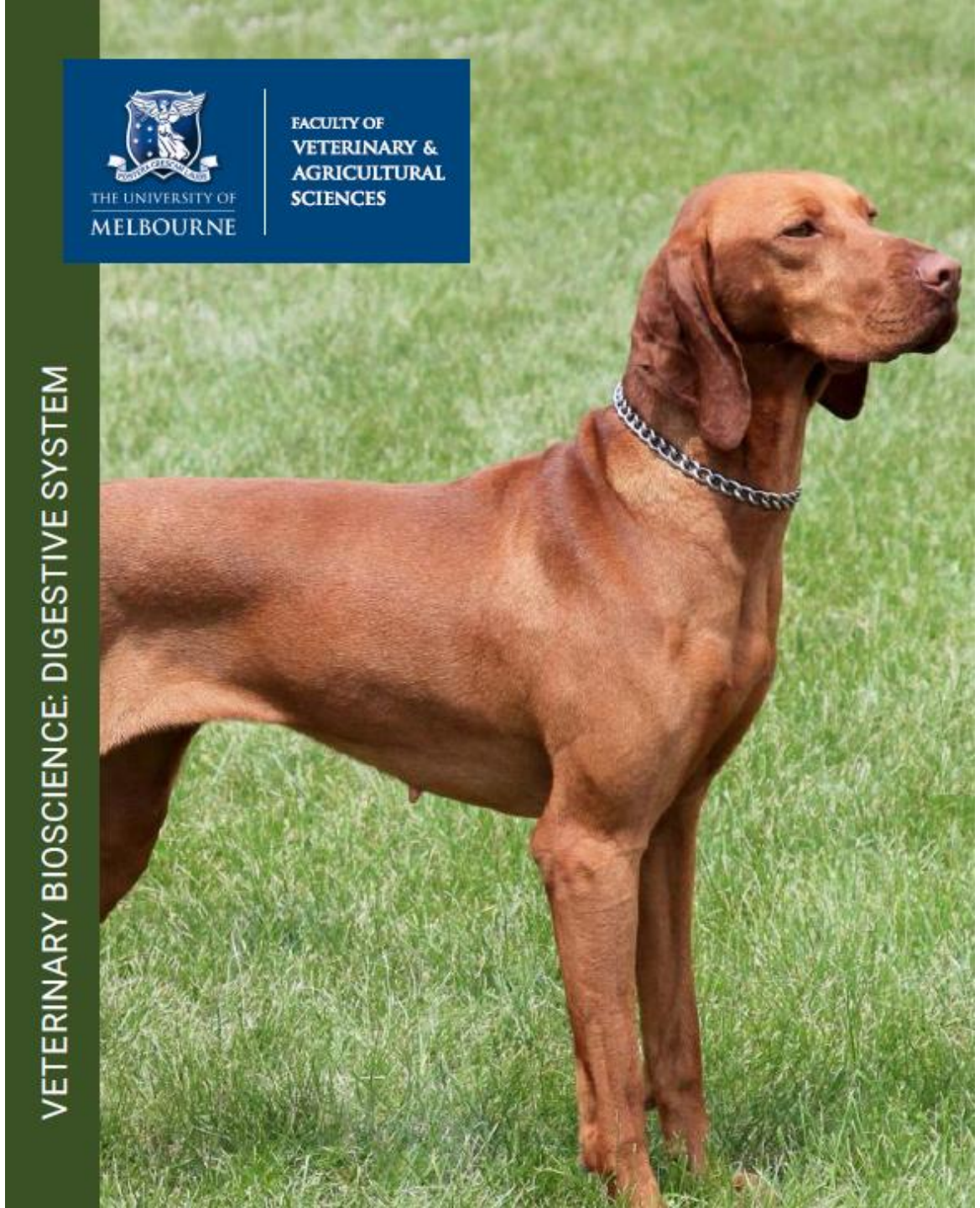
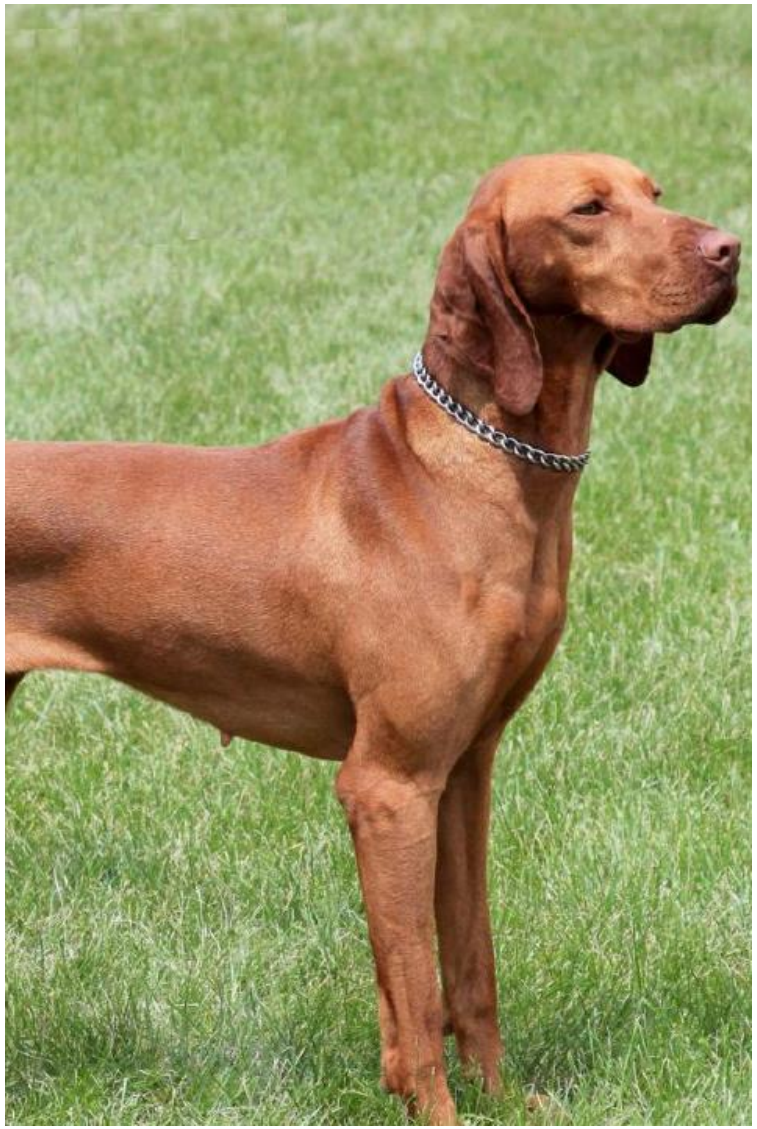



