

**Hammersmith Neonatal Neurological Examination (HNNE)
proforma for term infants**

Dubowitz L et al J Pediatrics 1998;133:406-416 (front sheet not part of the scored exam)

Name Hospital number

Date of birth Date of examination

Gestation at birth Gestation now

Head circumference at birth Head circumference: now
Centile Centile

Fontanelle size shape Sutures: wide/ overlapping

Respiratory support: Ventilator / CPAP / oxygen / none

Encephalopathic Yes / No If yes describe (Coma, reflex response only/ responsive but not appropriate)

Cataracts / corneal clouding Normal papillary responses

Dysmorphisms

Cutaneous markers Yes / No Describe
Skin dimples: Yes / No
Fat folds: Excess Yes/No

| Contractures | Description (flexion/extension) | Left | degree | Right | degree |
|---------------------|------------------------------------|------|--------|-------|--------|
| Shoulders | | | | | |
| Elbows | | | | | |
| Wrists | | | | | |
| Fingers | | | | | |
| Hips | | | | | |
| Knees | | | | | |
| Ankles | | | | | |

Jaw jerk present / absent / excessive

Glabella tap (for hyperekplexia)

Mouth shape Stridor:

Tongue soft / hard / fasciculation / protruding

Dribbling / need for suction (how often) / bubbly respiration

Chest shape Diaphragmatic movement

Organomegaly liver, spleen, kidneys

Genitalia Normal male/female

HAMMERSMITH NEONATAL NEUROLOGICAL EXAMINATION

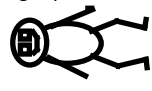

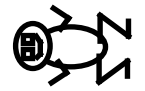

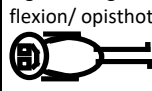
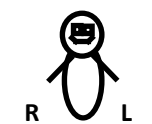
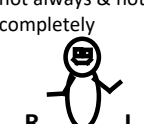

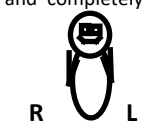
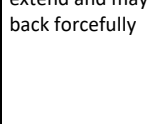

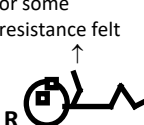
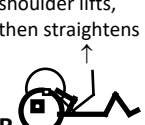
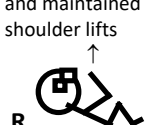
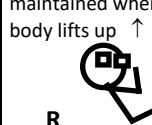
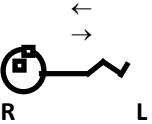
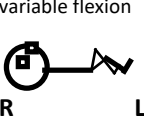
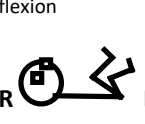
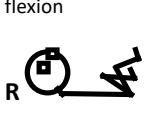
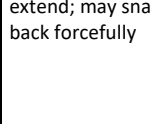

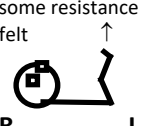
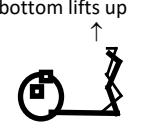
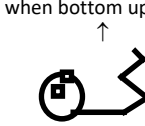
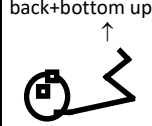
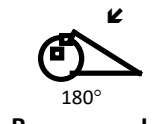
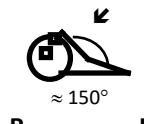
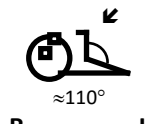
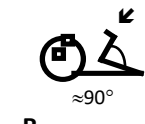
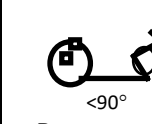



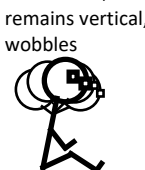
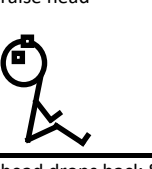
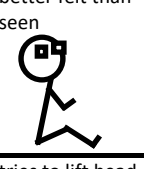
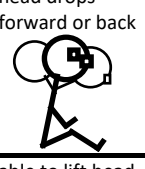
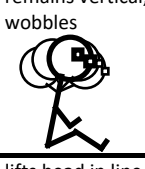
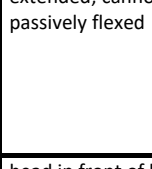






