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**Children's Hospital of Philadelphia Infant Test of Neuromuscular Disorders (CHOP INTEND)**

**Manual of Procedures**

**Biogen Nusinersen Program**

| Version # | Date<br>(dd-mmm-yyyy) | Revision Summary  |
|-----------|-----------------------|---|
| 1.0       | 18-Mar-2015           | Initial Release Version for 232SM201 (NURTURE)  |
|           | 09-Dec-2015           | Initial Release Version for ISIS 396443-CS11 (SHINE)  |
| 2.0       | 27-Sep-2017           | <ul style="list-style-type: none"><li>Updated to remove protocol specific information to allow this manual to be program level manual and not protocol specific.</li><li>Updated to reflect sponsor transition from Ionis Pharmaceuticals to Biogen</li></ul> |

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| Appendix A | Children's Hospital of Philadelphia Infant Test of Neuromuscular Disorders (CHOP INTEND) Proforma |

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CHOP INTEND  
Manual of Procedures

**Testing environment:**

- Ideally test first thing in the AM or same time of day, about 1 hour after feeding, when sated and alert but not fussy.
- Test on a firm padded covered mat (ie. fabric or paper sheet)
- Clothing: in a diaper only, unless the infant is cold where you can use a sleeveless “onesie” garment.
- Test with rattle, giraffe, toy phone (if patient is over 20 months old) or bubbles to encourage participation
- May use pacifier only if needed to maintain state 4 or 5 (see definition, below).
- Allow parent to be present and give rest period especially to calm the infant if upset. Aim to complete the entire test without a pause. Parents can assist with administering items with instructions from the evaluator to enhance cooperation

**Behavioral State:**

Include a rating of Brazelton behavioral state for each test item. The optimal state for testing is state 4 and 5. If a subject cannot be tested for an item due to an adverse behavioral state, score as “CNT” (can not test) and not a zero. Directly quoted descriptions for each state from the Brazelton text (T. Berry Brazelton, Neonatal Behavioral Assessment Scale, 2<sup>nd</sup> ed. Clinics in Developmental Medicine No 88, Spastics International Medical Publications, London 1984):

**State 1 = deep sleep**

**State 2 = light sleep**

**State 3 = “drowsy or semi-dozing”**

- eyes may be open but dull and heavy-lidded or closed, eyelids fluttering. Dazed look when infant not processing information and is not “available”.
- activity level variable, with interspersed, mild startles from time to time reactive to sensory stimuli, but response often delayed. State change after stimulation frequently noted. Movements are usually smooth.

**State 4 = “alert, with bright look”**

- seems to focus invested attention on source of stimulation, such as an object to be sucked or a visual or auditory stimulus impinging stimuli may break through, but with some delay in response.
- Motor activity is at a minimum.
- There is a kind of glazed look, which can be easily broken though in this state.

**State 5 = eyes open**

- **considerable motor activity, with thrusting movements of the extremities, and even a few spontaneous startles**
- reactive to external stimulation with increase in startles or motor activity, but discrete reactions difficult to distinguish because of general activity level.
- Brief fussy vocalizations occur in this state.

**State 6 = Crying**

- Characterized by intense crying which is difficult to break through with stimulation
- Motor activity is high.

**Testing and Scoring:**

- All items can be scored either with spontaneous movement or active movement depending on the cognitive level and age of the subject.
- Up to 3 good attempts should be made to elicit the maximum performance with either verbal encouragement or use of toys. A good attempt means adequate positioning, subject engagement and environment.
- Perform each test item in the order listed unless otherwise noted.
- Make a note in the margin of any comments about performing or scoring an item
- If in doubt in scoring between two responses, “score down”.

**Item 1: Spontaneous movement (upper extremity)**

Start Position: This item can be observed throughout the test and can be observed in any position.

An initial period of observation in supine should be completed with the child in an alert awake state.

Stimulus: The examiner may support the arm or leg and observe the hand or foot without the friction of the surface. The examiner may stroke the hand or foot to elicit a response if none is observed.

