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NASA 10 Minute Lean Test* | Instructions for Providers

Orthostatic intolerance (OI) is an umbrella term used to describe abnormal autonomic nervous system response to orthostatic challenge. 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. OI may contribute to dizziness, fatigue, cognitive dysfunction, chest and abdominal discomfort, and pain manifestations.

We recommend that all ME/CFS and Fibromyalgia patients have a NASA 10-minute Lean Test to assess for orthostatic intolerance.

The test will be most revealing if measures that reduce orthostatic intolerance are withheld before testing. For example: limit extra fluid and sodium intake, do not wear compression socks, and alter the intake of medications that might influence the test (see below). These treatments can be resumed after the test. Use continuous monitoring devices when possible.

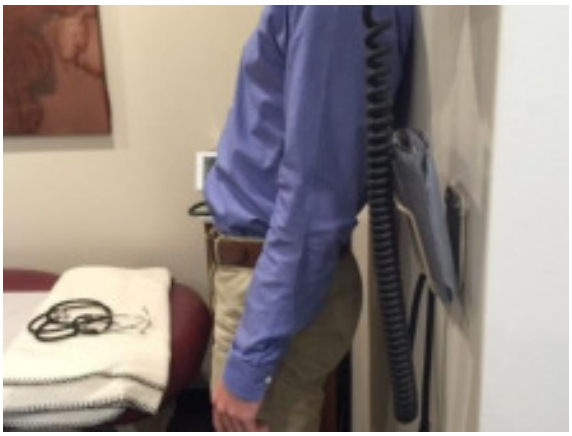
Ask the patient to remove shoes and socks and lie down on a bed or exam table in supine position for 10-20 minutes to allow for fluid equilibrium to be reached[1]. After the 10-20 minutes, record the patient's blood pressure (BP) and pulse. Repeat a minute later. If repeat vitals are not similar, retake until two consecutive vital readings are relatively consistent. The goal is to determine the average resting supine BP and pulse.

Next, ask the patient to arise and stand straight while leaning against the wall; only their shoulder blades should contact the wall, their heels should be approximately 6" from the wall. Coach patient to relax as much as possible. Once the patient is leaning against the wall, start the timer and record the first standing blood pressure and pulse. Repeat blood pressure and pulse measurements every minute for the next 10 minutes. Instruct patient not to talk and chat, except to report symptoms, and to resist moving feet or shifting weight. Observe patient for lightheadedness or signs of pre-syncope and stop the test if the patient is about to faint. Observe skin and extremities for swelling or changes in color and temperature. Assess cognition. Include any comments/patient symptoms as applicable. A template that can be used to record blood pressure and pulse follows on page 2.

General test preparation instructions, directed by provider, adjusted as appropriate for each patient.

- 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



Orthostatic Vital Signs/The NASA 10-minute Lean Test

	Blood Pressure (BP)		Pulse	Comments
	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				

*The NASA 10-minute Lean Test is a variant of a test used by NASA researchers to test for orthostatic intolerance[1]; 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.

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About the Bateman Horne Center

Our Mission:

Empowering Patients, Advancing Research, and Improving Clinical Care for all those impacted by ME/CFS and Fibromyalgia

Formerly the Fatigue Consultation Clinic (FCC) and the Organization for Fatigue & Fibromyalgia Education & Research (OFFER), the Bateman Horne Center of Excellence (BHC), was formed in 2015 as a 501(c)3 nonprofit organization.

We envision a world where patients with ME/CFS and Fibromyalgia are readily diagnosed, effectively treated, and widely met with empathy and understanding. BHC is led by Dr. Lucinda Bateman and Suzanne D. Vernon, Ph.D., who bring more than 40 years of combined experience and leadership to treating patients and advancing research in the areas of ME/CFS and Fibromyalgia.

Lucinda Bateman, MD | Founder & Medical Director

Dr. Lucinda Bateman completed her BS and MS at Brigham Young University (BYU), attended the Johns Hopkins School of Medicine, returned to the University of Utah for Internal Medicine residency, and became certified by the American Board of Internal Medicine in 1991. She started a small private group practice in 1991 and practiced General Internal Medicine until 2000.

During this time, she proctored many students as Adjunct Volunteer Clinical Faculty for the University of Utah, including nurse practitioners, physician assistants (PA), medical students and residents, and was active on the staff at LDS Hospital. She was awarded Teacher of the Year four times while teaching in the Utah PA (Physician's Assistant) program. In 2000, she was one of three Utah internists chosen by her peers in Top Doctors, a national publication.

Throughout her career, Dr. Bateman's interest has become more focused on the diagnosis and management of unexplained chronic fatigue, ME/CFS and FM, inspired by the silent suffering of her sister, Shauna Bateman Horne.

Since starting the Fatigue Consultation Clinic in 2000, Dr. Bateman has evaluated and followed more than a thousand patients with chronic fatigue conditions. She has lectured extensively on issues relating to chronic fatigue syndrome and fibromyalgia. She has served on the boards of the Easter Seals of Utah, The International Association of Chronic Fatigue Syndrome (IACFS/ME) and The CFIDS Association of America. She co-founded the non-profit, OFFER (The Organization for Fatigue and Fibromyalgia Education and Research) to encourage the sharing of information with patients and medical providers and foster cooperative research efforts aimed at understanding the cause(s) of and developing treatments for ME/CFS and FM. This goal led to the recent merge of OFFER Utah and the Fatigue Consultation Clinic to the Bateman Horne Center.

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To see Dr. Bateman's bibliography of published journal articles, visit:
http://www.ncbi.nlm.nih.gov/myncbi/collections/bibliography/46470176/?reload=publicURL