

- A. Canalithiasis: non-ampullary (apogeotropic PC)
- B. Canalithiasis: ampullary
- C. Cupulolithiasis: adhered to cupula
- D. Vestibulolithiasis: short arm

Quick Reference Guide: BPPV Assessment for Typical BPPV

TABLE 1: Diagnosis of the involved semicircular canal and the side of involvement, according to the appropriate diagnostic maneuver. SC: semicircular canal; R: right; L: left; P: posterior; A: anterior; H: horizontal; BPPV: benign paroxysmal positional vertigo.

(a) Vertical SC canals				
Involved SC canal	Diagnostic maneuver		Paroxysmal positioning nystagmus	
			Vertical	Torsional
P-BPPV R	Dix-Hallpike R (+)		Upbeating	Counterclockwise
	Dix-Hallpike L (-)		No nystagmus	
P-BPPV L	Dix-Hallpike R (-)		No nystagmus	
	Dix-Hallpike L (+)		Upbeating	Clockwise
A-BPPV R	Dix-Hallpike R (+)		Downbeating	Counterclockwise
	Dix-Hallpike L (+)		Downbeating	Counterclockwise
A-BPPV L	Dix-Hallpike R (+)		Downbeating	clockwise
	Dix-Hallpike L (+)		Downbeating	Clockwise
(b) Horizontal SC canals				
		Direction of nystagmus	Intensity of nystagmus	Pathogenetic mechanism
H-BPPV R	Supine roll test R (+)	Geotropic	More intense	Canalolithiasis
	Supine roll test L (+)	Geotropic	Less intense	
H-BPPV R	Supine roll test R (+)	Apogeotropic	Less intense	** Cupulolithiasis or canalolithiasis of the short arm of the horizontal SC
	Supine roll test L (+)	Apogeotropic	More intense	
H-BPPV L	Supine roll test R (+)	Geotropic	Less intense	Canalolithiasis
	Supine roll test L (+)	Geotropic	More intense	
H-BPPV L	Supine roll test R (+)	Apogeotropic	More intense	** Cupulolithiasis or canalolithiasis of the short arm of the horizontal
	Supine roll test L (+)	Apogeotropic	Less intense	

Balatsouras et al, 2011

Remember:

- Clockwise (CW) and counterclockwise (CCW) are based on **what you observe** when looking at the patient (vs we normally define nystagmus from the patient's perspective or from an anatomical perspective).
- Anterior canal BPPV may not have a torsional component.

**The anterior arm is referenced as the short arm in this article.

Quick Reference Guide: BPPV Assessment

Differentiating Anterior Canal from Non-ampullary (Apogetropic) Posterior Canalithiasis

	Anterior Canal (Califano et al, 2014)	Apogetropic Posterior Canalithiasis (Califano et al, 2014 and Vannucchi et al., 2015)
Dix-Hallpike Test (DHT)	DBN bilat - with or without torsional component. If torsion present (50%), it is weak and <i>towards affected ear</i> . Right AC: CCW nystagmus; Left AC: CW nystagmus	DBN bilat unilat or bilat DHT. Torsional component is typically weaker and <i>away from affected ear</i> . Right Apo-PC: CW nystagmus; Left Apo-PC: CCW nystagmus
Straight Head Hanging Test (SHHT)	DBN is always present (most sensitive test). If torsion present (50%), it is weak and <i>towards affected ear</i> . Right AC: CCW nystagmus; Left AC: CW nystagmus	DBN is evoked sometimes. Torsional component is typically weaker and <i>away from affected ear</i> . Right Apo-PC: CW nystagmus; Left Apo-PC: CCW nystagmus
Return-to-Sitting (RTS)	Nystagmus not present	Nystagmus may or may not be present. If present, it rarely reverses. BUT, if it does reverse, the intensity can be stronger than in supine position

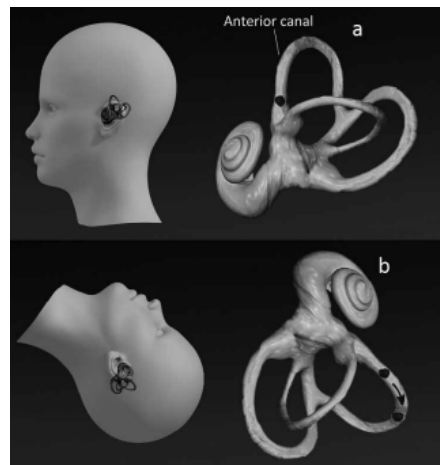


Figure 2: (a) AC in sitting; (b) in SHHT

(Califano et al, 2014)

