The North American Malignant Hyperthermia Registry

MALIGNANT HYPERTHERMIA
BIOPSY
and
DIAGNOSTIC CONSULTATION
REPORT

INSTRUCTIONS FOR USE
This form is only to be used by the staff of an MH diagnostic center.

1. Use this form for each patient referred to you for MH evaluation, if they undergo muscle biopsy.

2. If any adult relatives wish to be registered by name, separate consent forms for participation in the Registry must be signed by that relative. If you wish to register a minor under the age of 18, a consent form must be signed by one of the minor’s parent or guardian.

3. The Center Director must review and sign this form verifying accuracy before it is submitted to the Registry.

4. Please make a photocopy of the completed form for your records.

5. Submit original completed form to:
The North American Malignant Hyperthermia Registry
University of Florida
Department of Anesthesiology
1600 SW Archer Road, PO Box 100254
Gainesville, FL 32610

I certify that the information contained in this report is complete and accurate.

________________________________________________________________________  __________/ __________/ ______
Biopsy Center Director Signature                  year   month   day

Updated 11-14-17
MH BIOPSY AND DIAGNOSTIC CONSULTATION REPORT

May 2014

Complete this form for each patient referred for MH susceptibility evaluation. The MH muscle biopsy center director must review the completed form before it is returned to the NAMHR.

1. MH muscle biopsy center code number:
   see final page for code numbers
   ____ ____

PATIENT IDENTIFICATION

2. North American MH Registry Number for this patient (if previously assigned)
   ____ ____ ____ ____ ____

3. Any previous North American MH Registry numbers associated with the patient. That is, AMRA, RSR, (formerly AKA), close relative’s reports, etc.
   a. ____ ____ ____ ____ ____  Comment  ____________________________
   b. ____ ____ ____ ____ ____  Comment  ____________________________
   c. ____ ____ ____ ____ ____  Comment  ____________________________

4. Patient's Initials
   ___________________________  ___________________________  __________________
   last  first  middle

5. Has consent been obtained to enter patient's name into the Registry?
   check one
   ( ) yes
   ( ) no

If yes, please complete a-g on following page.

Note: DO NOT COMPLETE IF CONSENT HAS NOT BEEN OBTAINED

a. Patient’s name. This is the primary subject
   ___________________________  ___________________________  __________________
   last  first  middle
b. Patient's previous name

_______________________  ___________________________ __________________
last       first       middle

c. Patient's maiden name

______________________________
last

d. Patient’s Address

________________________________________________________________________
 street address

________________________________________________________________________
    city       state/province       zip/postal code

________________________________________________________________________
country

e. Phone number

(Home) (____) _____ - _______
(Work) (____) _____ - _______

f. Patient e-mail address

________________________________________________________________________

g. Date of patient's birth

____ ___ ___ \ ___ ___ \ ___
year       month       day

DEMOGRAPHIC INFORMATION

6. Sex

    check one

(   ) male

(   ) female

7. Weight

   _____ . _____ kilograms OR _____ lbs

8. Height
9. Year of patient’s birth
__ __ __ __

10. 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):

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

12. State or province of patient’s residence
____ ____

FAMILY IDENTIFICATION

13. Does the primary subject have minor children or siblings under the age of 6 and does this minor child’s parent or guardian consent to the child being in the Registry?
    check one
    ( ) yes
    ( ) no
    If yes, please complete below for all children under the age of 6

   a. name

   ___________________________  ___________________________  ___________________________
   last  first  middle
   
   Date of birth
   ____ ____ ____ \ ____ \ ____
   year  month  day
Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

b. name

_______________________  ___________________________ __________________

last  first  middle

Date of birth

___ ___ ___ ___ \ ___ ___ \ ___ ___

year  month  day

Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

c. name

_______________________  ___________________________ __________________

last  first  middle

Date of birth

___ ___ ___ ___ \ ___ ___ \ ___ ___

year  month  day

Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

d. name

_______________________  ___________________________  __________________

last  first  middle

Date of birth

___ ___ ___ ___ \ ___ ___ \ ___ ___

year  month  day

Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling
e. **name**

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Date of birth

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Is this the child or the sibling of the biopsied patient?

- **check one**
  - ( ) child
  - ( ) sibling

14. Has consent been obtained to enter the names of children or siblings ages 6 through 17, or ages 18 and over, of the biopsied patient into the Registry?