# Jack the Dog

Case Study 2
Wrap-Up Session
April 6, 2023

# Session outline

- Q&A with Professor Liz Tudor
  - Lectures from Week 6 (motility, vomiting and anti-emetics)
- Case study wrap-up
  - Key concepts and intended learning outcomes
  - Example flow diagram
- Q&A



# Some really good questions

## Question

- “With the CRTZ, does it just get activated by toxins or is there something else that can trigger it?”

## Answer

- The CRTZ can be triggered by a range of small chemicals including molecules of inflammation (inflammatory cytokines), urea and by a number drugs.
- One such drug is **medetomidine** which is commonly used in dogs and cats as a sedative prior to anaesthesia – this can actually be quite useful as it can make an animal vomit and empty is stomach prior to anaesthesia.
- Another example is **apomorphine** – which is used to induce vomiting when animals have ingested a poison. These drugs are called **emetics**.

# Some really good questions

## Question

- Just want to confirm that for vomiting when the glottis is closed and deep inspiration happens, the diaphragm contracts and that will push onto the stomach → decreasing the volume of the stomach/whole abdomen and hence increasing the intra-abdominal pressure? Is the intra-abdominal pressure referred to the pressure within the whole abdomen or a digestive organ wherever the food is?

## Answer

- As the pressure increases inside the abdomen that will affect the pressure applied (externally) on all the organs, hence forcing content to escape from the stomach through the relaxed sphincters.

- *… so how does that differ from the pressure changes in Jack's abdomen in today's case study??*

