Anaesthetist 1 - Resuscitation	Anaesthesia Assistant	Dantrolene	Anaesthetist 2 - Lines and investigations	Cooling	Logistics	Surgical Team
Dantrolene 2.5mg/kg every 10-15 minutes Total intravenous anaesthesia (TIVA) Hyperkalaemia management Arrhythmia management Renal Protection	Collect MH box Arterial line set-up Central line setup Restock resuscitation and TIVA drugs	20mg/vial 2.5mg/kg every 10-15 minutes Reconstitute with 60mls sterile water	Arterial Line Frequent blood tests: ABG U&E CK Coagulation profile Urine Myoglobin Central venous line Anaesthetic record	Collect ICE Collect refrigerated IV fluids and insulin Collect defibrillator Cover all exposed parts with ICE	Call for: Additional anaesthetists Additional dantrolene Arrange transfer to ICU and call for ICU bed	Complete or abandon surgery Insert urinary catheter Expose patient to aid cooling

ANAESTHETIST 1: RESUSCITATION

DANTROLENE

2.5mg/kg every 10-15 minutes IV until signs of hypermetabolism (acidosis, pyrexia, muscle rigidity) are resolving

Do not delay dantrolene to insert a central line

MAINTENANCE OF ANAESTHESIA

Consider Propofol maintenance +/- benzodiazepine

Intubate to support hyperventilation (dantrolene is a muscle relaxant)

HYPERKALAEMIA MANAGEMENT

Hyperventilation

Insulin 0.15 units/kg + 0.5 ml/kg 50% dextrose as rapid infusion (10 units insulin in 50 ml 50% dextrose) in adults

Calcium Chloride ($CaCl_2$) – 0.1 ml/kg OR Calcium Gluconate (10%) 0.3 ml/kg

ARRHTHYTHMIA MANGEMENT

Amiodarone: 3mg/kg slow IV

Lignocaine: 1mg/kg IV

ACIDOSIS MANAGEMENT

Dantrolene (treats primary cause)

Hyperventilation

Consider 0.5-1 mmol/kg sodium bicarbonate if pH <7.2 (8.4% is 1mmol/ml)

RENAL PROTECTION

Maintain urine output > 2ml/kg/hr by

Maintaining intravascular volume – normal saline

Mannitol – there is 3 g mannitol/vial of dantrolene

INOTROPIC SUPPORT

Epinephrine/norepinephrine infusions prn

ANAESTHESIA ASSISTANT

ONCE THE MH BOX AND REFRIGERATED SUPPLIES ARE IN THE OPERATING THEATRE

Lay contents out on trolley

Prepare arterial line equipment and assist anaesthetist to insert arterial line

Assist with dantrolene mixing

Ensure adequate stocks of resuscitation drugs are maintained

Assist with TIVA management

Set up central venous line equipment and assist anaesthetist to insert central line

Ensure volatile agent has been removed from the operating room

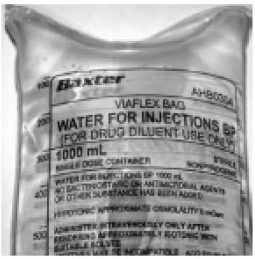
Change soda lime when required

Revised August 2018

DANTROLENE RECONSTITUTION

THIS IS THE HIGHEST PRIORITY
MIXING DANTROLENE CAN BE TIME CONSUMING
USE AS MANY PEOPLE AS ARE AVAILABLE
REPEAT DOSE EVERY 10-15 MINUTES UNTIL SYMPTOMS RESOLVE

HERE IS ONE METHOD



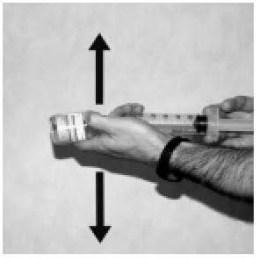
1) Dantrolene must be mixed ONLY with **STERILE WATER**

2) 60 mls water for each 20mg vial from bag or bottle

3) Remove metal vial cap or flip off cap

4) Inject 30ml of water

5) Hold syringe vertically, allow air in vial to escape, inject remaining 30mls water



6) Hold together firmly or disconnect and shake to mix

WEIGHT	10KG	20KG	30KG	40KG	50KG	60KG	70KG	80KG	90KG	100KG
AMPOULES FOR INITIAL DOSE	2	3	4	5	7	8	9	10	12	13

Revised August 2018

RYANODEX®

Ryanodex® is dantrolene presented as sterile 250 mg lyophilised powder. Mix Ryanodex® with 5 ml of sterile water for injection to obtain a solution with a concentration of 50 mg/ml.

