

Neurodegenerative diseases: grey matter (2)

Major lesion groupings

Grey matter

- Neuronal necrosis
 - cerebrocortical, hippocampal, cerebellar
- Neuronal degeneration, spheroid formation
 - Cerebellum, [motor, sensory – with GM / WM], 'multisystem'
- **Multi/focal neuroparenchymal necrosis / rarefaction / oedema**
- Vacuolation

Grey matter and white matter

- Neuroparenchymal necrosis / rarefaction / oedema
- Neuronal degeneration + axonal degeneration : long fibre tract Wallerian degeneration, spheroid formation
 - motor neurone + tract, sensory neurone + tract, combination
- Vacuolation

White matter

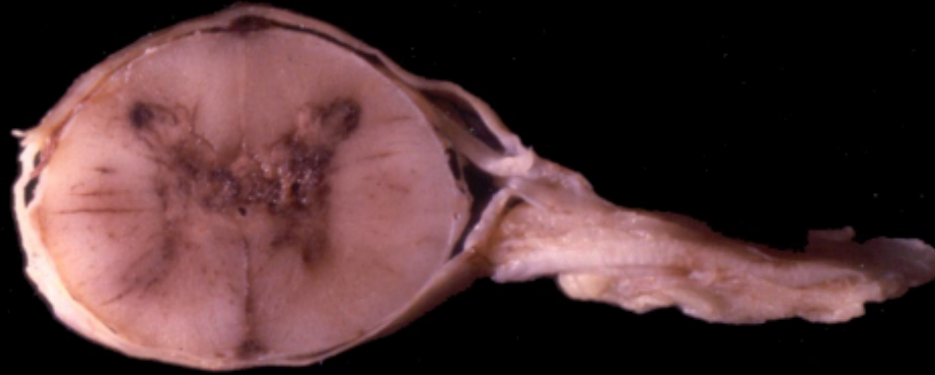
- Multi/focal neuroparenchymal necrosis / myelinolysis –demyelination / oedema
- Secondary demyelination / Wallerian degeneration
 - Long fibre tract and other patterns of Wallerian degeneration, spheroid formation – with GM+WM
- Hypomyelination
- Dysmyelination (lesions of myelin sheath / oligodendroglia)
- Vacuolation

Necrosis grey matter : neuropil ± nerve cell bodies; 'malacia', sometimes haemorrhagic

Disease / aetiology	Predilection sites for grey matter necrosis
Porcine Selenium intoxication	Spinal intumescences
Nigropallidal encephalomalacia of horses : prolonged ingestion of <i>Centaurea solstitialis</i> or <i>C repens</i>	Globus pallidus and substantia nigra, usually both symmetrically involved
Porcine Focal symmetrical encephalomalacia ; <i>Aeschynomene indica</i> seed intoxication following contamination of rice	Cerebellar roof and vestibular nuclei
Idiopathic syndromes of ovine polioencephalopathy, Kenya and Ghana	Spinal intumescences ± medullary nuclei
Caprine encephalomyelomalacia of unknown cause (Cordy <i>et al</i> 1984)	Spinal intumescences ± medullary nuclei
Multifocal symmetrical necrotising encephalomyelopathy of Simmental cattle *	Caudate, thalamic, mesencephalic, olivary and cuneate nuclei, dorsal horn
Multifocal symmetrical necrotising encephalomyelopathy in Angus calves *	Medullary nuclei predom. DVN, lat cuneate, olives (± spinal cord central GM, substantia nigra,
Focal symmetrical poliomalacia of the spinal cord in Ayrshire calves	Spinal intumescences
Subacute symmetrical necrotising encephalopathy in lambs (Swaledale, Welsh mountain, Blackface) *	Brainstem nuclei particularly periventricular and olives
Hereditary striatonigral and cerebello-olivary degeneration of Kerry Blue terriers	Basal nuclei and olives
Alaskan Husky – Leigh disease like syndrome	Bilateral V-shaped thalamus backwards continuous through to medulla – periphery and caudally – ncbs + axons pres.
Australian cattle dog encephalopathy	Cervical intumescence, lumbar intumescence, lateral cuneate, vestibular cerebellar, ambiguous, caudal colliculi
Infarction Post-anaesthetic myelopathy in horses ? Vascular compromise	Varies ; grey matter more vulnerable than white Haemorrhage and necrosis usually in thoracic spinal cord
Vertebral fracture (lumbar) cattle, other species	Dorsal horn, ~ fracture level
Subacute - chronic stages of thiamine deficiency / sulphur intoxication ruminants	Usual sites - mainly cerebral cortex and caudate nucleus
Thiamine deficiency encephalopathy carnivores : cats, dogs, foxes, mink	Haemorrhage brainstem particularly caudal colliculus; oedema, haemorrhage, capillary activation, neuronal degeneration, axonal swelling

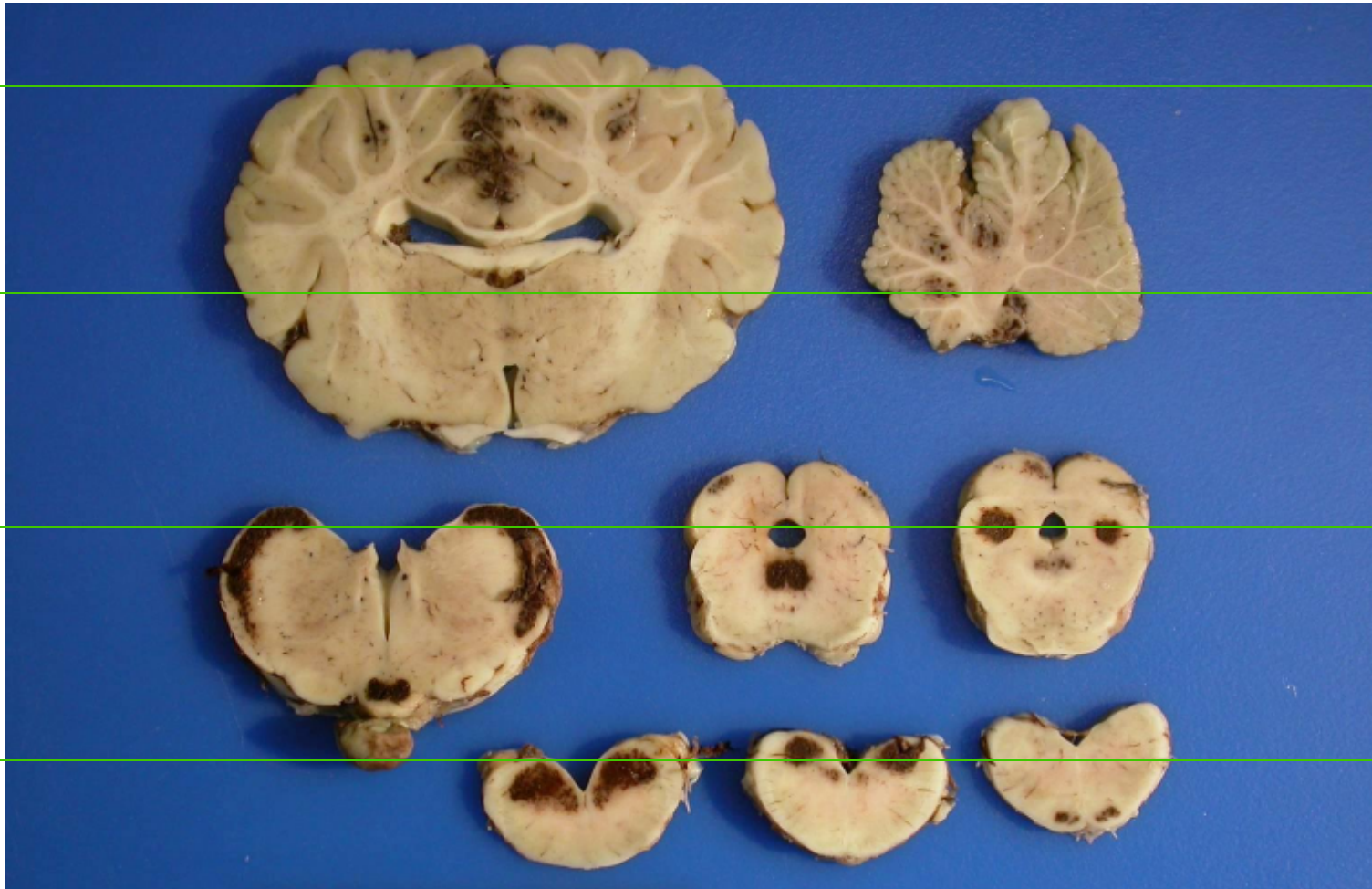
*predominantly neuropil especially early stages / margins of lesions