## Scoring Criteria:

- Score 4 Antigravity shoulder movement (elbows off surface in supine)
- Score 3 For active antigravity movement (hand and forearm off surface in supine)
- Score 2 For active wrist movement
- Score 1 For isolated finger movement
- Score 0 For no movement of limbs

Score both sides and select the maximum score for the best score.

**Item 2: Spontaneous movement (lower extremity)**

Start Position: This item can be observed throughout the test and can be observed in any position.

An initial period of observation in supine should be completed with the child in an alert awake state.

Stimulus: The examiner may support the arm or leg and observe the hand or foot without the friction of the surface. The examiner may stroke the hand or foot to elicit a response if none is observed.

## Scoring Criteria:

- Score 4 Antigravity hip movement (feet and knees off surface in supine)
- Score 3 Active antigravity hip adduction/internal rotation (knees off surface in supine do not give credit if maintained only due to range of motion loss)
- Score 2 Active gravity eliminated knee/hip movement (extension and flexion in abduction and external rotation)
- Score 1 Isolated ankle movement
- Score 0 No movement of limbs

Score both sides and select the maximum score for the best score.

**Item 3: Hand Grip**

Start Position: Supine with arm and forearm on the surface of testing mat and in pronation with the wrist extended.

Stimulus: Place your “pinkie” (or a toy of the same diameter for infants without a grasp reflex) in the infant’s hand until a grip response is secure, then slowly lift the arm and hand, creating traction on the arm at 90<sup>0</sup> to the support surface, then continue to draw shoulder off the mat. Record score when the child loses grip. May repeat 3 times to make sure the child’s best effort is obtained. Repeat for the other arm. Provide verbal encouragement for older infants.

## Scoring Criteria:

- Score 4 Maintains handgrip with shoulder off bed
- Score 3 Maintains grip with elbow just off bed but shoulder on surface
- Score 2 Maintains grip with forearm off surface but elbow still supported

Score 1 Maintains grip only with no traction

Score 0 No grip or rattle or pen slips out

Score both sides and select the maximum score for the best score



**Item 4: Head in midline**

Start Position: Supine head midline

Stimulus: Visual stimulation with a bright object at midline. If the infant maintains midline for 5 seconds then turn the infant’s head 90 degrees to the right and provide visual stimulation to encourage return to midline, then repeat to the left. Note: If the infant’s head cannot be turned passively at least 60 degrees off midline, due to a neck contracture, then this side cannot be tested and should be indicated as “CNT” (Can Not Test) on the source and scanning sheet.

Scoring Criteria:

Score 4 Rotates from 90<sup>0</sup> back fully to midline

Score 3 Actively turns head part way from 90<sup>0</sup> towards midline

Score 2: Maintains head within 15<sup>0</sup> of midline for 5 or more sec.

Score 1: Maintains within 15<sup>0</sup> of midline for less than 5 sec.

Score 0 Head falls to side and no attempt to regain midline is noted

Score both sides and select the maximum score for the best score.



**Item 5: Hip adductors**

Start Position: Supine, with hips at 45<sup>0</sup>, knees at 90<sup>0</sup>, feet hip width apart, remove diaper. Can remove sheet or paper beneath feet to allow a non-slip surface.

Stimulus: Position legs in neutral with thighs parallel and release; observe response of legs. A downward stimulus may be included to elicit movement. Avoid squeezing knees together.

**Scoring Criteria:**

Score 4 Maintains knee off surface of bed more than 5 sec. or lifts feet off surface

Score 2 Keeps knee off surface of bed 1 to 5 seconds

Score 0 No attempt to maintain knees off surface

Score both sides and select the maximum score for the best score.

*Note: may score item based on regaining adducted position and maintaining for prescribed time after a fall to the surface or maintaining adduction.*



**Item 6: Rolling: elicited from the legs**

Start Position: Supine arms at sides

Stimulus: Holding infant's lower thigh, flex hip and knee and adduct across midline of the body to stimulate rolling. Pause with hips at 90° to surface to allow infant to attempt to derotate body against the fixed distal leg, continue to maintain tension on the leg as the infant derotates the upper body against it.

