REPORT OF ACUTE ADVERSE METABOLIC OR MUSCULAR REACTION TO ANESTHESIA

(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, etc.

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. Please make one (1) photocopy of the completed form, and send the forms as follows:

   Original............................................NAMH Registry
   Copy 1................MH Diagnostic Center (if referred)

   The North American Malignant Hyperthermia Registry
   UPMC Mercy Hospital
   8th Floor, Ermire Building (B)
   Room 8522-3
   1400 Locust Street
   Pittsburgh, PA 15219

For FULMINANT MH cases refer the patient and their physician to the genetic counselor, Deanna Steele at # 800-454-8155 for consideration of the blood test that can help diagnose MH susceptibility in other family members. The patient should call # 888-274-7899, the MH Registry, to discuss joining this research registry.

AMRA Report Version 9.6
June 2011
DEMOGRAPHIC INFORMATION

1. Sex
   check one
   (   ) male          (   ) female

2. Weight
   ______ __ kilograms  OR  ______ lbs

3. Height
   _______ cms  OR  ____ ft  ___ inches

4. Year of patient’s birth
   __ __ __ __

4a. Age when MH event occurred?
   __ __ __ years  __ __ months

5. Race:
   check as many as apply
   (   ) Caucasian  (   ) African
   (   ) Hispanic    (   ) East Asian
   (   ) African-American (   ) South Asian
   (   ) Native American  (   ) Middle Eastern
   (   ) Hawaiian or Pacific Islander
   (   ) other (specify): ____________________________________________

6. Body Build
   check one
   (   ) Normal   (   ) Lean
   (   ) Muscular (   ) Obese
   (   ) Postpartum
   (   ) Other (specify): ____________________________________________

7. State or province of patient’s residence
   __ __ __

8. State or province of facility in which anesthesia was given
   __ __ __

8a. Country
   __ __ __

9. Reporting physician’s name: (optional)
   ________________________________________________________________

10. Facility type:
    (   ) Hospital
    (   ) Ambulatory Surgical facility located on hospital campus
    (   ) Free-standing ambulatory surgical facility
    (   ) Dental Office
    (   ) Surgical Office   other ________________________________

10a. Facility name: (optional)
     ________________________________

11. Anesthesia department telephone number and/or email address: (optional)
    (___ ___)-___ ___-______     __________________@________________________
12. Before this episode, was the patient’s family history positive for:

- [ ] 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 years > 1.5 years
- [ ] heatstroke
- [ ] neurolept 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 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
MEDICAL HISTORY

13. 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 when was it last ingested? __ __ (days)
   ( ) a regular regimen of physical activity?
     If so, when was the last work-out? __ __ (days)
   ( ) ingestion of any medicine to improve muscular performance
   ( ) intolerance to heat
   ( ) exercise intolerance due to muscle pain, weakness or fever
   ( ) diabetes
     ( ) Type 1
     ( ) Type 2
   ( ) Other (specify): ____________________________________________
   ( ) none of the above
   ( ) unknown

14. 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
   ( ) hiatal hernia
   ( ) inguinal hernia
   ( ) umbilical hernia
   ( ) undescended testes
   ( ) clubbed foot
   ( ) joint hypermobility
   ( ) kyphoscoliosis (moderate or severe; curve > 45°)
   ( ) pectus carinatum
   ( ) winged scapulae
   ( ) skeletal fractures (more than 2)
   ( ) gallstones
   ( ) kidney stones
   ( ) laryngeal papillomas
   ( ) other (specify): ____________________________________________
   ( ) none of the above
   ( ) unknown
ANESTHETIC HISTORY

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

(   ) unknown, but greater than zero  (   ) Unknown

*Skip to question 20 if zero*

16. How many were general anesthetics?

(   ) unknown, but greater than zero  (   ) Unknown

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

(   ) unknown

Year

18. Were unusual metabolic or muscular responses noted during prior anesthetics?

*check one*

(   ) no
(   ) yes
(   ) unknown

19. Was there delayed awakening from previous general anesthetics?

*check one*

(   ) no
(   ) yes
(   ) unknown

ADVERSE METABOLIC REACTION TO ANESTHESIA

20. Year of adverse metabolic or muscular reaction.

(   ) unknown

21. Type of procedure scheduled

*check all applicable*

(   ) cardiothoracic  (   ) thoracoscopic surgery (thoracic)
(   ) dental  (   ) oral surgery
(   ) ear, nose, or throat  (   ) orthopedic
(   ) eye  (   ) plastic surgery
(   ) general surgery  (   ) radiology
(   ) laparoscopic surgery  (   ) obstetrics

a) abdominal

b) pelvic

c) other (specify) ___________________________________________________________________

