

*The North American Malignant Hyperthermia Registry of MHAUS*

**Report of Acute**

**ADVERSE METABOLIC OR MUSCULAR REACTION TO  
ANESTHESIA**

**(AMRA Report)**

**INSTRUCTIONS**

*This form is to be filled out by an anesthesiologist or other health care provider.*

1. Complete this form each time you **suspect** a patient may have experienced an adverse metabolic reaction to anesthesia or exercise, possibly related to malignant hyperthermia (MH).

Examples: hypercarbia, acidosis, tachycardia, rigidity, hyperkalemia, myoglobinuria, arrhythmias, unexplained fever.

2. Please fill out as soon as patient is stable, preferably within 48 hours of the event.
3. The attending anesthesiologist or other physician should review the completed form.
4. The patient's name should **not** be recorded on the form sent to the NAMH Registry. If a patient wishes to be registered by name, they may contact the Registry directly. The toll free telephone # of the NAMHR is 888-274-7899
5. Send to:

The North American Malignant Hyperthermia Registry  
University of Florida  
Department of Anesthesiology  
1600 SW Archer Road, PO Box 100254  
Gainesville, FL 32610

For **FULMINANT MH** cases refer the patient for a blood test that assesses genetic risk of MH. This may also help diagnose MH susceptibility in other family members. The patient or the legal guardian of a minor should call # **888-274-7899**, the MH Registry, to discuss joining this research registry. In the case of fatal, fulminant MH, muscle should be examined by the autopsy pathologist for genetic defects related to MH and the patient's next of kin should consider calling the MH Registry, # 888-274-7899, to facilitate full reporting of this death.

AMRA Report Version 9.9 - June 2015

Z:\MHReg\Admin\IRB\NAMHR\2009 AMRA

**DEMOGRAPHIC INFORMATION**

1. Sex  
*check one*  
 male       female
  
2. Weight  
\_\_\_\_.\_\_\_\_ kilograms OR \_\_\_\_ lbs
  
3. Height  
\_\_\_\_\_ cm OR \_\_\_\_ ft \_\_\_\_ inches
  
4. Age when MH event occurred?      \_\_\_\_ years \_\_\_\_ months
  
5. Race/Ethnicity:  
*check as many as apply*  
 White                                       African  
 Hispanic                                       East Asian  
 Black or African-American               South Asian  
 American Indian/Alaskan Native       Middle Eastern  
 Hawaiian/Pacific Islander  
 other (*specify*): \_\_\_\_\_
  
6. Body Build  
*check one*  
 Normal                                       Lean  
 Muscular                                       Obese  
 Peripartum  
 Other (*specify*): \_\_\_\_\_
  
7. State or province of patient's residence  
\_\_\_\_
  
8. State or province of facility in which anesthesia was given  
\_\_\_\_
  
9. Country  
\_\_\_\_\_
  
10. Reporting physician's name: (*optional*)  
-----
  
11. Facility type:  
 Hospital  
 Ambulatory Surgical facility located on hospital campus  
 Free-standing ambulatory surgical facility  
 Dental Office  
 Surgical Office                              other \_\_\_\_\_
  
12. Facility name: (*optional*)  
-----

13. Anesthesia department telephone number and/or email address: *(optional)*  
(\_\_ \_\_ \_\_)-\_\_ \_\_ \_\_-\_\_ \_\_ \_\_ \_\_ \_\_\_\_\_ @\_\_\_\_\_

### **FAMILY HISTORY**

14. Before this episode, was the patient's family history positive for:  
*check all applicable*
- malignant hyperthermia
  - masseter spasm
  - intraoperative death not thought to be MH
  - sudden infant death syndrome or cot death
  - sudden death from unknown cause at < 45 year >1.5 years
  - exercise-associated heatstroke
  - environmentally induced heatstroke
  - neuroleptic malignant syndrome
  - intolerance to heat
  - chronic muscle pain
  - frequent muscle cramps
  - chronic muscle weakness
  - exercise intolerance due to muscle pain, weakness or fever
  - episodes of dark urine (myoglobinuria) and muscle pain
  - myopathies *specify type; write unknown if not known:* \_\_\_\_\_
  - idiopathic creatine kinase elevation
  - diabetes
    - Type 1
    - Type 2
  - Other (*specify*): \_\_\_\_\_
  