# Some really good questions

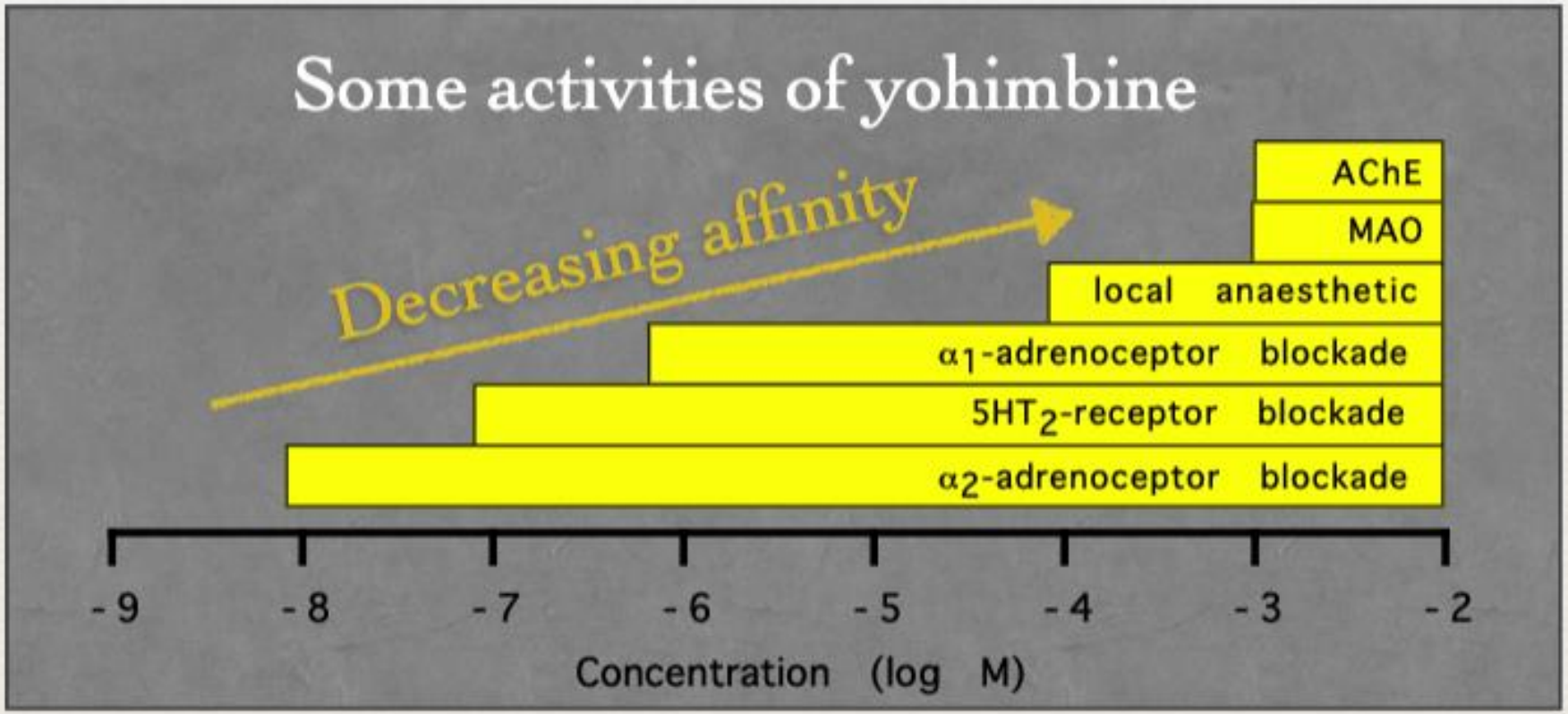
## Question

- “If receptors are specific to their ligands, how can this drug (phenothiazine) bind to both kinds of receptors and at different doses? Do these receptors have similar shapes or sections in their site that allow this to happen?”

## Answer

- It’s all about “fit” – between the receptor and the drug. And some drugs – the “dirty ones” – fit (perhaps a bit “loosely”) to multiple different receptors.  Also, if you give higher doses, any drug will tend to bind less specifically to a range of receptors – you will discuss this more in *VB: Cells to Systems* in a couple of weeks. This fits into the discipline of pharmacodynamics

# A selective drug?




All drugs have more than one action

affinity, potency, selectivity ratio

# Some really good questions

## Question

- Regarding Cisapride's effect to apparently increase ACh release, you said that it is used with a poorly understood mechanism of action, how is it allowed to be used when it is poorly understood? Is it available for use in clinics or only in experimentation?

## Answer

- There are multiple examples of drugs that were used for decades without a clear understanding of how they work- and that is still the case for some commonly used anaesthetic drugs.

