Pain Recognition and Treatment in Farm Animals

R. Eddie Clutton

Department of Veterinary Clinical Sciences,
University of Edinburgh,
Edinburgh,
United Kingdom

definitions

R
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what is pain ?

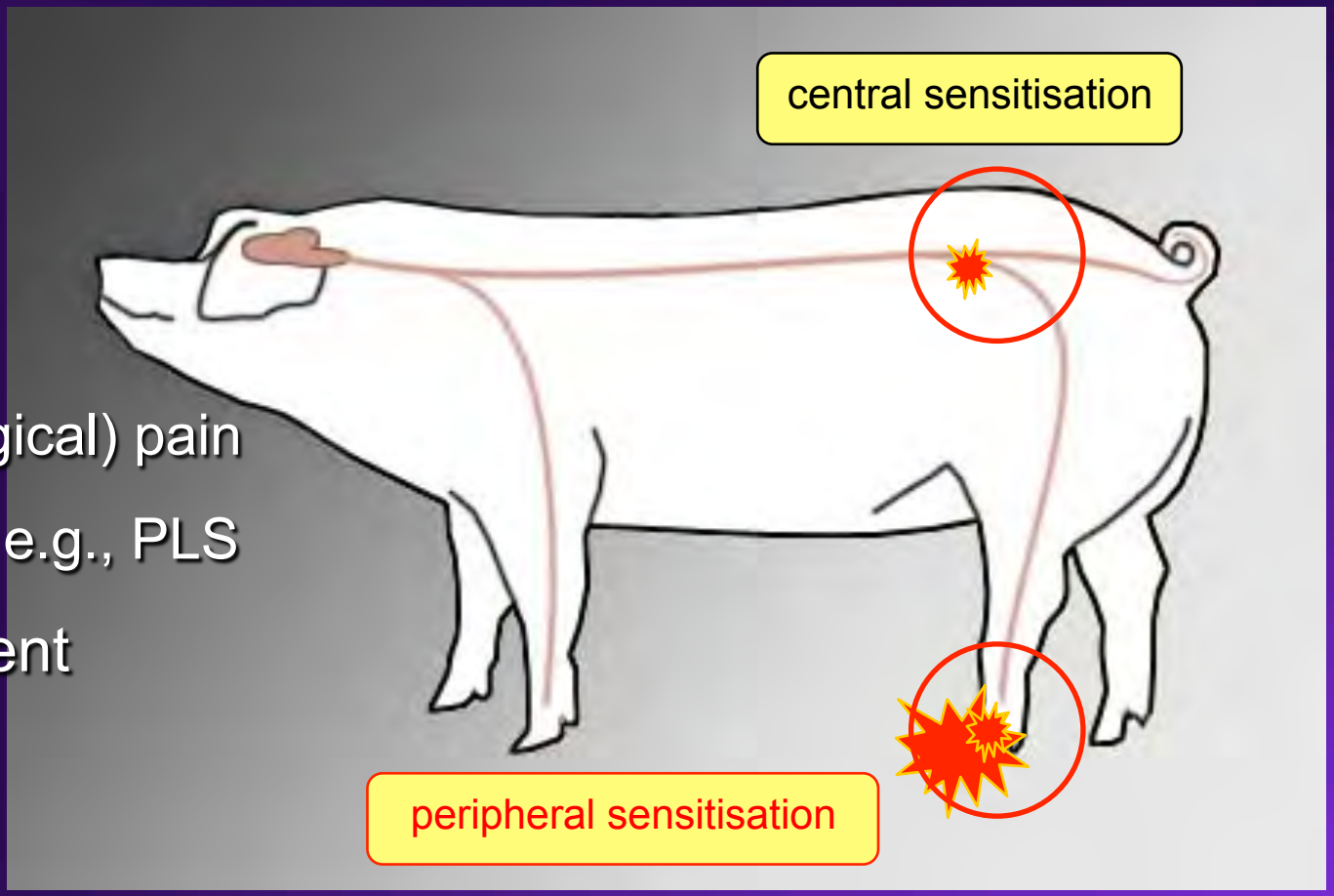
IASP (1986) An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

IASP (2011) The inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment

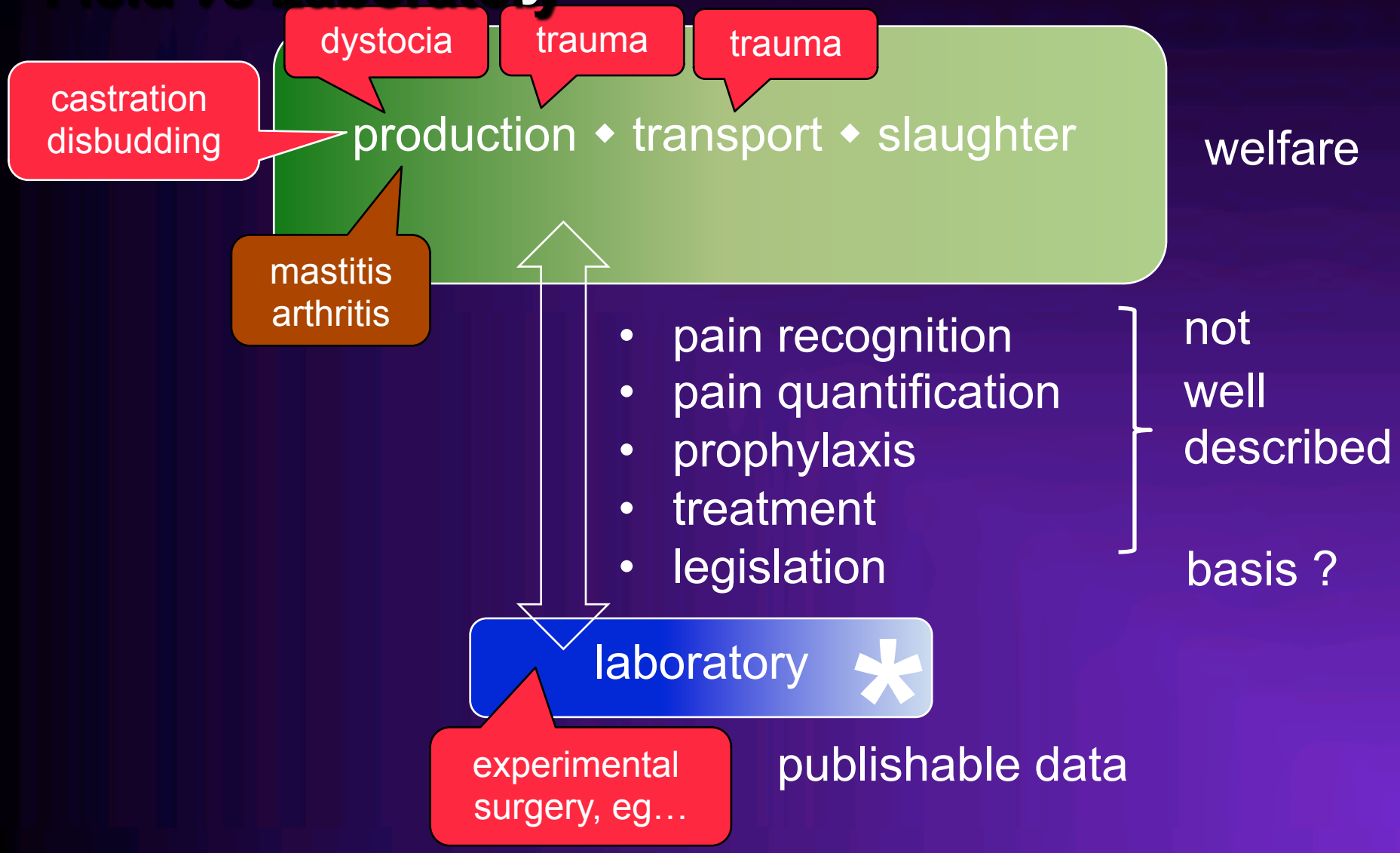
- “stress” hyperalgesia
- biological purpose
- unreliable (!)

what is pain ?

- “sensitization”
- biological purpose ?
- explains
  - allodynia
  - post-traumatic (surgical) pain
  - neuropathic states, e.g., PLS
- informs logical treatment

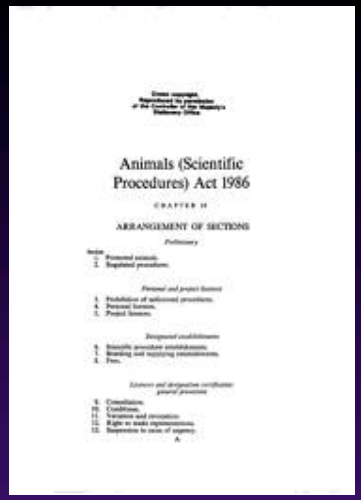


Field *vs* Laboratory



Why bother ?

- ethical
- justice
- legal
- practical
- production
- medical



Animals (Scientific Procedures) Act 1986

CHAPTER II

ARRANGEMENT OF SECTIONS

Animal Welfare Act 2006

Papers and Articles

Guidelines on the recognition of pain, distress and discomfort in experimental animals and an hypothesis for assessment

SPECIAL ARTICLE

PAIN AND ITS EFFECTS IN THE HUMAN NEONATE AND FETUS

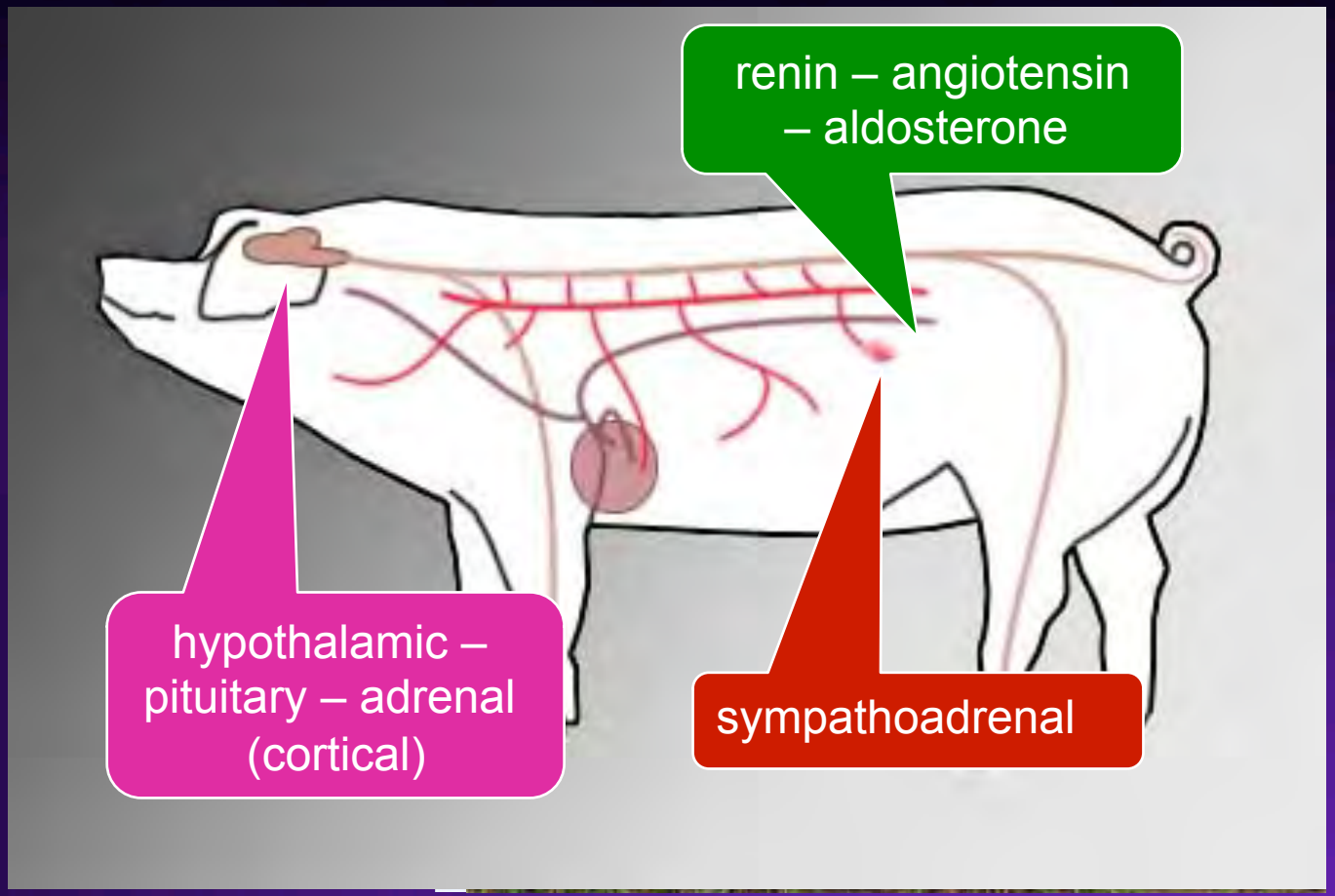
K.J.S. ANAND, M.B.B.S., D.PHIL., AND P.R. HICKEY, M.D.

THE evaluation of pain in the human fetus and neonate is difficult because pain is generally defined as a subjective phenomenon.[1] Early studies of neurologic development concluded that neonatal re-

have obscured the mounting evidence that nociception is important in the biology of the neonate. This is true regardless of any philosophical view on consciousness and "pain perception" in newborns. In the literature,

Why bother ?