  - none of the above\*
  - unknown\*

\* Check one only; if applicable

### **MEDICAL HISTORY**

15. Has the patient had any of the following?  
*check all applicable*
- muscle weakness interferes with daily activity at least once/week
  - muscle cramps or pain that interfere with daily activity at least once/week
  - cola colored urine
  - heat stroke or heat prostration
  - oral (or rectal/axillary equivalent) fever >38.8°C or 101.4°C at least 6 times/year without medical cause

- recent generalized infection  
If there was infection, how long ago was it? \_\_\_\_ (*days*)
- recent use of cholesterol lowering drugs  
If so, which drug \_\_\_\_\_, and how long ago was it last ingested? \_\_\_\_ (*days*)
- recent use of antipsychotic drugs  
If so, which drug(s) \_\_\_\_\_, and how long ago was it last ingested? \_\_\_\_ (*days*)
- recent use of serotonin re-uptake inhibitors  
If so, which drug(s) \_\_\_\_\_, and how long ago was it last ingested? \_\_\_\_ (*days*)
- recent use of monoamine oxidase inhibitors  
If so, which drug(s) \_\_\_\_\_, and how long ago was it last ingested? \_\_\_\_ (*days*)
- recent use of illicit drugs  
If so, which drug(s) \_\_\_\_\_, and how long ago was it last ingested? \_\_\_\_ (*days*)
- a regular regimen of strenuous physical activity?  
If so, how long ago was the last work-out? \_\_\_\_ (*days*)
- ingestion of any drug to improve muscular performance  
If so, which drug: \_\_\_\_\_, how long ago was it ingested: \_\_\_\_\_ (*days*)
- intolerance to heat
- exercise intolerance due to muscle pain, weakness or fever
- diabetes
  - Type 1
  - Type 2
  - Other (*specify*): \_\_\_\_\_
- none of the above\*
- unknown\*

\* Check one only; if applicable

16. Has the patient ever had physical findings of:

*check all applicable*

- increased muscle tone
- decreased muscle tone
- generalized muscle weakness
- myopathy *specify type; write unknown if not known*: \_\_\_\_\_
- ptosis
- strabismus
- undescended testes
- clubbed foot
- joint hypermobility
- kyphoscoliosis (moderate or severe; curve > 45°)
- pectus carinatum
- pectus excavatum
- winged scapulae
- skeletal fractures (e.g. possible osteogenesis imperfect) (more than 2)
- kidney stones
- laryngeal papillomas
- other (*specify*): \_\_\_\_\_
- none of the above\*
- unknown\*

\* Check one only; if applicable

**ANESTHETIC HISTORY**

17. How many times was this patient anesthetized prior to this event?

— —

( ) unknown, but greater than zero ( ) Unknown

*Skip to question 20 if zero*

18. How many were general anesthetics?

— —

( ) unknown, but greater than zero ( ) Unknown

19. Year of most recent anesthetic (excluding present episode)?

— — — —

( ) unknown

Year

20. Were unusual metabolic or muscular responses (including myoglobinuria) noted during prior anesthetics?

*check one*

( ) no

( ) yes

( ) unknown

21. Was there unusual delayed awakening from previous general anesthetics?

*check one*

( ) no

( ) yes

( ) unknown

**ADVERSE METABOLIC REACTION TO ANESTHESIA**

22. Date of adverse metabolic or muscular reaction.

— — / — — / — — (mm/dd/yy)

