**Porcine stress syndrome**  
(PSS, Malignant hyperthermia)  
Extended Version

**Classic cases:** TWO TYPES

1. **Sudden death** in several/many of a group of pigs during handling, transport, hot days  
   a. Pigs become very stiff and rigid, get very hot, and die  
   b. Muscles are pale, soft, and greasy at slaughter, cannot be used for meat

2. **Muscle stiffness**, fast increasing temp. and CO₂ in a pig under inhalant anesthesia

**Presentation:**
- **History and Signalment**  
  - Breeds affected (usually heavy muscled breeds)  
    - Pietrain, Poland China, Landrace, Large White, Hampshire, nearly any breed, also reported in pot-bellied pigs  
    - Also seen in humans, dogs, cats, horses  
  - Triggers:  
    - Excitement, stress  
    - Rough handling  
    - Exercise  
    - High ambient temperature  
    - Inhalant anesthetics  
    - Succinyllcholine

- **Clinical signs**  
  - Muscle stiffness, rigidity  
  - Severe hyperthermia, up to 113°F (45°C)  
  - Tachypnea, tachycardia, arrhythmias  
  - Very high CO₂ – soda lime goes blue fast!  
  - Acidosis – metabolic and respiratory  
  - Skin becomes red, mottled  
  - Death  
  - Very rapid rigor mortis  
  - Necrosis, degeneration of back muscles  
    - Muscles pale, soft, exudative (PSE)

**DDX:**
- **Sudden death**  
  - Mulberry heart disease, acute bacterial septicemia, heat exhaustion, intestinal volvulus

- **Stiff muscles**  
  - Hypocalcemia, Vitamin D deficiency, other exercise induced myopathy

- **Pale muscles**  
  - Selenium/Vitamin E deficiency

Landrace pigs are at risk of porcine stress syndrome (PSS).  
*Photo courtesy of Zeilag*

*Soda lime goes blue VERY FAST with malignant hyperthermia  
photos courtesy Drs. JG Adams, CM Trim*
**Test of choice:**
- Genetic testing now supersedes other diagnostics
- History and clinical signs (esp. w/ anesthesia)
- Creatine kinase levels elevated

**Rx of choice:**
- Stop inhalant anesthesia
- IV dantrolene can reverse by inhibiting Ca\(^{++}\) release (muscle relaxant)
- Body cooling – hose down, ice, fans
- IV fluids, decrease K\(^{+}\), bicarbonate for acidosis,
- +/- steroids?
- If not anesthetized – abort procedure, separate if fighting, move pigs to cool area, hose down, fans, etc

**Prognosis:**
Poor to grave if episode not recognized in time

**Prevention:**
- IV dantrolene
- Change machine, hoses, and soda lime as needed; ventilate
- Breeding program to eliminate mutation
- Minimize stress to pigs, do not handle on hot days
- Avoid inhalant anesthetics

**Pearls:**
- **DANGEROUS AND RAPIDLY FATAL CONDITION** if not recognized
- Also called malignant hyperthermia (MH)
- **All inhalant anesthetics can trigger**
  - Halothane, isoflurane, sevoflurane, desflurane
- Hypermetabolic syndrome of skeletal muscles
  - Uncontrolled Ca\(^{++}\) release from sarcoplasmic reticulum in myocytes -> muscle contraction
  - Muscle metabolism goes crazy – producing heat, lactate, CO\(_2\), and acidosis
- Mutation usually at ryanodine receptor on Ca\(^{++}\) channels of sarcoplasmic reticulum
  - Autosomal recessive in pigs
  - Autosomal dominant in dogs, horses
- Porcine stress syndrome has been bred out of most production breeds, but still occasionally seen
Porcine stress syndrome (PSS, Malignant hyperthermia)

Extended Version

Porcine stress syndrome breeding practices. Chart courtesy of GreenGibbon

Refs: Tranquilli, Thurmon, and Grimm's Lumb & Jones Veterinary Anesthesia, 4th ed. pp. 761-2; Merck Veterinary Manual, Veterinary Medicine 10th edition (online): Malignant Hyperthermia; O.M. Radostits et al., pp 1750-1755; Interesting info on stress induced damage to pork from the Univ of Guelph Dept of Animal & Poultry Science; FASEB historical summary of malignant hyperthermia

My Notes: