MALIGNANT HYPERTHERMIA

By Stanford Anesthesia Cognitive Aid Group and Henry Rosenberg, MD

**SIGNS**
- Light anesthesia
- Hypoventilation
- Over-heating (external)
- Thyroid storm
- Pheochromocytoma
- Hypoxemia
- Insufflation of CO₂

**DDX**
- Mixed Acidosis (ABG)
- Masseter spasm/ trismus
- Sudden cardiac arrest in young person due to hyperkalemia

**TREATMENT**
1. **Discontinue** anesthetic triggers (volatiles and succinylcholine) and **increase** fresh gas flow to 10 L/min. Do **NOT** change machine or circuit
2. **Halt procedure.** If emergent, continue with non-triggering anesthetic
3. **Hyperventilate,** FiO₂ 100%, high flow O₂
4. **Assign several people to prepare 2.5 mg/kg IV Dantrolene bolus.** Dilute each 20 mg Dantrolene vial in 60 mL preservative-free sterile water (for 70kg person give 175 mg so prepare 9 vials of 20 mg Dantrolene each as above)
5. **Rapidly administer dantrolene.** Continue giving until patient stable (may give up to 10 mg/kg)
6. **Administer** sodium bicarbonate 1-2 mEq/kg for metabolic acidosis/hyperkalemia

**CALL FOR HELP**
- Inform team
- Start preparing Dantrolene!

**CALL FOR MH CART**
- Continue preparing Dantrolene!
- Inform team
- Start preparing Dantrolene!

**EARLY:**
1. Increased ETCO₂
2. Tachycardia
3. Tachypnea
4. Mixed Acidosis (ABG)
5. Masseter spasm/ trismus
6. Sudden cardiac arrest in young person due to hyperkalemia

**May be LATER:**
1. Hyperthermia
2. Muscle rigidity
3. Myoglobinuria
4. Cardiac Arrest

**INFORM TEAM**

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7. Actively **cool patient** with ice packs, lavage if open abdomen. Stop cooling at 38°C
8. Arrhythmias are usually secondary to Hyperkalemia. **Go to ACLS algorithms as needed.**
9. **Treat hyperkalemia with:**
   - **Calcium Chloride** 1 g IV
   - **D50** 1 Amp IV (25 g Dextrose) + **Regular Insulin** 10 units IV (monitor glucose)
   - **Sodium Bicarbonate** 1 Ampule.
   - **Avoid calcium channel blockers**
10. Send **labs** for ABG, CPK, myoglobin, PT/PTT, and lactic acid
11. Place **foley** catheter. Monitor urine output. Goal 2 cc/kg per hour urine output. Can give IV fluid and diuretics
12. Arrange **ICU** bed. Mechanical ventilation usually required.
13. **Continue dantrolene** 1mg/kg every 4-6 hours for 24-36 hours, observe closely 24 hours. Call MH hotline with questions.

Contact the Malignant Hyperthermia Association of the United States (**MHAUS hotline**) at any time for consultation if MH is suspected:
1-800-MH-HYPER (1-800-644-9737)
or online at http://www.mhaus.org/