( ) unknown

23. Type of procedure scheduled

*check all applicable*

( ) cardiothoracic with bypass

( ) orthopedic

( ) cardiothoracic without bypass

( ) plastic surgery

( ) dental

( ) radiology

( ) ear, nose, or throat

( ) robot-assisted surgery

( ) eye

( ) thoracic surgery

( ) general surgery

( ) thoracoscopic surgery

- gynecology  
 laparoscopic surgery  
 neurosurgery  
 obstetrics  
 oral surgery
- transplant  
transplant type \_\_\_\_\_  
 trauma  
 urology  
 vascular

other (specify): \_\_\_\_\_  
 unknown

24. Was the procedure an emergency?

*check one*

- no  
 yes  
 unknown

25. Did this adverse reaction occur without exposure to anesthetic?

*check one*

- no  
 yes add details \_\_\_\_\_

26. Was the environment hot when this reaction occurred?

*check one*

- no  
 yes  
 unknown

If yes how hot? \_\_\_ . \_\_\_ C or \_\_\_ . \_\_\_ F

27. Was any infection present at the time of this reaction?

*check one*

- no  
 yes  
 unknown

28. If infection was present, what organisms were known to be present?

*specify:* \_\_\_\_\_

29. Where was the reaction noted to occur?

*check one*

- pre-operative holding area  
 in the operating room  
 in the intensive care unit  
 in a remote location (e.g. GI suite, radiology)  
 in the post-anesthesia care unit  
 other (specify): \_\_\_\_\_

30. After adverse metabolic or muscular reaction was noted, the procedure was: *check one*

- deferred  
 terminated before all scheduled procedures completed  
 completed in spite of reaction  
 not applicable - patient was in transport at time reaction occurred  
 not applicable - patient in recovery or intensive care area at time of reaction

31. Premedication and anesthetic agents utilized (before reaction occurred):

*check all applicable*

- |  |   |
|--|---|
| <input type="checkbox"/> sodium citrated citric acid (Bicitra) | <input type="checkbox"/> fentanyl and droperidol (Innovar)    |
| <input type="checkbox"/> cimetidine (Tagamet)                  | <input type="checkbox"/> meperidine (Demerol)                 |
| <input type="checkbox"/> famotidine (Pepcid)                   | <input type="checkbox"/> morphine                             |
| <input type="checkbox"/> lansoprazole (Prevacid)               | <input type="checkbox"/> remifentanyl (Ultiva)                |
| <input type="checkbox"/> ranitidine (Zantac)                   | <input type="checkbox"/> sufentanil (Sufenta)                 |
| <input type="checkbox"/> metoclopramide (Reglan)               | <input type="checkbox"/> hydromorphone (Dilaudid)             |
| <input type="checkbox"/> omeprazole (Prilosec)                 | <input type="checkbox"/> sevoflurane (Ultane)                 |
| <input type="checkbox"/> atropine                              | <input type="checkbox"/> desflurane (Suprane)                 |
| <input type="checkbox"/> glycopyrrolate (Robinul)              | <input type="checkbox"/> isoflurane (Forane)                  |
| <input type="checkbox"/> scopolamine (Hyoscine)                | <input type="checkbox"/> <b>NO</b> volatile anesthetic        |
| <input type="checkbox"/> dolasetron (Anzemet)                  | <input type="checkbox"/> nitrous oxide                        |
| <input type="checkbox"/> droperidol (Inapsine)                 | <input type="checkbox"/> nalbuphine (Nubain)                  |
| <input type="checkbox"/> hydroxyzine (Vistaril)                | <input type="checkbox"/> naloxone (Narcan)                    |
| <input type="checkbox"/> ondansetron (Zofran)                  | <input type="checkbox"/> atracurium (Tracrium)                |
| <input type="checkbox"/> promethazine (Phenergan)              | <input type="checkbox"/> cisatracurium (Nimbex)               |
| <input type="checkbox"/> diphenhydramine (Benadryl)            | <input type="checkbox"/> rocuronium (Zemuron)                 |
| <input type="checkbox"/> clonidine (Duraclon)                  | <input type="checkbox"/> vecuronium (Norcuron) (              |
| <input type="checkbox"/> ketorolac (Toradol)                   | ) pancuronium (Pavulon)                                       |
| <input type="checkbox"/> acetaminophen (Tylenol)               | <input type="checkbox"/> other NMB                            |
| <input type="checkbox"/> diazepam (Valium)                     | <input type="checkbox"/> <b>IM</b> succinylcholine (Anectine) |
| <input type="checkbox"/> lorazepam (Ativan)                    | <input type="checkbox"/> <b>IV</b> succinylcholine (Anectine) |
| <input type="checkbox"/> midazolam (Versed)                    | <input type="checkbox"/> <b>NO</b> succinylcholine            |
| <input type="checkbox"/> dexamethasone                         | <input type="checkbox"/> edrophonium (Tensilon)               |
| <input type="checkbox"/> hydrocortisone                        | <input type="checkbox"/> neostigmine (Prostigmin)             |
| <input type="checkbox"/> dexmedetomidine                       | <input type="checkbox"/> bupivacaine (Marcaine)               |
| <input type="checkbox"/> etomidate (Amidate)                   | <input type="checkbox"/> levo-bupivacaine                     |
| <input type="checkbox"/> ketamine (Ketalar)                    | <input type="checkbox"/> chloroprocaine (Nesacaine) (         |
| <input type="checkbox"/> propofol (Diprivan)                   | ) cocaine   |
| <input type="checkbox"/> alfentanil (Alfenta)                  | <input type="checkbox"/> etidocaine (Duranest) (              |
| <input type="checkbox"/> fentanyl (Sublimaze)                  | ) lidocaine (Xylocaine)                                       |
|  | <input type="checkbox"/> mepivacaine (Carbocaine)             |
|  | <input type="checkbox"/> prilocaine (Citanest) (              |
|  | ) procaine (Novocain)   |