(   ) gynecology  (   ) urology
(   ) neurosurgery  (   ) vascular
(   ) transplant  (   ) unknown

transplant type________________________________________________________________________

(   ) other (specify):________________________________________________________________
22. Was the procedure an emergency?
   check one
   ( ) no
   ( ) yes
   ( ) unknown

22a. Did this adverse reaction occur without exposure to anesthetic?
   check one
   ( ) no
   ( ) yes
   ( ) unknown
   add details ______________________________________

22b. Was the environment hot when this reaction occurred?
   check one
   ( ) no
   ( ) yes
   ( ) unknown
   If yes how hot? __ __ . __ C or __ __ __ . __ F

23. Was any infection present at the time of this reaction?
   check one
   ( ) no
   ( ) yes
   ( ) unknown

24. If infection was present, what organisms were known to be present?
   specify: __________________________________________

25. After adverse metabolic or muscular reaction was noted, the surgical procedure was:
   check one
   ( ) deferred
   ( ) terminated before all scheduled procedures completed
   ( ) completed in spite of reaction
   ( ) not applicable - patient in recovery or intensive care area at time of reaction
   ( ) patient was in transport at time reaction occurred
26. Premedication and anesthetic agents utilized (before reaction occurred): check all applicable

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<td>NO potent volatile anesthetic</td>
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<td>other (specify): __________________________________________________</td>
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27. Anesthesia induction time
   __ __:__ __ (military time)

28. General anesthetic induction method
   check one
   ( ) inhalation
   ( ) intravenous
   ( ) other (specify): _______________________________________________________

29. Anesthesia duration
   __ __ . __ (in hours, express parts of an hour using decimal points)
   (example – 3 minutes = 0.05)

30. Type of anesthetic prior to adverse metabolic or muscular reaction
    check all applicable
   ( ) monitored anesthesia care (local standby)
   ( ) regional anesthesia
   ( ) spinal anesthesia
   ( ) epidural anesthesia
   ( ) general anesthesia without endotracheal intubation
   ( ) general anesthesia with endotracheal intubation
   ( ) tourniquet use
      elapsed time after the start of anesthesia tourniquet was inflated
      __ __.__ (in hours, express parts of an hour using decimal points)
      (example – 3 minutes = 0.05)
      elapsed time after final release of tourniquet
      __ __.__ (in hours, express parts of an hour using decimal points)
      (example – 3 minutes = 0.05)
   ( ) general anesthesia with a face mask
   ( ) general anesthesia with a laryngeal mask airway
PATIENT MONITORING UTILIZED BEFORE THE REACTION

31. Monitoring utilized (before reaction occurred):
   *check all monitoring used*
   
   ( ) blood pressure monitor  ( ) end-tidal PCO₂
   ( ) electrocardiograph  ( ) pulse oximeter
   ( ) stethoscope  ( ) bladder (Foley) catheter
   ( ) arterial catheter
   ( ) central venous catheter
   ( ) pulmonary artery catheter

   temperature probes:
   ( ) axillary
   ( ) bladder
   ( ) esophageal
   ( ) nasopharyngeal
   ( ) rectal
   ( ) skin - electronic
   ( ) skin - liquid crystal
   ( ) tympanic
   ( ) other (specify): _______________________________________________________

32. If a liquid crystal temperature probe was used, did it accurately trend with core temperatures?
   *check one*
   ( ) no
   ( ) yes
   ( ) unknown

33. Was a forced air or I.V. warming device in use?
   *check one*
   ( ) no
   ( ) yes
   ______ temperature used
   ( ) unknown
34. Abnormal signs judged to be inappropriate by the attending anesthesiologist or other physician: 
*RANK in order of appearance. NUMBER do not check. WRITE ZERO if sign did not occur.*
*(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): _______________________________________________________