Equine rabies poliomalacia
courtesy Dr Donal O'Toole
99E2791
April 1999

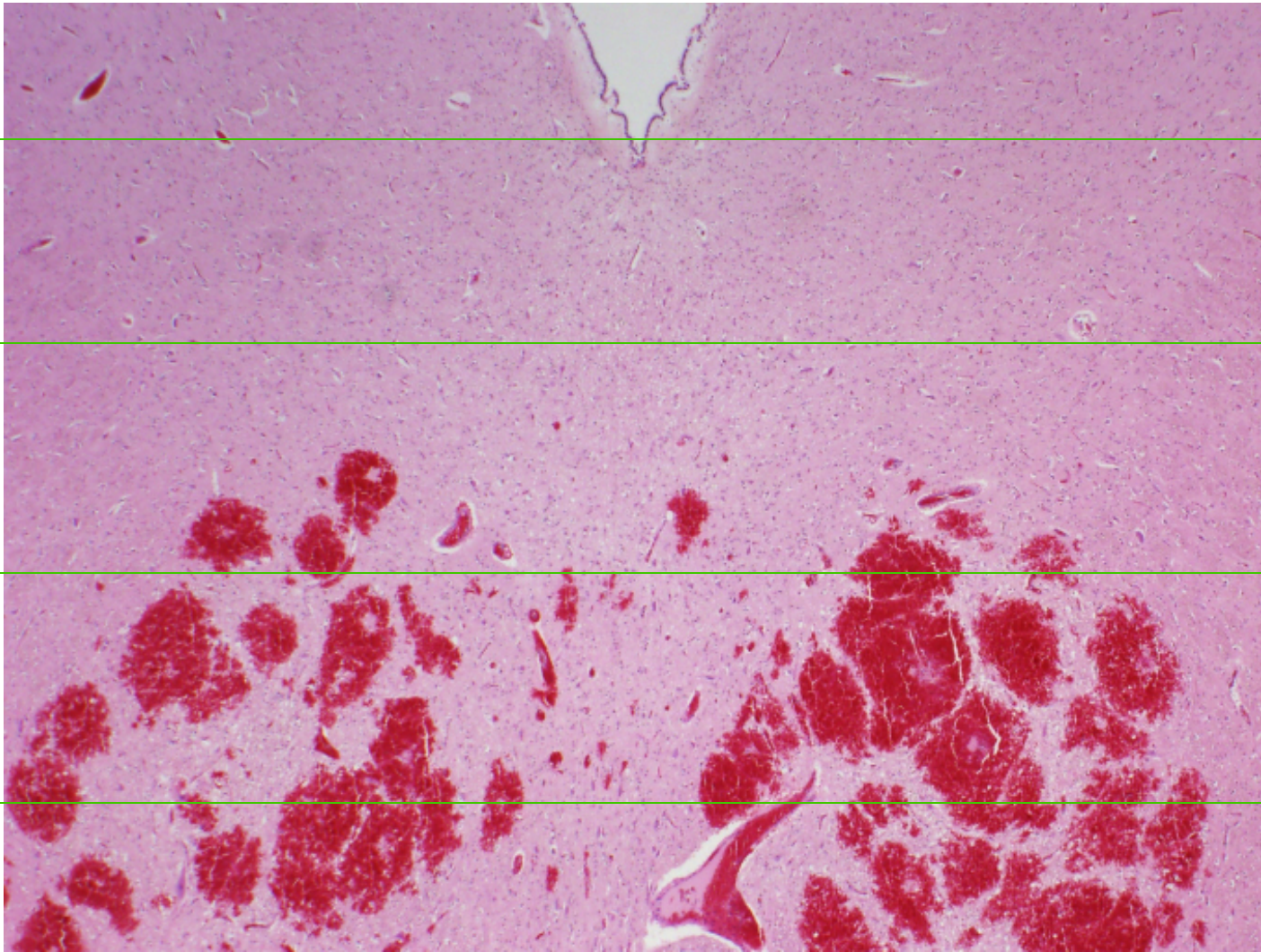


Equine rabies
poliomalacia
WSVL 91E2288
courtesy Dr Donal
O'Toole

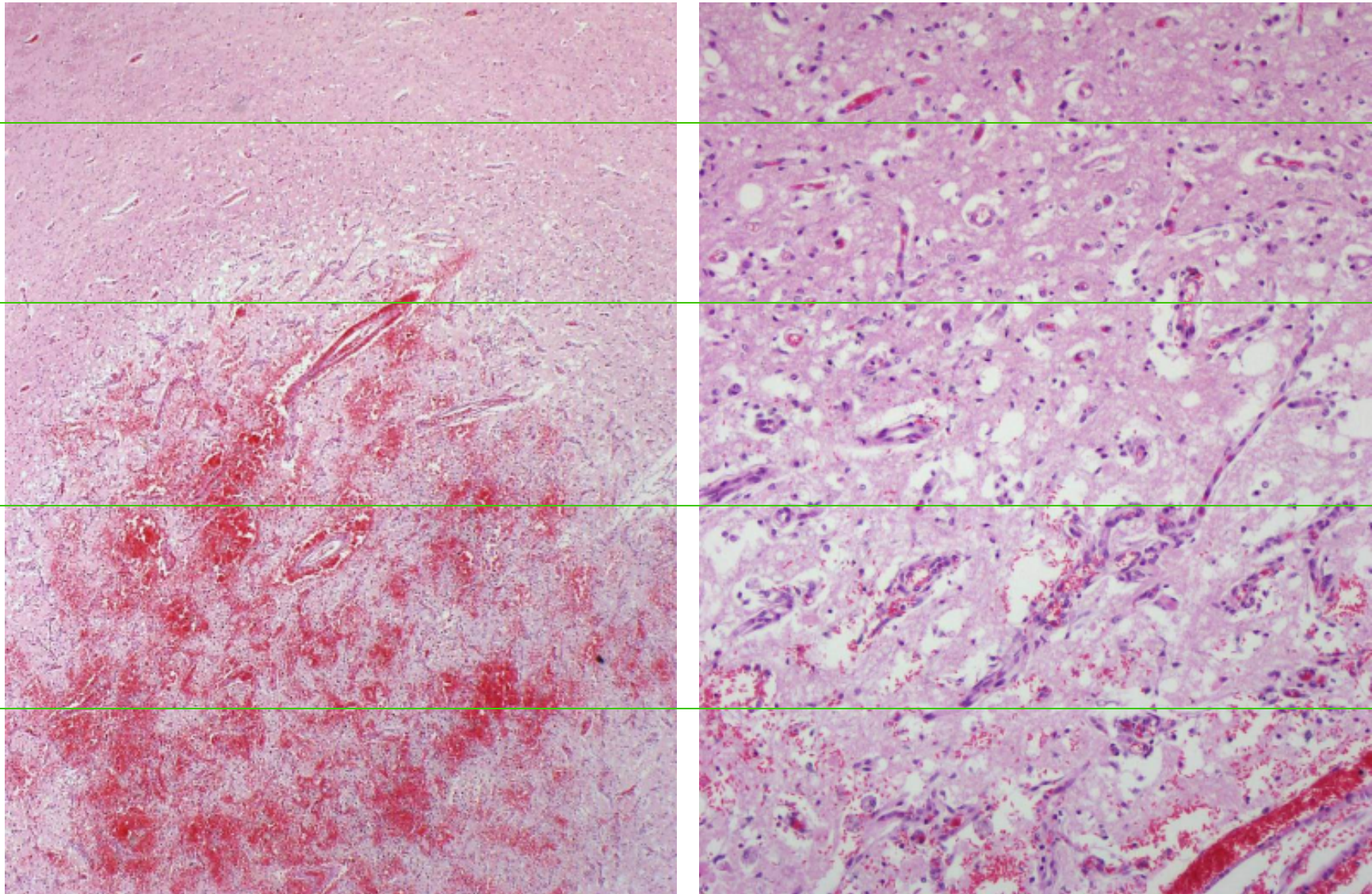




Symmetrical haemorrhagic encephalopathy - alpaca



Symmetrical haemorrhagic encephalopathy - alpaca



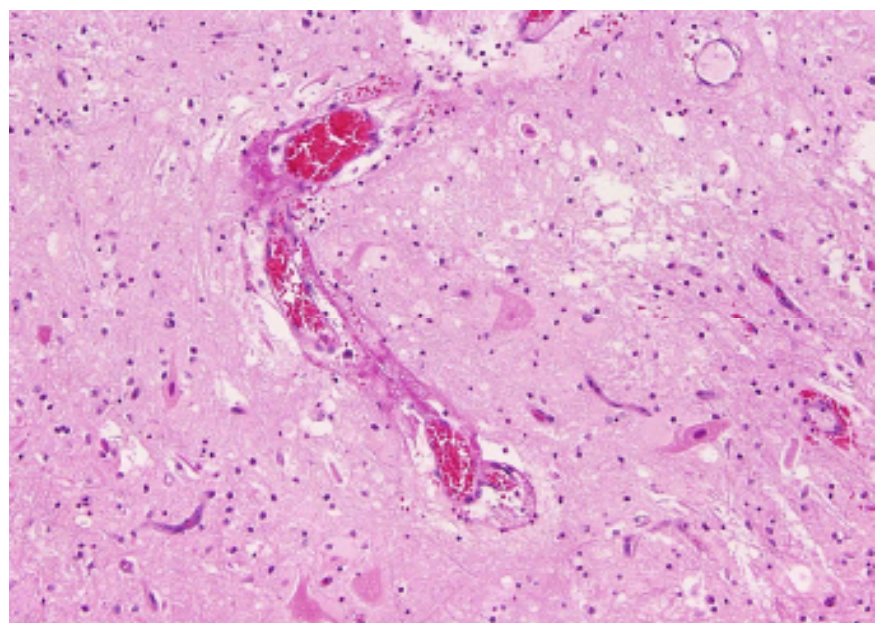
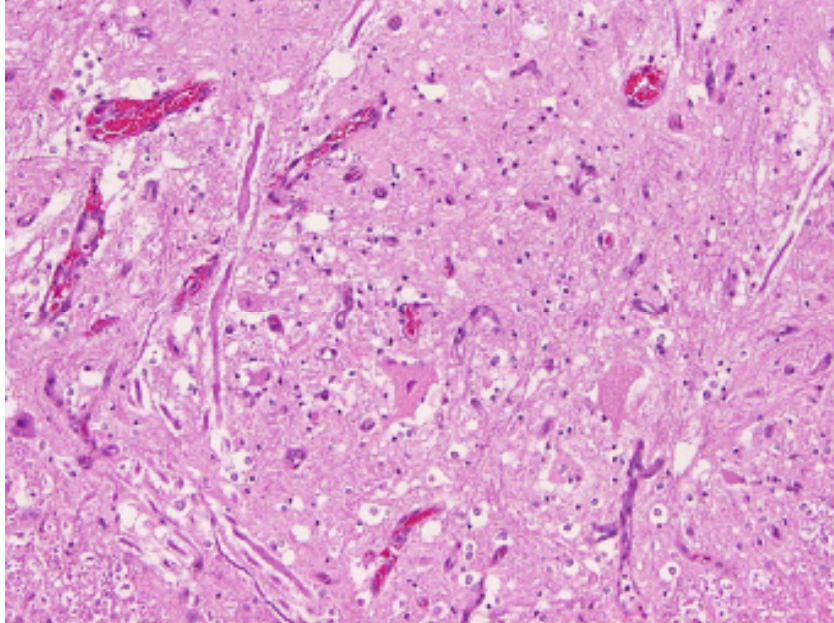
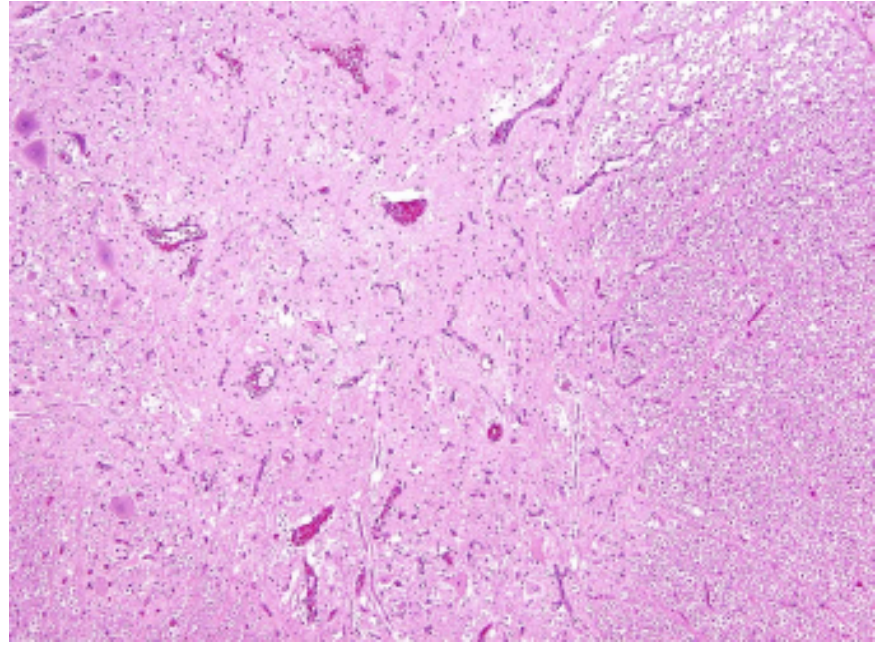
Symmetrical haemorrhagic encephalopathy - alpacas

- bilaterally symmetrical brain hemorrhages progressing to malacia
- no other significant lesions
- aetiology unknown

- hypotheses
 - clostridial enterotoxaemia
 - other bacterial toxin
 - nutritional encephalopathy (thiamine?)



