

## 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 intolerance<sup>1</sup>; 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<sup>2,3</sup>.

[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

