

Movement Disorders

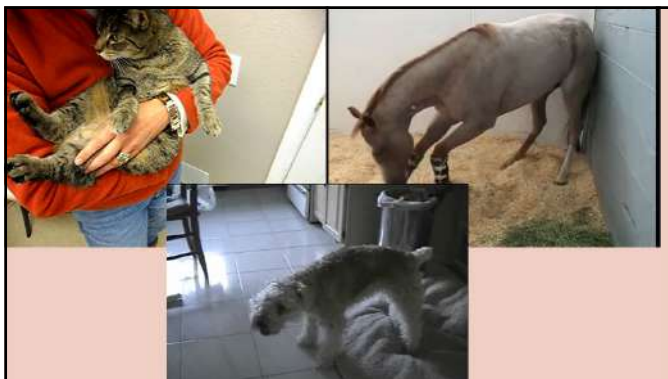
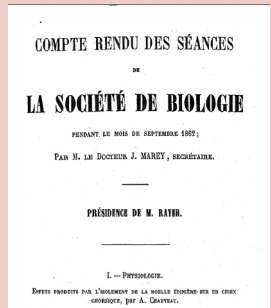


Comparative Neurology Program



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Un Chien Choreique 1862



Movement Disorders

- Function of the basal ganglia
- Types of movement disorders
- Specific causes
- Therapeutic options



Movement Disorder

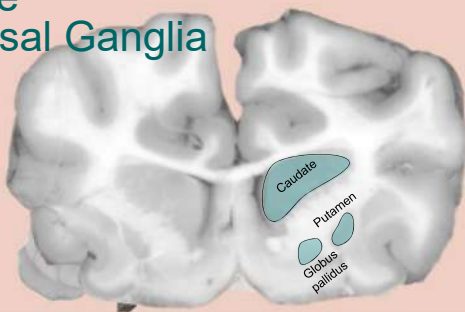
Abnormal increased movements or tone, or a paucity of voluntary movements

Movement Disorders

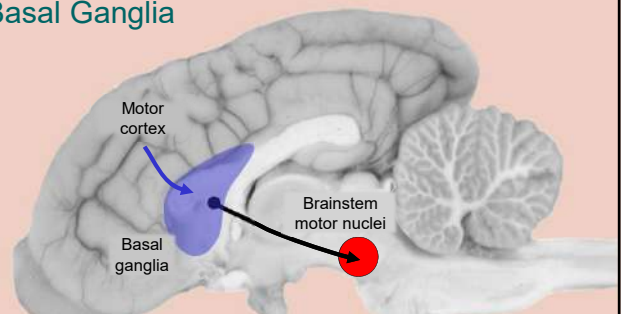
- Inability to initiate movement (Hypokinetic)
 - Not paralysis
- Involuntary movements (Hyperkinetic)
 - Not seizures but can be paroxysmal
- Arise from nuclei at the base of the forebrain