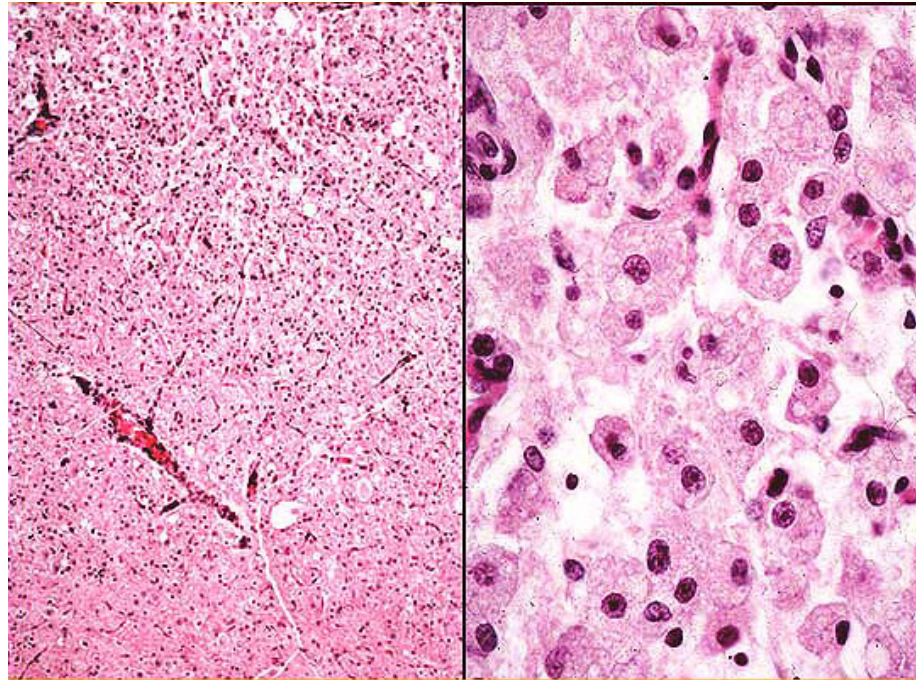
Lumbar vertebral fracture, lamb



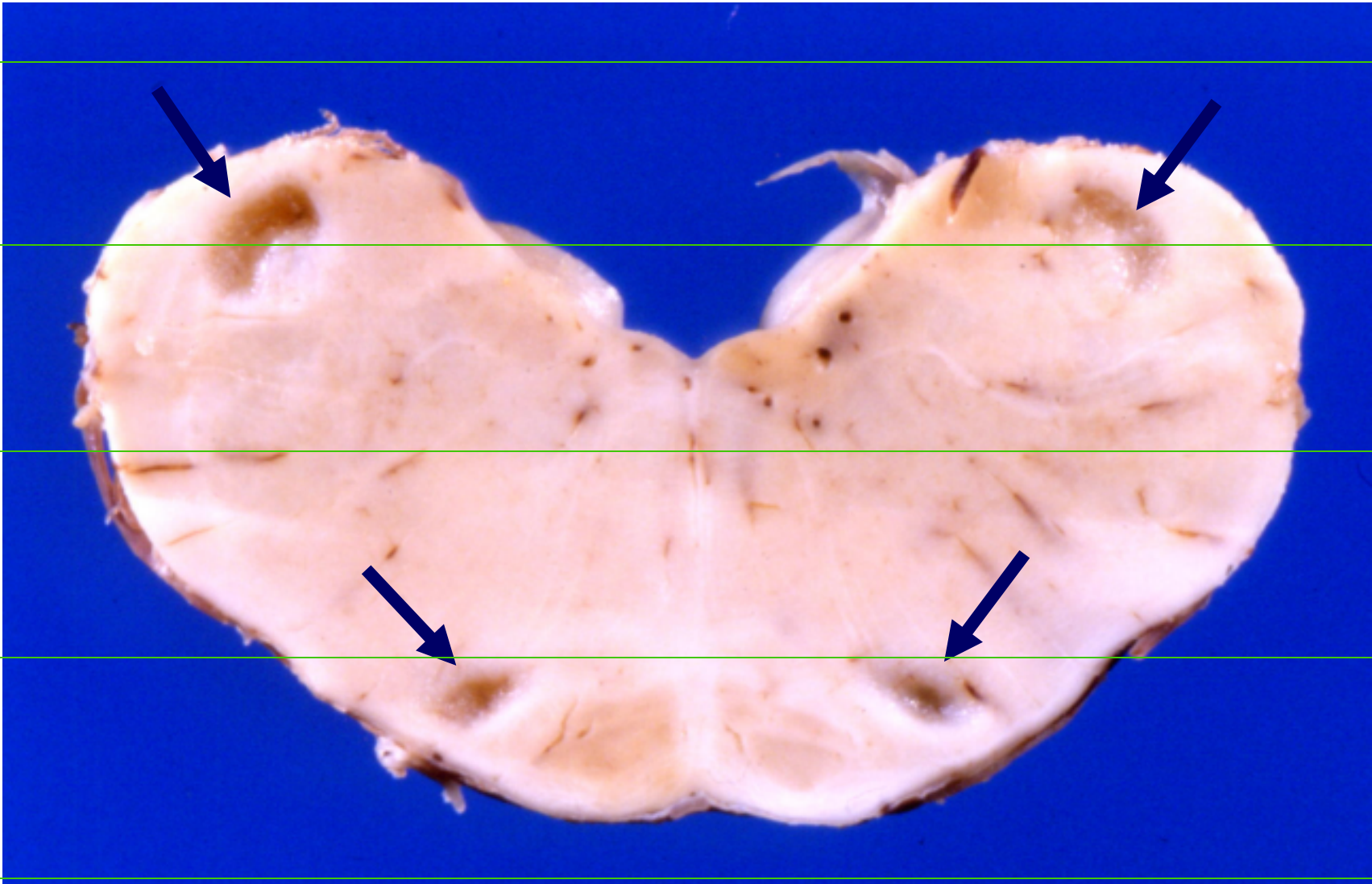
E30-90 Selenium intoxication porcine



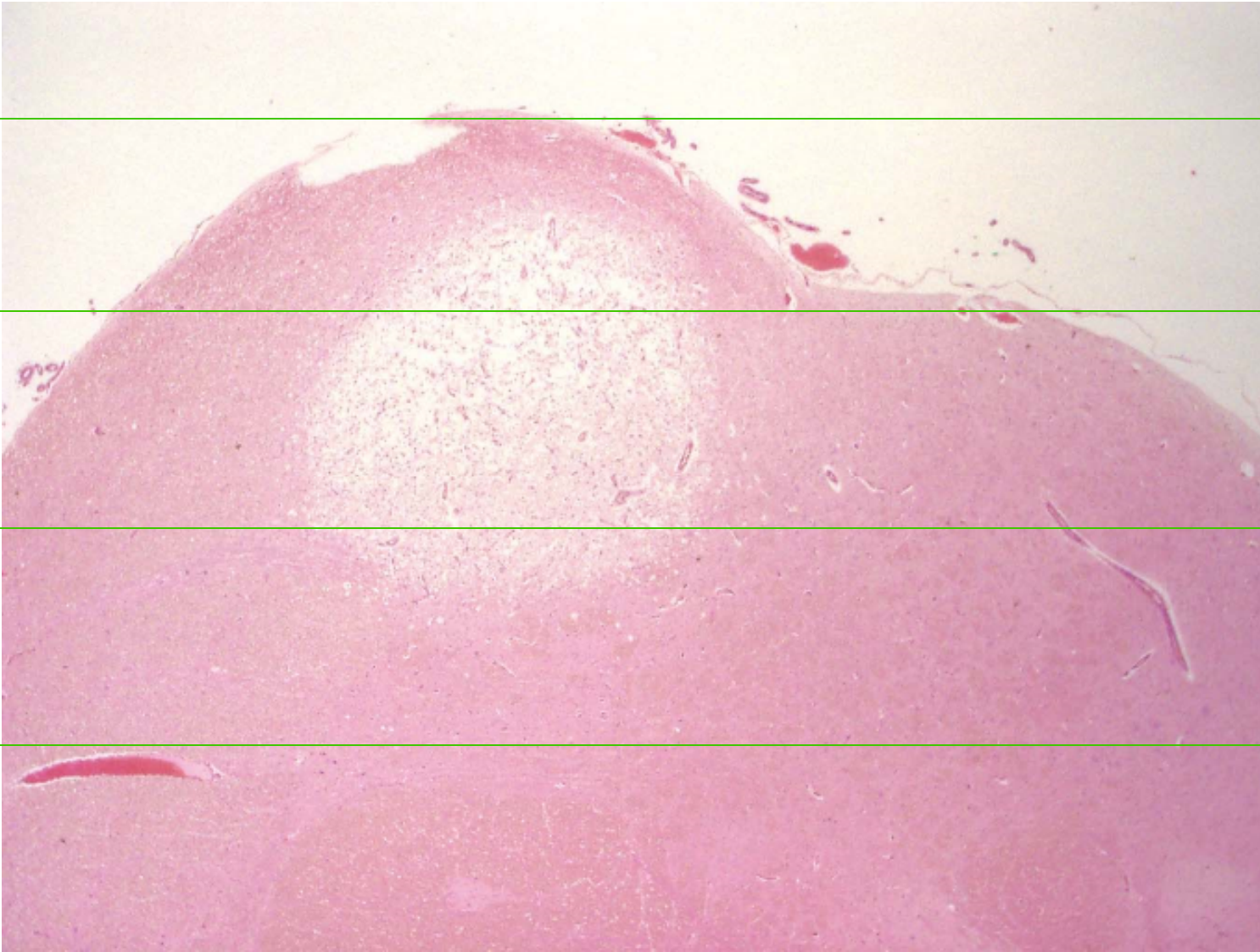
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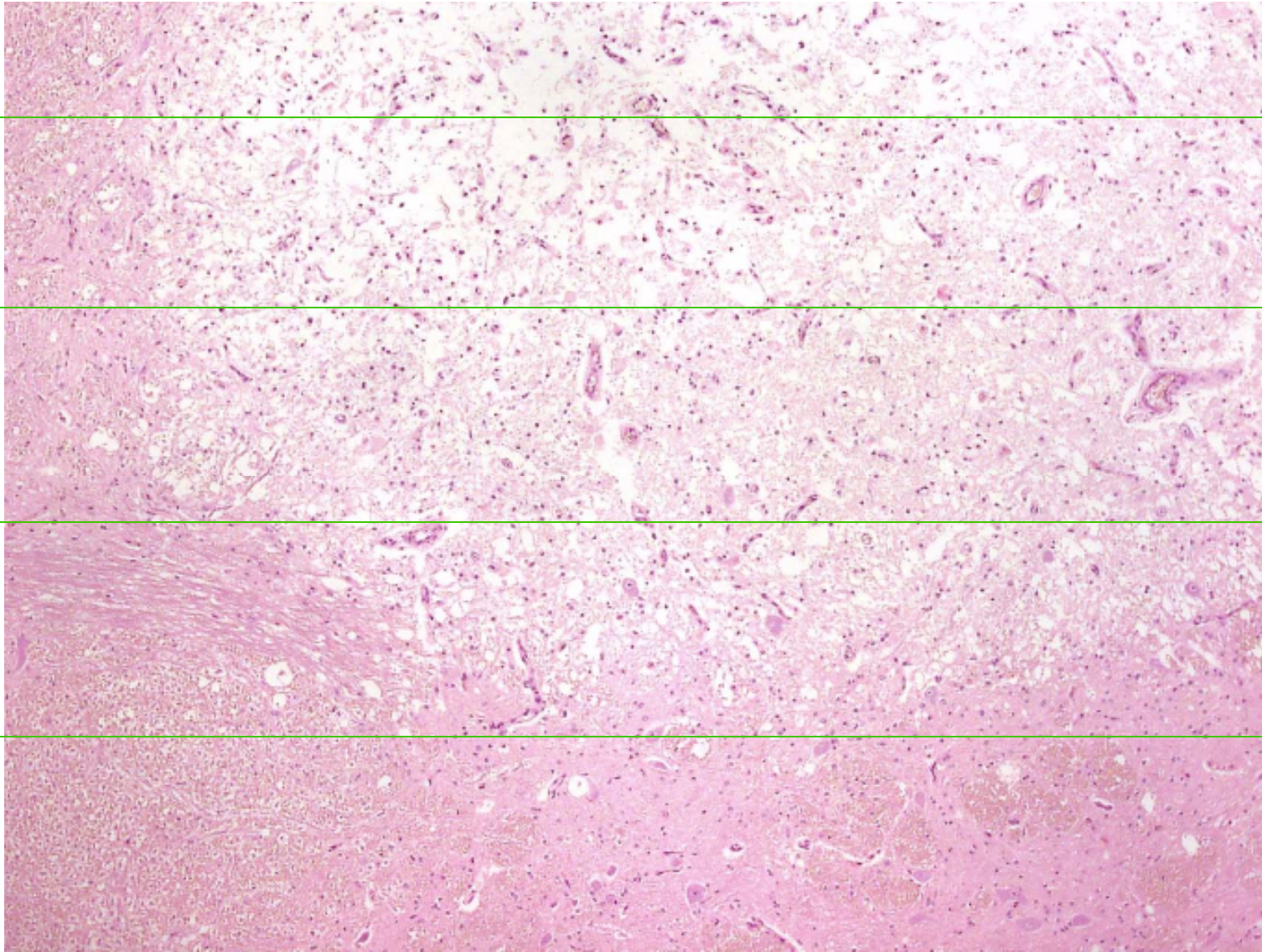
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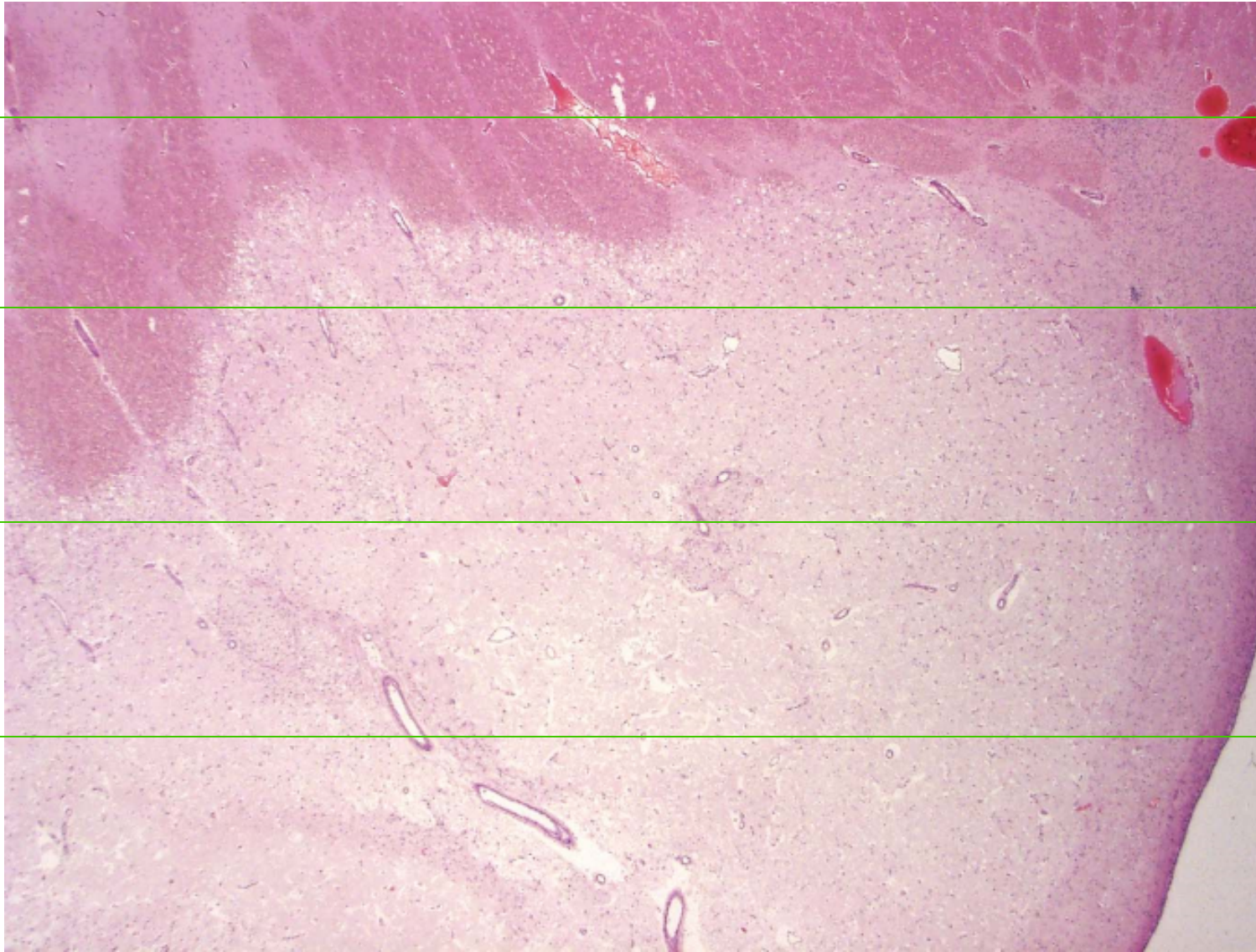
Multifocal encephalomyelopathy , Simmental calf