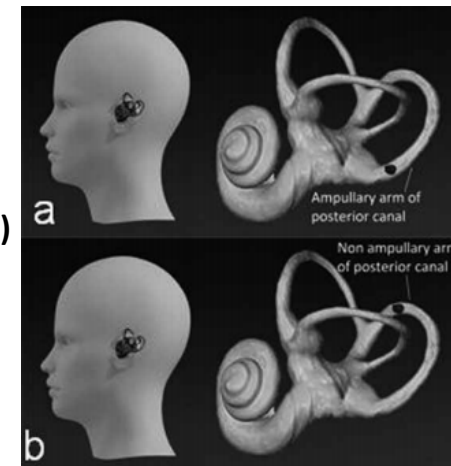


Figure 3: (a) typical posterior canalithiasis (TPC); (b) apogeotropic posterior canalithiasis (APC)

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Table 4: Differentiating Tests to Identify Side of Involvement in Horizontal Canal BPPV (Note: after identify direction of nystagmus w/Roll Test)

Direction of Nystagmus in Roll Test	Test to Identify the Affected side	Direction of the Horizontal Nystagmus
Geotropic	Seated: Bow (90°cervical flexion) Lean (45°cervical extension) Sit-to-Supine Test	Bow: <i>towards</i> the affected side Lean: <i>away from</i> the affected side STS: <i>away from</i> affected side
Ageotropic	Seated: Bow (90°cervical flexion) Lean (45°cervical extension) Sit-to-Supine Test	Bow: <i>away from</i> the affected side Lean: <i>towards</i> the affected side STS: <i>towards</i> the affected side

4 Proposed Types of Horizontal BPPV:

1. Canalithiasis (CAa): anterior arm (ampullary side)
2. Canalithiasis (CAp): posterior arm (non-ampullary side)
3. Cupulolithiasis (CUc): canal side
4. Cupulolithiasis (CUu): utricular side

CU: Cupulolithiasis

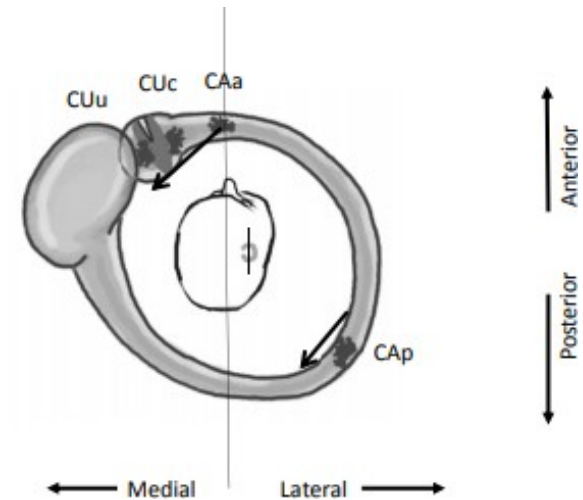


Figure 4: Horizontal Canal – Right Side (Vannucchi & Pecci, 2010; Riga et al, 2013; Galgon, Webb-Schoenewald, Holmberg at CSM, 2017)

Quick Reference Guide: BPPV Assessment

Summary of Canal Involvement

References: AAO-HNS BPC, 2017; [Buki, 2014](#); [Califano, 2014 & 2015](#); [Kim, 2014](#); [Shin, 2018](#); [Vannucchi, 2015](#)