35. Signs: Maximum values and times

*fill in the blanks*

- ___ — ___ time first adverse sign noted *(after induction)*
  *(in hours, express parts of an hour using decimal points)*
  *(example – 3 minutes = 0.05)*

- ___ — ___ time second adverse sign noted *(after induction)*
  *(in hours, express parts of an hour using decimal points)*
  *(example – 3 minutes = 0.05)*

- ___ — ___ maximum temperature noted *(°C)* OR
- ___ — ___ maximum temperature noted *(°F)*

- ___ — ___ time maximum temperature noted *(after induction)*
  *(in hours, express parts of an hour using decimal points)*
  *(example – 3 minutes = 0.05)*

- ___ — ___ maximum end-tidal PCO₂ noted *(mmHg)*
- ___ — ___ time noted *(after induction)*
  *(in hours, express parts of an hour using decimal points)*
  *(example – 3 minutes = 0.05)*

36. Type of ventilation used at the time hypercarbia was first observed:

*check one*

( ) spontaneous
( ) assisted
( ) controlled
( ) not applicable
( ) unknown

___ ___ liters/minute

ventilation at the time of this blood gas
**LABORATORY TESTS UTILIZED**

37. 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:

- ___. __ FiO₂
- ___. __ pH
- ___. ___ PCO₂ ___ liters/minute
- __. ___ PO₂ ventilation
- ___. ___ BE (mEq/L) (specify ±) at the time of this blood gas
- ___. ___ Bicarbonate (mEq/L)
- ___. ___ time *(after induction)*

(in hours, express parts of an hour using decimal points)

*(example – 3 minutes = 0.05)*

- peak lactic acid
  - __. ___ mmol/L

- peak K⁺
  - __. ___ mEq/L or mmol/L

- peak post-op creatine kinase*  
  - first creatine kinase*
  - last creatine kinase*
  - ___. ___ U/L
  - __. ___ hours after induction
  - __. ___ hrs after induction
  - __. ___ hrs after induction

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

- serum myoglobin
  - __. ___ ng/ml
  - __. ___ hours after induction

- urine myoglobin
  - __. ___ mg/L
  - __. ___ hours after induction

- fibrinogen
  - __. ___ mg/dl

- PT (prothrombin time)
  - __. ___ seconds
  - laboratory upper limit of normal
  - __. ___ seconds

- PTT (partial thromboplastin time)
  - __. ___ seconds
  - laboratory upper limit of normal
  - __. ___ seconds

- platelet count
  - __. ___ INR
  - __. ___
PATIENT MONITORING UTILIZED AFTER THE REACTION

38. Monitoring utilized (after reaction occurred):
check all monitoring used

( ) blood pressure monitor   ( ) end-tidal PCO₂
( ) electrocardiograph   ( ) pulse oximeter
( ) stethoscope   ( ) bladder (Foley) catheter
( ) arterial catheter
( ) central venous catheter
( ) pulmonary artery catheter

temperature probes:
( ) axillary
( ) bladder
( ) esophageal
( ) nasopharyngeal
( ) rectal
( ) skin – electronic
( ) skin - liquid crystal
( ) tympanic
( ) other (specify):_____________________________________________________


TREATMENT GIVEN

39. Treatment given for possible or fulminant MH
   Check all treatments utilized.
   Fill in the blanks.
   ( ) Volatile anesthetics discontinued
      ——— time (after induction)
      (in hours, express parts of an hour using decimal points)
      (example – 3 minutes = 0.05)
   ( ) Anesthesia circuit changed
   ( ) Hyperventilation with 100% oxygen
   ( ) Dantrolene (Dantrium)
      ——— Initial dose (mg)
      ——— Time of first dose (after induction)
      (in hours, express parts of an hour using decimal points)
      (example – 3 minutes = 0.05)
      ——— Total dose (mg) - including maintenance therapy
      ——— Time of last dose (after induction)
      (in hours, express parts of an hour using decimal points)
      (example – 3 minutes = 0.05)
   ( ) Active cooling
      Method (specify) _________________________________________
   ( ) Fluid loading
      ——— ml/kg
      Fluid type (specify) _______________________________________
      ( ) Furosemide
      ( ) Mannitol
      ( ) Glucose, insulin
      ( ) Bretylium
      ( ) Lidocaine
      ( ) CPR
      ( ) other (specify): _______________________________________
   ( ) none of the above