**NOTE:** CONSENT MUST BE OBTAINED FROM EACH CHILD/SIBLING OVER 18 YEARS OF AGE FOR WHOM YOU ENTER THIS DATA. (If the child/sibling is deceased, the following data may be entered with the consent of the next of kin*. If the child is under 18 years of age, consent must be obtained from the child's parent or guardian).

* check your local/state regulations regarding the definition of next of kin

- **check one**
  - ( ) yes
  - ( ) no

If yes, complete below for all individuals for whom consent has been obtained

a. **name**

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Date of birth

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Is this the child or the sibling of the biopsied patient?

- **check one**
  - ( ) child
  - ( ) sibling

b. **name**

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Date of birth
Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

c. name

_______________________  ___________________________ __________________

last  first  middle

Date of birth

day  month  year

Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

d. name

_______________________  ___________________________ __________________

last  first  middle

Date of birth

day  month  year

Is this the child or the sibling of the biopsied patient?

check one

( ) child

( ) sibling

15. Has consent been obtained to enter the names of the parents of a biopsied patient?

check one

( ) yes

( ) no

If yes, complete below
NOTE: CONSENT MUST BE OBTAINED FROM EACH PARENT FOR WHOM YOU ENTER THIS DATA (If the parent is deceased, the following data may be entered regardless of consent status.)

a. Mother of biopsied patient

_______________________  ___________________________ __________________

last  first  middle

Date of mother’s birth

year   month       day

Mother’s maiden name _______________________

last

Father of biopsied patient

_______________________  ___________________________ __________________

last  first  middle

Date of father’s birth

year   month       day

16. Family History Table

   Key to Family History table (below)

   Relationship to Patient          Known Medical Problems
a.  child                           1.  fatal MH
b.  grandchild                     2.  survived fulminant MH event
c.  brother/sister                 3.  possible MH event
d.  half-sibling                   4.  MH family history (use only for those relatives with CHCT results)
e.  niece/nephew                   5.  perioperative death - not thought to be MH
f.  mother                         6.  perioperative death - etiology undetermined
g.  maternal grandparent           7.  S.I.D.S. or cot death
h.  maternal aunt/uncle            8.  Sudden death - unknown cause, age 1.5 to 45 yrs
j.  maternal first cousin          9.  heat stroke
k.  maternal second cousin         10.  neurolept malignant syndrome
m.  maternal - other               11.  myopathy
n.  father                         12.  idiopathic creatine kinase elevation
o.  paternal grandparent           13.  CFIDS (Chronic Fatigue and Immune Dysfunction Syndrome)
p.  paternal aunt/uncle            14.  muscle pain, weakness or fever with exercise
q.  paternal first cousin          15.  episodic dark urine and muscle pain
r.  paternal second cousin         16.  diabetes
s.  paternal – other               17.  none of the above
t.  relative by marriage            18.  unknown
Please complete one row for each relative for whom relevant medical history is known.

<table>
<thead>
<tr>
<th>Relative's Initials</th>
<th>Registry Number</th>
<th>Relationship to Patient</th>
<th>Sex</th>
<th>Medical Problems</th>
<th>CHCT Test Result</th>
<th>Genetic Result</th>
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FAMILY HISTORY

16a. 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
( ) 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
   ( ) none of the above
   ( ) unknown
   ( ) other specify __________________________

MEDICAL HISTORY

17. Does the patient have any of the following complaints?
   check all applicable
   ( ) muscle weakness interferes with daily activity at least once/week
   ( ) muscle cramps interfere with daily activity at least once/week
   ( ) cola colored urine
   ( ) heat stroke or heat prostration
   ( ) oral (or rectal/axillary equivalent) fever > 38.6 °C or 101.4 °F 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

18. Has 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

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( ) 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

19. How many times was this patient anesthetized prior to this evaluation?

__ __  ( ) unknown but > 0  ( ) unknown

Skip to question 35 if the response is zero

20. How many were general anesthetics?

__ __  ( ) unknown but > 0  ( ) unknown

21. Indicate the number of anesthetics with the following agents

__ __ volatile agents without succinylcholine
__ __ volatile agents with succinylcholine
__ __ succinylcholine without other known triggering agents

