Table of Excluded cases

| Exclusion criterion | Frequency (%) | Cumulative frequency |
|--|---------------|----------------------|
| <i>Ehrlichia canis</i> co-infection | 28 (65.1) | 65.1 |
| Septicaemia | 2 (4.7) | 69.8 |
| Parvoviral enteritis | 3 (7) | 76.8 |
| Pancreatitis | 1 (2.3) | 79.1 |
| Warfarin toxicity | 1 (2.3) | 81.4 |
| Granulomatous meningo-encephalitis | 1 (2.3) | 83.7 |
| Metastatic cerebral neoplasia (with concurrent <i>Ehrlichia canis</i> infection) | 1 (2.3) | |
| Splenic torsion | 1 (2.3) | 86 |
| Acute heart failure | 1 (2.3) | 88.3 |
| <i>Babesia canis</i> not confirmed | 2 (4.7) | 93 |
| Intussusception | 1 (2.3) | 95.3 |
| Spinal injury | 1 (2.3) | 97.6 |
| Suspected diamidine toxicity | 1 (2.3) | 99.9 |
| TOTAL | 43 | |