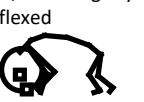


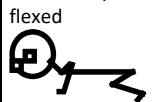
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|--|---|--|--|--|---|--|--|
| <p>POSTURE Infant lying supine. Look mainly at the position of the legs but also note arms. <i>Score predominant posture.</i></p> | <p>arms & legs extended or very slightly flexed</p>  | <p>legs slightly flexed</p>  | <p>legs well-flexed but not adducted</p>  | <p>legs well flexed & adducted near abdomen</p>  | <p>abnormal postures: marked extension of legs / strong arm flexion/ opisthotonus</p>  | | |
| <p>ARM RECOIL Take both wrists, quickly extend arms parallel to the body, count to 3. Release. <i>Repeat x3. Note response on each side.</i></p> | <p>arms do not flex</p>  | <p>arms flex slowly, not always & not completely</p>  | <p>arms flex slowly, more completely</p>  | <p>arms flex quickly and completely</p>  | <p>arms difficult to extend and may snap back forcefully</p>  | | |
| <p>ARM TRACTION Hold wrist and pull arm upwards. Note flexion at elbow and resistance while shoulder lifts off the bed. <i>Test each side separately.</i></p> | <p>arm remains straight - no resistance felt</p>  | <p>arm flexes slightly or some resistance felt</p>  | <p>arm flexes well till shoulder lifts, then straightens</p>  | <p>arm flexes at ~100° and maintained as shoulder lifts</p>  | <p>arms flexed (<100°) & maintained when body lifts up ↑</p>  | | |
| <p>LEG RECOIL Hold both ankles in one hand, flex hips and knees. Quickly extend fully and release. <i>Repeat x3. Note response on each side.</i></p> | <p>No flexion</p>  | <p>Incomplete or variable flexion</p>  | <p>complete but slow flexion</p>  | <p>complete fast flexion</p>  | <p>legs difficult to extend; may snap back forcefully</p>  | | |
| <p>LEG TRACTION Hold ankle, slowly pull leg upwards. Look at flexion at knees and resistance as the bottom lifts. <i>Test each side separately.</i></p> | <p>leg straight - no resistance felt</p>  | <p>leg flexes slightly / some resistance felt</p>  | <p>leg flexes well till bottom lifts up</p>  | <p>knee remains flexed when bottom up</p>  | <p>flexion stays when back+bottom up</p>  | | |
| <p>POPLITEAL ANGLE Fix knee on stomach, extend leg at knee by gentle pressure from first finger at ankle. Note angle behind knee. <i>Test sides separately.</i></p> |  <p>180°</p> |  <p>≈ 150°</p> |  <p>≈ 110°</p> |  <p>≈ 90°</p> |  <p>< 90°</p> | | |
| <p>HEAD CONTROL (1) (extensor tone) Hold infant upright in sitting. Encircle chest with both hands holding shoulders. Let head drop forward.</p> | <p>no attempt to raise head</p>  | <p>infant tries: effort better felt than seen</p>  | <p>raises head but head drops forward or back</p>  | <p>raises head; head remains vertical, wobbles</p>  | | | |
| <p>HEAD CONTROL (2) (flexor tone) Hold infant upright in sitting. Encircle chest with both hands holding shoulders. Let head drop backwards.</p> | <p>no attempt to raise head</p>  | <p>infant tries: effort better felt than seen</p>  | <p>raises head but head drops forward or back</p>  | <p>raises head; head remains vertical, wobbles</p>  | <p>head upright or extended; cannot be passively flexed</p>  | | |
| <p>HEAD LAG Pull infant towards a sitting posture by the wrists and support the head slightly. (note arm flexion).</p> | <p>head drops back & stays</p>  | <p>tries to lift head but it drops back</p>  | <p>able to lift head slightly</p>  | <p>lifts head in line with body</p>  | <p>head in front of body</p>  | | |
| <p>VENTRAL SUSPENSION Hold infant prone lifting horizontally under the abdomen. Look at curvature of back, flexion of limbs and relation of head to trunk</p> | <p>back curved, head & limbs hang straight</p>  | <p>back curved, head ↓, limbs slightly flexed</p>  | <p>back slightly curved, limbs flexed</p>  | <p>back straight, head in line, limbs flexed</p>  | <p>back straight, head above body, limbs flexed</p>  | | |