**PATIENT MONITORING UTILIZED BEFORE THE REACTION**

37. Monitoring utilized (before reaction occurred):

*check all monitoring used*

- |  |   |
|--|---|
| <input type="checkbox"/> blood pressure monitor    | <input type="checkbox"/> end-tidal PCO <sub>2</sub>     |
| <input type="checkbox"/> electrocardiograph        | <input type="checkbox"/> pulse oximeter                 |
| <input type="checkbox"/> stethoscope               | <input type="checkbox"/> bladder (Foley) catheter       |
| <input type="checkbox"/> arterial catheter         | <input type="checkbox"/> processed EEG (e.g. BIS)       |
| <input type="checkbox"/> central venous catheter   |   |
| <input type="checkbox"/> pulmonary artery catheter | <input type="checkbox"/> other ( <i>specify</i> ):_____ |

Temperature probes:

- axillary
- bladder
- esophageal
- nasopharyngeal
- rectal
- skin – electronic (*specify location of skin temperature monitor*):\_\_\_\_\_
- skin - liquid crystal  
(*specify type and location of skin temperature monitor*):\_\_\_\_\_
- tympanic
- other (*specify*):\_\_\_\_\_
- no temperature monitoring used before reaction occurred

38. If a liquid crystal temperature probe was used, did it accurately trend with core temperatures? *check one*

- no
- yes
- unknown

39. Was a forced air warming device in use? *check one*

- no
- yes  
\_\_\_\_\_ temperature used (°C)
- unknown

40. Was an IV fluid warming device in use?

*check one*

- no
- yes  
\_\_\_\_\_ temperature used (°C)
- unknown

41. Was a circulating water mattress used? *check one*  
 no  
 yes  
\_\_\_\_\_ temperature used (°C)  
 unknown

**SIGNS NOTED DURING THE REACTION**

42. Abnormal signs judged to be inappropriate by the attending anesthesiologist or other physician:

**RANK in order of appearance. NUMBER, do not check.**

*(a number may be used more than once if signs were noted simultaneously)*

- \_\_\_ masseter spasm: mouth cannot be fully opened, but direct laryngoscopy possible
- \_\_\_ masseter spasm: jaw clamped shut, direct laryngoscopy impossible
- \_\_\_ generalized muscular rigidity
- \_\_\_ cola colored urine
- \_\_\_ tachypnea
- \_\_\_ hypercarbia
- \_\_\_ cyanosis
- \_\_\_ skin mottling
- \_\_\_ sinus tachycardia
- \_\_\_ ventricular tachycardia
- \_\_\_ ventricular fibrillation
- \_\_\_ elevated temperature
- \_\_\_ rapidly increasing temperature
- \_\_\_ sweating
- \_\_\_ excessive bleeding