- ethical
- justice
- legal
- practical
- production
- medical
- scientific
  - effective pain treatmentmandatory
  - requires recognition



- cardiovascular hyperdynanism
- oliguria
- reduced appetite
- -ve E and N_2 balance
- immunosuppresion
- catabolism & cachexia
- inadequate sleep
- adverse memory
- behavioural changes
- retarded convalescence

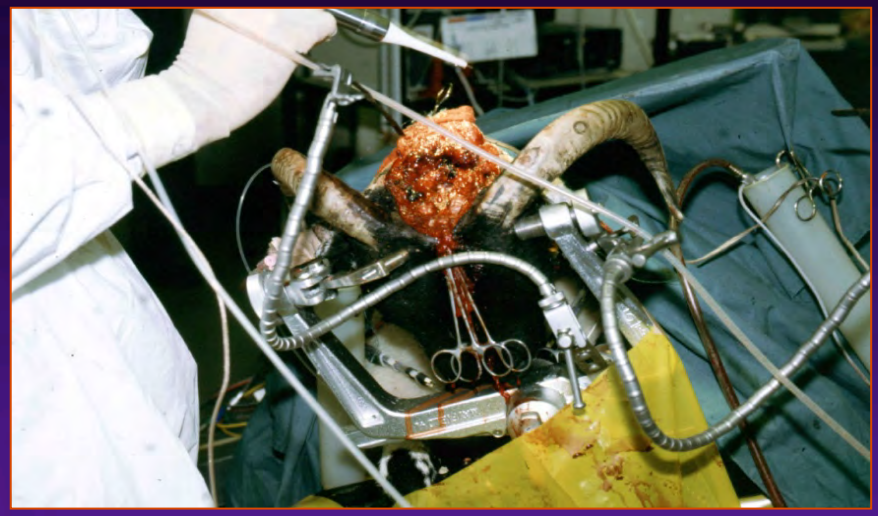
post-operative pain recognition: species effects

"conservation – withdrawal" (trophotropic) responses

"fight-or-flight" (ergotropic) responses

post-operative pain recognition: species effects

- complicates pain assessment



post-operative pain recognition: food animals

Canadian Council on Animal Care 1993

Flecknell & Waterman-Pearson 2000

Australian Government; National Health and Medical Research Council 2008

National Academy of Sciences; Institute for Laboratory Animal Research 2009

- changes in normal, appearance, spontaneous & provoked behaviour

post-operative pain recognition

spontaneous behaviour & appearance (sheep)

ears:	hanging close to head	directed backwards
eyes:	bright, open, normal pupil size	sunken, partially closed, mydriasis
expression:	normal	grimacing, flemen
mentation:	BAR, food searching	depressed, lethargic, stare, wound inspection
position:	standing (head down for food) sternal (head up, ruminating)	sternal (head down, 0 activity) lateral recumbency (worst)
social behaviour:	flock engagement food arguments	self-imposed (corner) separation
appetite:	eating, ruminating or searching	uninterested
vocalisation:	normal (food-seeking) bleats	bruxism, depressed bleats, groaning

- promotes “pigeon-holing”

- easily applied
- inaccurate
- insensitive

post-operative pain recognition

changes in spontaneous behaviour & appearance (sheep)

ears:	hanging close to head	directed backwards
eyes:	bright, open, normal pupil size	sunken, partially closed, mydriasis
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post-operative pain recognition: sheep

changes in provoked behaviour (sheep)

Pain Recognition and Management in Small Ruminants Involved in Musculoskeletal Research
AVA questionnaire study 2005

"….start bleating, walk or run to the door and are looking at the person who is approaching the pen; even more active if the person has a feeding bucket or hay in his hand "

"….smell the hand, try to chew the fingers, looking for food in the hand"

"…….escape away from the door (not familiar with the person) "

"……..do not respond (remain recumbent)"

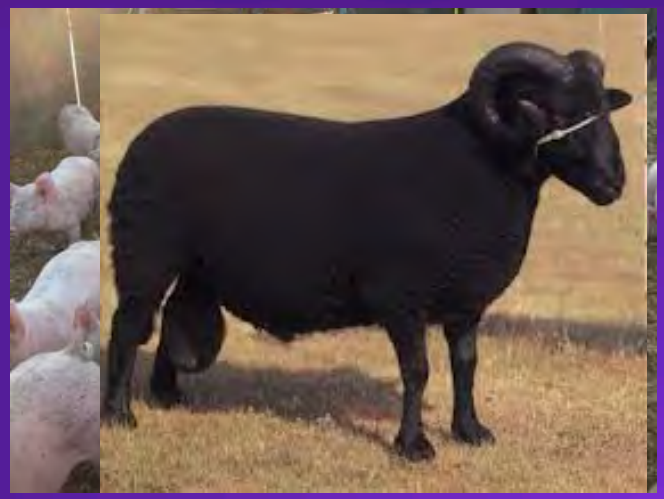
post-operative pain recognition

changes in provoked behaviour (sheep)

- interaction assessment
- more sensitive
- more informative
- time consuming (2 – 4 weeks) interaction
- do-able in pigs
- beware

post-operative pain recognition

some breeds do not allow familiarization



post-operative pain recognition

some breeds do not show pain

Variation in the analgesic effects of xylazine in different breeds of sheep.
Ley, S.; Waterman, A.; Livingston, A.
Veterinary Record 1990 Vol. 126 No. 20 pp. 508

Welsh mountain > Swaledales > Cluns

post-operative pain recognition

pain behaviours change with age

post-operative pain recognition: food animals

- difficulty α^{-1} degree of familiarisation
- age-dependent
- breed – dependent
- “production pain” of little value
- does it matter?

post-operative pain treatment: principles

surgeon control

body position

opioids
NSAIDs
local anaesthetics
NMDA antagonists
α_2 agonists
antispasmodics
general anaesthetics

SAIDs
benzodiazepines
anticonvulsants
antidepressants

new knowledge

PREVENT post-operative pain ☺

familiarisation (2 - 4 weeks)
feeding
watering
bedding
grooming
attention
exercise
Dr Green
physiotherapy
dressings & wound inspection
monitoring pain behaviours
reporting