HAMMERSMITH NEONATAL NEUROLOGICAL EXAMINATION

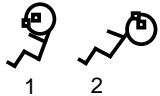

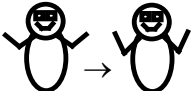
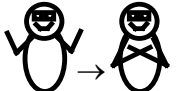

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Tone patterns

| | | | | | | | |
|---|--|--|---|--|--|--|--|
| FLEXOR TONE (1) (on traction: arm vs. leg) compare scores for arm traction with leg traction. | | score for arm flexion less than score for leg flexion | score for arm flexion equal to score for leg flexion | score for arm flexion more than leg flexion but difference ≤ 1 column | score for arm flexion more than leg flexion and difference >1 column | | |
| FLEXOR TONE (2) (arm vs leg) Posture in supine | | | arms and legs flexed | strong arm flexion with strong leg extension <i>intermittent</i> | strong arm flexion with strong leg extension <i>continuous</i> | | |
| LEG EXTENSOR TONE Compare scores for leg traction and popliteal angle. | | score for leg traction more than score for popliteal angle | score for leg traction equal to score for popliteal angle | score for leg traction less than score for popliteal angle; difference ≤ 1 column | score for leg traction less than score for popliteal angle; difference >1 column | | |
| NECK EXTENSOR TONE (INFANT IN SITTING) Compare scores of head control 1 and 2. | | score for head extension less than score for head flexion | score for head extension equal to score for head flexion | score for head extension more than head flexion; difference ≤ 1 column | score for head extension more than head flexion; difference >1 column | | |
| NECK EXTENSOR TONE (INFANT HORIZONTAL) Compare scores for head lag and ventral suspension. | | score for ventral suspension less than score for head lag | score for ventral suspension equal to score for head lag | score for ventral suspension more than head lag; difference ≤ 1 column | score for ventral suspension more than head lag; difference >1 column | | |

Reflexes

| | | | | | | | |
|--|--------------------------------------|--|--|--|---|--|--|
| TENDON REFLEX (biceps, knee, ankle jerks) Wait till muscles relaxed and tap with finger or hammer. | absent | felt, not seen | seen | 'exaggerated' (very brisk) | clonus | | |
| SUCK / GAG Put little finger into mouth with pulp of finger upwards (<i>use gloves</i>) | no gag / no suck | weak irregular suck only: no stripping | weak suck only, but regular some stripping | strong suck: (a) irregular (b) regular good stripping | no suck but strong clenching | | |
| PALMAR GRASP Put index finger into palm of hand and press gently. DO NOT TOUCH BACK OF HAND. <i>Test sides separately.</i> | no reaction R L | short, weak flexion of fingers R L | strong flexion of fingers R L | strong finger flexion even when shoulder lifts R L | strong finger flexion, so whole body can be lifted R L | | |
| PLANTAR GRASP Press thumb on ball of foot just beneath toes <i>Test sides simultaneously.</i> | no response R L | toes flex slightly R L | toes curve around the examiner's thumb R L | | | | |
| PLACING Hold infant upright. Wait for legs to straighten and relax. Stroke front of infant's lower leg against edge of the table. <i>Test each side separately.</i> | no response R L | dorsiflexion of ankle only R L | full response i.e. flexion of hip, knee, ankle & placing sole of foot on table R L | | | | |
| MORO REFLEX (do last) Raise the infant to 45° (1) supporting head in midline. Bring head forward and let it fall back at least 10°. <i>Note if jerky.</i>  1 2 | no response or opening only of hands | full abduction at shoulders and extension of arms, no adduction  | full abduction but delayed or partial adduction  | partial abduction at shoulders, extension of the arms followed by smooth adduction  | •minimal abduction or adduction •only forward extension of arms •marked adduction only  | | |