- \_\_\_ hypertension > 20% of baseline
- \_\_\_ other (*specify*): \_\_\_\_\_

43. Signs: Maximum values and times noted *fill in the blanks, use military time*
- \_\_\_ . \_\_\_ . \_\_\_ time first adverse sign noted, date \_\_\_ / \_\_\_ / \_\_\_ (mm/dd/yy)
  - \_\_\_ . \_\_\_ . \_\_\_ time second adverse sign noted, date \_\_\_ / \_\_\_ / \_\_\_ (mm/dd/yy)
  - \_\_\_ . \_\_\_ maximum temperature noted (°C) **OR**
  - \_\_\_ . \_\_\_ maximum temperature noted (°F)
  - \_\_\_ . \_\_\_ . \_\_\_ time maximum temperature noted, date \_\_\_ / \_\_\_ / \_\_\_ (mm/dd/yy)
  - \_\_\_ . \_\_\_ maximum end-tidal PCO<sub>2</sub> noted (mmHg)
  - \_\_\_ . \_\_\_ . \_\_\_ time maximum end-tidal PCO<sub>2</sub> noted, date \_\_\_ / \_\_\_ / \_\_\_ (mm/dd/yy)

44. Did the temperature exceed 40°C?  
*check one*  
 no  
 yes (*specify minutes that temp was > 40 C*)

45. Type of ventilation used at the time hypercarbia was first observed:  
*check one*  
( ) spontaneous \_\_\_\_\_ liters/minute ventilation  
( ) assisted/pressure support \_\_\_\_\_ at the time hypercarbia 1<sup>st</sup> noted  
( ) controlled \_\_\_\_\_  
( ) unknown \_\_\_\_\_  
( ) not applicable \_\_\_\_\_

### **LABORATORY TESTS UTILIZED**

46. Laboratory Evaluation  
*Fill in the blanks for all lab tests obtained. Write unknown if results are not known.*

Most abnormal arterial blood gas after MH was suspected:

\_\_\_\_.\_\_\_\_ FiO<sub>2</sub>  
\_\_\_\_.\_\_\_\_ pH  
\_\_\_\_.\_\_\_\_ PCO<sub>2</sub> \_\_\_\_\_ liters/minute  
\_\_\_\_.\_\_\_\_ PO<sub>2</sub> \_\_\_\_\_ ventilation  
\_\_\_\_.\_\_\_\_ BE (mEq/L) (specify ±) \_\_\_\_\_ at the time of this  
\_\_\_\_.\_\_\_\_ Bicarbonate (mEq/L) \_\_\_\_\_ blood gas  
\_\_\_\_.\_\_\_\_ time of blood gas, *military time*  
\_\_\_\_/\_\_\_\_/\_\_\_\_ date of this blood gas (mm/dd/yy)

peak lactic acid

\_\_\_\_.\_\_\_\_ mmol/L \_\_\_\_:\_\_\_\_ time of this test, *military time*  
\_\_\_\_/\_\_\_\_/\_\_\_\_ date of this test (mm/dd/yy)

peak K<sup>+</sup>

\_\_\_\_.\_\_\_\_ mEq/L or mmol/L \_\_\_\_:\_\_\_\_ time of this test, *military time*  
\_\_\_\_/\_\_\_\_/\_\_\_\_ date of this test (mm/dd/yy)

peak post-op creatine kinase*	first creatine kinase*	last creatine kinase*
____, ____ U/L	____, ____	____, ____
____:____ <i>military time</i>	____:____ <i>military time</i>	____:____ <i>military time</i>
____/____/____ <i>date</i>	____/____/____ <i>date</i>	____/____/____ <i>date</i>