	Canalithiasis (ampullary)	Canalithiasis (non-ampullary)	Cupulolithiasis (utricle or canal side)	Vestibulolithiasis (short arm)
Posterior Canal	In DHT, transient, upbeat and torsional towards the affected ear.	(AKA: Apogeotropic PC) In DHT, 1 or both sides; transient DBN w/torsion. If torsion present, it's away from affected ear. May be evoked in SHHT.	In DHT, nystagmus is upbeat, torsional towards the affected ear – lasting >60 seconds	In DHT, no nystagmus vertigo in return-to-sitting (RTS)
Lateral Canal (HC)	(AKA: anterior arm of HC) In RT, transient, apogeotropic bilat. Affected ear is side w/weaker nystagmus	(AKA: posterior arm of HC) In RT, transient, geotropic bilat. Affected ear is side w/stronger nystagmus	In RT, apogeotropic nystagmus 2+ minutes & weaker on the affected side. Consider Light vs Heavy Cupula or central	In RT, apogeotropic nystagmus when the affected ear is undermost (closest to ground) and no nystagmus when unaffected side is undermost. Differential: hypofunction.
Anterior Canal	Recommend SHHT. Transient DBN always present. If torsion present (50%), towards the affected ear.	Lack of evidence – likely does occur because of the position of the non-ampullary side of the canal	Would expect same presentation as canalithiasis but duration is longer. Note: persistent DBN suggests CNS dysfunction	Little evidence

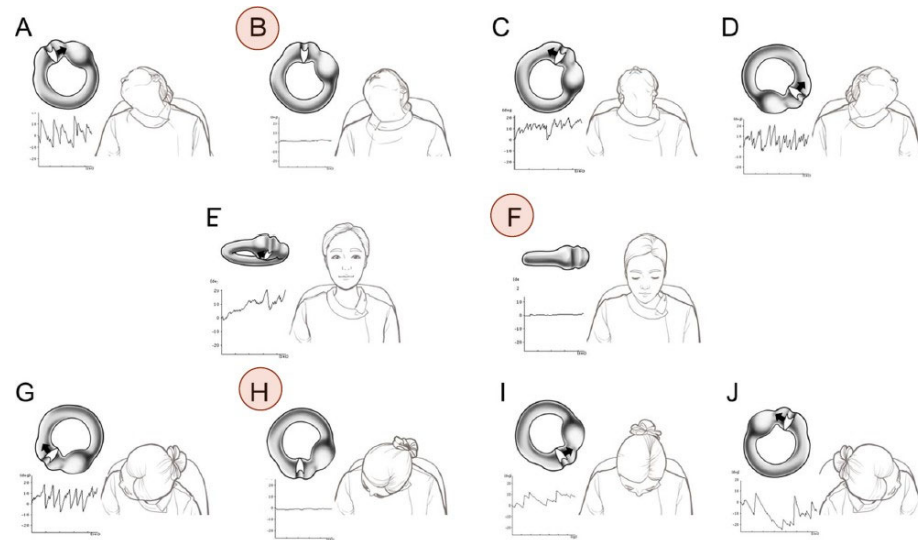
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Horizontal Canalithiasis vs Light Cupula

Nystagmus	HC Canalithiasis	Light Cupula
Geotropic Direction Changing Nystagmus	Present - bilaterally	Present - bilaterally
Latency	Present – (<20 seconds)	Absent – no latency
Persistency	Absent - fatigues	Present – doesn't fatigue
Fatigability	Present - transient	Absent - persistent
Null Plane (towards affected side)	Absent – nystagmus continues	Present – nystagmus ceases w/15-25° rotation

Identification of 3 null planes in sitting for the right horizontal canal

(Figure 5: Kim et al, 2014)



Note: ageotropic nystagmus is associated with Heavy Cupula (Tang, 2019)

Quick Reference Guide: BPPV Treatments

	Canalithiasis (Ampullary arm)	Canalithiasis (Non-ampullary)	Cupulolithiasis	Vestibulolithiasis (short arm)
Posterior Canal (PC)	Epley Semont Brandt-Daroff	Demi-semont Quick Liberatory Epley	Semont Epley w/mastoid vibration or head shakes	Bow & Yaw Maneuver
Lateral Canal (HC)	Roll Maneuvers: (270 ⁰ or 360 ⁰) Gufoni Forced Prolonged Positioning (FPP)	Roll Maneuvers: (270 ⁰ or 360 ⁰) Gufoni Zuma	Gufoni Roll maneuvers w/mastoid vibration or head shakes FPP	Zuma maneuver
Anterior Canal (AC)	Yaccovino or Kim Epley Semont	N/A	Semont Epley w/mastoid vibration or head shakes FPP	N/A

References: Gold, 2018 , AAO-HNS BPC, 2017; Zuma, 2016; Vannuchi, 2015, Califano, 2014; Kim, 2014