HAMMERSMITH NEONATAL NEUROLOGICAL EXAMINATION

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Movements

| | | | | | | | |
|--|----------------|--|-------------------------------------|---|---|--|--|
| SPONTANEOUS MOVEMENTS (quantity) Watch infant lying supine. | no movement | sporadic and short isolated movements | frequent isolated movements | frequent generalised movements | continuous exaggerated movements | | |
| SPONTANEOUS MOVEMENTS (quality) Watch infant lying supine. | only stretches | stretches and random abrupt movements; some smooth movements | fluent movements but monotonous | fluent alternating movements of arms and legs; good variability | <ul style="list-style-type: none"> •cramped synchronised •mouthing •jerky/other abnormal movements | | |
| HEAD RAISING PRONE Lie Infant on stomach with head in the midline. | no response | infant rolls head over, chin not raised | infant raises chin, rolls head over | infant brings head and chin up | infant brings head up and keeps it up | | |

Abnormal signs/patterns

| | | | | | | | |
|---|---------------------------------|--|---|---|---|--|--|
| ABNORMAL HAND OR TOE POSTURES | | hands open, toes straight most of the time | intermittent fisting or thumb adduction | continuous fisting or thumb adduction; index finger flexion; thumb opposition | continuous big toe extension or flexion of all toes | | |
| TREMOR | | no tremor or tremor only when crying or after Moro | tremors occasionally when awake | frequent tremors when awake | continuous tremors | | |
| STARTLE Similar movements to Moro but without doing Moro. | no startle even to sudden noise | no spontaneous startle but reacts to sudden noise | 2 – 3 spontaneous startles | more than 3 spontaneous startles | continuous startles | | |

Orientation and behaviour

| | | | | | | | |
|---|--|---|--|---|--|--|--|
| EYE APPEARANCES | does not open eyes | | full conjugate eye movements | <i>transient</i> <ul style="list-style-type: none"> •nystagmus •strabismus •roving eye movements •sunset sign | <i>persistent</i> <ul style="list-style-type: none"> •nystagmus •strabismus •roving eye movements •sunset sign | | |
| AUDITORY ORIENTATION Infant awake. <i>Wrap infant. Hold rattle 10-15 cms from ear. Do not shake infant.</i> | no reaction | auditory startle; brightens and stills; no true orientation | shifting of eyes; head might turn towards source | prolonged head turn to stimulus; search with eyes; smooth | turns head and eyes to noise every time but jerkily and abruptly | | |
| VISUAL ORIENTATION Wrap infant, wake up with rattle if needed or rock gently. | does not follow or focus on target | stills, focuses, follows briefly to side but loses stimulus | follows horizontally and vertically but no head turn | follows horizontally and vertically and turns head | follows in a circle | | |
| ALERTNESS Tested as response to visual stimulus. | does not respond to stimulus | when awake, looks only briefly | when awake looks at stimulus but loses it | keeps interest in stimulus | does not tire (hyper-reactive) | | |
| IRRITABILITY In response to stimuli | quiet all the time, not irritable to any stimuli | awakes, cries sometimes when handled | cries often when handled | cries always when handled | cries even when not handled | | |
| CONSOLABILITY | not crying consoling not needed | cries briefly; consoling not needed | cries; becomes quiet when talked to | cries; needs picking up to be consoled | cries; cannot be consoled | | |
| CRY | no cry at all | whimpering cry only | cries to stimuli but normal pitch | | high-pitched cry; often continuous | | |

SUMMARY OF EXAMINATION:

Head and trunk tone:

Motility:

Orientation and alertness:

Consolability:

Limb tone:

Reflexes:

Irritability:

List deviant signs:

Examiner's signature