\* recommended intervals for creatine kinase determination are 0, 6, 12, 24 hours after the adverse reaction

urine chemstrip positive for blood  
*check one* ( ) no

( ) yes

\_\_ \_\_: \_\_ \_\_ *military time*, \_\_ \_\_ / \_\_ \_\_ / \_\_ \_\_ *date*

Lowest fibrinogen  
\_\_ \_\_ \_\_ \_\_ mg/dl

peak PT (prothrombin time)  
\_\_ \_\_ seconds

laboratory upper limit of normal  
\_\_ \_\_ \_\_ seconds

lowest platelet count  
\_\_ \_\_ \_\_, \_\_ \_\_ \_\_

peak PTT (partial thromboplastin time)  
\_\_ \_\_ seconds

laboratory upper limit of normal  
\_\_ \_\_ \_\_ seconds

peak INR  
\_\_ . \_\_

### **PATIENT MONITORING UTILIZED AFTER THE REACTION**

47. Monitoring utilized (after reaction occurred):

*check all monitoring used*

( ) blood pressure monitor

( ) electrocardiograph

( ) stethoscope

( ) arterial catheter

( ) central venous catheter

( ) pulmonary artery catheter

( ) end-tidal PCO<sub>2</sub>

( ) pulse oximeter

( ) bladder (Foley) catheter

( ) processed EEG (e.g. BIS)

( ) other (*specify*): \_\_\_\_\_

Temperature probes:

( ) axillary

( ) bladder

( ) esophageal

( ) nasopharyngeal

( ) rectal

( ) skin – electronic (*specify location of skin temperature monitor*): \_\_\_\_\_

( ) skin - liquid crystal

(*specify type and location of skin temperature monitor*): \_\_\_\_\_

( ) tympanic

( ) other (*specify*): \_\_\_\_\_

( ) no temperature probe used after reaction

### **TREATMENT GIVEN**

48. Treatment given for possible or fulminant MH

*Check all treatments utilized.*

*Fill in the blanks.*

( ) Volatile anesthetics discontinued at:

- \_\_\_:\_\_\_ military time, date \_\_\_/\_\_\_/\_\_\_ (mm/dd/yy)
- ( ) Anesthesia circuit changed
  - ( ) Activated carbon filters in circuit
  - ( ) Hyperventilation with 100% oxygen
    - \_\_\_ maximum EtCO<sub>2</sub> after initiation of hyperventilation
  - ( ) Dantrolene (type)
    - ( ) Dantrium
    - ( ) Revonto
    - ( ) Ryanodex
    - \_\_\_ Initial dantrolene dose (mg)
    - \_\_\_ Time of first dantrolene dose military time
    - \_\_\_/\_\_\_/\_\_\_ Date of first dantrolene dose (mm/dd/yy)
    - \_\_\_ Time of last dantrolene dose military time
    - \_\_\_/\_\_\_/\_\_\_ Date of last dantrolene dose (mm/dd/yy)
    - \_\_\_ Total dantrolene dose (mg) - including maintenance therapy
  - ( ) Active cooling
    - Method (specify) \_\_\_\_\_
  - ( ) Fluid loading
    - \_\_\_ ml/kg
    - Fluid type (specify) \_\_\_\_\_
  - ( ) Furosemide
  - ( ) Mannitol
  - ( ) Glucose, insulin
  - ( ) Amiodarone
  - ( ) Procainamide
  - ( ) CPR
  - ( ) Inotrope, which one(s): \_\_\_\_\_
  - ( ) Vasopressor, which one(s): \_\_\_\_\_
  - ( ) other (*specify*): \_\_\_\_\_
  - ( ) none of the above

49. Mark any of the following that were noted after dantrolene was given:

- Decrease in heart rate
- Decrease in end-tidal carbon dioxide or carbon dioxide tension in blood
- Decrease in temperature
- Decrease or resolution of rigidity

*If none were noted, please skip to question 52*

50. How many minutes after dantrolene administration was the maximum change in this sign noted and what was the magnitude of the maximum change?