22. Year of most recent anesthetic (excluding present evaluation)

__ __ __ __  ( ) unknown

23. Were unusual metabolic responses noted during prior anesthetics?

check one  ( ) yes
( ) no
( ) unknown

23a. Were unusual metabolic or muscular responses noted during prior anesthetics?

check one  ( ) no
( ) yes
( ) unknown
24. Was there delayed awakening from previous general anesthetics?

check one  ( ) yes
( ) no
( ) unknown
25. How many anesthetics were suspect for possible MH (director's opinion)?
   __ __

26. How many fulminant MH episodes occurred (director's opinion)?
   __ __

   Skip to question 35 if the answer to questions 25 and 26 are zero

27. If the patient experienced possible or fulminant MH, answer questions a-w.

   Report the anesthetic that was most suspect for MH

   a. Date of possible or fulminant MH episode: ___ ___ ___ ___ / ___ ___ / ___ ___
       (   ) unknown

   NOTE: If consent for the patient has not been obtained only enter the year.

   b. Patient weight at time of incident
       _____.__ kilograms   OR   ____ lbs

   c. Height
       _____ cms   OR   ____ ft  ___ inches

   d. State or province of patient’s residence at time of incident.
       __ __

   e. Location of incident
      i. Hospital
      _______________________________
      ii. City
      _______________________________
      iii. State or Province __ __

   f. 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 – Transplant type_____________________
( ) unknown ( ) other (specify):____________________

g. Was the procedure an emergency?
   check one
   ( ) yes
   ( ) no
   ( ) unknown

g (a). Was the procedure performed outside a hospital?
   check one
   ( ) no
   ( ) yes
   ( ) ambulatory surgery center
   ( ) office
   ( ) unknown

g (b). Did this adverse reaction occur without exposure to anesthetic?
   check one
   ( ) no
   ( ) yes
   ( ) unknown

g (c). Was the environment hot when this reaction occurred?
   check one
   ( ) no
   ( ) yes
   If yes how hot? ___ ___ . ___ C or ___ ___ ___ . ___ F

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

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

j. Premedication and anesthetic agents utilized (before reaction occurred):
   check all applicable
   ( ) sodium citrated citric acid (Bicitra)
   ( ) cimetidine (Tagamet)
   ( ) famotidine (Pepcid)
   ( ) lansoprazole (Prevacid)
   ( ) ranitidine (Zantac)
   ( ) metoclopramide (Reglan)
   ( ) omeprazole (Prilosec)
   ( ) atropine
   ( ) glycopyrrolate (Robinul)
   ( ) dolasetron (Anzemet)
   ( ) droperidol (Inapsine)

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( ) hydroxyzine (Vistaril)
( ) ondansetron (Zofran)
( ) promethazine (Phenergan)
( ) diphenhydramine (Benedryl)
( ) clonidine (Duraclon)
( ) dexmedetomidine
( ) ketorolac (Toradol)
( ) acetaminophen (Tylenol)
( ) diazepam (Valium)
( ) lorazepam (Ativan)
( ) midazolam (Versed)
( ) etomidate (Amidate)
( ) ketamine (Ketalar)
( ) propofol (Diprivan)
( ) alfentanil (Alfenta)
( ) fentanyl (Sublimaze)
( ) fentanyl and droperidol (Innovar)
( ) meperidine (Demerol)
( ) morphine
( ) remifentanil (Ultiva)
( ) sufentanil (Sufenta)
( ) hydromorphone (Dilaudid)
( ) unknown
( ) NO potent volatile anesthetic
( ) sevoflurane (Ultane)
( ) desflurane (Suprane)
( ) isoflurane (Forane)
( ) nitrous oxide
( ) other (specify): ___________________________________________________________

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

1. General anesthetic induction method
   check one
   ( ) inhalation
( ) intravenous
( ) other (specify): ________________________________
( ) not applicable

m. Anesthesia duration
   __ __.__ __  (hours and minutes since induction)

n. Type of anesthetic prior to adverse metabolic or muscular reaction to anesthesia
   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
   ( ) tourniquet use elapsed time after the start of anesthesia tourniquet was inflated
      __ __.__ __  (hours and minutes since induction)
   elapsed time after final release of tourniquet
      __ __.__ __  (hours and minutes since induction)