# Some really good questions

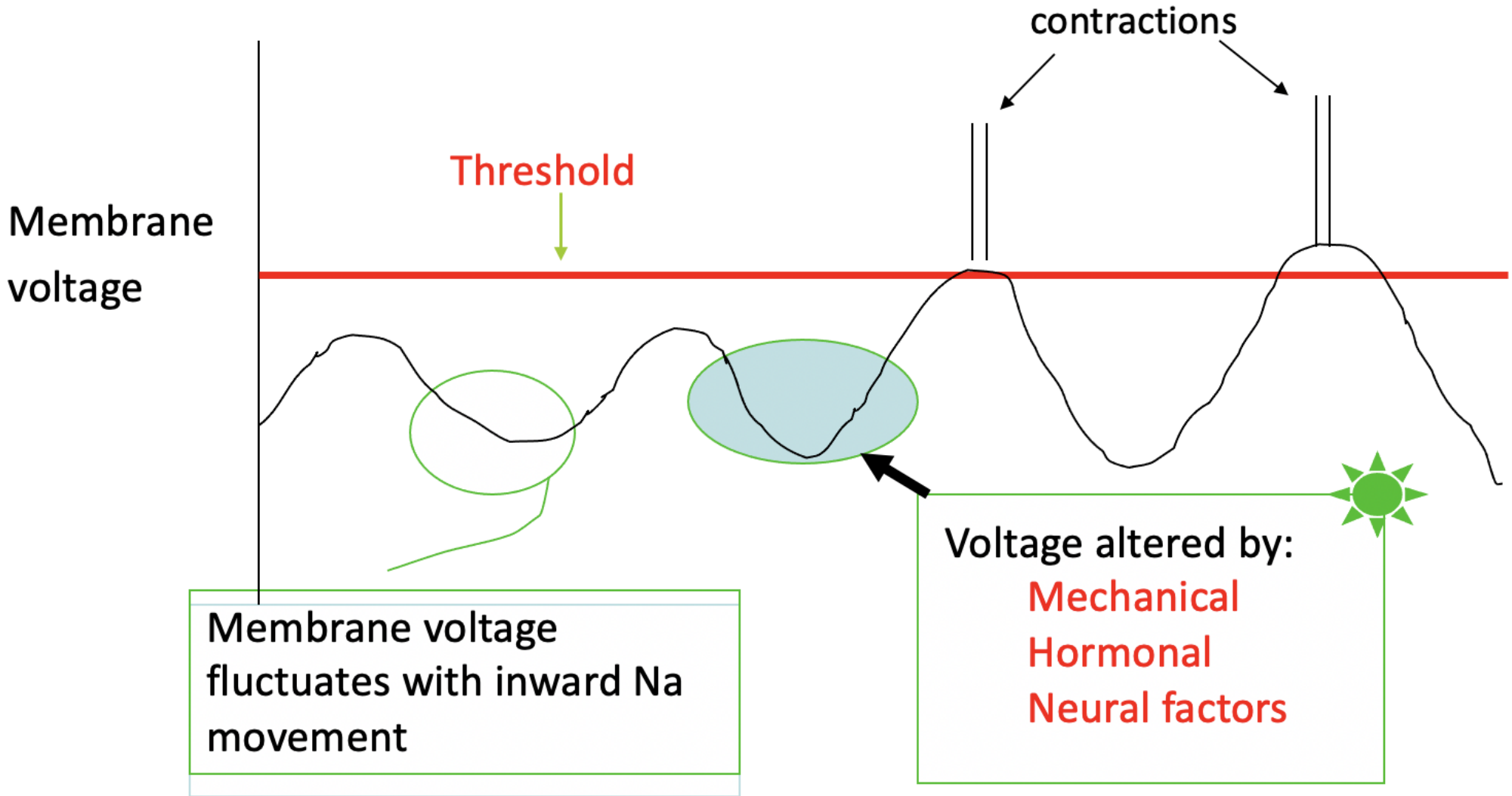
## Question

- “Just wanted to clarify that both the threshold and membrane voltage can move in response to the mechanical/hormonal/neural factors in order to contract?”

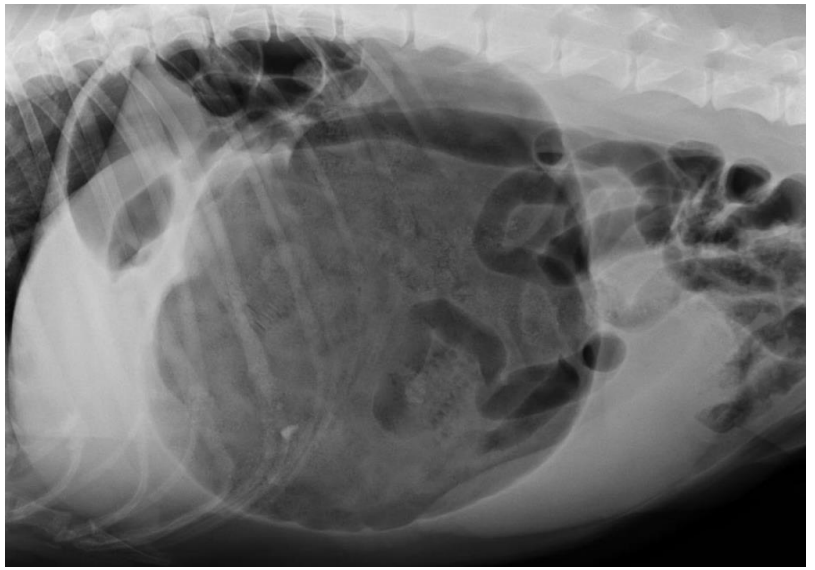
## Answer

- The membrane voltage fluctuates in response to the factors you describe above. This brings the voltage closer to or further away from the threshold at which depolarisation occurs.
- As the channels that allow entry of ions to the cell and initiate an action potential are voltage gated (ie voltage dependent), when the membrane voltage reaches that which opens voltage gated channels, then an action potential will result.

# Autonomous activity in smooth muscle



# Jack’s Night Out



## Intended learning outcomes

At the end of this learning exercise, you should be able to:

- Draw a flow diagram to explain the pathophysiology of GDV.
- Visualize the changes in the configuration of the stomach that occur in GDV in order to prepare you to surgically correct this condition in the future.
- Outline the principles of treatment and management of gastric dilation and volvulus (GDV) in the dog.
- Appreciate the systemic effects that may arise as a consequence of a changes in the configuration of the digestive tract.

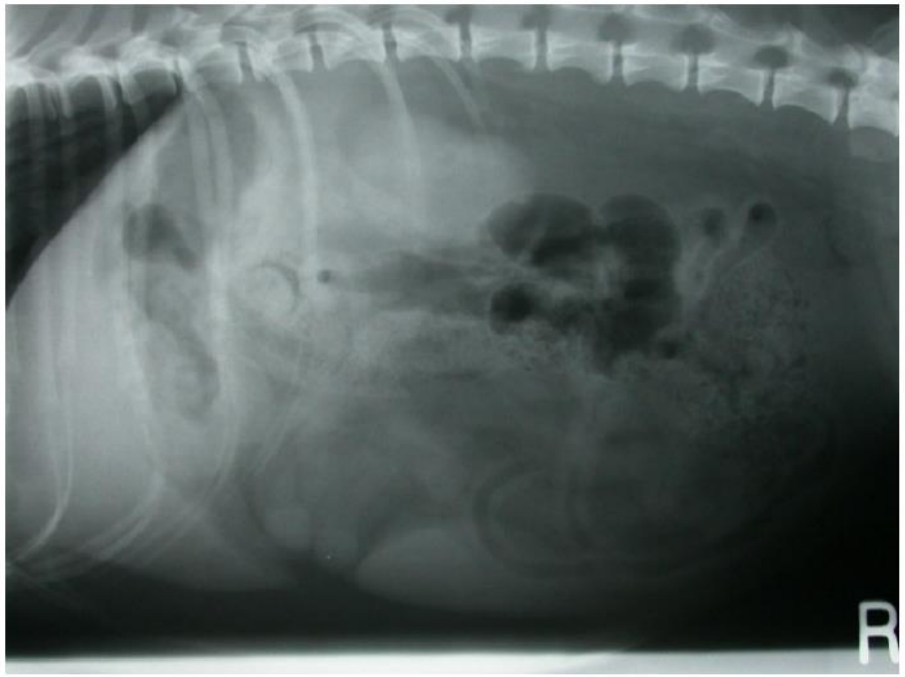
# Presentation

- Why was Jack ‘retching’? And what was the froth he was bringing up?