Heart rate

- ( \_ \_ \_ ) minutes
- ( \_ \_ ) (change in beats/min)

Carbon dioxide

- ( \_ \_ \_ ) minutes
- ( \_ \_ ) (change in mmHg or torr)

Temperature

- ( \_ \_ \_ ) minutes
- ( \_ . \_ °C) or ( \_ . \_ °F ) (change in temperature)

51. How many minutes after the start of dantrolene, did the rigidity completely resolve?

( \_ \_ \_ ) minutes

52. Were any problems noted with the dantrolene administration?

*check one*

- no
- yes

*If no, please skip to question 54*

53. What were the observed dantrolene complications?

*check all applicable*

- excessive secretions
- gastrointestinal upset
- muscle weakness
- phlebitis
- respiratory failure
- other (*specify*): \_\_\_\_\_

54. Anesthetic Agents Utilized **After** Adverse Metabolic or Muscular Reaction was noted:

*check all applicable*

- sodium citrated citric acid  
(Bicitra)

- cimetidine (Tagamet)
  - famotidine (Pepcid)
  
  - lansoprazole (Prevacid)
  - ranitidine (Zantac)
  
  - metoclopramide (Reglan)
  - omeprazole (Prilosec)
  
  - atropine
  - glycopyrrolate (Robinul)
  - scopolamine (Hyoscine)
  
  - dolasetron (Anzemet)
  - droperidol (Inapsine)
  - hydroxyzine (Vistaril)
  - ondansetron (Zofran)
  - promethazine (Phenergan)
  - diphenhydramine (Benedryl)
  
  - clonidine (Duraclon)
  - ketorolac (Toradol)
  - acetaminophen (Tylenol)
  
  - diazepam (Valium)
  - lorazepam (Ativan)
  - midazolam (Versed)
  
  - dexmedetomidine
  - etomidate (Amidate)
  - ketamine (Ketalar)
  - propofol (Diprivan)
  
  - alfentanil (Alfenta)
  - fentanyl (Sublimaze)
  - fentanyl and droperidol (Innovar)
  - meperidine (Demerol)
  - morphine
  - remifentanyl (Ultiva)
  - sufentanil (Sufenta)
- hydromorphone (Dilaudid)
  
  - sevoflurane (Ultane)
  - desflurane (Suprane)
  - isoflurane (Forane)
  - NO** volatile anesthetic
  - nitrous oxide
  
  - nalbuphine (Nubain)
  - naloxone (Narcan)
  
  - atracurium (Tracrium)
  - cisatracurium (Nimbex)
  - rocuronium (Zemuron)
  - vecuronium (Norcuron)
  - pancuronium (Pavulon)
  - other NMB
  - IM** succinylcholine (Anectine)
  - IV** succinylcholine (Anectine)
  - NO** succinylcholine
  
  - edrophonium (Tensilon)
  - neostigmine (Prostigmin)
  
  - bupivacaine (Marcaine)
  - levo-bupivacaine
  - chlorprocaine (Nesacaine)
  - cocaine
  - etidocaine (Duranest)
  - lidocaine (Xylocaine)
  - mepivacaine (Carbocaine)
  - prilocaine (Citanest)
  - procaine (Novocain)
  - ropivacaine (Naropin)
  - tetracaine (Pontocaine)
  