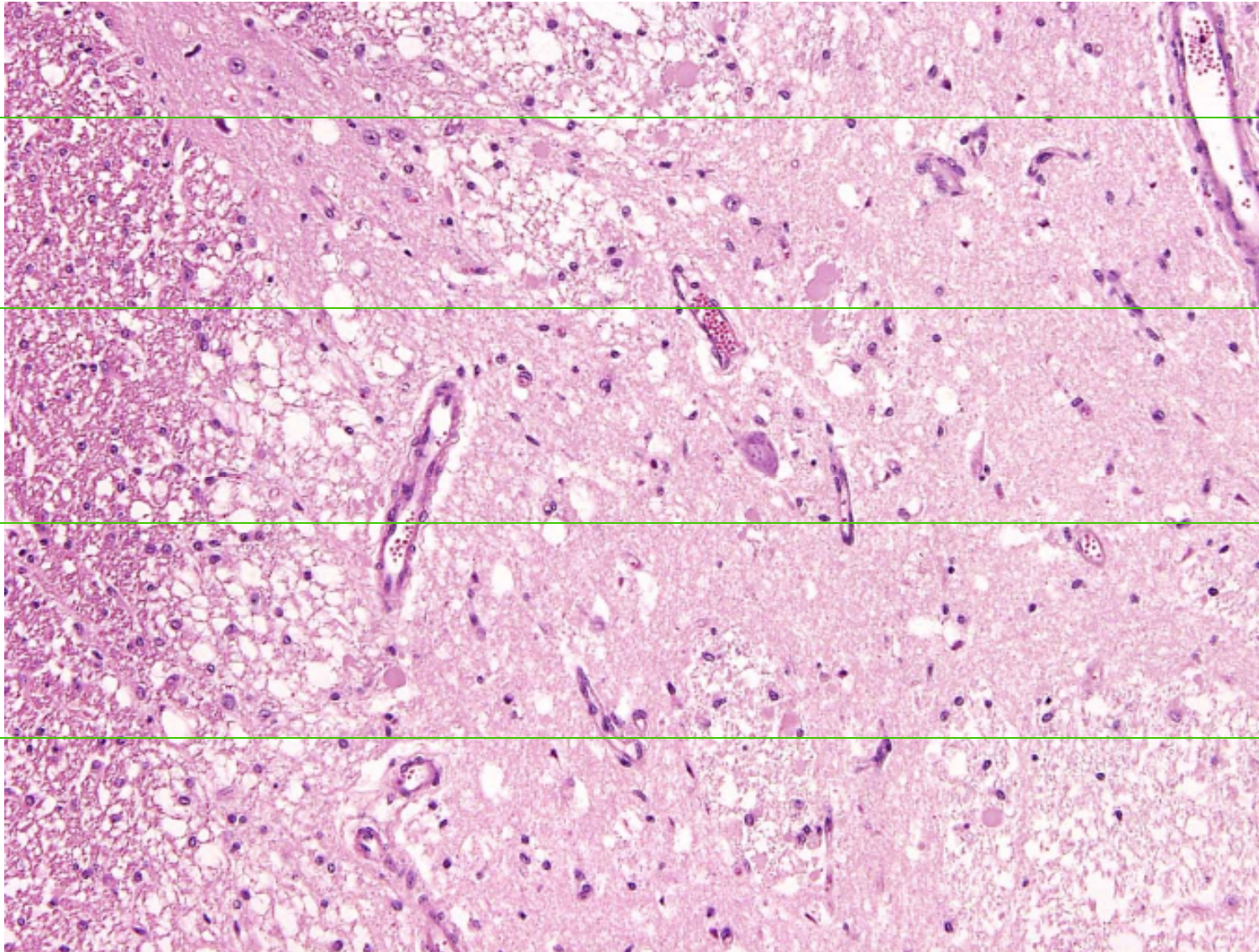
Simmental MNSE ACN



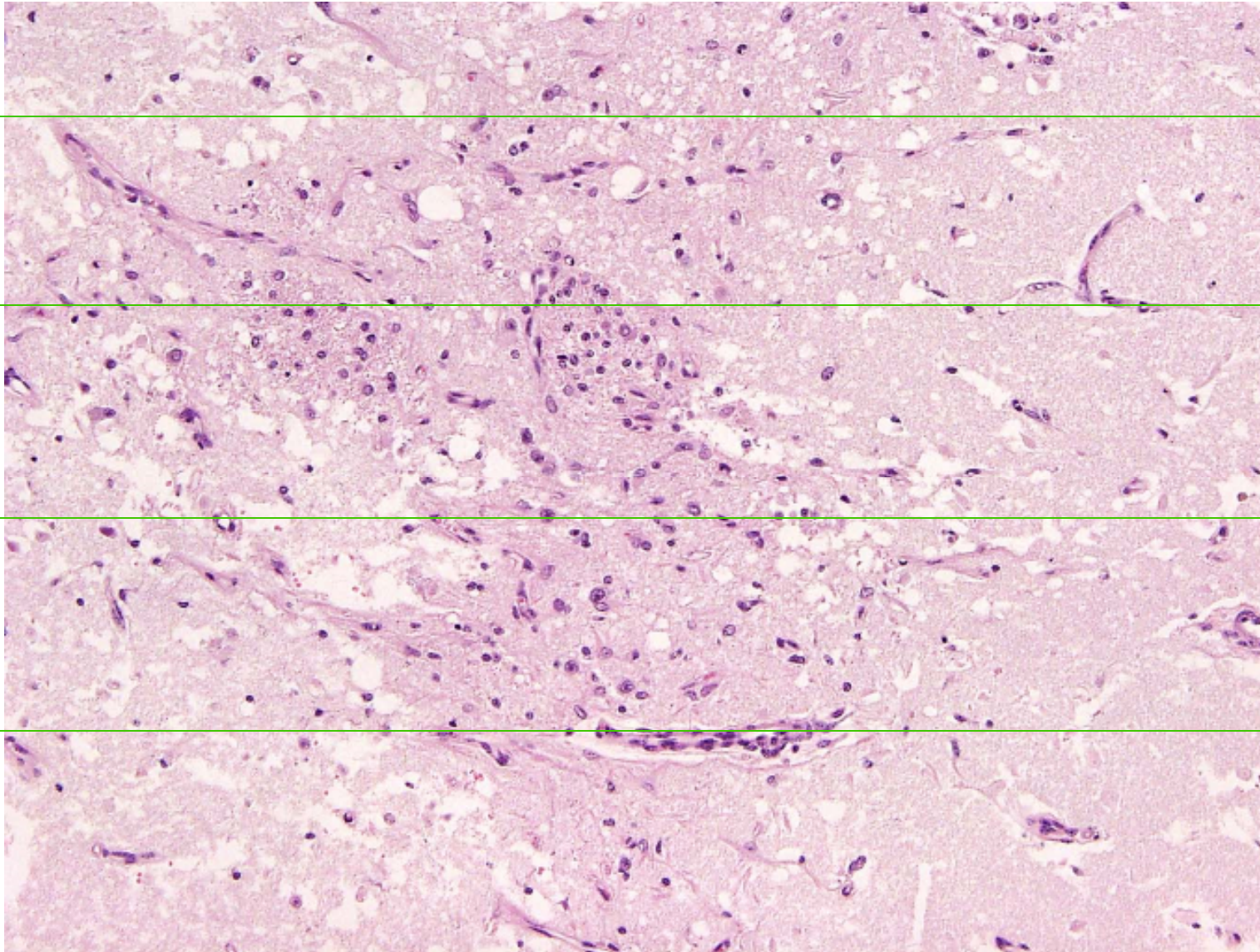
Simmental MNSE ACN



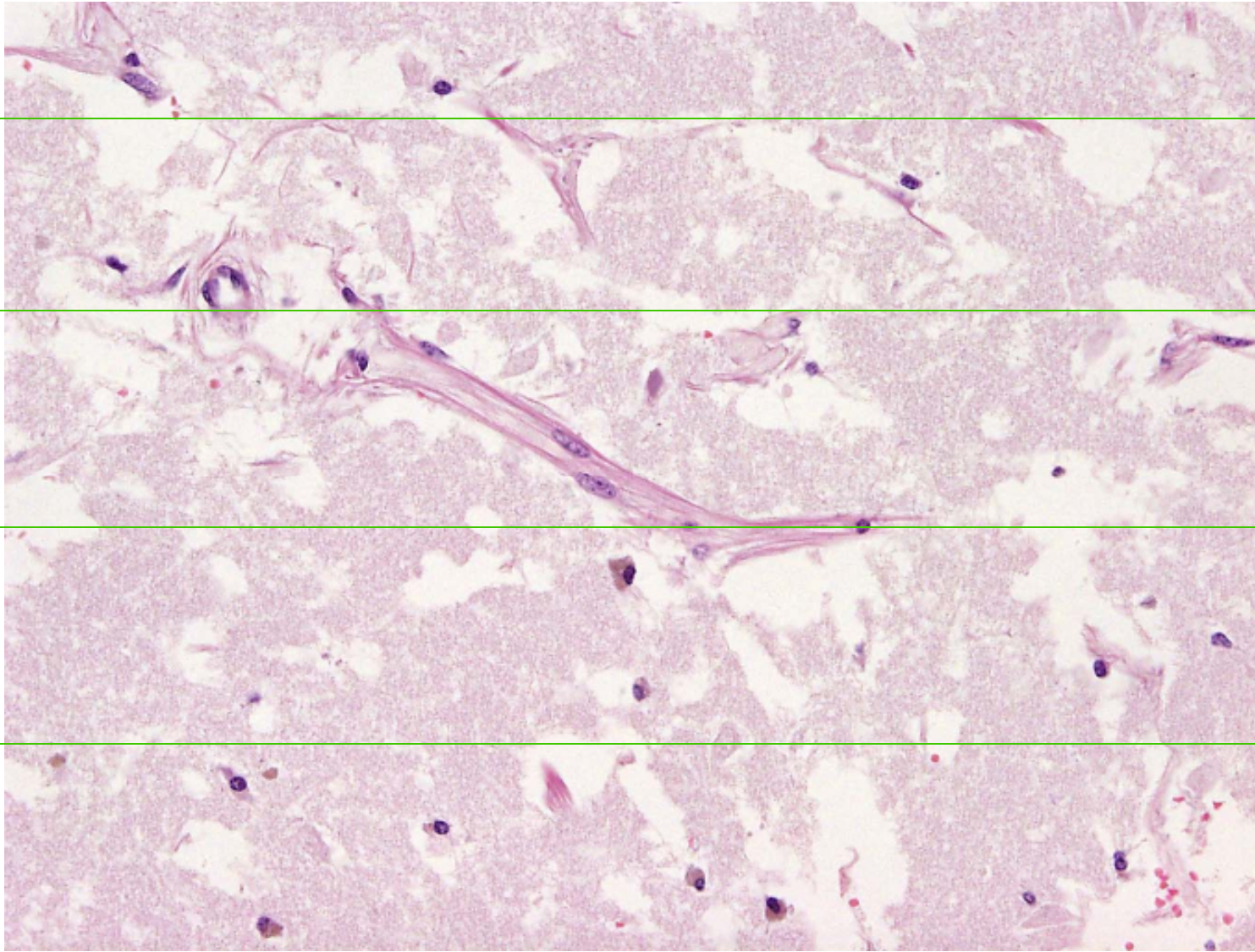
Simmental MNSE caudate nucleus / internal capsule