1) Pre-emptive analgesia: peripheral

Giving analgesics before needed

cm phospholipids

↓

phospholipase A_2

↓

arachidonic acid

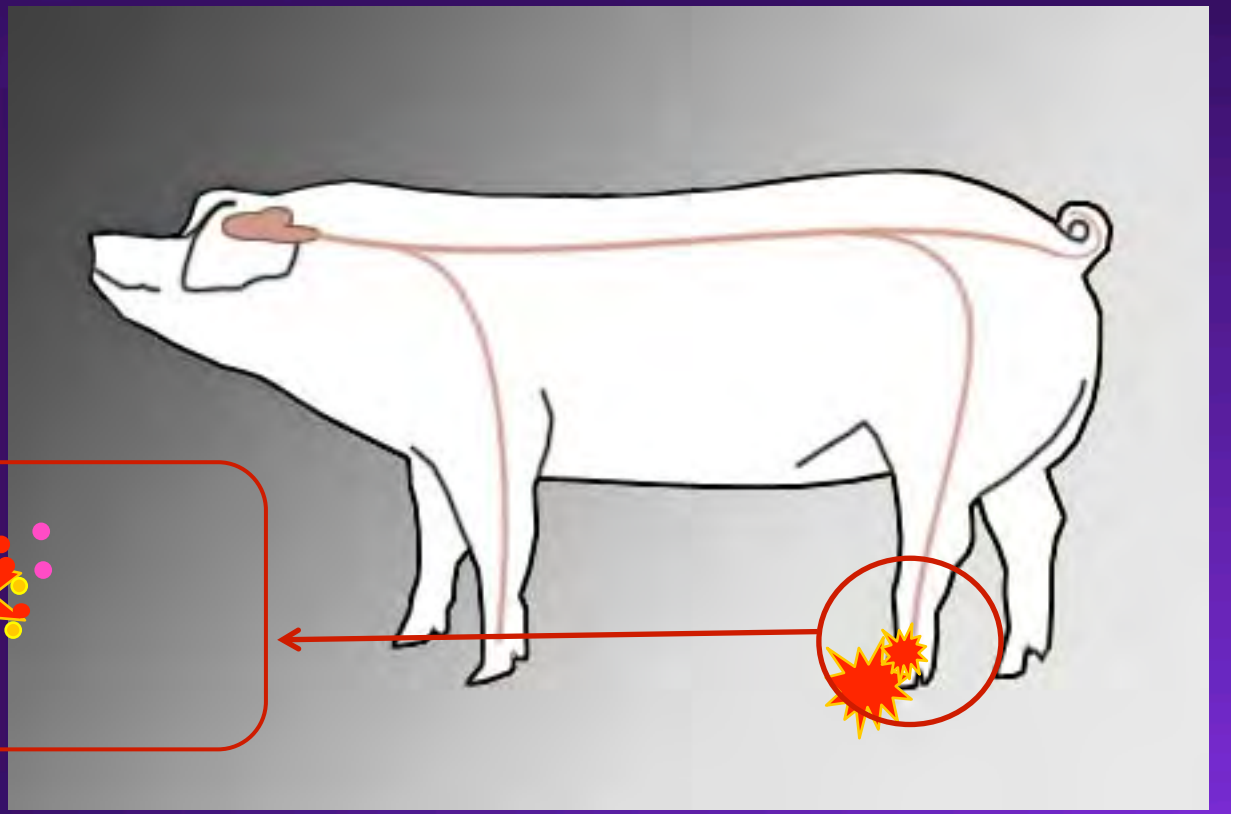
↓ ↓

LOX *COX2*

↓ ↓

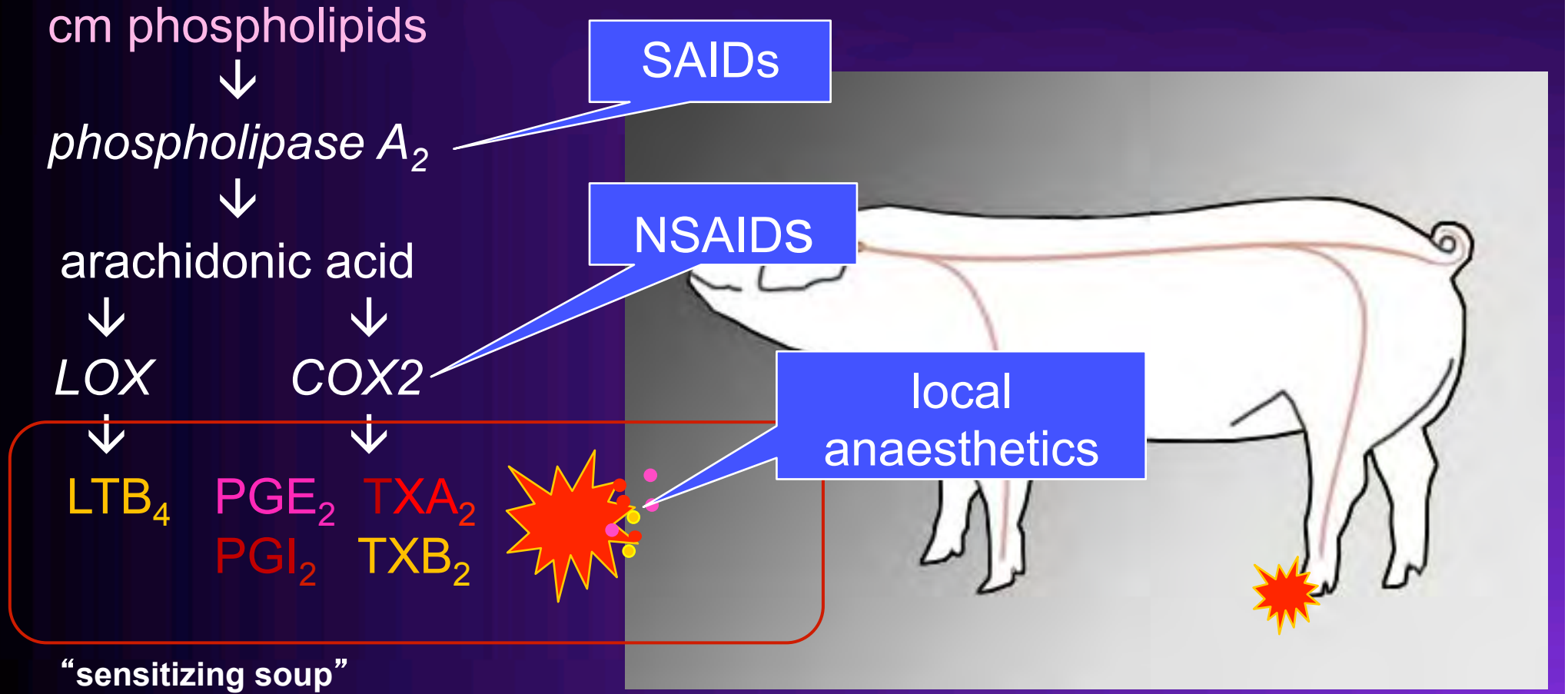
LTB_4 PGE_2 TXA_2

PGI_2 TXB_2

