

THE S.T.A.B.L.E. Program
Gestational Age Assessment of the Newborn
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Ballard Gestational Age Assessment

	Physical Maturity						
	-1	0	1	2	3	4	5
Skin	Sticky / Friable / Transparent	Gelatinous / Red / Translucent	Smooth pink / Visible veins	Superficial peeving / "fish scales" / Fine veins	Cracking / Pale areas / Pink veins	Parchment / Deep cracking / No veins	Leathery / Cracked / Washed
Lanugo	No lanugo	Scarcely lanugo	Abundant lanugo	Thinning Lanugo	Bald Areas	Mostly bald	
Plantar surface	Heel: 10-40 mm / < 40 x 2	Heel: 10-35 mm / No crease	Faint red marks	Amber / brownish / cream / white	Creases / anterior 2/3	Creases over entire sole	
Breast	Hypercapable	Barely perceptible	Flat areola on bud	Slightly everted areola / 1-2 mm bud	Raised areola / 3-4 mm bud	Full areola / 5-10 mm bud	
Eyes / ears	Lids fused / Lashless -1 / Tightly -2	Lids open / Pinea flat / Slays folded	Slightly everted pinna / Soft slow recoil	Well everted / pinna / Soft but steady recoil	Formed and firm / Instant recoil	Thick cartilage / Ear stiff	
Male Genitals	Scrotum flat, smooth	Scrotum empty / Fair rugae	Testes in upper / scrotum	Testes descending / Fair rugae	Testes down / Good rugae	Testes pendulous / Deep rugae	
Female Genitals	Clitoris prominent / Labia flat	Prominent clitoris / Small labia / fitting	Prominent clitoris / Enlarging / fitting	Majora and minora equally prominent	Majora large / Minora small	Majora cover clitoris and minora	
Neuromuscular Maturity							
Posture							
Square window (vertical)							
Arm recoil							
Popliteal angle							
Scarf sign							
Heel to ear							

Adapted from: Ballard et al. (1991) *J Pediatr.*, 119(3): 417-423.

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Ballard Gestational Age Assessment

A detailed monograph and explanation about how to perform the Ballard exam (written by Dr. Ballard), may be found at www.BallardScore.com

Adapted from: Ballard et al. (1991) *J Pediatr.*, 119(3): 417-423.

Neuromuscular illustrations were adapted with permission of Dr. Ballard

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Principles of Exam

- Timing
 - ◇ Most reliable if performed by 12 hours of life
- Keep infant warm






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Ballard Exam ♦ Physical Maturity

	-1	0	1	2	3	4	5
Skin	Sticky Friable Transparent	Gelatinous Red Translucent	Smooth pink Visible veins	Superficial peeling and/or rash Few veins	Cracking Pale areas Rare veins	Parchment Deep cracking No vessels	Leathery Cracked Wrinkled
Lanugo	No lanugo	Sparse lanugo	Abundant lanugo	Thinning Lanugo	Bald areas	Mostly bald	
Plantar surface	Heel-toe 40-50 mm <40 = -2	Heel-toe >50 mm No crease	Faint red marks	Anterior transverse crease only	Creases anterior 2/3	Creases over entire sole	
Breast	Im-perceptible	Barely perceptible	Flat areola no bud	Stippled areola 1-2 mm bud	Raised areola 3-4 mm bud	Full areola 5-10 mm bud	
Eyes / ears	Lids fused: Loosely: -1 Tightly: -2	Lids open Pinna flat Stays folded	Slightly curved pinna Soft slow recoil	Well-curved pinna Soft but ready recoil	Formed and firm Instant recoil	Thick cartilage Ear stiff	
Male Genitals	Scrotum flat, smooth	Scrotum empty Faint rugae	Testes in upper canal Rare rugae	Testes descending Few rugae	Testes down Good rugae	Testes pendulous Deep rugae	
Female Genitals	Clitoris prominent Labia flat	Prominent clitoris Small labia minora	Prominent clitoris Enlarging minora	Majora and minora equally prominent	Majora large Minora small	Majora cover clitoris and minora	

Skin

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Skin	Sticky Friable Transparent	Gelatinous Red Translucent	Smooth pink Visible veins	Superficial peeling and/or rash Few veins	Cracking Pale areas Rare veins	Parchment Deep cracking No vessels	Leathery Cracked Wrinkled
Images							

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Lanugo

-1	0	1	2	3	4
No lanugo	Sparse	Abundant	Thinning	Bald areas	Mostly bald

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Lanugo

-1	0	1	2	3	4
No lanugo	Sparse	Abundant	Thinning	Bald areas	Mostly bald

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Lanugo

-1	0	1	2	3	4
No lanugo	Sparse	Abundant	Thinning	Bald areas	Mostly bald

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Lanugo


-1	0	1	2	3	4
No lanugo	Sparse	Abundant	Thinning	Bald areas	Mostly bald



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Plantar Surface


-1	0	1	2	3	4
Heel-toe 40 – 50 mm < 40 = - 2	> 50 mm No crease	Faint red marks	Anterior transverse crease only	Creases anterior 2/3	Creases over entire sole