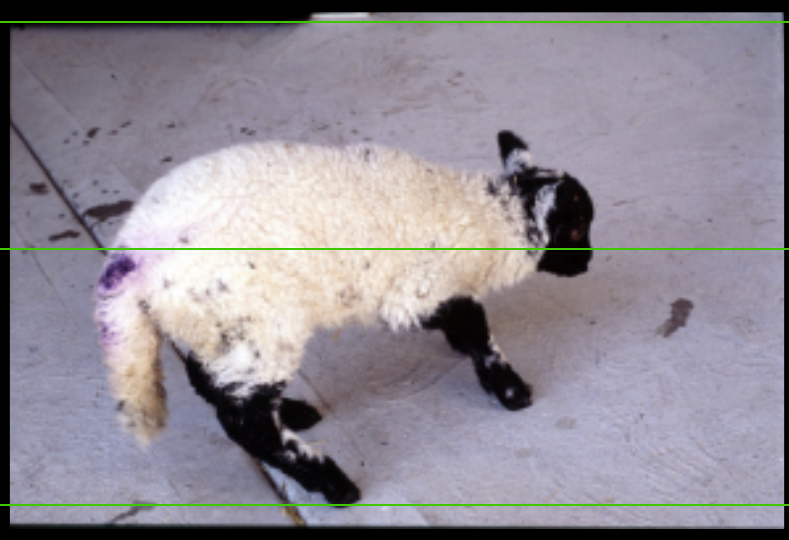
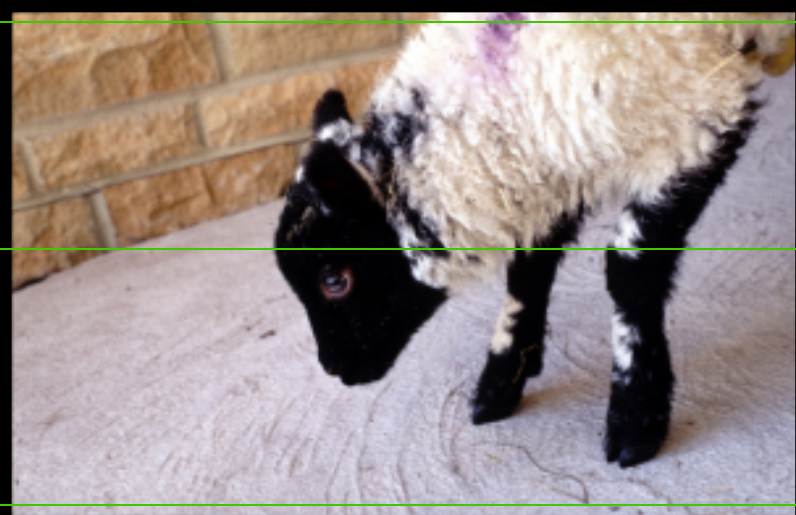
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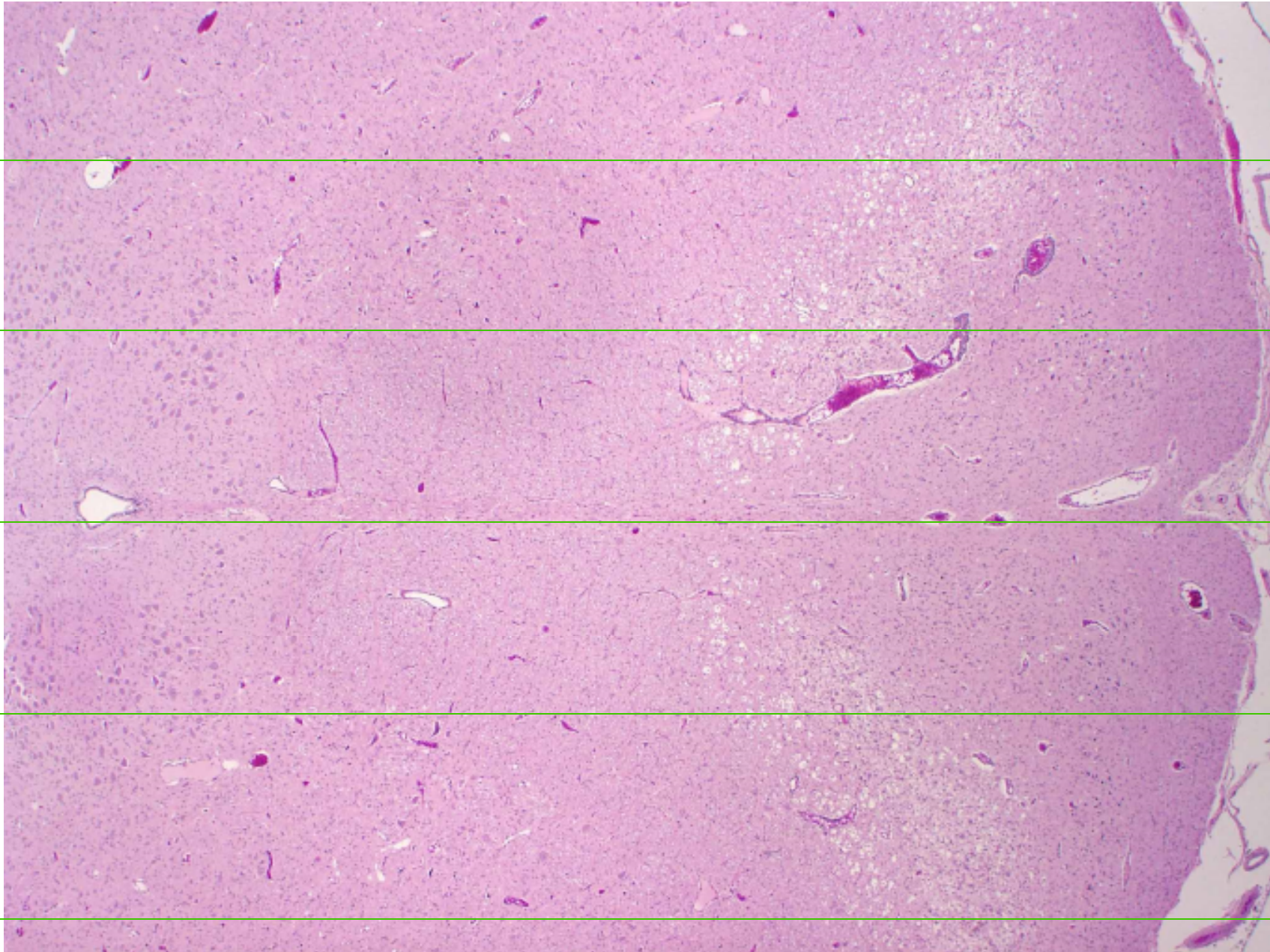
Simmental MNSE caudate nucleus