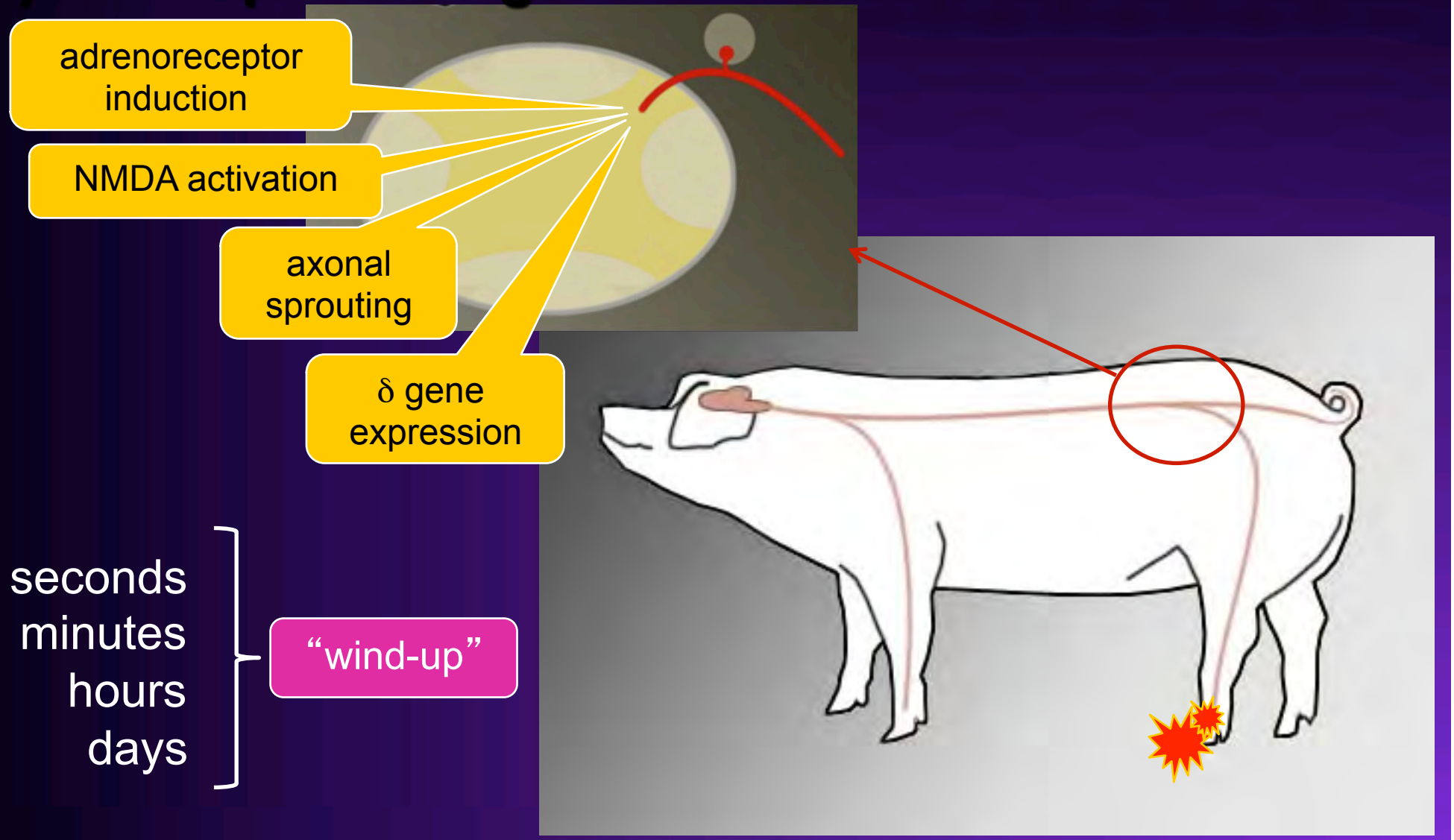


"sensitizing soup"

1) Pre-emptive analgesia: peripheral



1) Pre-emptive analgesia: central



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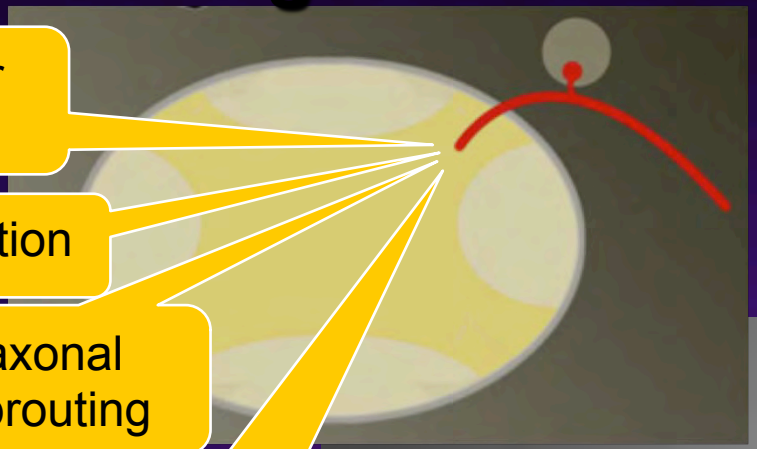
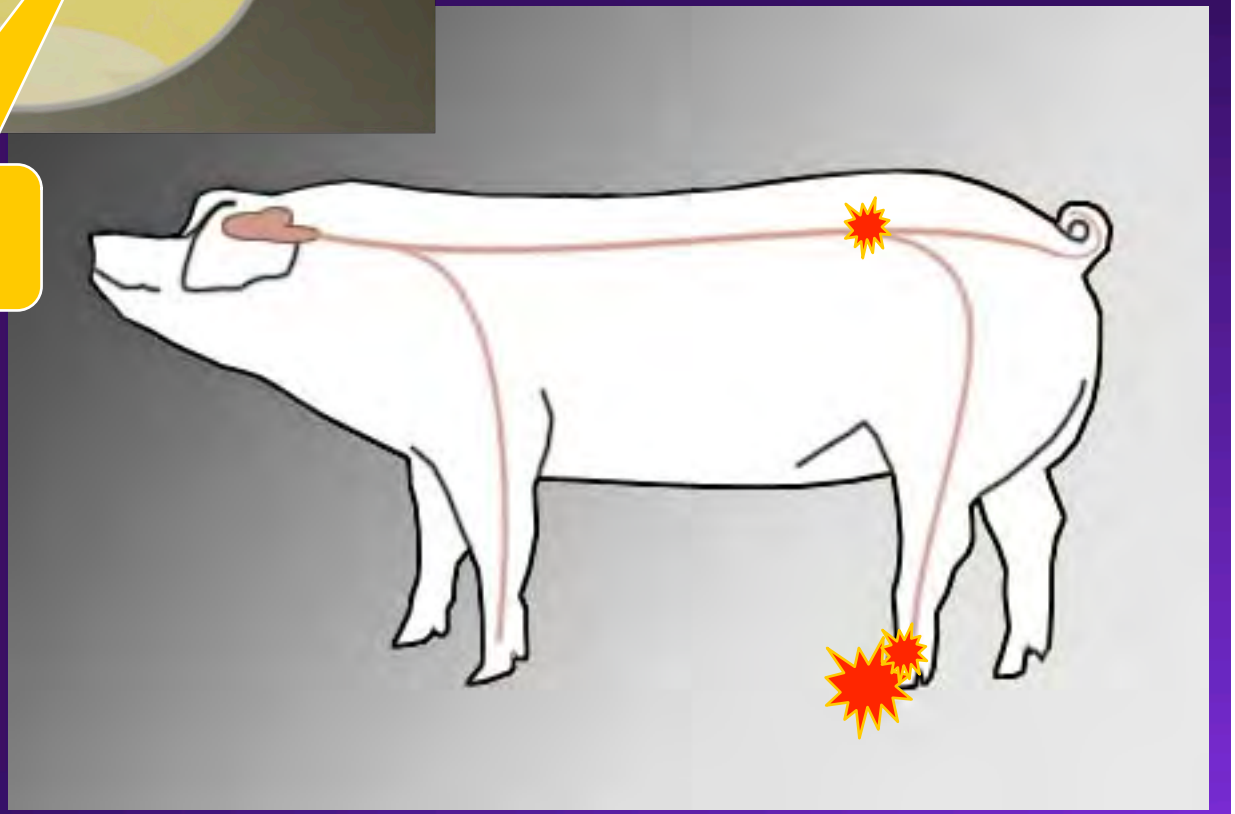