If the infant rolls to side continue to apply traction at diagonal to body to maintain tension on the leg. Do not passively pull the child across to prone but observe the active de-rotation of the trunk against the stabilized lower extremity with the hips vertical and then the head control and ability to clear the weight bearing shoulder as the child rolls to prone and frees the arm and brings the head across the arm.

**Scoring Criteria:**

Score 4 When traction is applied at the end of the maneuver, rolls to prone with lateral head righting

Score 3 Rolls through side lying into prone without lateral head righting (clears weight bearing arm completely to finish roll)

Score 2 Pelvis, trunk and arm lift from support surface, head turns and rolls onto side (arm comes through to front of body)

Score 1 Pelvis and trunk lift from support surface and head turns to side. Arm remains behind trunk

Score 0 Pelvis lifted passively off support surface with no active participation

*Score both sides and select the maximum score for the best score.*



**Item 7: Rolling: elicited from the arms**

Start Position: Supine arms at side

Stimulus: Hold infant at the elbow and move across midline toward opposite shoulder to elicit rolling pause with shoulders 90° to surface and maintain traction on limb and allow infant to de-rotate. Pause with shoulders vertical and wait for trunk to de-rotate and lower extremity and hips to come to sideling do not passively pull the infant to prone. Continue to apply traction to arm and observe head control and ability to free arm and complete roll to prone.

Scoring Criteria:

- Score 4        Rolls onto side with lateral head righting (infant lifts head laterally off the support surface to complete the roll to prone)
- Score 3        Rolls into prone without lateral head righting (Clears weight bearing arm completely to finish roll)
- Score 2        Rolls onto side (leg comes through and adducts bringing the pelvis vertical)
- Score 1        Head turns to side and shoulder and trunk lift from surface
- Score 0        Head turns to side; body remains limp or shoulder lifts passively with out active participation

*Score both sides and select the maximum score for the best score.*



**Item 8: Shoulder flexion and elbow flexion and horizontal abduction**

Start Position: Side-lying with upper arm supported on body in 30 degrees of elbow flexion and shoulder extension. The dependent arm should be restrained along the trunk.

Stimulus: Prompt reaching for a toy presented at arm’s length at shoulder level (hold the lower arm to prevent the child from reaching with that arm). You may touch the infant’s hand with the toy to encourage reaching. Any spontaneous upper extremity movements should be scored; intent is not required.

Scoring Criteria:

- Score 4        Clears hand from the surface while reaching (the infant demonstrates any antigravity horizontal abduction)

- Score 3 Able to flex shoulder to 45 degrees (the infant demonstrates gravity eliminated shoulder flexion)
- Score 2 Flexes elbow after arm comes off body
- Score 1 Able to get arm off body
- Score 0 No attempt (the arm remains on the infants trunk)

*Intent is not necessary and spontaneous movement may be scored  
Score both sides and select the maximum score for a final score.*



**Item 9: Shoulder flexion & elbow flexion**

Start Position: Sitting (slightly reclined about 20<sup>0</sup>) on parents or other study team members lap straddled over examiners leg, with support for trunk and posterior head, child’s arm dangling at side and not obstructed by the person holding the child.

Stimulus: Present toy at midline and at shoulder level (May touch the infant’s hand with toy to stimulate movement).

Scoring Criteria:

- Score 4 Abducts or flexes shoulder to 60 degrees
- Score 3 Abducts or flexes shoulder to 30 degrees
- Score 2 Any shoulder flexion or abduction
- Score 1 Flexes the elbow only
- Score 0 No attempt to lift arm

*Intent is not necessary and spontaneous movement may be scored  
Score both sides and select the maximum score for the best score.*



**Item 10: Knee extension**

Start Position: sitting on parent’s or other study team members lap in straddle position on one leg, with approximately 20 degree recline of the subject’s torso. The subject’s lower leg should be positioned vertically and free from contact with any surface or person.



Stimulus: Tickle plantar surface of the foot or gently pinch the toe.

Scoring Criteria:

Score 4      If the infant extends the knee greater than 45 degrees. Make sure this is not due to passive swinging of the leg from examiner's repositioning.