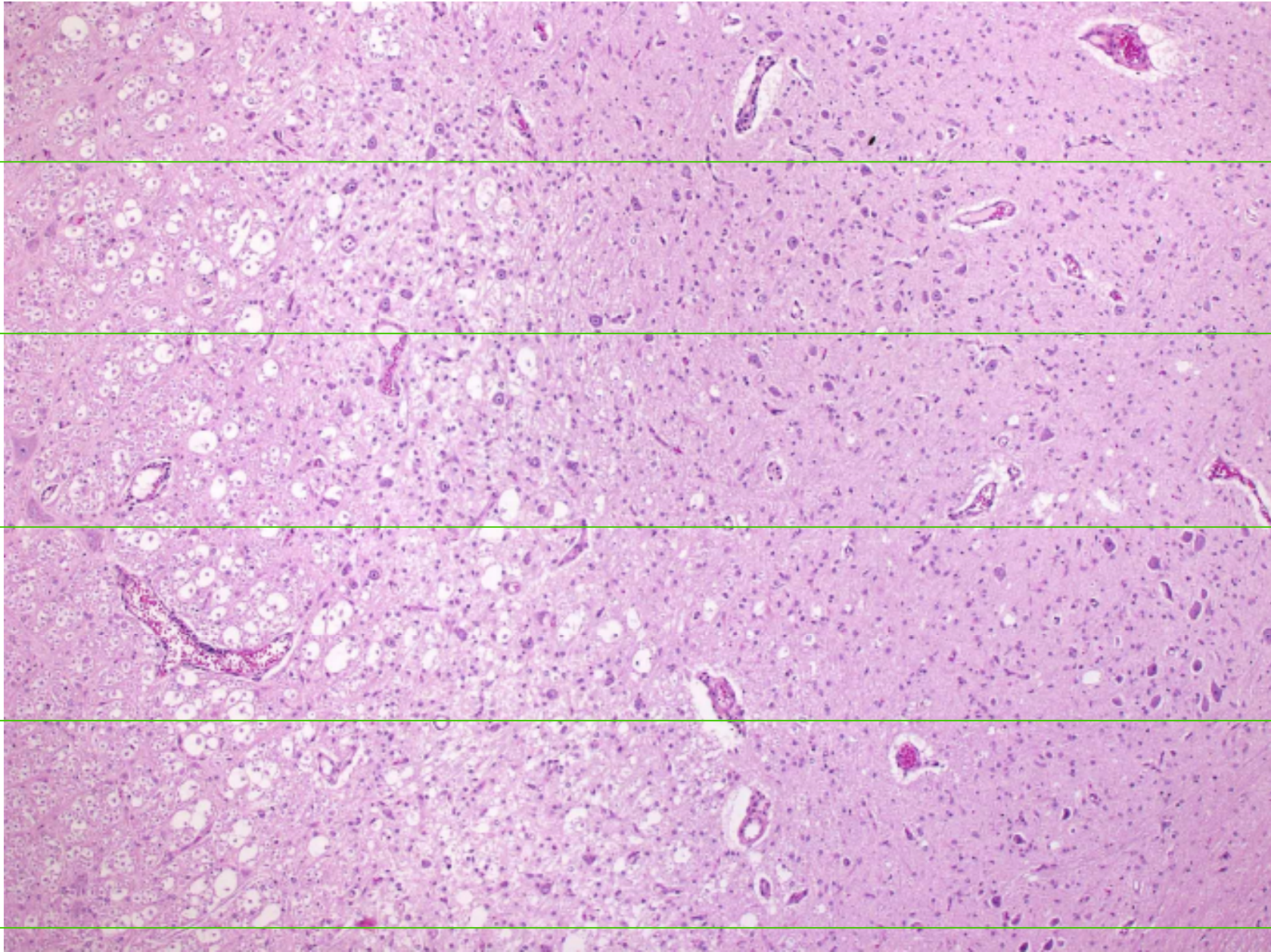
3 - 10 day old Swaledale lambs

Normal at birth

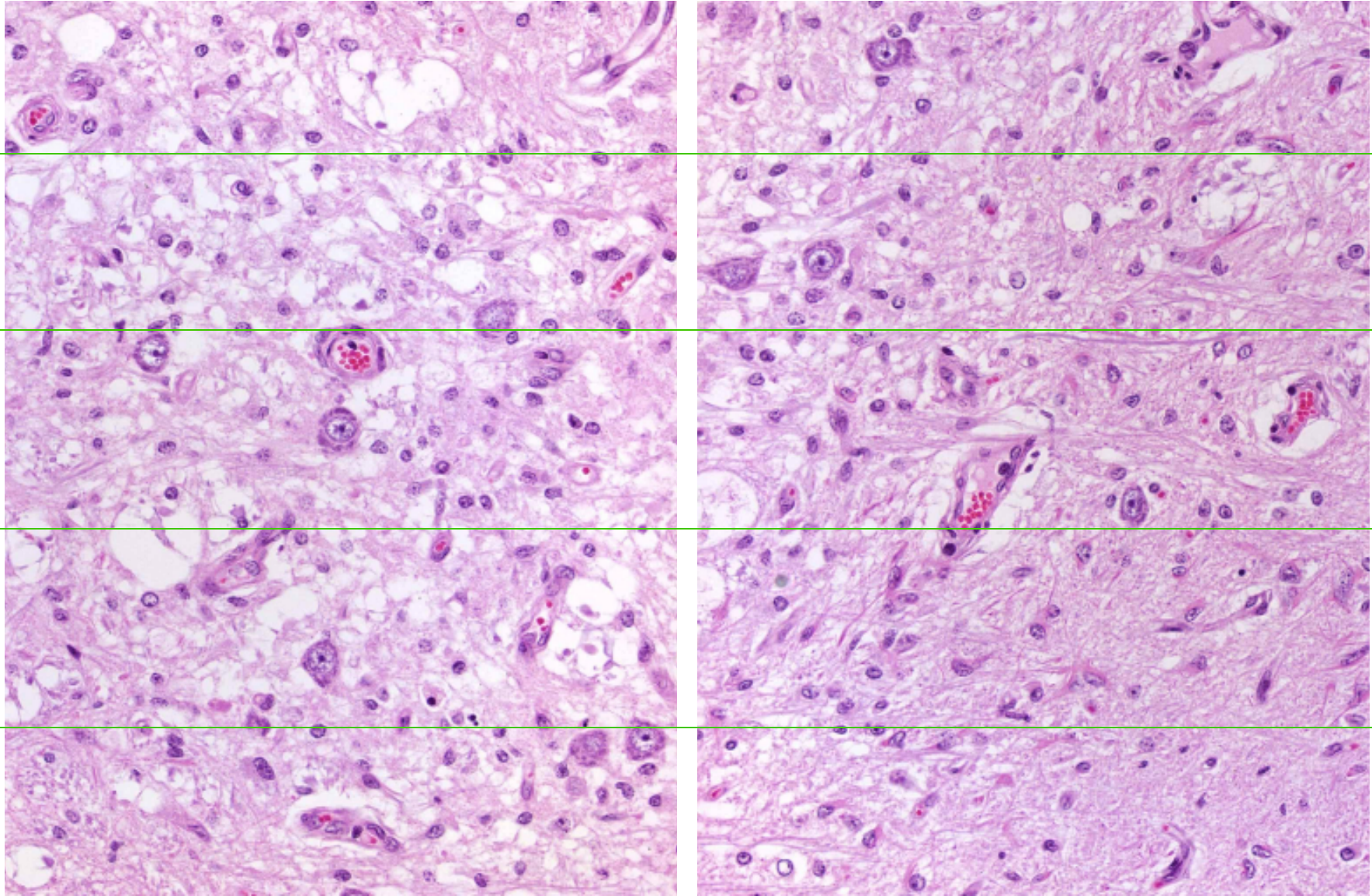
Progressive neurological signs include hyper-responsiveness to stimulation (handling, feeding), progressing to muscle stiffening and seizure-like activity