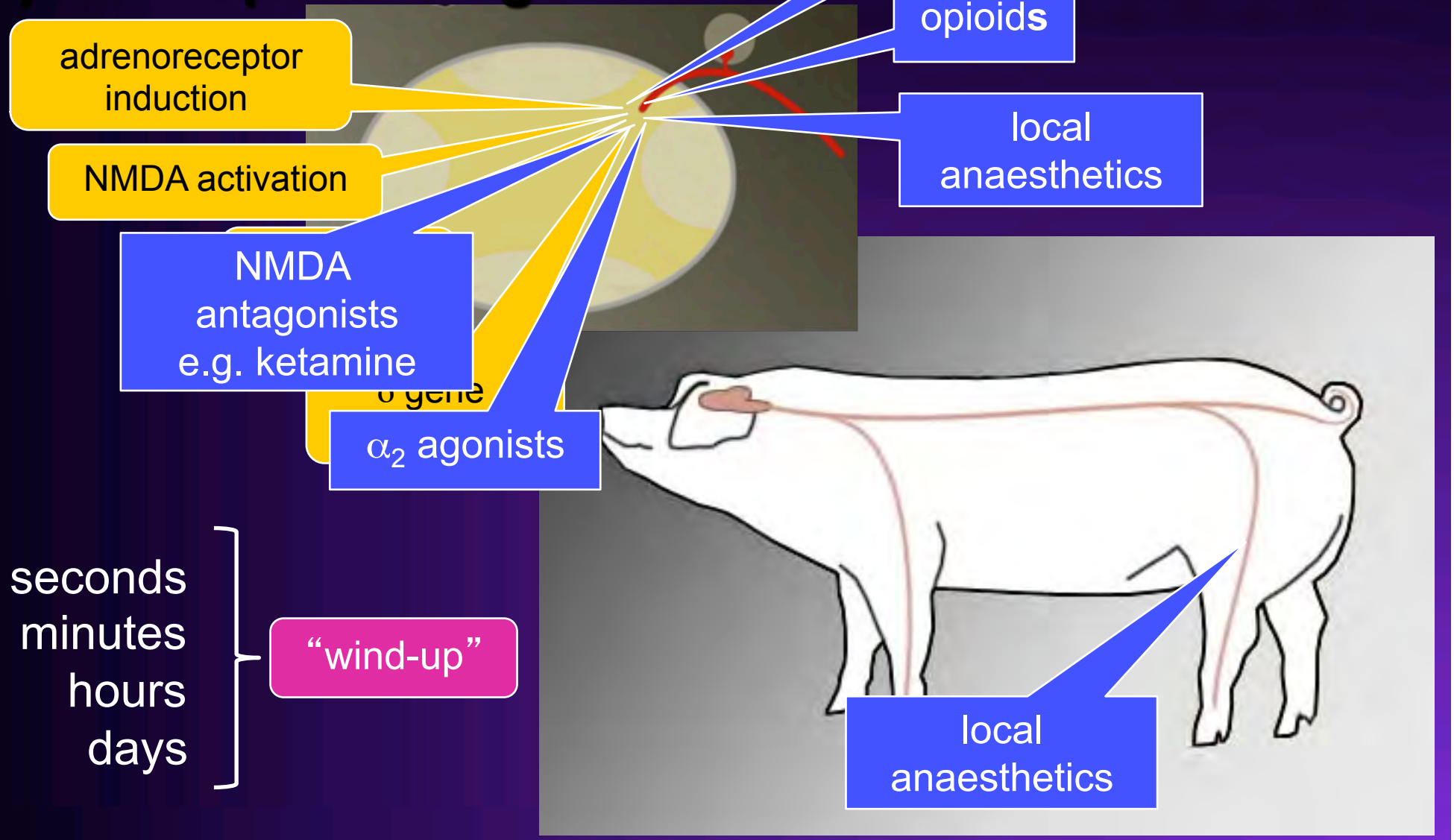
- adrenoreceptor induction
- NMDA activation
- axonal sprouting
- δ gene expression



