Malignant Hyperthermia

Triggers and genes, early vs late signs, the MHAUS treatment order, dantrolene mixing, the first 24 hours in the ICU and look-alikes

WHAT YOU WILL DO

Malignant hyperthermia (MH) is an inherited muscle disorder: volatile anesthetics or succinylcholine open a faulty calcium channel, and muscle burns energy out of control. Most crises start in the OR, but ICU nurses see it too: after succinylcholine for an intubation, with inhaled sedation, and as the patient sent up after a crisis.

- Recognize it early and call for help and the MH cart.
- Mix and give dantrolene fast; you will likely be one of several people mixing.
- Run the 24-hour watch after a crisis: vital signs, temperature, labs, urine, dantrolene doses, signs of relapse.

TRIGGERS AND WHO IS AT RISK

- Triggers: all volatile anesthetics (sevoflurane, desflurane, isoflurane) and succinylcholine. Propofol, opioids, benzodiazepines, ketamine, local anesthetics, nitrous oxide and nondepolarizing blockers are safe.
- Genes: RYR1 in most families; CACNA1S rarely; STAC3 (Native American myopathy). Autosomal dominant: each child or sibling has about a 50% chance.
- A past uneventful anesthetic does not rule it out.

EARLY VS LATE SIGNS

EMHG 2024 and MHAUS. Fever is often late; do not wait for it.

EARLY	LATE
$EtCO_2$ rising despite more ventilation (often first)	Rapidly rising core temperature
Unexplained tachycardia, arrhythmias, unstable BP	Hyperkalemia, severe arrhythmias, cardiac arrest
Masseter spasm after succinylcholine; generalized rigidity	CK very high; cola-colored urine (myoglobin)
Mixed respiratory and metabolic acidosis; sweating, mottled skin	DIC, kidney injury, compartment syndrome

TREATMENT IN ORDER (MHAUS)

1. Stop volatile agents and succinylcholine; continue with IV non-triggering drugs.
2. Call for help and the MH cart (dantrolene); call the MHAUS hotline 1-800-644-9737.
3. Hyperventilate with 100% oxygen at 10 L/min or more; charcoal filters on both circuit limbs if available.
4. Dantrolene 2.5 mg/kg IV rapidly through a large-bore line. Repeat until $EtCO_2$ falls, rigidity eases and heart rate slows; more than 10 mg/kg may be needed.
5. Cool if core temperature is over 39 °C or rising fast; stop cooling below 38 °C.
6. Hyperkalemia: calcium, insulin with dextrose, bicarbonate. Arrhythmias: standard drugs, never calcium channel blockers.
7. Bladder catheter; urine over 1 mL/kg/h (over 2 with myoglobinuria). Blood gas, K^+, CK, urine myoglobin, coagulation.
8. Transfer to PACU or ICU for at least 24 hours once stable.

Sterile water without preservative only: never saline or D5W. Use within 6 hours. Vesicant (pH about 9.5–10.3): watch the IV site.

	RYANODEX	DANTRIUM IV / REVONTO
Vial	250 mg	20 mg (with 3 g mannitol)
Mix with	5 mL sterile water	60 mL sterile water
Result	Orange suspension; shake until uniform	Clear solution; shake until clear
80 kg first dose (200 mg)	1 vial, 4 mL	10 vials, 600 mL

SAFETY No calcium channel blockers (verapamil, diltiazem) with dantrolene: the combination has caused severe hyperkalemia and cardiovascular collapse.

CALL FOR HELP WHEN

- $EtCO_2$ climbs or the patient becomes rigid after succinylcholine or a volatile agent: call at once; do not wait for fever.
- After a crisis: rising $EtCO_2$ or rigidity, unexplained acidosis or a temperature rise (relapse); K^+ over 5.9 or ECG changes; urine dark or under target; bleeding or oozing; a tense, painful limb.
- Signs persist after large doses: the provider should reconsider the diagnosis.

CHECK YOUR UNIT POLICY FOR

Where the MH cart lives and who restocks it, which dantrolene product your hospital stocks, how to get more from pharmacy or a nearby hospital, and whether volatile sedation is used in your ICU.

Sources (8) are listed with links at icubasics.com/sheets/malignant-hyperthermia.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.