The following table outlines the differences in preparations of dantrolene in the event that RYANODEX® is the preparation that is available.

Product characteristic	**RYANODEX®**	**DANTRIUM®**
Presentation	Sterile **250 mg** lyophilised powder, 20 mL vial injectable suspension for IV use	Sterile **20 mg** lyophilised powder, 65 ml vial for IV use
Formulation	Active: **250 mg** dantrolene sodium; Inactive: 125 mg mannitol, 25 mg polysorbate 80, 4 mg povidone K12, NaOH, HCl.	Active: **20 mg** dantrolene sodium; Inactive 3 g mannitol, NaOH
Dosing	Dose 2.5 mg/kg – MHANZ, MHAUS* recommendation	Dose 2.5 mg/kg – MHANZ, MHAUS* recommendation
Reconstitution/ Administration	Mix with **5 mL** WFI**; produces orange coloured suspension. For Intravenous push. Final concentration = 50 mg/mL, pH 10.3.	Mix with 60 mL WFI. Shake until solution is clear. Continuous rapid Intravenous push. Final concentration ~ 0.33 mg/mL, pH 9.5.
Warning/ Precautions/ Contraindications	Similar. Check full Product Information before prescribing.	Similar. Check full Product Information before prescribing
Storage/ Handling	Use within 6 hrs @ 20C – 25C, Protect from light	Protect from light, use within 6 hrs @ 15C – 25C

*MHAUS – Malignant Hyperthermia Association of the United States

** WFI – water for injection

WEIGHT	10KG	20KG	30KG	40KG	50KG	60KG	70KG	80KG	90KG	100KG
AMPOULES FOR INITIAL DOSE	1	1	1	1	1	1	1	1	1	1

ANAESTHETIST 2: LINES/INVESTIGATIONS

ENSURE TEMPERATURE PROBE INSERTED

INSERT ARTERIAL LINE

Check arterial blood gases frequently
Notify coordinating anaesthetist of changes

Pay particular attention to:
Acidosis
Hyperkalaemia
$PaCO_2$
Blood glucose

INSERT CENTRAL VENOUS LINE WHEN/IF APPROPRIATE

SEND LABORATORY BLOODS

Urea and electrolytes
Creatinine Kinase
Coagulation screen

URINE

Once urinary catheter is inserted, send urine sample for myoglobin
Maintain urine output at > 2ml/kg/hr

ANAESTHETIC RECORD

Ensure an accurate anaesthetic record is being kept
Document times, temperatures, drugs and monitor recordings
Document blood test results
Document presence of masseter spasm and/or rigidity, colour of urine, excessive bleeding, time to administer dantrolene etc.

COOLING

AMBIENT TEMPERATURE

Reduce operating theatre thermostat to lowest setting

IV FLUIDS

Collect 2 litres of Normal Saline (for intravenous infusion) and actrapid insulin from refrigerator located:

ICE

Bring bags of ice from the ice machine located:

Assist packing all exposed body parts with ice bags

DEFIBRILLATOR

Collect defibrillator located

LOGISTICS

CALL FOR ADDITIONAL SUPPORT

Ideally two specialist anaesthetists should be involved

Call senior surgeon If required to complete surgery rapidly

MOBILISE OFF-SITE DANTROLENE

At least 24 ampoules should be kept on site for immediate management

Further dantrolene stocks are held at:

Hospital 1 stocks ____ vials

Hospital name and contact details

Hospital 2 stocks ____ vials

Hospital name and contact details

Organise urgent transfer of additional stocks of dantrolene

Consider air transport, ambulance and police escort to expedite delivery

LIAISE WITH INTENSIVE CARE FOR PATIENT TRANSFER

All patients should be monitored post operatively in an intensive care environment. Ongoing use of dantrolene will require assisted ventilation as dantrolene is a muscle relaxant

Up to 25% of patients relapse in the first 24 hours

ASSIST WITH DANTROLENE MIXING

SURGICAL TEAM

SURGERY

Complete or abandon surgery as soon as possible

Call for senior help if required to complete surgery more quickly

HELP COOL PATIENT

Expose all parts of the patient outside immediate sterile field

If abdomen open, consider washout with normal saline at 4^0C

Assist with packing all exposed body parts with ice bags

URINARY CATHETER

Set up and insert urinary catheter at earliest convenience

ASSIST WITH DANTROLENE MIXING