

The 10-Minute NASA Lean Test

(a standardized passive stand test)

Preparation for Patients

Orthostatic Intolerance (OI) is the development of symptoms when standing upright that are relieved by reclining. Orthostatic hypotension (OH), neurally mediated hypotension (NMH) [or neurogenic orthostatic hypotension/NOH] and postural orthostatic tachycardia syndrome (POTS) are medical terms used to describe variants of this response.

The National Academy of Medicine (NAM) clinical criteria for myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) establishes that orthostatic intolerance is a common and often overlooked feature of illness that can be objectively measured.

The 10-Minute NASA Lean Test* is a standardized, reliable, bedside measure of orthostatic intolerance, when implemented correctly. It is a simple procedure that can diagnose untreated OI, and it can additionally be implemented to reassess and monitor treatments for OI. *Preparation for testing depends on what you want to learn from the test.*

If evaluating for a **new diagnosis** of OI, helpful preparation for the 10-Minute NASA Lean Test might involve stopping interventions or medications that improve OI and could mask or reduce the abnormal findings of the test.

These treatments should be resumed **immediately** after the test.

Note: Do not stop any medical intervention without direction from your medical provider.

- 1) Stop drinking extra fluid and adding sodium for 24 hours prior to testing.
- 2) Do not wear compression clothing during the test.
- 3) You may need to reduce, taper-off, or hold medications that can influence the test (*see below*).

Examples of medications that could influence NASA Lean Test results:

- Midodrine or Northera
- Fludrocortisone
- Beta blockers: propranolol, metoprolol, bisoprolol or atenolol
- Stimulants: methylphenidate, dexadrine or caffeine
- Tricyclic antidepressants (TCA): amitriptyline, doxepin, or cyclobenzaprine
- Serotonin-norepinephrine reuptake inhibitors (SNRI): duloxetine (Cymbalta) or venlafaxine (Effexor)
- Tizanidine



If the goal of testing is to **assess treatments and interventions**, perform the 10-Minute NASA Lean Test again, mid-day on the current/full treatment regimen of fluids, sodium, compression, and medications.

During the actual test:

- Do your best to release excess muscle tension (try to relax your arms and legs), limit compensatory movements of the legs or body, and avoid excess chatty conversation.
- Report any symptoms you are experiencing at any phase of the test.
- Be sure to vocalize if any of the symptoms feel like your illness presentation, and/or if you feel you are about to faint.
 - Ideally, the test should be stopped before fainting occurs.





Orthostatic Vital Signs/The 10-Minute NASA Lean Test

	Blood Pressure (BP)		Heart Rate bpm	Comments/Symptoms
	Systolic	Diastolic		
Supine 1 minute				
Supine 2 minute				
Standing 0 minute				
Standing 1 minute				
Standing 2 minute				
Standing 3 minute				
Standing 4 minute				
Standing 5 minute				
Standing 6 minute				
Standing 7 minute				
Standing 8 minute				
Standing 9 minute				
Standing 10 minute				

Notes and References

*The 10-Minute NASA Lean Test (a passive stand/lean test) is a variant of a test used by NASA researchers decades ago to test for orthostatic intolerance¹; it reduces muscular influences on venous return, a major cause of variability in orthostatic testing. Passive stand testing has been validated as an equivalent or superior measure of orthostatic intolerance as compared to head-up Tilt Table tests^{2,3}.

[1] Bungo, M. W., Charles, J. B., & Johnson Jr, P. C. (1985). Cardiovascular deconditioning during space flight and the use of saline as a countermeasure to orthostatic intolerance. *Aviation, space, and environmental medicine*, 56(10), 985-990.

[2] Shvartz, E., Meroz, A., Magazanik, A., Shoenfeld, Y., & Shapiro, Y. (1977). Exercise and heat orthostatism and the effect of heat acclimation and physical fitness. *Aviation, Space, and Environmental Medicine*, 48(9), 836-842.

[3] Hyatt, K. H., Jacobson, L. B., & Schneider, V. S. (1975). Comparison of 70 degrees tilt, LBNP, and passive standing as measures of orthostatic tolerance. *Aviation, Space, and Environmental Medicine*, 46(6), 801-808.

[4] Roma, M., Marden, C., Rowe, PC. Passive standing tests for the office diagnosis of postural tachycardia syndrome: New methodological considerations. *Fatigue: Biomedicine, Health & Behavior*, 6:4, 179-192, DOI: 10.1080/21641846.2018.1512836

[5] Natelson, BH., Lin, JMS., Blate, M., Kahn, S., Chen, Y., Unger, ER. Physiological assessment of orthostatic intolerance in chronic fatigue syndrome. *J Transl Med*. 2022 Feb 16;20(1):95. doi: 10.1186/s12967-022-03289-8. PMID: 35172863. PMCID: PMC8849016