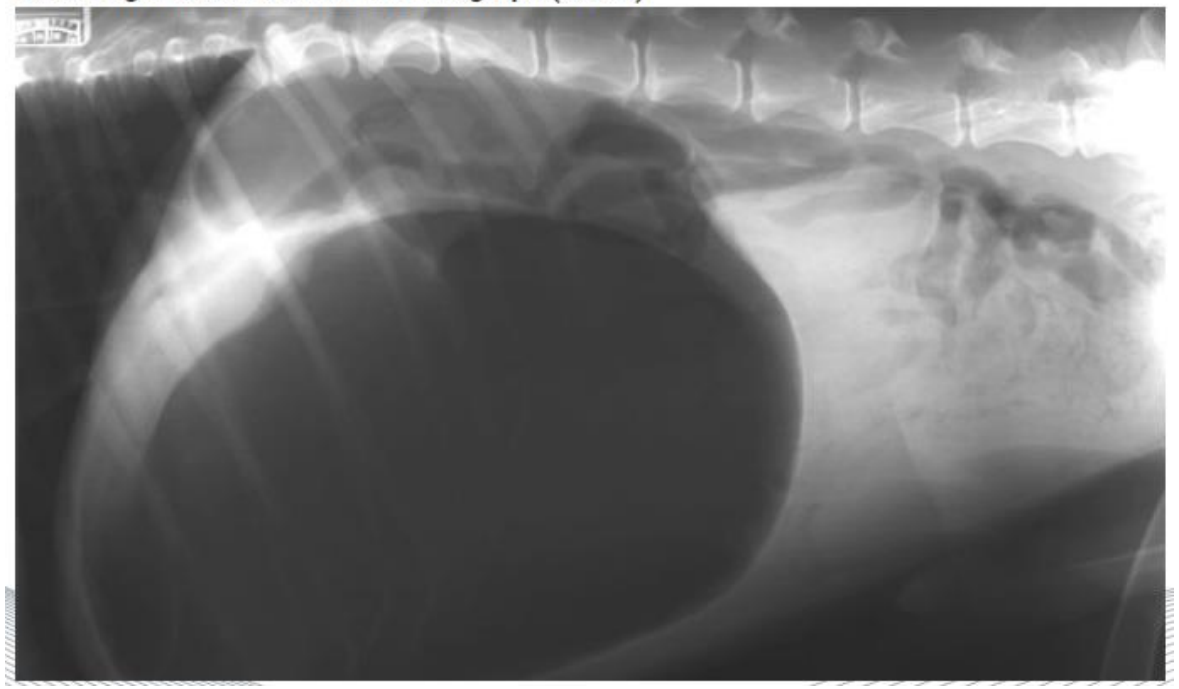
- How can you distinguish between vomiting and regurgitation?

# Radiograph

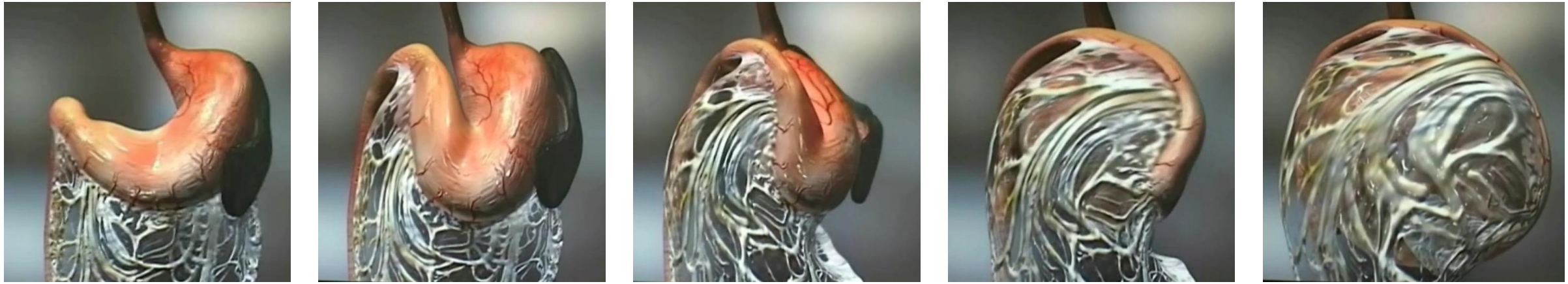
Normal right lateral abdominal radiograph (below)




Jack's right lateral abdominal radiograph (below)



# Gastric volvulus



# Volvulus vs. torsion

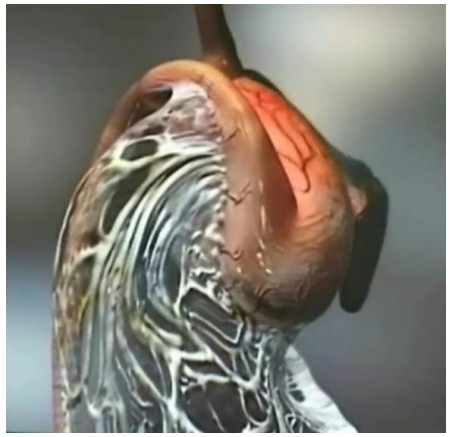
- Confusion exists (!)
  - Some references use terms interchangeably
  - Depends on the use of “around”, “along” or “across”