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Plantar Surface

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Breast

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Eye and Ear

-1	0	1	2	3	4
Lids fused: Loosely: -1 Tightly: -2	Lids open Pinna flat Stays folded	Slightly curved pinna Soft slow recoil	Well-curved pinna Soft but ready recoil	Formed and firm Instant recoil	Thick cartilage Ear stiff

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Eye and Ear

-1	0	1	2	3	4
Lids fused: Loosely: -1 Tightly: -2	Lids open Pinna flat Stays folded	Slightly curved pinna Soft slow recoil	Well-curved pinna Soft but ready recoil	Formed and firm Instant recoil	Thick cartilage Ear stiff

1 2 3 4

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Genitalia • Male

-1	0	1	2	3	4
Scrotum flat, smooth	Scrotum empty Faint rugae	Testes in upper canal Rare rugae	Testes descending Few rugae	Testes down Good rugae	Testes pendulous Deep rugae

0 1 2 3 4

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Genitalia • Female

-1	0	1	2	3	4
Clitoris prominent Labia flat	Prominent clitoris Small labia minora	Prominent clitoris Enlarging minora	Majora and minora equally prominent	Majora large Minora small	Majora cover clitoris and minora

0 3 4

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Ballard Exam • Neuromuscular Maturity

	-1	0	1	2	3	4	5
Posture							
Square window (wrist)							
Arm recoil							
Popliteal angle							
Scarf sign							
Heel to ear							

Principles of Neuromuscular Exam

- Positioning
 - Head midline
 - Hips flat
- Reliability of exam altered by:
 - Sedation
 - Anesthesia
 - Paralysis
 - Critically ill state
 - Breech position


⚠ Neuromuscular assessment may be too stressful for premature and sick infants → should be performed by skilled neonatal ICU personnel once infant stabilized and able to tolerate the exam



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Posture

-1	0	1	2	3	4



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Posture

-1	0	1	2	3	4

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Square Window

-1	0	1	2	3	4
>90°	90°	60°	45°	30°	0°

- Assesses wrist flexibility and/or resistance to extensor stretching at the wrist
- Press gently on knuckles to straighten fingers
- Apply gentle pressure on back of hand close to fingers → avoid wrist rotation
- Stop pressing when resistance felt
- Angle decreases as gestational age increases

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Square Window

-1	0	1	2	3	4
>90°	90°	60°	45°	30°	0°

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Square Window

-1	0	1	2	3	4
>90°	90°	60°	45°	30°	0°

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Arm Recoil

-1	0	1	2	3	4
	180°	140-180°	110-140°	90-110°	<90°

- Tests for passive flexor tone of biceps muscle
- Test one arm at a time in order to avoid the Moro reflex
- Supine position
- Hold infant's hand
- Briefly flex arm → then momentarily extend arm and release hand
- Scores based on angle of recoil when arms return to flexion

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Arm Recoil

-1	0	1	2	3	4
	180°	140-180°	110-140°	90-110°	<90°

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Popliteal Angle

-1	0	1	2	3	4	5
180°	160°	140°	120°	100°	90°	<90°

- Assesses maturation of passive flexor tone about the knee joint
- Refrain from touching hamstrings (the muscle group being tested) during maneuver
- Thigh placed in knee-chest position with knee fully flexed
- Allow infant to relax, then grasp foot at sides
- Extend leg until resistance is felt
- Estimate angle behind the knee
- Measurement unreliable if frank breech in utero

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Popliteal Angle

-1	0	1	2	3	4	5
180°	160°	140°	120°	100°	90°	<90°

0

1

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Popliteal Angle

-1	0	1	2	3	4	5
180°	160°	140°	120°	100°	90°	<90°

2

3

4

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Scarf Sign



-1	0	1	2	3	4
neck	axillary line	nipple line	xyphoid process	nipple line	axillary line

- Tests passive tone of the posterior shoulder girdle flexor muscles
- Supine position with head midline
- Hold infant's hand across chest and use thumb of other hand to gently push elbow across chest
- Or, gently pull arm across chest (shown in photos)
- Stop when resistance is felt
- Scores based on position of elbow at landmarks

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Scarf Sign



-1	0	1	2	3	4
neck	axillary line	nipple line	xyphoid process	nipple line	axillary line

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Scarf Sign

-1	0	1	2	3	4
neck	axillary line	nipple line	xyphoid process	nipple line	axillary line

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Heel-to-Ear




-1	0	1	2	3	4
ear	nose	chin	nipple line	umbilical area	femoral crease

- Tests for passive flexion or resistance to extension of posterior hip flexor muscles
- Refrain from touching gluteus muscle (the muscle group being tested) during maneuver
- Rest leg alongside the body
- Grasp foot along both sides
- Gently pull toward ear until resistance felt
- Scores based on location of heel to landmarks
- Measurement unreliable if frank breech in utero

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Heel-to-Ear



-1	0	1	2	3	4
ear	nose	chin	nipple line	umbilical area	femoral crease

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Heel-to-Ear

-1	0	1	2	3	4
ear	nose	chin	nipple line	umbilical area	femoral crease

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