  - epinephrine
  - ephedrine
  - neosynephrine

other (*specify*): \_\_\_\_\_  
 unknown



**PATIENT OUTCOME**

55. Did the patient develop any of the following complications?

*check all that apply*

- brain death
- cardiac dysfunction
- cardiac arrest
- change in consciousness level
- coma
- compartment syndrome
- disseminated intravascular coagulation
- hepatic dysfunction
- hypotension
- pulmonary edema
- renal dysfunction
- SIRS after initial control of MH episode \_\_\_\_\_
- other (*specify*): \_\_\_\_\_
- none\*
- unknown\*

\* Check one only; if applicable

56. Did the patient survive the initial reaction?

*check one*

- no
- unknown because of transfer to another facility
- yes

*If no or unknown, please skip to question 61*

57. Did the patient develop additional signs or symptoms of unanticipated hypercarbia, rigidity, myoglobinuria, or rapidly increasing temperature, after initial adequate treatment (i.e. recrudescence)?

- no
- unknown because of transfer to another facility
- yes

*If no or unknown, please skip to question 60*

58. What was the date and time of the recrudescence?

\_\_\_/\_\_\_/\_\_\_ date (mm/dd/yy)

\_\_\_:\_\_\_ military time

59. Signs of recrudescence that were judged to be inappropriate by the attending anesthesiologist or other physician:  
***RANK in order of appearance. NUMBER do not check. A number may be used more than once if signs were noted simultaneously.***
- masseter spasm: mouth cannot be fully opened, but direct laryngoscopy possible
  - masseter spasm: jaw clamped shut, intubation via direct visualization impossible
  - generalized muscular rigidity
  - cola colored urine
  - tachypnea
  - hypercarbia
  - cyanosis
  - skin mottling
  - sinus tachycardia
  - ventricular tachycardia
  - ventricular fibrillation
  - elevated temperature
  - rapidly increasing temperature
  - sweating
  - excessive bleeding
  - hypertension > 20% of baseline
  - other (*specify*): \_\_\_\_\_
60. Did the patient survive both the initial reaction & the recrudescence, if any, and recover?  
*check one*
- no
  - yes
  - unknown due to transfer to another facility
61. If the patient died, what was the primary cause of death?  
*check all that apply*
- MH
  - other (*specify*): \_\_\_\_\_
  - unknown
62. If the patient died, was an autopsy performed?
- no
  - yes specify principal findings \_\_\_\_\_
-

63. If tissue from this patient was examined for a specific genetic defect, at what lab was this done?

(specify name and location of lab): \_\_\_\_\_

If so what was found? Specify amino acid change, such as Arg 614 Cys

( ) Ryanodine receptor type 1 amino acid change \_\_\_\_\_

( ) Other, specify: Gene \_\_\_\_\_ amino acid change \_\_\_\_\_

In what tissue?

( ) Blood

( ) Muscle

( ) Other (specify) \_\_\_\_\_

### **CLINICAL IMPRESSION**

64. Patient experienced (opinion of attending anesthesiologist):

*check one*

( ) adverse metabolic reaction that was not related to MH

( ) possible MH - may include masseter spasm (MH diagnostic center referral recommended)

( ) fulminant MH - (family counseling, MH diagnostic center referral recommended)

( ) other (specify): \_\_\_\_\_

65. Were the patient and his/her family referred to a MH diagnostic center?

*check one*

( ) no

( ) yes

( ) unknown

66. If referred to a MH diagnostic center, check identity of center:

( ) Wake Forest University .....Winston-Salem, NC

( ) Uniformed Services University .....Bethesda, MD

( ) University of California at Davis .....Davis, CA

( ) University of Minnesota .....Minneapolis, MN

( ) University of Toronto .....Toronto, ON

67. Were the patient and the family also referred to MHAUS?

PO Box 1069

Sherburne, NY 13460-1069

1-800-986-4287

*check one*

( ) no

( ) yes

**COMMENTS ON PATIENT**

*(Optional)*

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Original may be mailed to:

The North American Malignant Hyperthermia Registry  
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Department of Anesthesiology  
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