Score 2      If the infant extends knee 15 to 45 degrees

Score 1      If any visible knee extension is noted

Score 0      If no visible knee extension is noted

Score both sides and select the maximum score for the best score.



**Item 11: Hip flexion and foot dorsiflexion**

**Start Position:** To attain this test position the examiner may start with the subject in supine, hold him with your non dominant hand under the chin and roll the infant to prone over your hand then place your dominant hand across the infants abdomen lean forward and lift the child against your chest. Support the infant’s back against the parent or caregiver’s or other study team members chest and with the support provided by the examiner across the subject’s abdomen with their dominant arm, with the legs dangling unsupported. Tickle, or have the parent tickle, the child’s foot and observe the child’s response.

**Stimulus:** Stroke plantar surface of foot.

**Scoring Criteria:**

- Score 4        If hip flexion or knee flexion > than 30<sup>0</sup>
- Score 3        If any hip flexion or knee flexion is noted
- Score 2        If only dorsiflexion is observed
- Score 0        If no active hip, knee, or ankle motion is noted

Score both sides and select the maximum score for the best score.



**Item 12: Head Control**

**Start Position:** Sitting facing the examiner in ring sit, with the examiner supporting with both hands at the shoulders on the anterior and posterior surface. Position the infant’s trunk in an erect position with shoulders and trunk neutral. Try to get the infant positioned with the head erect. This may take some repositioning as many infants only have tenuous head control and have a very limited cone of stability.

**Stimulus:** If the infant cannot be positioned with head erect allow the head to fall forward and support the chin with your thumbs at end range to keep the chin off the chest.

**Scoring Criteria:**

- Score 4        Attains upright head position at least once from flexion and moves the head freely with control
- Score 3        Maintains head upright for greater than 15 seconds
- Score 2        Maintains head in midline for >5 sec. with the head tipped in up to 30<sup>0</sup> of forward flexion or extension
- Score 1        Actively lifts or rotates the head twice within 15 seconds (This may not be scored only on head movement with breathing effort)
- Score 0        No response, head hangs

*Evaluation of scores of 1 and 4 can be delayed till the end of the test to maintain calm*

**Item 13: (Elbow Flexion, Score with item 14)**

Start Position: Supine

Stimulus: Traction response: initiate “pull to sit” with arms extended at 45 degree angle until shoulders are lifted off the surface, to point of nearly lifting head off the surface.

Scoring Criteria:

- Score 4: Active elbow flexion
- Score 2: Visible biceps contraction with out elbow flexion
- Score 0: No visible biceps contraction

Score both sides and select the maximum score for the best score.

**Item 14: (Neck Flexion, Score with item 13)**

Start Position: Supine

Stimulus: **Traction response:** Initiate “pull to sit” with arms extended at 45 degree angle to trunk until shoulders are lifted off the surface, to point of nearly lifting head off the surface.

Scoring Criteria:

- Score 4 Lifts head off bed
- Score 2 Visible muscle contraction of SCM
- Score 0 No visible contraction



**Item 15: Head/Neck extension (Landau)**

Start Position: Ventral suspension: prone, held in one hand over upper abdomen/lower rib cage. For larger infants, if necessary, the head and knees are allowed to rest on the mat.

Stimulus: Stroke the paraspinal muscles bilaterally along spine from neck to sacrum.

Scoring Criteria:

The coronal axis of the head when parallel to the bed surface = 0 degrees (horizontal)

- Score 4 If the head is extended to or above the horizontal plane.
- Score 2 If the head is extended partially, but not to the horizontal plane.
- Score 0 If no active head extension is noted.



**Item 16: Spinal incurvation (Galant)**

Start Position: Prone over examiners hand supported at the upper abdomen or lower thorax. For larger infants, if necessary, the head and knees are allowed to rest on the mat.

Stimulus: Stroke right then left throacolumbar paraspinal muscles with thumbnail, from sacrum to mid-thoracic level (**Galant's reflex**). For older children tilt them to facilitate righting reaction, tickle them at the side or foot or ask them to wiggle their buttock.