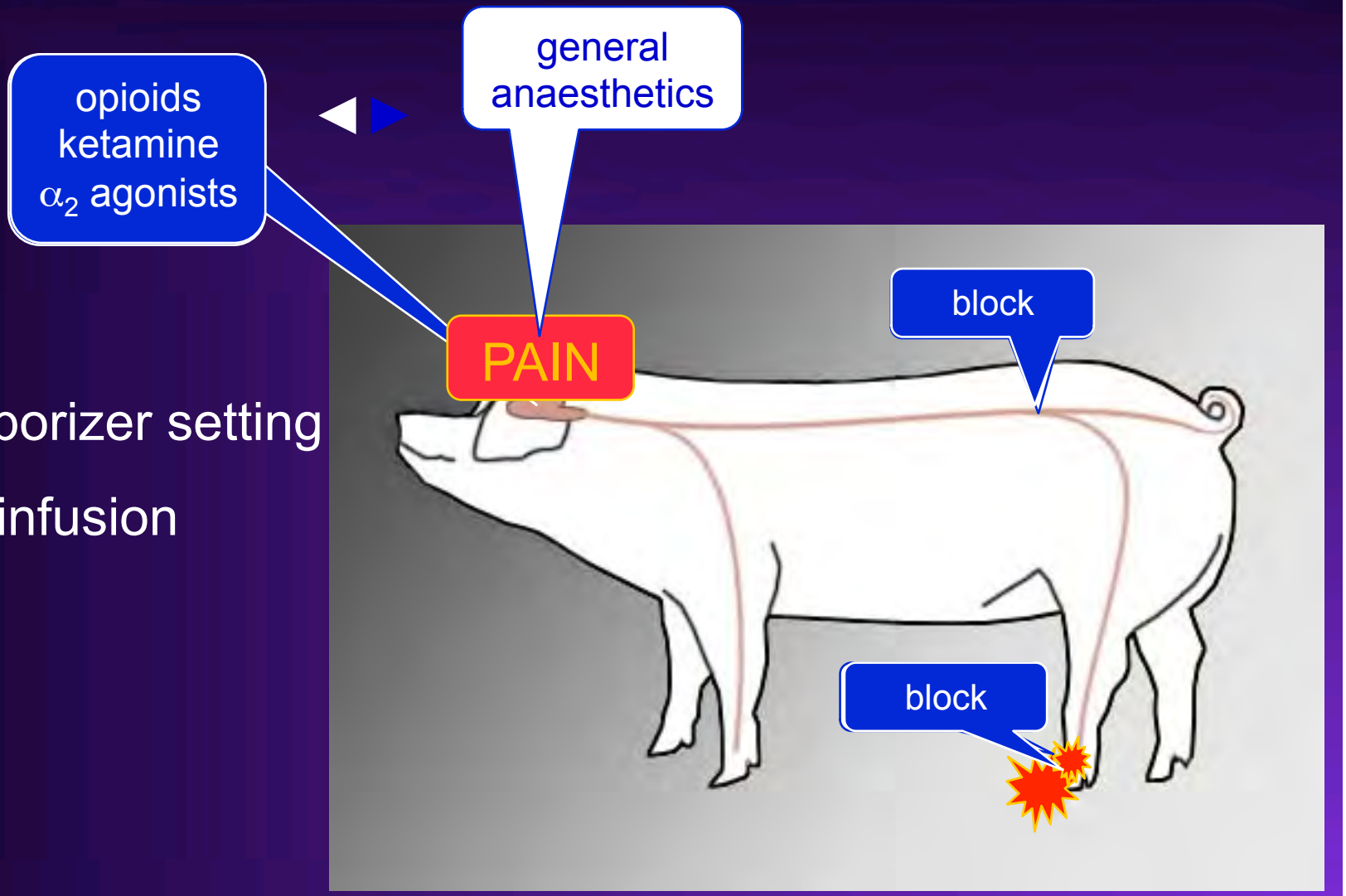
seconds
minutes
hours
days

"wind-up"