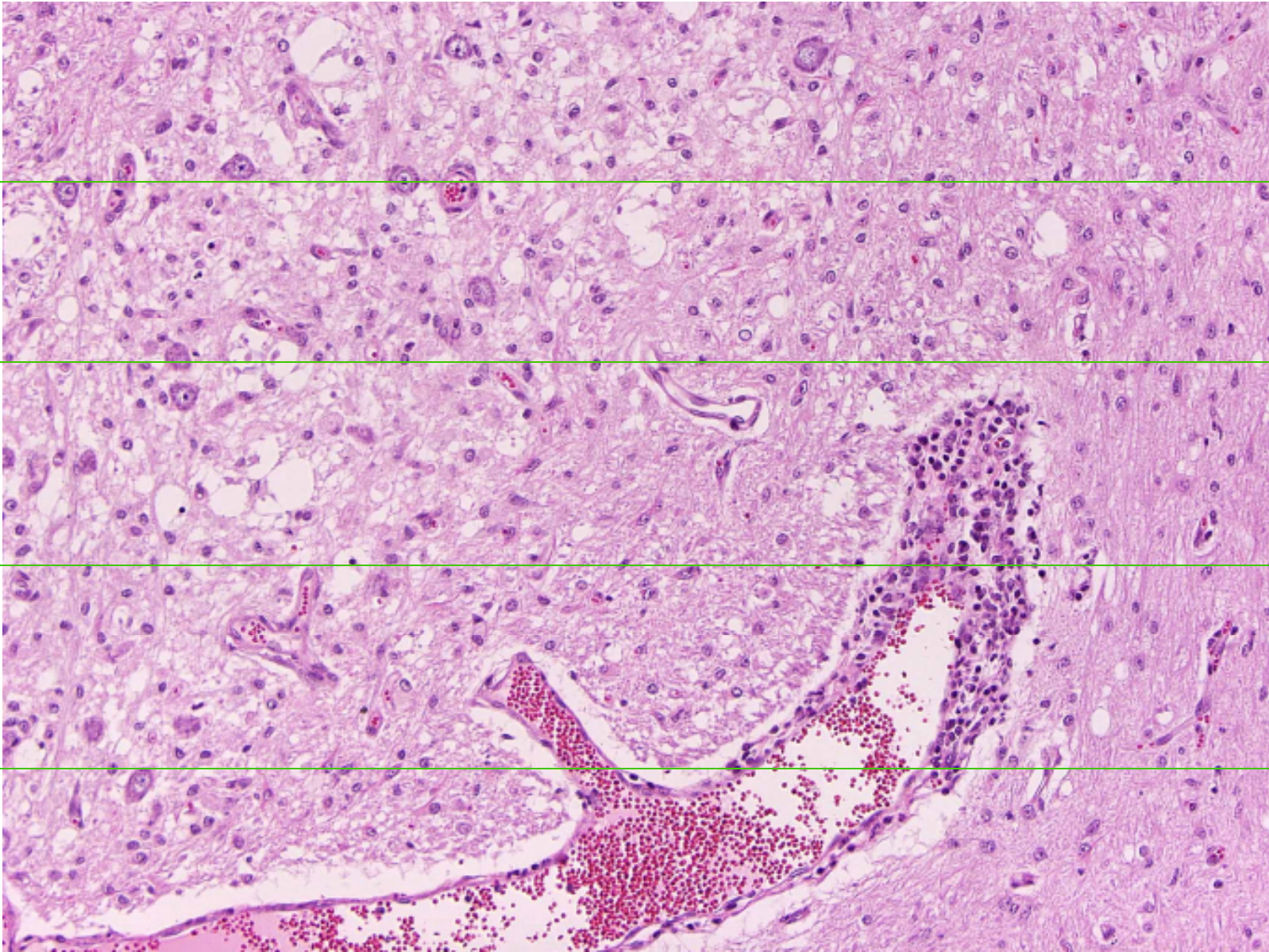
Swaledale encephalopathy – olives



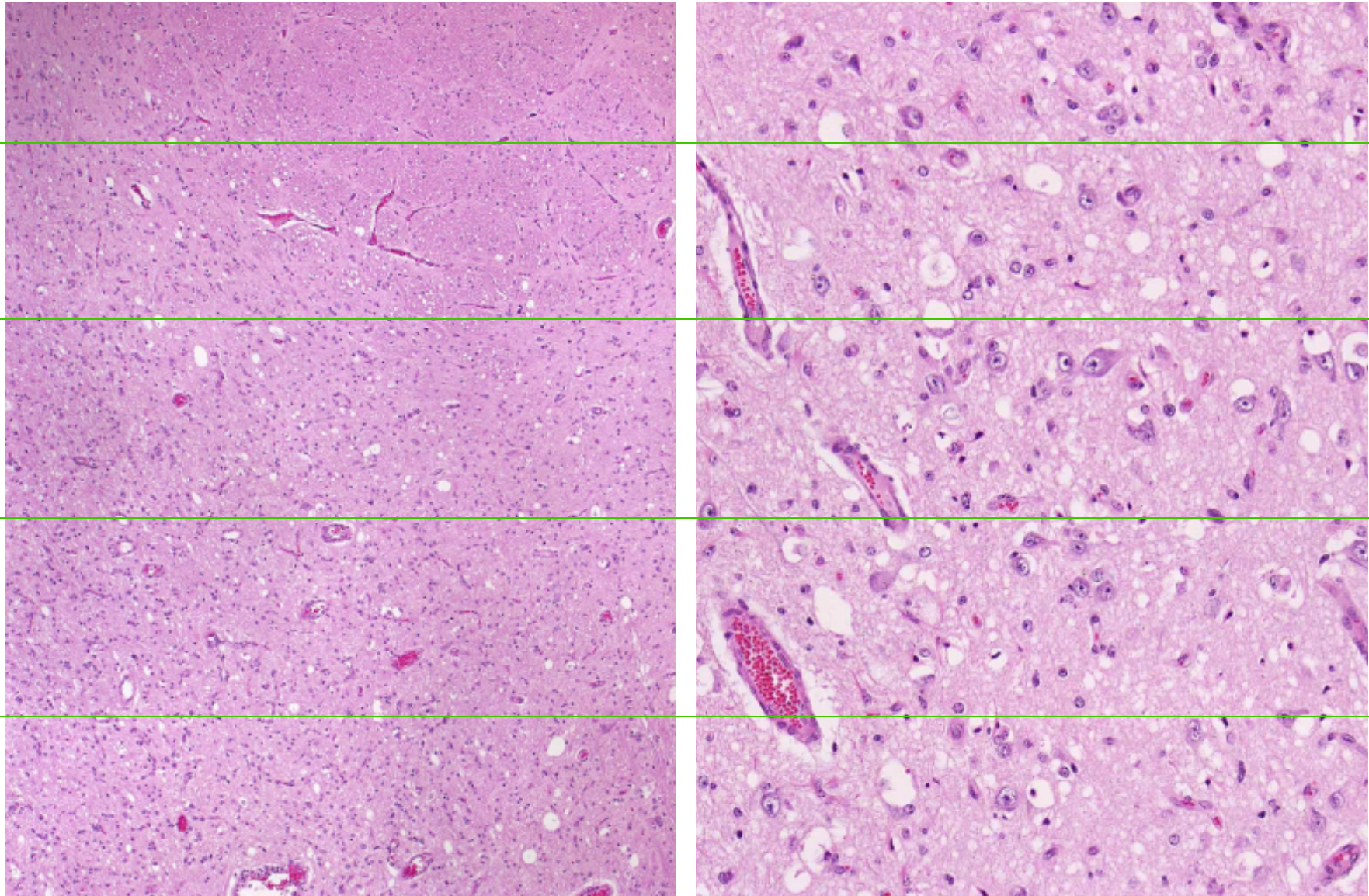
Swaledale encephalopathy – olives



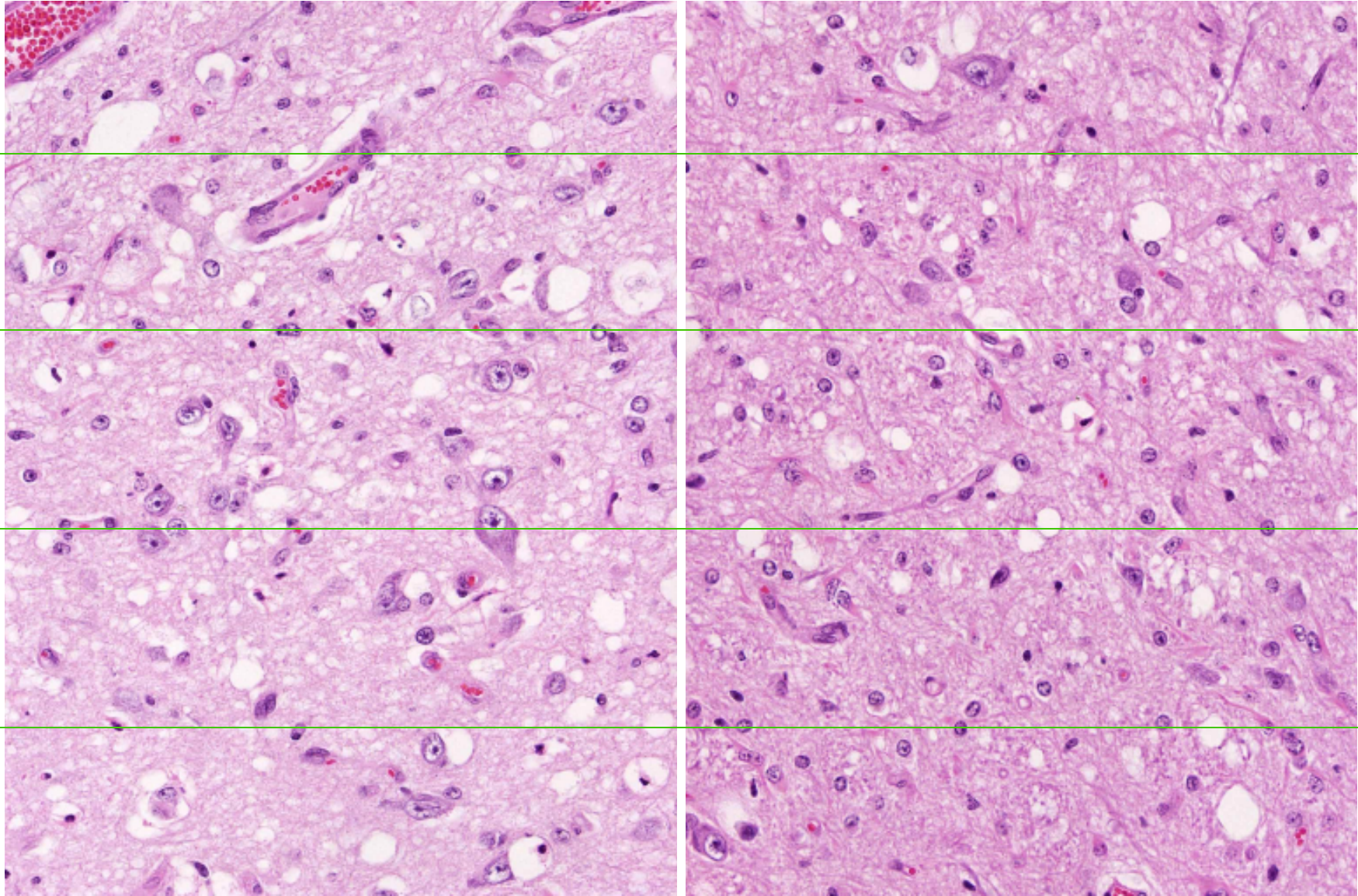
Swaledale encephalopathy – olives



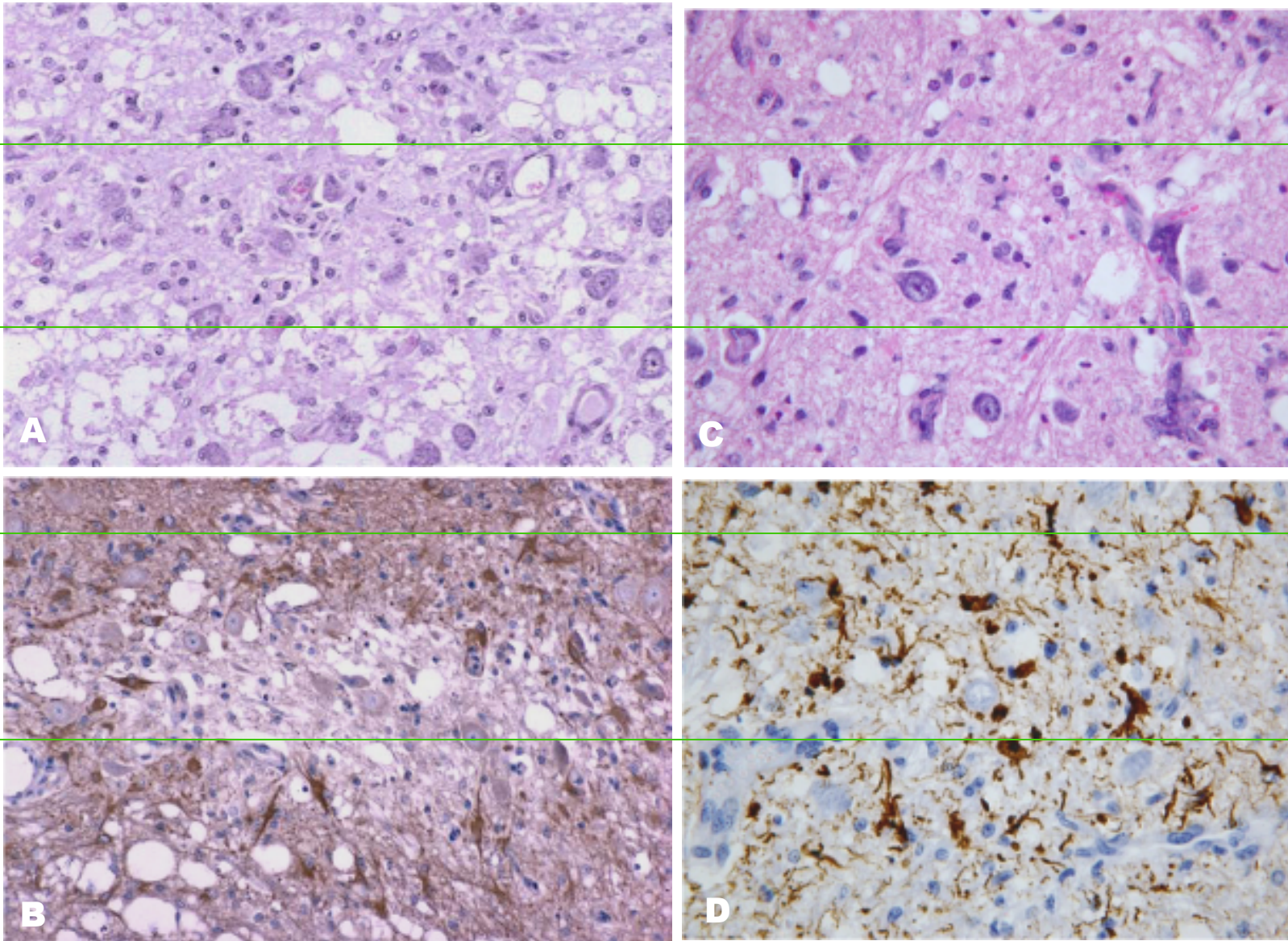
Swaledale encephalopathy – olives



Swaledale encephalopathy – tegmentum / periaqueductal grey



Swaledale encephalopathy – tegmentum

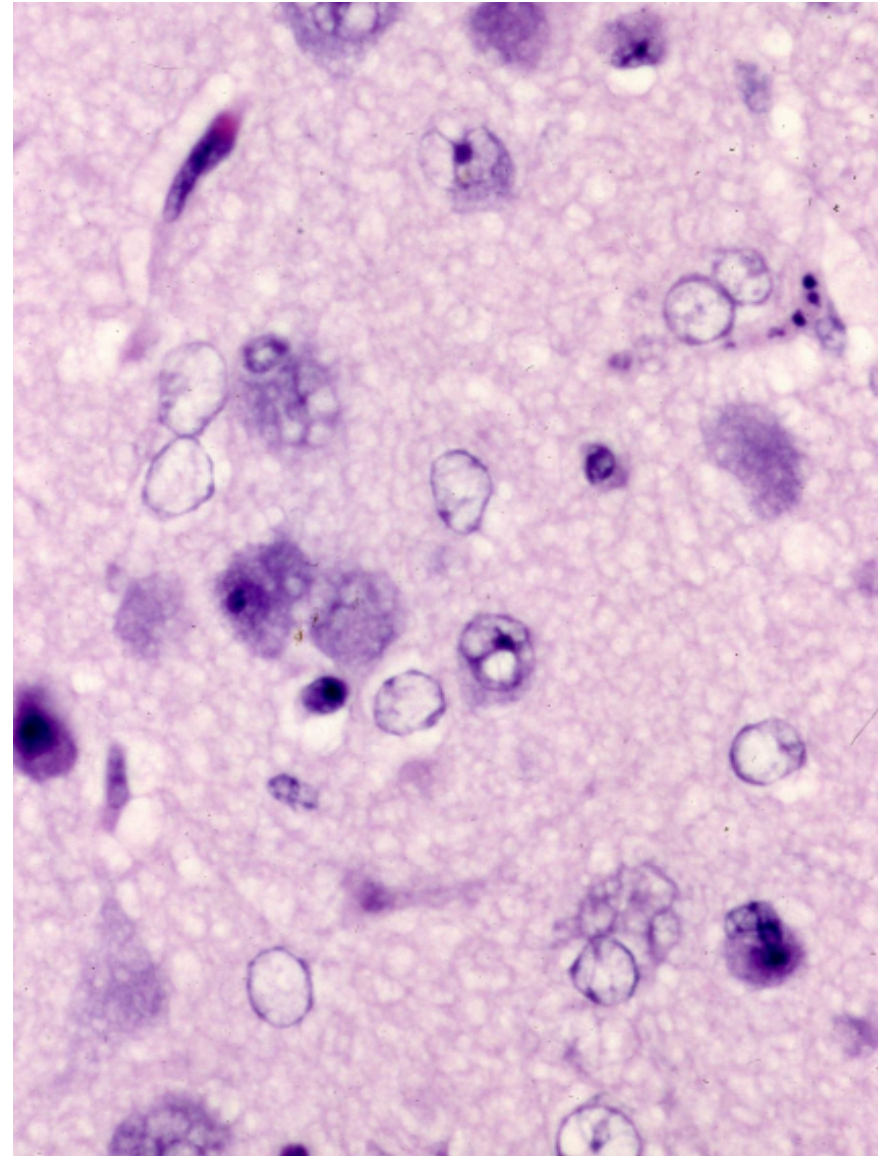
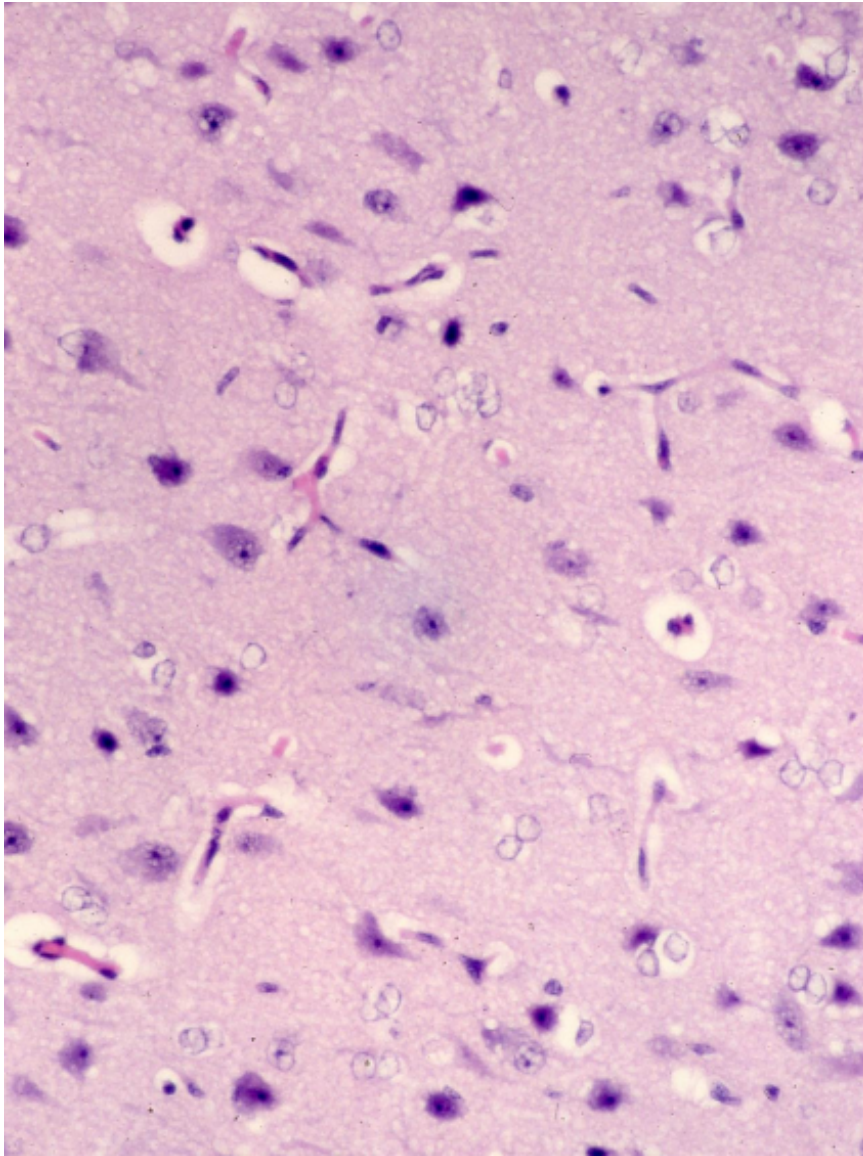