## Scoring Criteria:

Score 4        Twists pelvis toward stimulus off axis

Score 2        Visible paraspinal muscle contraction

Score 0        No Response

Score both sides and select the maximum score for the best score.

## **Appendix A**

### **Children's Hospital of Philadelphia Infant Test of Neuromuscular Disorders (CHOP INTEND) Proforma**

# CHOP INTEND

## CHILDREN'S HOSPITAL of PHILADELPHIA INFANT TEST OF NEUROMUSCULAR DISORDERS

Patient ID: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Date of Evaluation: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time of Evaluation: \_\_\_\_

Study Day: \_\_\_\_\_ Duration since last feeding: \_\_\_\_\_ hrs and \_\_\_\_\_ minutes

Evaluator Name: \_\_\_\_\_

| Item   | Position   | Test Procedure  | Graded Response  |   | Score            |                           |
|--|--|---|--|---|------------------|---------------------------|
| <b>1</b><br>Spontaneous movement (Upper extremity)   | Supine   | <u>Observe throughout testing</u><br><br>May unweight limb or stimulate infant to facilitate response   | Antigravity shoulder movement (achieves elbow off surface)   | 4 | L<br><br>R       | Best score:<br><br>State: |
|  |  |   | Antigravity elbow movement (achieves hand and forearm off surface)   | 3 |                  |                           |
|  |  |   | Wrist movement   | 2 |                  |                           |
|  |  |   | Finger movement  | 1 |                  |                           |
|  |  |   | No movement of limbs   | 0 |                  |                           |
| <b>2</b><br>Spontaneous movement (Lower extremity)   | Supine   | <u>Observe throughout testing</u><br><br>May unweight limb or stimulate infant to facilitate response   | Antigravity hip movement (achieves feet and knees off surface)   | 4 | L<br><br>R       | Best score:<br><br>State: |
|  |  |   | Antigravity hip adduction/internal rotation (knees off surface)  | 3 |                  |                           |
|  |  |   | Active gravity eliminated knee movement  | 2 |                  |                           |
|  |  |   | Ankle movement   | 1 |                  |                           |
|  |  |   | No movement of limbs   | 0 |                  |                           |
| <b>3</b><br>Hand grip                                | Supine   | Grip strength: place finger in palm and lift until shoulder comes off surface observe when infant loses grasp<br><br>May use toy of similar diameter for older children   | Maintains hand grip with shoulder off bed  | 4 | L<br><br>R       | Best score:<br><br>State: |
|  |  |   | Maintains grip with elbow off surface (shoulders on surface)   | 3 |                  |                           |
|  |  |   | Maintains grip with forearm off surface (elbow supported on surface)   | 2 |                  |                           |
|  |  |   | Maintains grip only with no traction   | 1 |                  |                           |
|  |  |   | No attempt to maintain grasp   | 0 |                  |                           |
| <b>4</b><br>Head in midline with visual stimulation* | Supine head midline  | Visual stimulation is given with toy.<br><b>If head is maintained in midline for 5 seconds:</b> Place head in maximum available rotation and provide visual stimulation to encourage midline  | Rotates from maximum rotation to midline   | 4 | L>R<br><br>R>L   | Best score:<br><br>State: |