- From Quiz 2:
  - Volvulus = abnormal twisting of a segment of the gastrointestinal tract along its longitudinal axis
  - Torsion = abnormal twisting of a segment of the gastrointestinal tract along its short axis

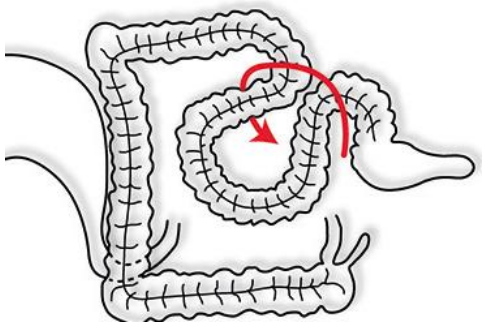
- From A/Prof. Jenny Charles lecture notes:
  - Volvulus = rotation on the mesenteric axis
  - Torsion = rotation of the intestine across its long axis

# Volvulus

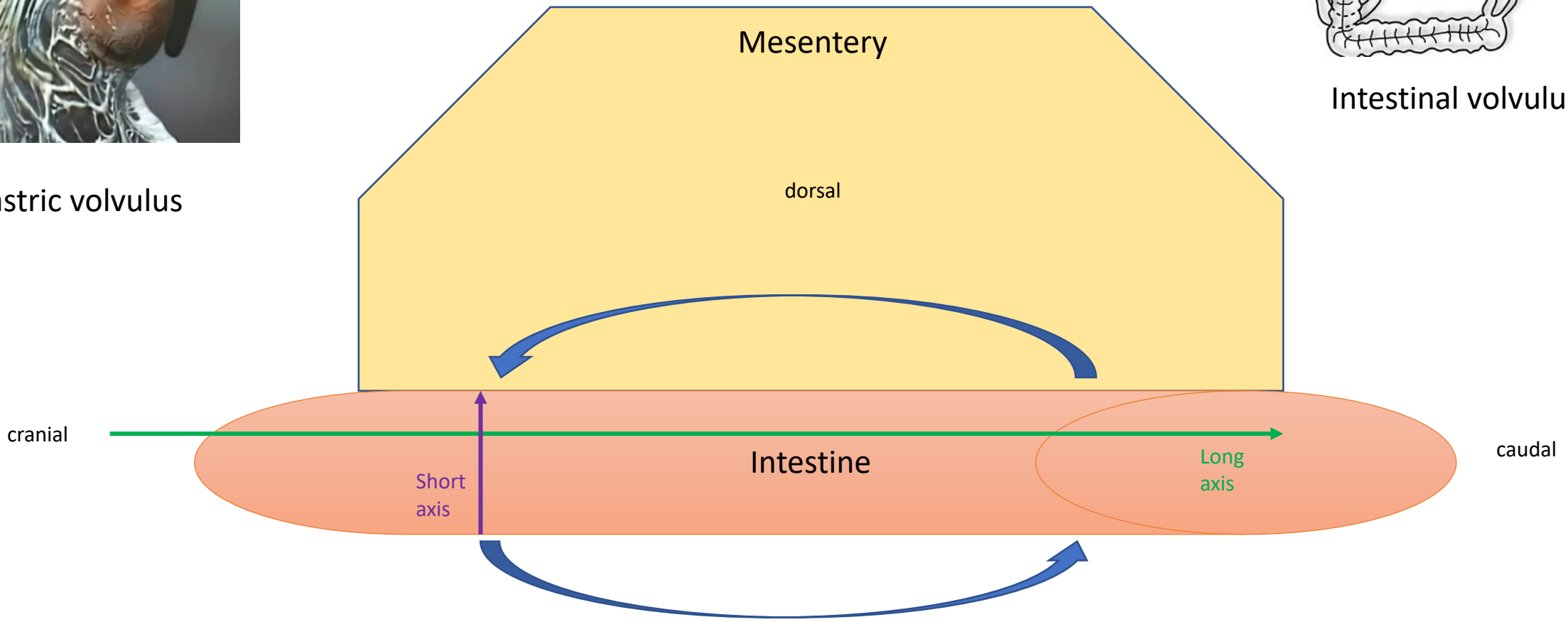
Connecting peritoneum (omentum or mesentery) are included in the twist