1) Pre-emptive analgesia: central



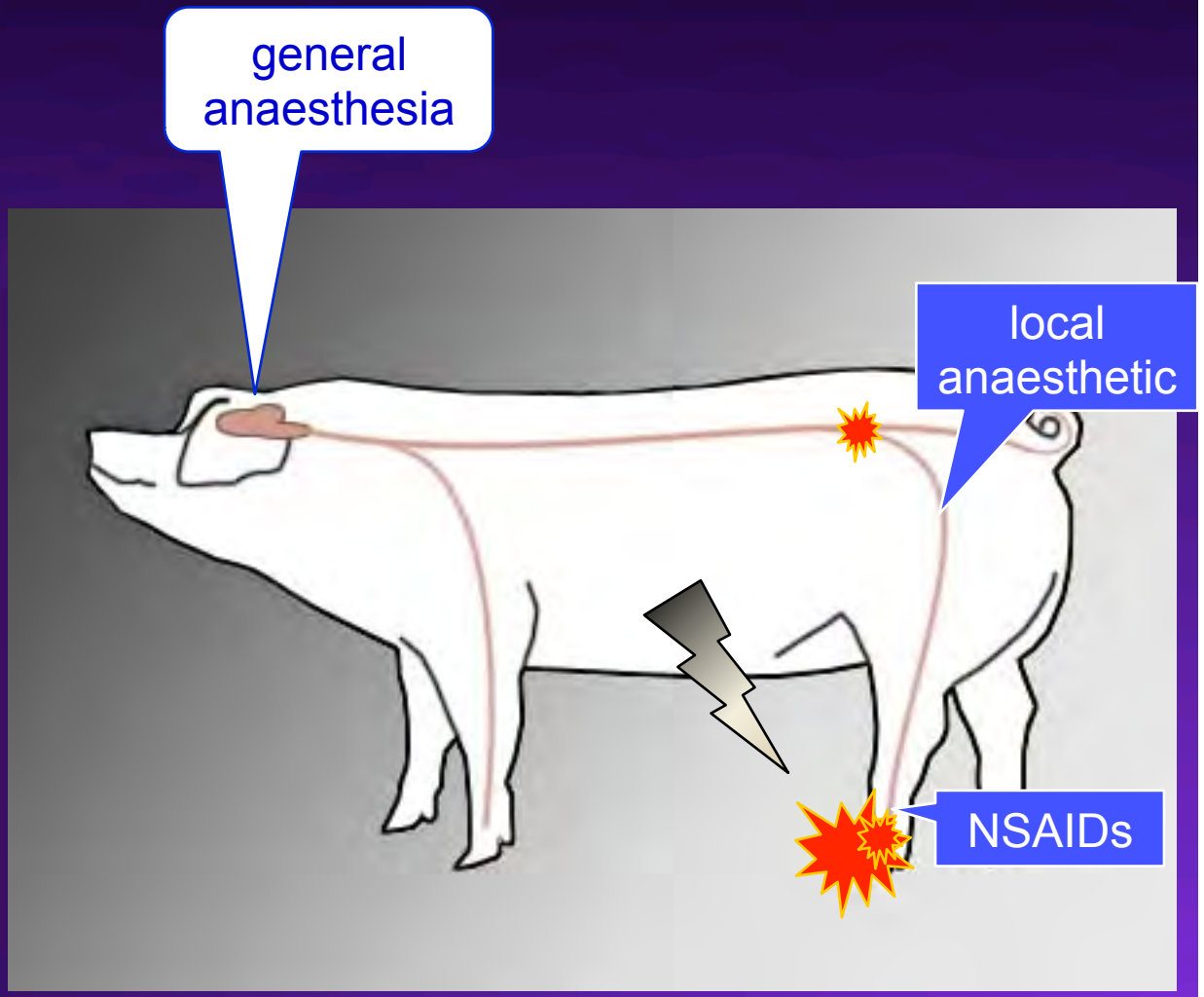
2) Partial intravenous anaesthesia



- reduce vaporizer setting
- analgesic infusion

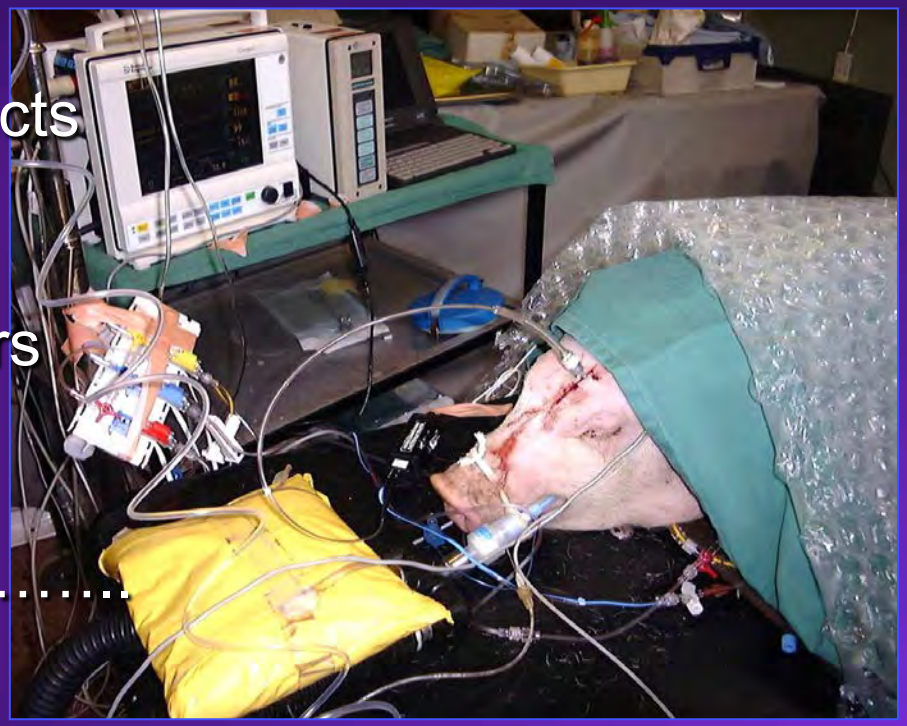
3) Prolonged postoperative analgesia

- pre-surgery
- pre-emptive analgesics
- 5 – 30 days NSAIDs

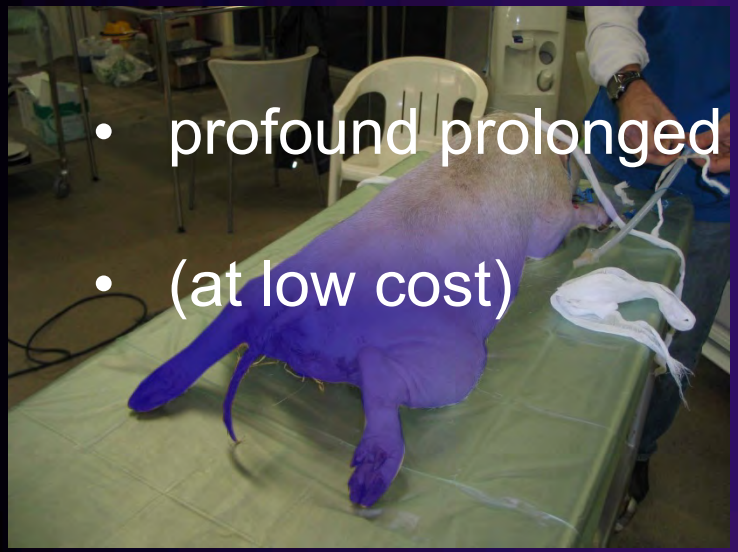


But…….

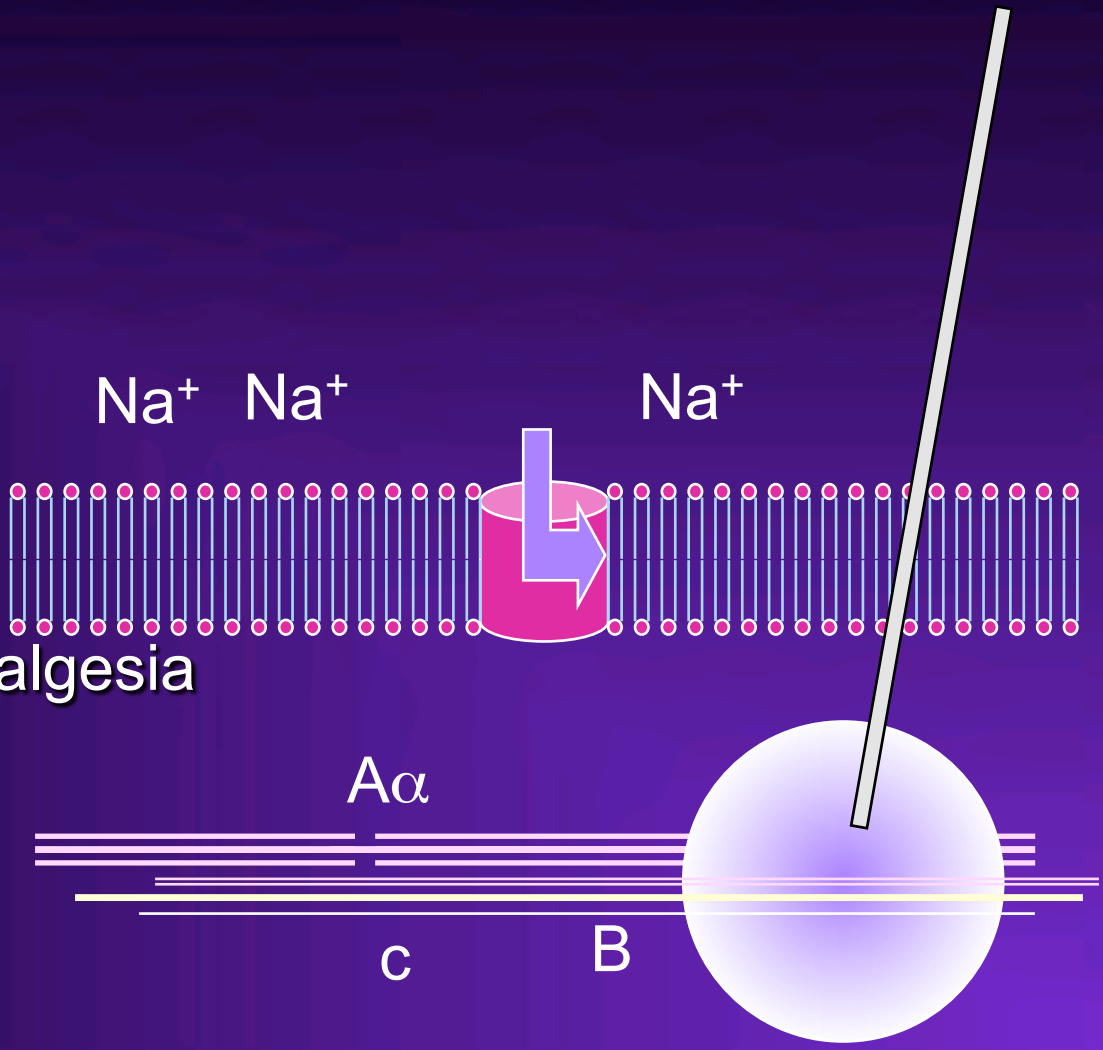
- effective analgesia theoretically devisable
- analgesics cause behavioural changes
- e.g., δ appetite
- analgesics cause physiological effects
- e.g., ileus
- δ (or un-δ) postoperative behaviours
  - drugs ◆ pain ◆ both
- drugs may affect studied variables…….



4) Local anaesthetics



- profound prolonged analgesia
- (at low cost)



Conclusion

- analgesics
- pain behaviours
- pain scoring system

} limited information

non-existent

} research

- encourage (?) familiarisation
  - motivate staff
  - adequate staff
  - adequate time
- veterinary (anaesthetist) on moderate – severe band procedures
- moratorium on food animal use for experimental surgery

Conclusion

- traditional, not demonstrable “good models”
- medically – driven (inherent specism)
- inexpensive - widely available
- ostentatious pain behaviours
- < noble
- < cuddleble
- < politically contentious

Conclusion

"The question is not, can they reason ? Nor can they talk ?

But can they suffer ?"

……possibly more