|  |  |   | Turns head part way back to midline  | 3 |                  |                           |
|  |  |   | Maintains midline for 5 or more seconds  | 2 |                  |                           |
|  |  |   | Maintains midline, less than 5 seconds   | 1 |                  |                           |
|  |  |   | Head falls to side, no attempts to regain midline  | 0 |                  |                           |
| <b>5</b><br>Hip adductors                            | Supine, no diaper  | Hips flexed and adducted<br><br>Feet hip width apart and thighs parallel, knees slightly apart  | Keeps knee off surface of bed > 5 sec or lifts foot off surface  | 4 | L<br><br>R       | Best score:<br><br>State: |
|  |  |   | Keeps knees off surface of bed 1-5 sec   | 2 |                  |                           |
|  |  |   | No attempt to maintain knees off surface   | 0 |                  |                           |
| <b>6</b><br>Rolling: elicited from legs*             | Supine (arms at side)<br>Keep side tested up<br>roll away from the Side tested | <b>1.</b> Holding infant's lower thigh, flex hip and knee and adduct across midline bringing pelvis vertical maintain traction and <b>pause in this position.</b><br><b>2.</b> If infant rolls to side apply traction at a 45° diagonal to body and pause to allow infant to attempt to derotate body | When traction is applied at the end of the maneuver, rolls to prone with lateral head righting                   | 4 | To R<br><br>To L | Best score:<br><br>State: |
|  |  |   | Rolls through side lying into prone without lateral head righting, clears weight-bearing arm to complete roll    | 3 |                  |                           |
|  |  |   | Pelvis, trunk and arm lift from support surface, head turns and rolls onto side, arm comes thru to front of body | 2 |                  |                           |
|  |  |   | Pelvis and trunk lift from support surface and head turns to side. Arm remains behind trunk                      | 1 |                  |                           |
|  |  |   | Pelvis lifted passively off support surface.   | 0 |                  |                           |
| <b>7</b><br>Rolling: elicited from arms*             | Supine (arms at side)<br>Keep side tested up<br>roll away from the Side tested | <b>1.</b> Hold infant at the elbow move toward opposite shoulder maintain traction on limb and <b>pause with the shoulders vertical</b> allow infant to derotate<br><b>2.</b> if the pelvis achieves vertical continue to provide traction  | Rolls to prone with lateral head righting  | 4 | To R<br><br>To L | Best score:<br><br>State: |
|  |  |   | Rolls into prone without lateral head righting; must clear weight-bearing arm completely to finish roll          | 3 |                  |                           |
|  |  |   | Rolls onto side, leg comes thru and adducts, bringing the pelvis vertical  | 2 |                  |                           |
|  |  |   | Head turns to side and shoulder and trunk lift from surface  | 1 |                  |                           |
|  |  |   | Head turns to side; body remains limp or shoulder lifts passively  | 0 |                  |                           |
| <b>Item</b>  | Position   | Test Procedure  | Graded Response  |   | Score            |                           |

