

## NASA\* 10 Minute Lean Test | Preparation for Patients

Orthostatic intolerance (OI) is an umbrella term used to describe dizziness upon standing, a drop in blood pressure, and/or abnormal heart rate response---either increased or decreased---while in an upright position. Orthostatic hypotension (OH), neurally mediated hypotension (NMH) [or neurogenic hypotension] and postural orthostatic tachycardia syndrome (PoTS) are terms used to describe variants of this response. The new evidence-based IOM clinical criteria for ME/CFS establish that orthostatic intolerance is a common and often overlooked feature of illness that is objectively measurable.

In preparation for the 10 minute NASA lean test you should stop doing any behaviors or taking any medications that might impact the test. For example: limit extra fluid and sodium intake, do not wear compression clothing, and you may need to alter the intake of medications that might influence the test (see below). These treatments can be resumed after the test. **Confirm your plan with a medical provider before stopping or reducing any prescribed medications.**

- Limit water/fluid intake to 500-1000 mL for 24 hours before the test
- Limit sodium intake for 48 hours before the test
- Do not wear compression socks or clothing on the day of the test
- Withhold medications, supplements, or substances that might affect blood pressure or heart rate, with timing based on the drug half-life and patient safety.
  - Examples:
    - midodrine or Northera
    - fludrocortisone
    - beta blockers such as propranolol, metoprolol or atenolol
    - stimulants such as methylphenidate, dexadrine or caffeine
    - tricyclic antidepressants (TCA)-- amitriptyline, doxepin or cyclobenzaprine
    - Serotonin Norepinephrine Reuptake Inhibitors (SNRI) e.g. Cymbalta or duloxetine
    - tizanidine

### During the actual test

- During the test do your best to release excess muscle tension (try to relax your arms and legs), and limit conversation or any compensatory movements of the legs or body
- Report any symptoms you experience at any phase of the test, especially if they are recognizable illness symptoms





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\*The NASA 10-minute Lean Test is a variant of a test used by NASA researchers 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.