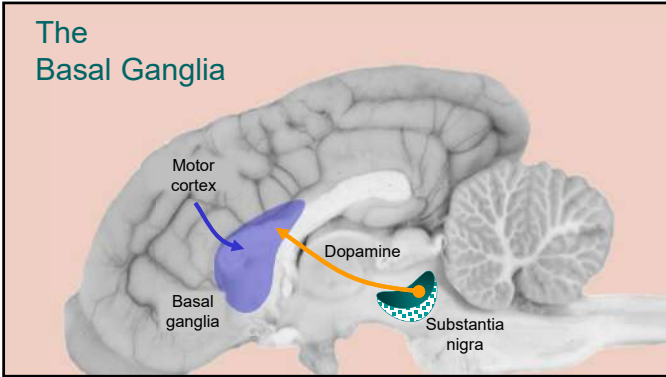
The Basal Ganglia



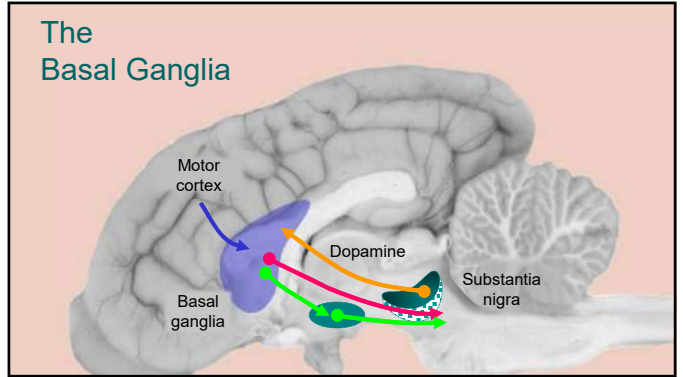
The Basal Ganglia



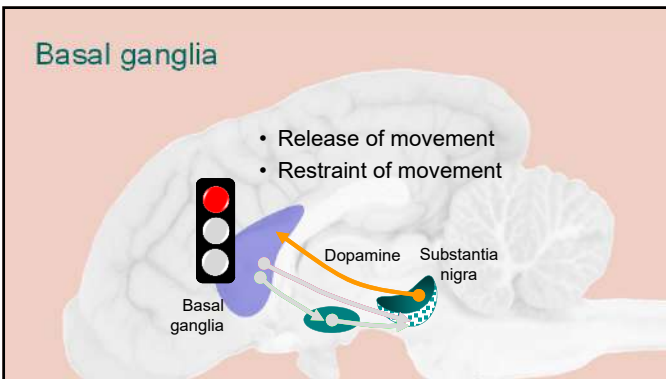
The Basal Ganglia



The Basal Ganglia

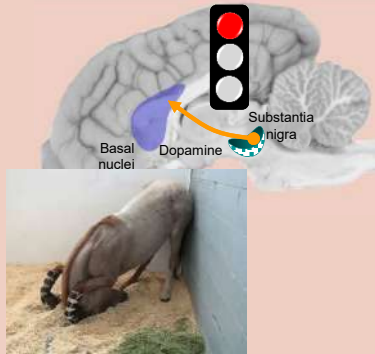


Basal ganglia



Causes - Drugs

- Affect Dopamine
- Phenothiazines
- Fluphenazine deconate
 - Long acting tranquilizer
- Tx diphenhydramine
 - Anticholinergic effects



Causes

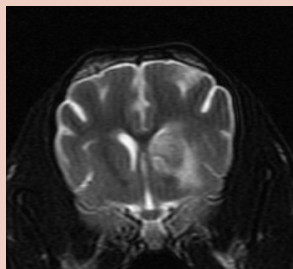
- Drugs
 - Phenothiazines
 - Metoclopramide
- Toxins
 - Russian knapweed
 - Yellow star thistle



Video courtesy Sean Sanders WSU

Causes

- Drugs
- Toxins
- Lesion of basal ganglia
- Breed specific hereditary



Paroxysmal Dyskinesia Soft Coated Wheaten Terrier

- Age of onset \bar{x} 2.25 years (8m-11y)
- Males = Females
- Episodes of involuntary movement
 - Always awake
 - Stress or excitement (6/20)
 - Minutes to >4 hours
 - Every couple days to >10 daily



Paroxysmal Dyskinesia vs Focal Idiopathic Epilepsy

- | | |
|------------------------------------------------------------|-----------------------------------------------|
| • Normal between | • Normal between |
| • Onset 2-3 years | • Onset 1-5 years |
| • Spontaneous or triggered by stress, excitement, exercise | • Very rarely triggered |
| • Multiple/day to infrequent | • Infrequent to daily esp structural causes |
| • Minutes to hours | • <2 minutes: rarely focal status epilepticus |

Character of the movement



Dystonia



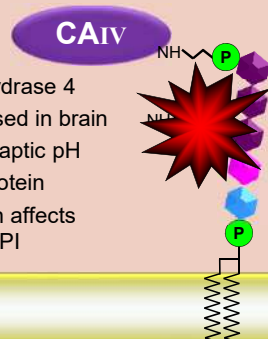
Paroxysmal Dyskinesia vs Focal Seizure

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Conscious• +/- Voluntary movements• No autonomic signs• Bilateral or lateral• Fragmented movements | <ul style="list-style-type: none">• Conscious• In unaffected body• Autonomic signs common• Mostly lateral• Irregular jerks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Acetazolamide



- Carbonic anhydrase 4
- Highly expressed in brain
- Regulates synaptic pH
- GPI anchor protein
- *PIGN* mutation affects synthesis of GPI



Acetazolamide

- 4-10 mg/kg BID-TID (start low)
- Side effects
 - Acidosis and panting
 - Hypokalemia (monitor)
- Supplement K gluconate
 - 2 mEq (500 mg of gluconate)/day

Anticonvulsants

- Variable response
- Trial and error
- Zonisamide has carbonic anhydrase inhibition as well

DNA test available



- www.offa.org
- Confirm diagnosis
- Identify carriers
 - Wise breeding strategies
 - Avoid affected
 - Maintain desirable traits & genetic diversity

Chinook “Seizures”



- Dystonia & tremors

Packer, R.A. et al. *JVM* 24, 1305-1313 (2010)
Black, V et al. *J Small Anim Pract* 55, 102-107 (2014)

Border Terrier CECS



- Gluten sensitivity?

