

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	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 or steady 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	Majora and minora equally prominent	Prominent clitoris Enlarged minora	Majora large Minora small	Majora cover clitoris and minora	

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


Neuromuscular illustrations were adapted with permission of Dr. Ballard

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

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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	
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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	
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Skin

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Skin

-1	0	1	2	3	4	5
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Skin

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Lanugo

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

- Begins to appear 24 – 25 weeks
- Abundant across shoulders and upper back by 28 weeks
- With increasing gestation
 - ◇ Lower back area thins first
 - ◇ Bald areas appear over lumbo-sacral area
 - ◇ Mostly bald by term
- Amount and location may vary with nutritional status, ethnicity, hormonal and metabolic factors

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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

2 **3** **4**

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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

-1 **0** **1** **4**

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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

2 **3** **4**

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Breast

-1	0	1	2	3	4
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

-1 **0** **1**

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Breast

-1	0	1	2	3	4
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

2 **3** **4**

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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

-2 **0** **4**

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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

1 2

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Posture

-1	0	1	2	3	4

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°

0 **1**

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Square Window

-1	0	1	2	3	4
>90°	90°	60°	45°	30°	0°

2 **3** **4**

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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°

1 **3** **4**

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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°

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Popliteal Angle

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

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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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Gestational Age Evaluation

Sum scores

	-1	0	1	2	3	4	5
Physical Maturity							
Skin	Sticky Fruity Transparent	Gelatinous Red Translucent	Smooth pink Visible veins	Superficial peeling rash	Cracking Pale areas Fare veins	Purpura Deep cracking No vessels	Leathery Cracked Wrinkled
Lanugo	No lanugo	Scarcely lanugo	Abundant lanugo	Thinning lanugo	Bald areas	Mostly bald	
Plantar surface	Heel less than 40 mm +40 = 2	No crease	Faint red marks	Thick transverse creases	Creases anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat nipple 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	Slightly curved pinna No ear wax	Thinned pinna Soft but easy	Furrowed and firm instant recoil	Thick cartilage Ear stiff	
Male Genitals	Scrotum flat, smooth	Scrotum empty	Faint rugae	Testes in upper scrotum	Testes descending Fair rugae	Testes down Good rugae	Testes prominent Deep rugae
Female Genitals	Clitoris prominent Labia flat	Clitoris Small labia inflated	Clitoris Emerging labia	Major and minor equally prominent	Major large Minor small	Major cover clitoris and labia	
Neuromuscular Maturity							
Posture							
Square window (elbow)							
Arm recoil							
Popliteal angle							
Scarf sign							
Heel to ear							
							10
							15
							25

10 + 15 = 25

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Gestational Age Evaluation

Sum scores

- Neuromuscular
- Physical maturity

Total score correlates to weeks gestation

10 + 15 = 25

Score	Wks
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

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