Patient Monitoring Utilized

   o. 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 monitoring (specify): ________________________________
p. If a liquid crystal temperature probe was used, did it accurately trend with core temperatures?
   check one
   (   ) yes
   (   ) no

q. Was a forced air or I.V. warming device in use?
   check one
   (   ) yes
   (   ) no
   (   ) unknown

Documentation of the Reaction

r. 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 intubation possible
___ masseter spasm: teeth 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):_____________________________________________________

s. Signs: Maximum values and times
   fill in the blanks
   __ __.__ __ time first adverse sign noted *(after induction)*
   *(hours and minutes since induction)*
   __ __.__ __ time second adverse sign noted *(after induction)*
   *(hours and minutes since induction)*
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maximum temperature noted (°C) OR
maximum temperature noted (°F)
time maximum temperature noted (after induction)
(hours and minutes since induction)
maximum end-tidal PCO₂ noted (mmHg)
time maximum end-tidal PCO₂ noted (after induction)
(hours and minutes since induction)

---

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

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

---

u. Laboratory Evaluation used during the reaction.

Fill in the blanks for all lab tests obtained

Most abnormal arterial blood gas after MH was suspected:

FiO₂
pH
PCO₂
PO₂
BE (mEq/L) (specify ±)
Bicarbonate (mEq/L)
Time (after induction)
(hours and minutes since induction)

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 adverse reaction)
serum myoglobin
__ __,__ __ __ ng/ml
__ __ hours after induction

urine myoglobin
__ __,__ __ __ mg/L
__ __ hours after induction
PT (prothrombin time)  INR  PTT (partial thromboplastin time)
__ __  seconds  __. ___  __ __  seconds
laboratory upper limit of normal laboratory upper limit of normal
__ __ __  seconds  __ __ __  seconds
platelet count  fibrinogen
__ __ __ __, __ __ __ __ mg/dl

v. 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 monitoring (specify):

w. Treatment given for possible or fulminant MH
   check all treatments utilized; fill in the blanks
   (   ) Volatile anesthetics discontinued
   ______.____ Time (after induction)
   ______.____ (hours and minutes since induction)
   (   ) Anesthesia machine changed
   (   ) Anesthesia circuit changed
   (   ) Hyperventilation with 100% oxygen
   (   ) Dantrolene (type)
      (   ) Dantrium
      (   ) Revonto
      (   ) Ryanodex
   ______.____ Initial dose (mg)
   ______.____ Time of first dose (after induction)
   ______.____ (hours and minutes since induction)
28. 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 35*

29. How many minutes after dantrolene administration was the maximum decrease in this sign noted and what was the magnitude of this change?
   - Heart rate
     ( _ _ _ ) minutes
     ( _ _ ) (beats/min)
   - Carbon dioxide
     ( _ _ _ ) minutes
     ( _ _ ) (mmHg or torr)
   - Temperature
     ( _ _ _ ) minutes
     ( __ __.__ ºC) or ( __ __ __ ºF )

30. Were any problems noted with the dantrolene administration?
   check one
   ( ) yes
   ( ) no
   *If no, please skip to question 32*

31. What were the observed dantrolene complications?
   check all applicable
   ( ) phlebitis
   ( ) excessive secretions
   ( ) gastrointestinal upset
   ( ) hyperkalemia
   ( ) muscle weakness
(  ) respiratory failure
(  ) other (specify): ________________________________________________

32. Did the patient develop additional signs or symptoms after initial adequate treatment (recrudescence)? check one
(  ) yes
(  ) no
If no, please skip to question 35

33. What was the time of the recrudescence?
   __ __ : __ __ time (hours after anesthetic induction)

34. Signs of recrudescence that were noted:
   (judged to be inappropriate by the attending anesthesiologist or other physician)
   **RANK in order of appearance.**
   *(a number may be used more than once if signs were noted simultaneously)*
   ___ masseter spasm: mouth cannot be fully opened but intubation possible
   ___ masseter spasm: teeth 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): ________________________________________________

ADVERSE METABOLIC REACTION TO ANESTHESIA (AMRA) REPORT

35. If an AMRA Report was submitted, did you review it after pertinent anesthesia records were obtained? check one
   (  ) yes
   (  ) no
   If no, skip to question 57