Gastric volvulus



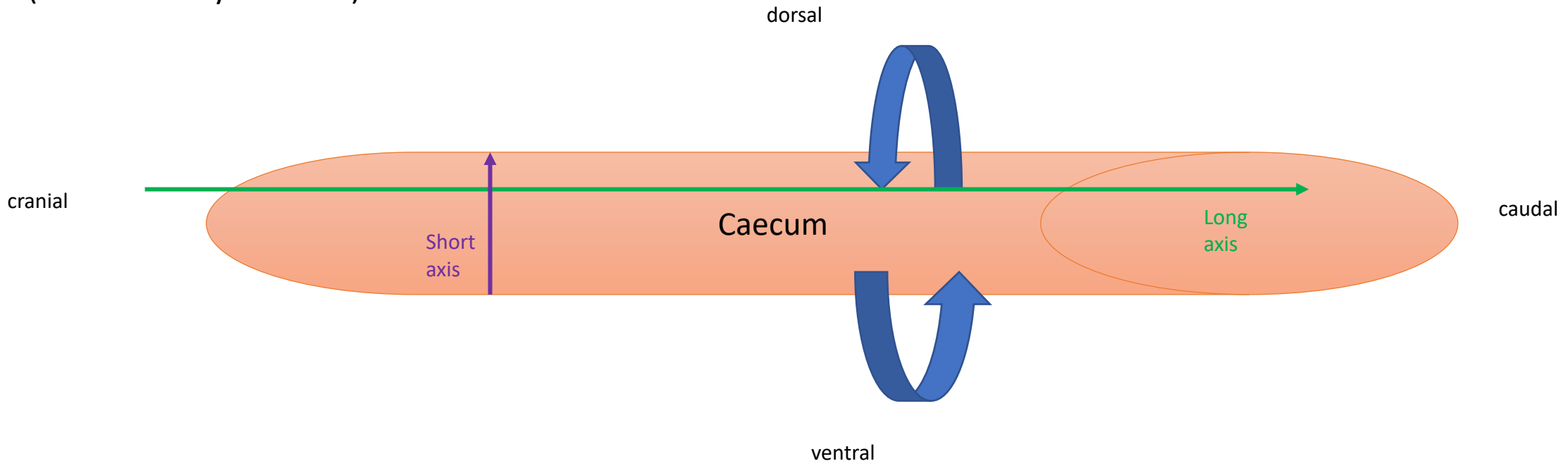
Intestinal volvulus



# Torsion

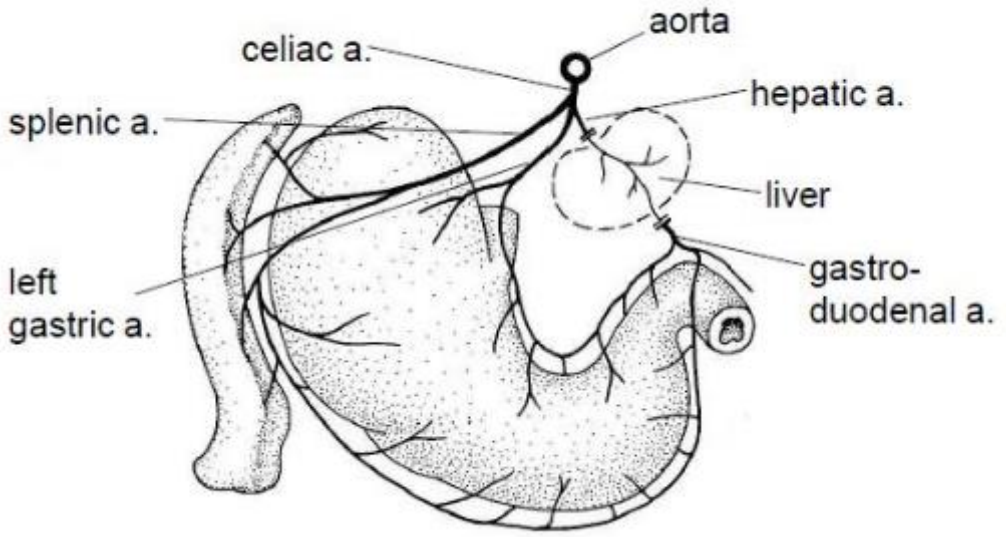
Torsion of the caecum in a horse (no mesentery involved)

No connecting peritoneum (omentum or mesentery) included in twist



# Consequences

- From Lecture 7 (Prof. Simon Bailey)




- More detailed pathology in Lecture 19 (Dr Liz Dobson)