Symmetrical necrotising polioencephalopathy, olivary nucleus

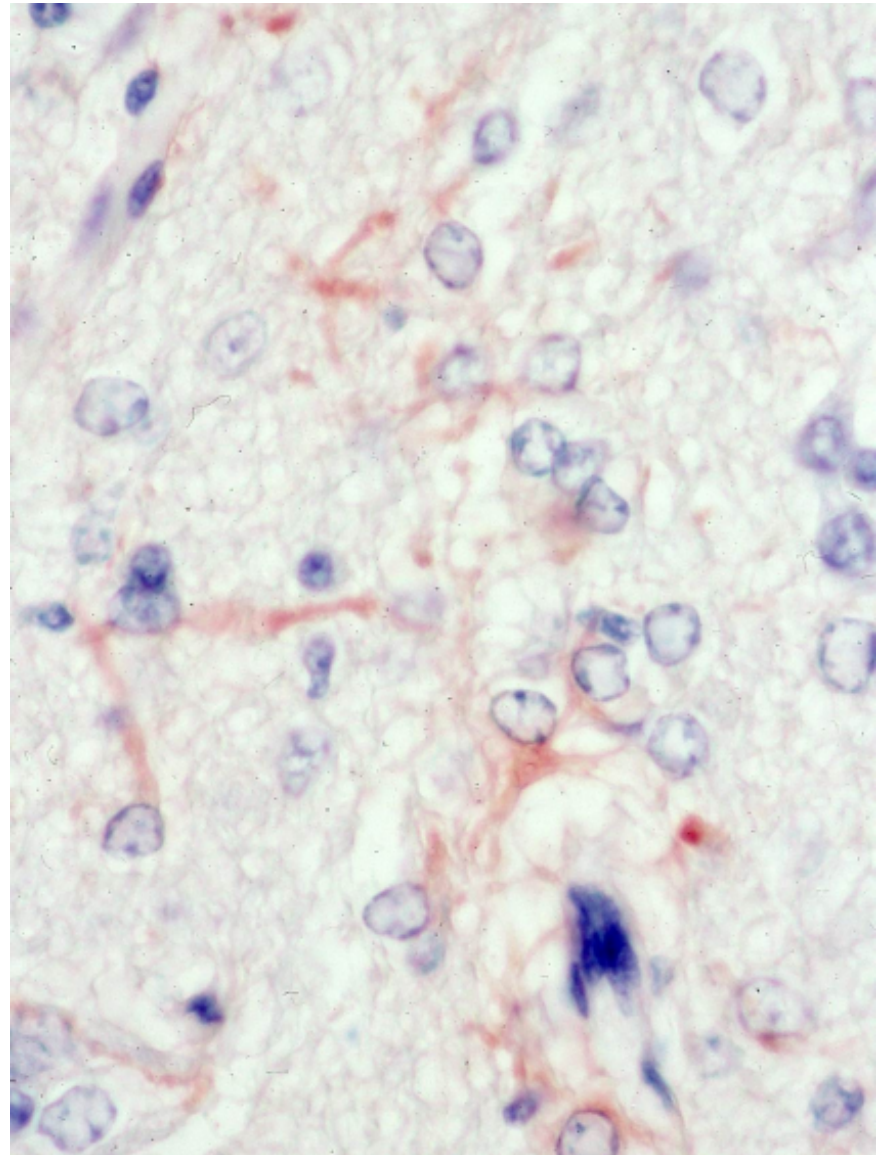
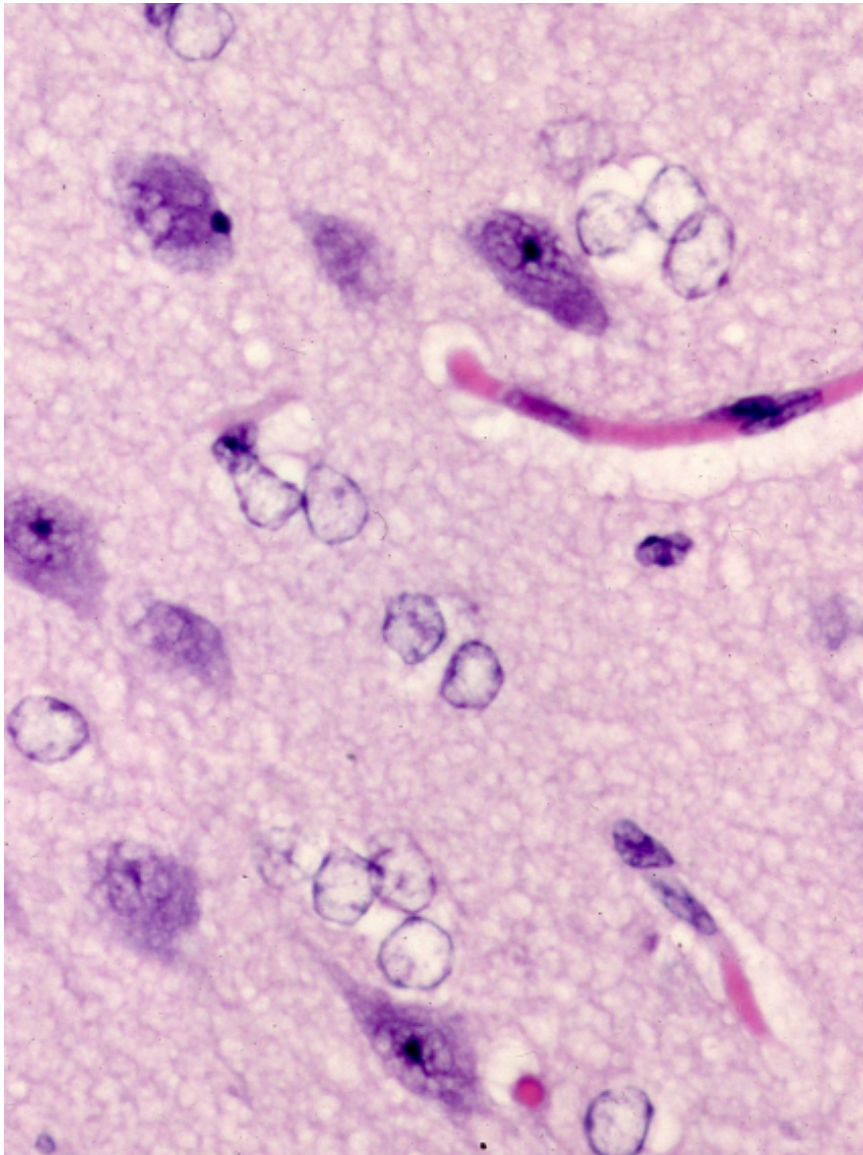
A (H&E), **B** (GFAP IHC), 8 days old Swaledale lamb
C (H&E), **D** (GFAP IHC), 5 days old Swaledale lamb

Grey matter oedema: possible causes include

- Metabolic
 - Citrullinaemia Holstein Friesian calves
- Toxic
 - Per/acute Clostridium perfringens epsilon intoxication
 - Plant toxicities – Trigonella foenum-graecum
 - Acute 'polioencephalomalacic' syndrome of Phalaris toxicity in sheep – marked oedema of deep laminae of cerebral cortex

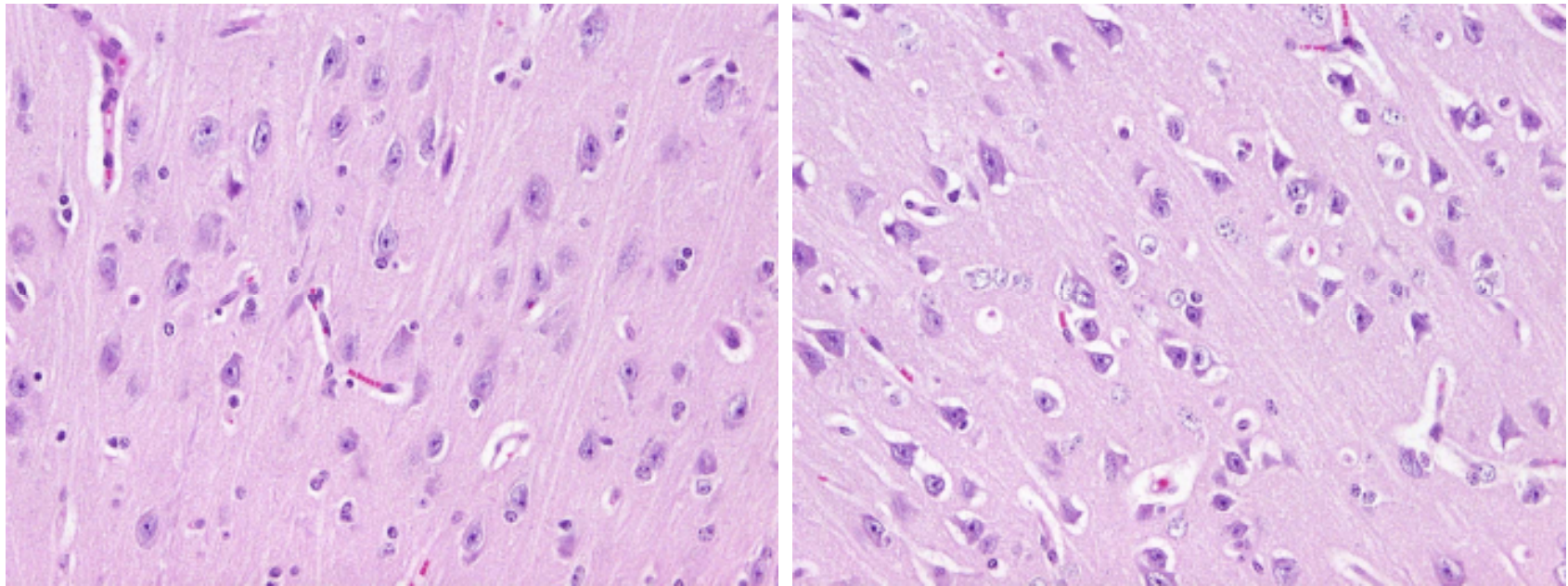


Alzheimer type II cell formation, equine Courtesy Prof. Brian Summers



Alzheimer type II cell formation, equine, HE, GFAP Courtesy Prof. Brian Summers

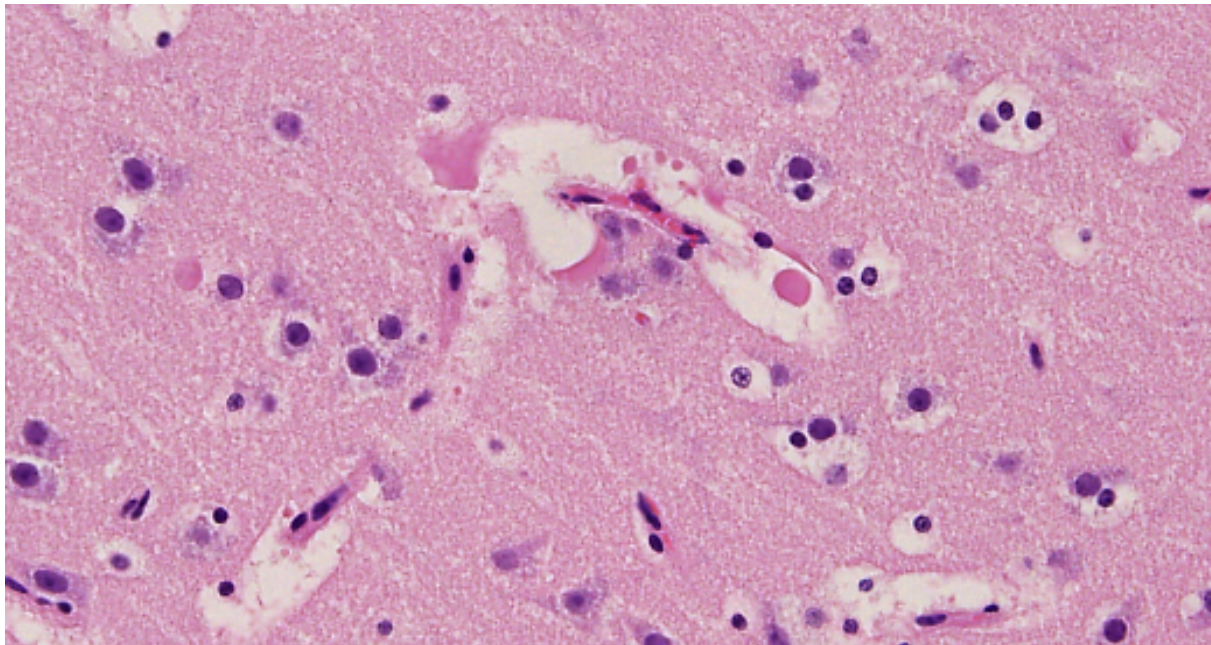
Cerebral (CNS) oedema



Thiamine dependent encephalopathy

Astrocytes

- Fluid accumulation in processes ('hyaline protein droplets')



Clostridium perfringens type D intoxication, 3 day old lamb