AMRA number (if known) ___ ___ ___ ___ ___

Updated 11-14-17
36. Were errors found in the AMRA Report?
   check one
   ( ) yes
   ( ) no   If yes, specify ________________________________

LABORATORY EXAM:

Serum Creatine Kinase

37. Creatine kinase at the time of evaluation:
   ___ ___ ___ , ___ ___ ___ U/L

38. Laboratory upper limit of normal for creatine kinase
   ___ ___ ___U/L

Muscle Biopsy

39. Was a MH diagnostic muscle biopsy indicated?
   check one
   ( ) yes
   ( ) no   Note: If no, then skip to question 55

40. What was the reason for the MH diagnostic muscle biopsy?
   check all applicable
   ( ) fulminant MH
   ( ) possible MH event (may include MMR), AMRA Report completed
   ( ) possible MH event (may include MMR), AMRA Report not completed
   ( ) family history of MH
   ( ) control
   ( ) negative genetic test
      location ____________________________
      date ____________________________
      exons examined ____________________________
      ____________________________
      ____________________________
   ( ) other (specify): ____________________________

41. Date of muscle biopsy
   ___ ___ ___ ___ \ ___ ___ \ ___
   year     month    day

42. Time of anesthetic induction for muscle biopsy
   ___ ___ : ___ ___ (military time)
43. Time muscle was excised

___ ___ : ___ ___ (military time)
44. Which muscle was biopsied?

   check one
   ( ) vastus
   ( ) rectus abdominus
   ( ) gracilis
   ( ) other (specify): ________________________________________________

45. Were any medications being taken at the time of biopsy?

   check one
   ( ) yes
   ( ) no

   If yes, specify type of medication:

<table>
<thead>
<tr>
<th>Type of agent</th>
<th>Name of Drug</th>
<th>Hrs. before biopsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium channel blocker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neuroleptic agent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>adrenergic agent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lipid lowering agent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

46. Premedication and anesthetic agents utilized (for biopsy):

   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)
   ( ) promethazaine (Phenergan)
   ( ) diphenhydramine (Benedryl)

   ( ) clonidine (Duraclon)
   ( ) 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)
   ( ) promethazaine (Phenergan)
   ( ) diphenhydramine (Benedryl)
(  ) morphine
(  ) remifentanil (Ultiva)
(  ) sufentanil (Sufenta)
(  ) hydromorphone (Dilaudid)
(  ) unknown
(  ) nitrous oxide
(  ) flumazenil (Romazicon)
(  ) 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)

(  ) other (specify): ____________________________________________________________________________
46a. Type of anesthetic used for biopsy:  
*check all applicable*
- ( ) monitored anesthesia care (local standby)  
- ( ) regional anesthesia  
- ( ) spinal anesthesia  
- ( ) epidural anesthesia  
- ( ) general anesthesia without endotracheal intubation  
- ( ) general anesthesia with endotracheal intubation  
- ( ) general anesthesia with a face mask  
- ( ) general anesthesia with a laryngeal mask airway

HISTOLOGY

47. Was muscle histology performed?  
*check one*
- ( ) yes  
- ( ) no  
*If no, skip to question 48*

48. The muscle histology result was:  
*check one*
- ( ) normal  
- ( ) abnormal  
- ( ) equivocal  
*If normal, skip to question 48*

49. What were the abnormal histologic findings?  
*check one*
- ( ) diffusely distributed internal nuclei  
- ( ) other *(specify abnormality, write pending if results not available)*

50. Was muscle histochemistry performed?  
*check one*
- ( ) yes  
- ( ) no  
*If no, skip to question 51*

51. The muscle histochemistry result was:  
*check one*
- ( ) normal  
- ( ) abnormal  
- ( ) equivocal  
*If normal, skip to question 51*
52. Specify results of muscle histochemistry:
   check one
   ( ) moth-eaten fibers
   ( ) cores
   ( ) other *(specify abnormality, write pending if results not available)*

CONTRACTURE TESTS

53. In your lab, when muscle is exposed to 3% halothane, what is the minimum contracture
    indicating MH susceptibility?
    0. ___ ___ grams

54. To date, how many control patients has this lab evaluated with the 1989 Biopsy Standards
    protocol?    ___ ___ ___ ___
55. MH Diagnostic Muscle Biopsy Results