Scotty cramps

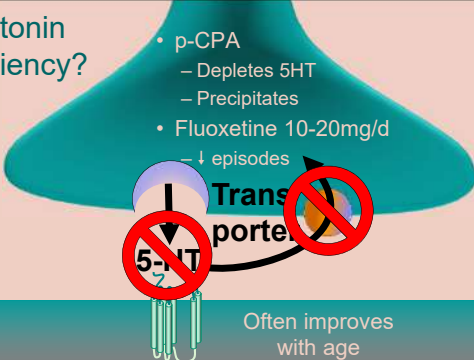


- Excitement or stress
- Onset 6 m (2-24)

Klarenbeek, A., et al. *Tijdschrift voor Diergeneeskunde* 69, 14-21 (1942).
Meyers, K.M., et al. *JAVMA* 155, 129-133 (1969).
Urkasemlin, G. & Olby, N.J., *J Small Anim Pract* 56, 276-80 (2015).

Serotonin deficiency?

- p-CPA
 - Depletes 5HT
 - Precipitates
- Fluoxetine 10-20mg/d
 - ↓ episodes



Often improves with age

CKCS Episodic falling

- Exercise induced
- *BCAN* (brevican) mutation
- Extracellular matrix of synapses
- Clonazepam
 - 0.5 mg/kg TID
- Fluoxetine?



Heritage, M.E. & Palmer, A.C. *Vet Rec* 112, 458-9 (1983).
 Forman, D.P. et al. *PLoS Genet* 8, e1002462 (2012).
 Gill, J.L. et al. *Neurobiol Dis* 45, 130-136 (2012).
 Brakebusch, C. et al. *Mol Cell Biol* 22, 7417-27 (2002).

Chinese Crested dogs & Kerry Blue Terriers



- Cerebellar ataxia
~3 months of age

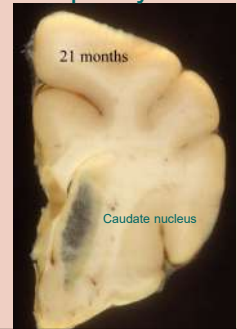
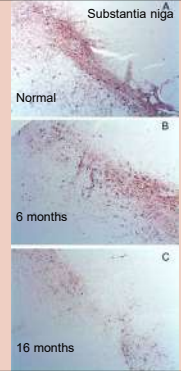


Kerry Blue Terriers & Chinese Crested dogs

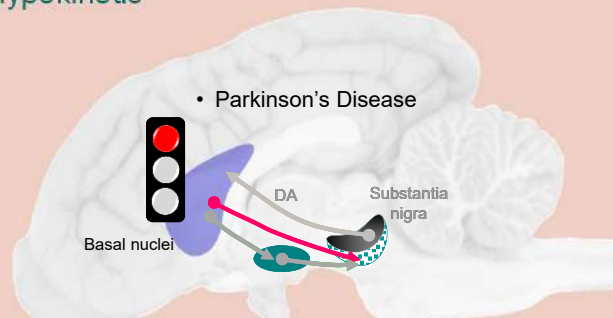


- 9-18 months
- Freeze & postural instability

Multiple system degeneration



Hypokinetic



- Parkinson's Disease

Parkinson's Disease

- Resting tremors
 - Only seen in primates
- Bradykinesia
 - Slow initiation & repetitive movements
 - Postural instability & falls
 - Freezing



Geriatric Parkinsonism in animals?



Movement Disorders



Comparative
Neurology
Program

Objectives

- Differentiate paroxysmal dyskinesia from seizures
- Know the causes and genetic disorders
- Recognize hypokinetic movement disorders
- Apply rational therapy

O'Brien DP, Movement Disorders *Kirk's Current Veterinary Therapy XVI 2019*

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