# CHOP INTEND

| Patient ID: ____ / ____ Study Day: _____                           |  |   |   |   |            |                           |
|--|--|---|---|---|------------|---------------------------|
| <b>8</b><br>Shoulder and elbow flexion<br>And horizontal abduction | Side-lying with upper arm at 30° of shoulder extension and elbow flexion and supported on body (restrain lower arm if needed)                  | Prompt reach for a toy presented at arms length at shoulder level (may provide stimulation and <i>observe spontaneous movement</i> )  | Clears hand from surface with antigravity arm movement  | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Able to flex shoulder to 45 degrees, without antigravity arm movement   | 3 |            |                           |
|  |  |   | Flexes elbow after arm comes off body   | 2 |            |                           |
|  |  |   | Able to get arm off body  | 1 |            |                           |
|  |  |   | No attempt  | 0 |            |                           |
| <b>9</b><br>Shoulder flexion & Elbow flexion                       | Sitting in lap or on mat with head and trunk support (20° recline)   | Present stimulus at midline and at shoulder level at arms length (may provide stimulation and <i>observe spontaneous movement</i> )   | Abducts or flexes shoulder to 60 degrees  | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Abducts or flexes shoulder to 30 degrees  | 3 |            |                           |
|  |  |   | Any shoulder flexion or abduction   | 2 |            |                           |
|  |  |   | Flexes elbow only   | 1 |            |                           |
|  |  |   | No attempt to lift arm  | 0 |            |                           |
| <b>10</b><br>Knee extension  | Sitting in lap or over edge of mat with head and trunk support (20° recline) thigh horizontal to ground  | Tickle plantar surface of foot<br>Or gently pinch toe   | Extends knee to > 45 degrees  | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Extends knee 15 to 45 degrees   | 2 |            |                           |
|  |  |   | Any visible knee extension  | 1 |            |                           |
|  |  |   | No visible knee extension   | 0 |            |                           |
| <b>11</b><br>Hip flexion and foot dorsiflexion                     | Hold infant against your body with legs free, facing outward. Support at the abdomen with the child's head resting between your arm and thorax | Stroke the foot or pinch the toe  | Hip flexion or knee flexion > 30°   | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Any hip flexion or knee flexion   | 3 |            |                           |
|  |  |   | Ankle dorsiflexion only   | 2 |            |                           |
|  |  |   | No active hip, knee or ankle motion   | 0 |            |                           |
| <b>12</b><br>Head control*   | Sitting with support at the shoulders and trunk erect  | Place the infant in ring sit with head erect and assistance given at the shoulders (front and back).<br><br><i>(may delay scoring a grade of 1 and 4 until end of test)</i> | Attains head upright from flexion and turns head side to side   | 4 | L<br><br>R | Score:<br><br>State:      |
|  |  |   | Maintains head upright for >15 sec (for bobbing head control score a 2)   | 3 |            |                           |
|  |  |   | Maintains head in midline for >5 sec. with the head tipped in up to 30° of forward flexion or extension                   | 2 |            |                           |
|  |  |   | Actively lifts or rotates head twice from flexion within 15 seconds (do not credit if movement is in time with breathing) | 1 |            |                           |
|  |  |   | No response, head hangs   | 0 |            |                           |
| <b>13</b><br>Elbow Flexion<br>Score with item 14                   | Supine   | <b>Traction response:</b> pull to sit extend arms at 45 degree angle, to point of nearly lifting head off surface   | Flexes elbow  | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Visible biceps contraction without elbow flexion  | 2 |            |                           |
|  |  |   | No visible contraction  | 0 |            |                           |
| <b>14</b><br>Neck Flexion<br>Score with item 13                    | Supine   | <b>Traction response:</b> hold in neutral proximal to wrist and shoulder at 45°, to point of nearly lifting head off surface  | Lifts head off bed  | 4 | L<br><br>R | Score:<br><br>State:      |
|  |  |   | Visible muscle contraction of SCM   | 2 |            |                           |
|  |  |   | No muscle contraction   | 0 |            |                           |
| <b>15</b><br>Head/Neck Extension (Landau)                          | <b>Ventral suspension:</b> Prone, held in one hand upper abdomen   | Stoke along spine from neck to sacrum. The coronal axis of the head when parallel to the bed surface = 0 degrees (horizontal)   | Extends head to horizontal plane or above   | 4 | L<br><br>R | Score:<br><br>State:      |
|  |  |   | Extends head partially, but not to horizontal   | 2 |            |                           |
|  |  |   | No head extension   | 0 |            |                           |
| <b>16</b><br>Spinal Incurvation (Galant)                           | Ventral suspension: Prone, held in one hand upper abdomen  | Stroke Right then Left throacolumbar paraspinals or tickle abdomen or foot or tilt in infants with integrated Galant For infant over 10 kg knees and head may touch         | Twists pelvis towards stimulus off axis   | 4 | L<br><br>R | Best score:<br><br>State: |
|  |  |   | Visible paraspinal muscle contraction   | 2 |            |                           |
|  |  |   | No response   | 0 |            |                           |

Total score, best score on each side for each item (maximum 64 points):

\* Adapted from the Test of Infant Motor Performance, Campbell, SK; et al. 2001.

**Behavioral State :** (Brazelton, TB. Neonatal Behavioral Assessment Scale, 2<sup>nd</sup> ed., 1984)

|  |                                 |
|--|---------------------------------|
| State 1 Deep sleep                       | State 2 Light sleep             |
| State 3 Drowsy or semi-dozing            | State 4 Alert, with bright look |
| State 5 Eyes open, considerable activity | State 6 Crying                  |

**Testing environment:**

Ideally test first thing in the visit or same time of day about 1 hour after feeding  
 Test on a firm padded mat  
 Diaper /onesie only unless the infant is cold  
 Test with rattle or squeaky toy to encourage participation  
 May use pacifier only if needed to maintain state 4 or 5 (see definition).