*check one*

- ( ) positive -- MH susceptible
- ( ) negative -- not susceptible to MH
- ( ) equivocal -- MH susceptibility not determined
- ( ) control biopsy

56. Contracture Test Results

**TENSION IN GRAMS MEASURED FROM ZERO OF MEASURING SCALE**

<table>
<thead>
<tr>
<th>HALOTHANE AT 3% <em>(Required):</em></th>
<th>Strip 1</th>
<th>Strip 2</th>
<th>Strip 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours between excision to completion of test (h)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>Stimulation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>duration (milliseconds)</td>
<td>__</td>
<td>__</td>
<td>__</td>
</tr>
<tr>
<td>frequency (Hz)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>voltage (volts)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>current (mA)</td>
<td>__</td>
<td>__</td>
<td>__</td>
</tr>
<tr>
<td>Was a length/tension curve done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>check one</td>
<td>( ) no</td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td></td>
<td>( ) yes</td>
<td>( ) yes</td>
<td>( ) yes</td>
</tr>
<tr>
<td>Pre-drug twitch tension (g)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td><em>(measure from baseline for twitch tension only)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-drug tension 3% hal(g)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>Low point tension 3% hal(g)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>Contracture tension developed to 3% hal(g)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>Do you consider the tension developed to be abnormal?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>check one</td>
<td>( ) no</td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td></td>
<td>( ) yes</td>
<td>( ) yes</td>
<td>( ) yes</td>
</tr>
<tr>
<td>Length (cm)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
<tr>
<td>Wet Weight (g)</td>
<td>__ • __</td>
<td>__ • __</td>
<td>__ • __</td>
</tr>
</tbody>
</table>
### Biopsy Report

**TENSION IN GRAMS MEASURED FROM ZERO OF MEASURING SCALE**

<table>
<thead>
<tr>
<th></th>
<th>Strip 1</th>
<th>Strip 2</th>
<th>Strip 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAFFEINE ALONE</strong> (Required):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours between excision to completion of test (h)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td><strong>Stimulation:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>duration (milliseconds)</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>frequency (Hz)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>voltage (volts)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>current (mA)</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td><strong>Was a length/tension curve done?</strong> check one</td>
<td>( ) no</td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td>(measure from baseline for twitch tension only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-drug twitch tension (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 0.5mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 0.5mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 1.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 1.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 2.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 2.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 4.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 4.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 8.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 8.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Predrug tension 32.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>Plateau tension 32.0mM (g)</td>
<td>___ ___</td>
<td>___ ___</td>
<td>___ ___</td>
</tr>
<tr>
<td>CSC (mM)</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>% response at 2mM</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

**Updated 11-14-17**
### TENSION IN GRAMS MEASURED FROM ZERO OF MEASURING SCALE

<table>
<thead>
<tr>
<th>Strip 1</th>
<th>Strip 2</th>
<th>Strip 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you consider the tension developed to be abnormal? <em>check one</em></td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td>If yes, at what concentration?</td>
<td>( ) yes</td>
<td>( ) yes</td>
</tr>
<tr>
<td>If yes, at what CSC?</td>
<td>( ) yes</td>
<td>( ) yes</td>
</tr>
<tr>
<td>Length (cm)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Wet Weight (g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>HALOTHANE 1% &amp; CAFFEINE (<em>Optional</em>):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### HALOTHANE 1% & CAFFEINE (*Optional*):

<table>
<thead>
<tr>
<th>Strip 1</th>
<th>Strip 2</th>
<th>Strip 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours between excision to completion of test (h)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Stimulation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>duration (milliseconds)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>frequency (Hz)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>voltage (volts)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>current (mA)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Was a length/tension curve done? <em>check one</em></td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td>Pre-drug twitch tension (g) (<em>measure from baseline for twitch tension only</em>)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Pre-drug tension 1% hal(g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Low point tension 1% hal(g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Contracture tension developed to 1% hal(g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Predrug tension 0.25mM (g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Plateau tension 0.25mM (g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Predrug tension 0.5mM (g)</td>
<td>___________</td>
<td>___________</td>
</tr>
<tr>
<td>Plateau tension 0.5mM (g)</td>
<td>___________</td>
<td>___________</td>
</tr>
</tbody>
</table>