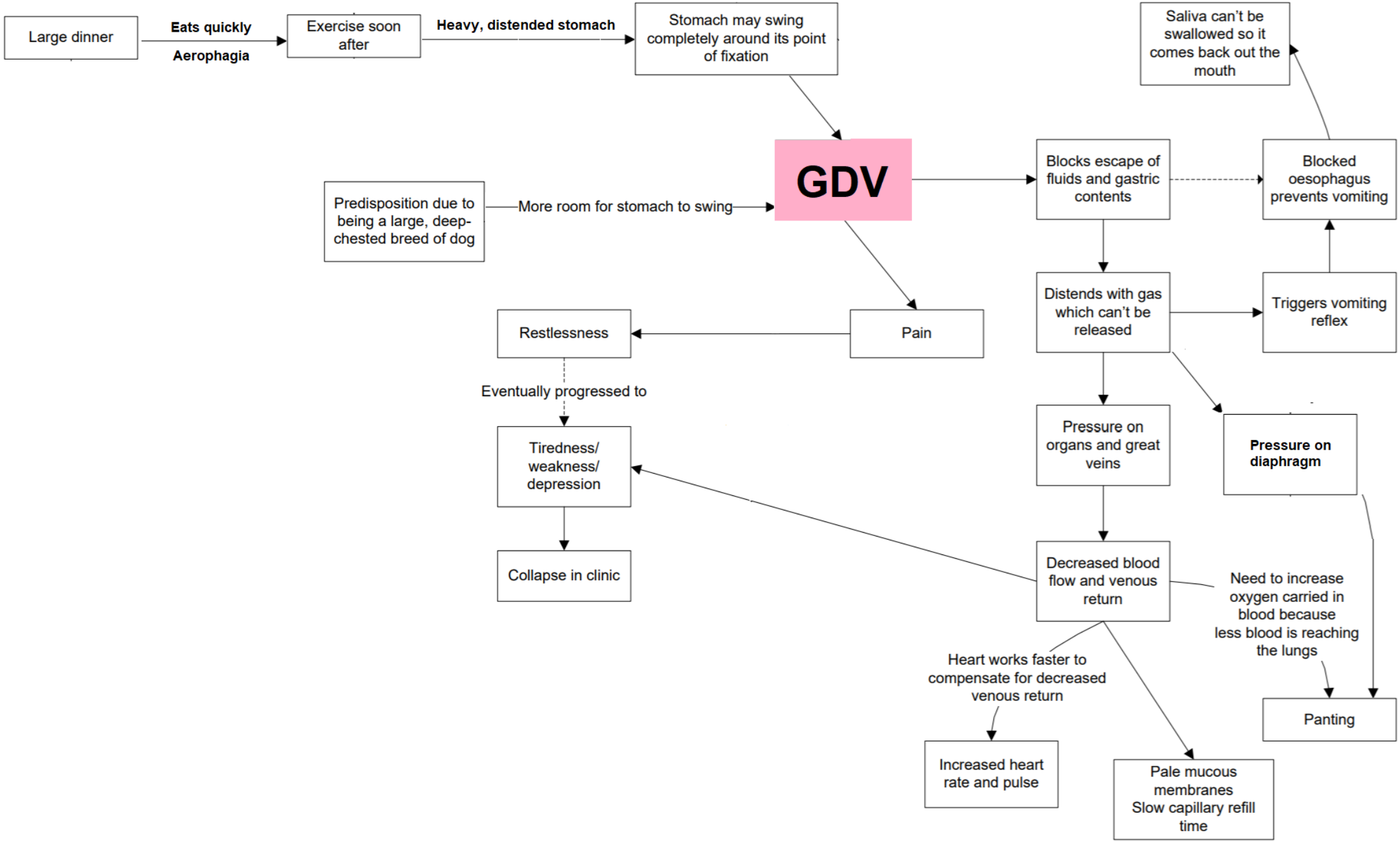
# Drugs used in the post-operative period

- Methadone – opioid: pain relief
- Metoclopramide – dopamine receptor antagonist: prokinetic / anti-emetic
- Maropitant – NK1 receptor antagonist: anti-emetic
- Pantoprazole – proton pump inhibitor: antacid
- Sucralfate – viscous barrier: gastroprotectant / antacid

# Food for thought

- Prophylactic gastropexy at the time of desexing for deep chested dogs?

# Flow diagram


Large dinner
Eats quickly
Aerophagia
Exercise soon after
Heavy, distended stomach
Stomach may swing completely around its point of fixation
GDV
Predisposition due to being a large, deep-chested breed of dog
More room for stomach to swing
Pain
Restlessness
Eventually progressed to
Tiredness/ weakness/ depression
Collapse in clinic
Blocks escape of fluids and gastric contents
Saliva can't be swallowed so it comes back out the mouth
Blocked oesophagus prevents vomiting
Distends with gas which can't be released
Triggers vomiting reflex
Pressure on organs and great veins
Pressure on diaphragm
Decreased blood flow and venous return
Need to increase oxygen carried in blood because less blood is reaching the lungs
Heart works faster to compensate for decreased venous return
Increased heart rate and pulse
Pale mucous membranes
Slow capillary refill time
Panting

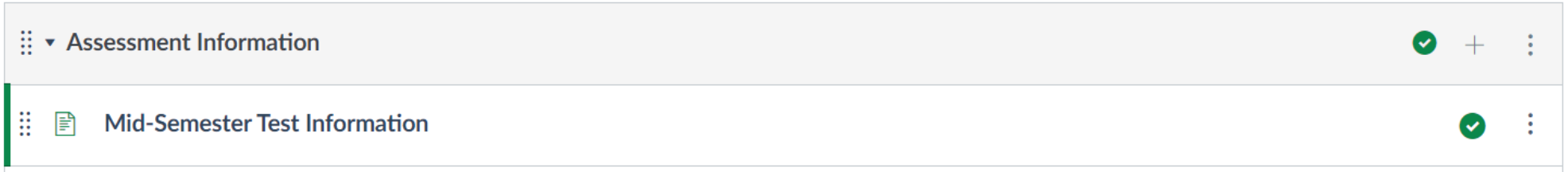
# Case Study Assessment

- Canvas Quiz
  - Released this afternoon (April 6)
  - Complete by 11:59pm on Monday April 17 (first day back after mid-semester break)
  - 60 minutes to complete
  - No collaboration

- Contribution to overall Digestive System grade (3.75%)

# MST

- Monday April 24 at 9am – online Canvas quiz
- 60 minutes / 50 marks
  - **Section A:** MCQ (approx. 30% of marks).
  - **Section B:** Short-answer questions (approx. 40% of marks).
  - **Section C:** Extended-response question (approx. 30% of marks). Clinical scenario.
- Examinable material:
  - Lectures 1-15
  - Practicals 1-6
  - Case studies 1-2
- Preparatory module in Canvas



# MST technique

- Will be significantly harder than case study quizzes
- Online open book
  - But will be time pressure – won't have time to look everything up
- Ensure that you answer the extended-response question
- Dot points OK
- Use appropriate scientific terminology and language
- Cutting/pasting from notes is considered plagiarism – and might not answer the question anyway
- Review practice test on Canvas and tutorial on how to approach answering extended-response questions
- Ask questions – the sooner the better

Have a nice break!