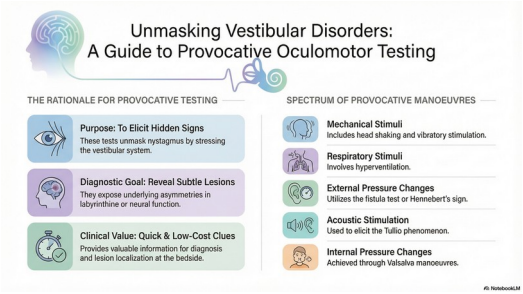
Specialized Oculomotor Tests — Clinical Cheat Sheet

OVERVIEW & ADVANCED TESTING



Purpose: Assess vergence, fixation suppression, anti-saccade control, and specialised cortical eye functions that are not evaluated in the standard oculomotor battery.

When to Use: When standard battery is inconclusive, suggests CN III pathology, cortical eye movement disorder, or when evaluating higher cortical functions (frontal lobe, dorsolateral prefrontal cortex).

Clinical Value: Reveals subtle abnormalities in vergence, fixation stability, and cortical oculomotor control not captured by routine saccade/pursuit testing. Essential for diplopia evaluation.

Key Indications: Diplopia/convergence insufficiency, suspected CN III palsy, frontal lobe disease (behavioural changes), progressive supranuclear palsy (vertical gaze), dorsal midbrain syndrome (Parinaud).

VERGENCE SYSTEM & NEAR RESPONSE

Component	Normal Response	Abnormal Finding	Localisation
Near Point Convergence	<6 cm break point	>10 cm (convergence insufficiency)	CN III nucleus, medial rectus
Vergence Latency	<100-150 ms	>250 ms (slow response)	CN III nucleus, supranucleus, CN III nerve
Convergence Amplitude	15-20° range	<10° (reduced range)	Medial rectus weakness or CN III palsy
Divergence	Smooth far-point shift	Slow, incomplete, or absent	Medial rectus inhibition pathology
Accommodation	Coupled with convergence	Accommodation-convergence dissociation	Midbrain (near response triad)

CLINICAL ASSESSMENT PROTOCOL

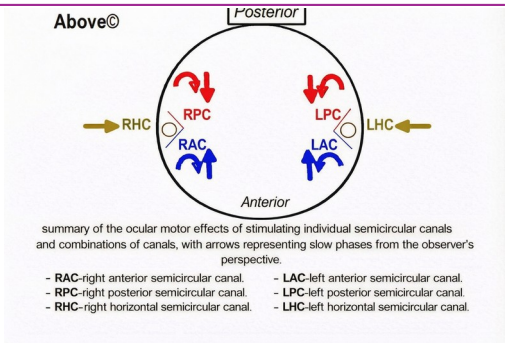
A. NPC (Near Point Convergence): Move red dot target slowly toward patient's nose at 2 cm/sec. Patient reports diplopia onset; clinician observes eye divergence. Measure break distance (normal <6 cm) and recovery.

B. Vergence Tracking: Target stepped between 60 cm and 6 metres. Measure convergence/divergence latency, velocity, and smoothness. Compare with normative values.

C. Anti-Saccade Test: Patient instructed to look in the opposite direction of the target. Measures volitional inhibition (FEF/DLPFC). Error rate >25% is abnormal and suggests frontal lobe dysfunction.

D. VOR Suppression: Head rotation ±20° at 60°/sec; patient fixates earth-fixed target. Measure suppression ratio (normal <0.50). Tests cerebellar-cortical integration.

SPECIALIZED TEST FINDINGS & INTERPRETATION



Finding	Test	Localisation	Associated Condition
Absent/reduced convergence	NPC	CN III nucleus, MLF	INO, medial rectus palsy, convergence insufficiency
Slow vergence latency	Vergence Tracking	CN III nucleus or nerve	Myasthenia gravis, CN III palsy
Poor VOR suppression (>0.50)	VORS Test	Cerebellar flocculus or cortex	Cerebellar atrophy, stroke, degeneration
Anti-saccade errors (>25%)	Anti-Saccade	DLPFC, FEF	Frontal dementia, ADHD, schizophrenia
Vertical gaze palsy	Vertical Saccade/Pursuit	Dorsal midbrain (riMLF)	PSP, Parinaud syndrome, pineal tumour
Convergence-retraction nystagmus	Upward gaze attempt	Dorsal midbrain	Parinaud (dorsal midbrain) syndrome

DORSAL MIDBRAIN SYNDROME (PARINAUD) FEATURES

Feature	Description	Mechanism	Test
Upgaze palsy	Limited voluntary upward gaze	riMLF/posterior commissure lesion	Ask patient to look up; test OKN vertical
Light-near dissociation	Pupils react to near but not light	Pretectal nucleus lesion	Pupil light reflex + near response
Convergence-retraction nystagmus	Eyes retract on attempted upgaze	Co-contraction of recti muscles	Attempt upgaze or downward OKN drum
Lid retraction (Collier sign)	Bilateral eyelid retraction	Posterior commissure involvement	Observe eyelid position at rest

HIGHER CORTICAL EYE MOVEMENT FUNCTIONS

Anti-Saccade Performance: Frontal lobe dysfunction produces high error rates (>25%). DLPFC lesions impair inhibitory control. Track error rate over time to monitor frontal disease progression.

Memory-Guided Saccades: Target flashed briefly, patient saccades to remembered location after delay. Tests prefrontal working memory. Errors suggest prefrontal or dorsolateral cortex pathology.

Predictive Saccades: Patient tracks regularly moving target. Timing prediction requires supplementary eye fields (SEF) and basal ganglia circuits. Abnormal in parkinsonian syndromes.

Convergence Insufficiency: Common after concussion/TBI. NPC >10 cm, difficulty reading, diplopia at near. May respond to vergence exercises (pencil push-ups, prism therapy).

Clinical Pearl: Vertical gaze limitation + convergence-retraction nystagmus + light-near dissociation = classic Parinaud triad. Consider pineal region mass, hydrocephalus, or midbrain stroke.