Updated 11-14-17
### TENSION IN GRAMS MEASURED FROM ZERO OF MEASURING SCALE

<table>
<thead>
<tr>
<th>Strips</th>
<th>Predrug tension</th>
<th>Plateau tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip 1</td>
<td>1.0mM (g)</td>
<td>1.0mM (g)</td>
</tr>
<tr>
<td>Strip 2</td>
<td>2.0mM (g)</td>
<td>2.0mM (g)</td>
</tr>
<tr>
<td>Strip 3</td>
<td>4.0mM (g)</td>
<td>4.0mM (g)</td>
</tr>
<tr>
<td>Strip 3</td>
<td>32.0mM (g)</td>
<td>32.0mM (g)</td>
</tr>
</tbody>
</table>

| HCSC (mM) | __ __ |

Do you consider the tension developed to be abnormal?  
**check one**  
(   ) no  
(   ) yes  
(   ) yes  
If yes, at what concentration?  
If yes, at what HCSC?  

| Length (cm) | __ __ __ |
| Wet Weight (g) | __ __ __ |

### HALOTHANE AT 2% (Optional):

<table>
<thead>
<tr>
<th>Strips</th>
<th>Hours between excision to completion of test (h)</th>
<th>Stimulation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip 1</td>
<td></td>
<td>duration (milliseconds)</td>
</tr>
<tr>
<td>Strip 2</td>
<td></td>
<td>frequency (Hz)</td>
</tr>
<tr>
<td>Strip 3</td>
<td></td>
<td>voltage (volts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>current (mA)</td>
</tr>
</tbody>
</table>

Was a length/tension curve done?  
**check one**  
(   ) no  
(   ) no  
(   ) no  
(   ) yes  
(   ) yes  
(   ) yes  

**Pre-drug twitch tension (g) (measure from baseline for twitch tension only)**  
<table>
<thead>
<tr>
<th>Strips</th>
<th></th>
</tr>
</thead>
</table>

Updated 11-14-17
**TENSION IN GRAMS MEASURED FROM ZERO OF MEASURING SCALE**

<table>
<thead>
<tr>
<th></th>
<th>Strip 1</th>
<th>Strip 2</th>
<th>Strip 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-drug tension 2% hal(g)</td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
</tr>
<tr>
<td>Low point tension 2% hal(g)</td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
</tr>
<tr>
<td>Contracture tension developed to 2% hal(g)</td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
</tr>
<tr>
<td>Do you consider the tension developed to be abnormal?</td>
<td>( ) no</td>
<td>( ) no</td>
<td>( ) no</td>
</tr>
<tr>
<td>Length (cm)</td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
<td><strong>·</strong></td>
</tr>
<tr>
<td>Wet Weight (g)</td>
<td>·____</td>
<td>·____</td>
<td>·____</td>
</tr>
</tbody>
</table>

**TISSUE AND BLOOD STORAGE**

57. Has additional muscle tissue been stored? 
   *check one*
   ( ) yes
   ( ) no
   *If yes, specify Sample ID No: ________________________________
   Location ________________________________

58. Has an additional blood specimen been stored? 
   *check one*
   ( ) yes
   ( ) no
   *If yes, specify Sample ID No: ________________________________
DNA TESTING

59. Was a genetic exam performed?
   check one
   ( ) yes          ( ) unknown
   ( ) no

60. Where was the genetic test done?

   ______________________________________________

60a. Is a sample of the DNA stored in the lab?
   ( ) yes
   ( ) no

61. When was the genetic test done?

   ______________________________________________

62. Which of the RYR1 exons were examined?

   ______________________  ______________________
   ______________________  ______________________
   ______________________  ______________________
   ______________________  ______________________
   If unknown, check here ( )

63. Was any mutation associated with MH or central core disease present?
   check one
   ( ) yes          ( ) unknown
   ( ) no
   If yes, specify __________________________________________________________

64. Were any other sequence variants identified?
   check one
   ( ) yes
   ( ) no
   If yes, specify __________________________________________________________
COMMENTS ON PATIENT  (Optional)

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________ 

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

MH BIOPSY CENTER CODE NUMBERS

Wake Forest University............................. 06
Toronto General Hospital ............................. 05
University of California at Davis...................... 07
Uniformed Services University.......................... 16
University of Minnesota............................... 24