40. 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.
      If none were noted, please skip to question 42

41. 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
      ( _ . _ ºC) or ( _ . _ ºF) (change in temperature)
42. Were any problems noted with the dantrolene administration?  
*check one*  
( ) no  
( ) yes  
*If no, please skip to question 44*

43. What were the observed dantrolene complications?  
*check all applicable*  
( ) phlebitis  
( ) excessive secretions  
( ) gastrointestinal upset  
( ) hyperkalemia  
( ) muscle weakness  
( ) respiratory failure  
( ) other (*specify*): __________________________________________
44. Anesthetic Agents Utilized After Adverse Metabolic or Muscular Reaction was noted: 

*check all applicable*

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<thead>
<tr>
<th>Drug Name</th>
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<td>prilocaine (Citanest)</td>
<td>(       )</td>
</tr>
<tr>
<td>roperivacaine (Naropin)</td>
<td>(       )</td>
</tr>
<tr>
<td>tetracaine (Pontocaine)</td>
<td>(       )</td>
</tr>
<tr>
<td>epinephrine</td>
<td>(       )</td>
</tr>
<tr>
<td>ephedrine</td>
<td>(       )</td>
</tr>
<tr>
<td>neosynephrine</td>
<td>(       )</td>
</tr>
</tbody>
</table>

( ) NO potent volatile anesthetic

( ) other (specify): ________________________________
PATIENT OUTCOME

45. Did the patient develop any of the following complications?
   check all that apply
   (  ) cardiac dysfunction
   (  ) change in consciousness level and/or coma
   (  ) disseminated intravascular coagulation
   (  ) hepatic dysfunction
   (  ) pulmonary edema
   (  ) renal dysfunction
   (  ) compartment syndrome
   (  ) other (specify): ____________________________________________
   (  ) none
   (  ) unknown

46. Did the patient survive the initial reaction?
   check one
   (  ) no                                  (  ) unknown because of transfer of case during treatment
   (  ) yes
      If no, please skip to question 51

47. Did the patient develop additional signs or symptoms after initial adequate treatment
    (recrudescence)?
   check one
   (  ) no                                  (  ) unknown because of transfer to another facility
   (  ) yes
      If no, please skip to question 54

48. What was the time of the recrudescence?
    ___ __. ___ hours after anesthetic induction
    (in hours, express parts of an hour using decimal points)
    (example – 3 minutes = 0.05)
49. 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. WRITE ZERO if sign did not occur** 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): _________________________________________________________

50. Did the patient survive both the initial reaction, the recrudescence, if any, and recover?

check one

(   ) no
(   ) yes (   ) unknown due to transfer to another hospital

51. If the patient died, what was the primary cause of death?

check all that apply

(   ) MH
(   ) other (specify): _______________________________________________________

(   ) unknown (   ) death > one month after the MH episode

52. If the patient died, was an autopsy performed?

(   ) no
(   ) yes specify principal findings ____________________________________________

53. Was tissue from the deceased examined for a specific genetic defect?

If so what was found?

specify: ________________________________________________________________

53a. In what tissue (check all that apply)?

(   ) Blood
(   ) Muscle
(   ) Other (specify) ____________________________
CLINICAL IMPRESSION

54. 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): ____________________________________________________

55. Were the patient and his/her family referred to a MH diagnostic center?
   check one
   ( ) no
   ( ) yes
   ( ) unknown

56. If referred to a MH diagnostic center, check identity of center:
   ( ) Ottawa Hospital Civic Campus .............................................Ottawa, ON
   ( ) 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

57. Were the patient and the family also referred to MHAUS?
   32 South Main Street
   PO Box 1069
   Sherburne, NY 13460-1069
   (607) 674-7902 or 1-800-986-4287
   check one
   ( ) no
   ( ) yes

COMMENTS ON PATIENT
(Optional)
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Please make photocopies and distribute according to instructions on cover sheet.
Original may be mailed to:
The North American Malignant Hyperthermia Registry
UPMC Mercy
8th Floor, Ermine Building (B)
Room 8522-3
1400 Locust Street
Pittsburgh, PA 15219
MH DIAGNOSTIC CENTER DIRECTORY

Kevin Nolan, M.D.
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CANADA
011 + 1 + 613 + 761-4169

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