



Quick Start Guide - DLMO

Dim Light Melatonin Testing from biologyofsleep.com

Learn More or Register at:
<https://biologyofsleep.com>

+ Overview

Dim Light Melatonin Onset (DLMO) is used as an objective, comprehensive assessment of an individual's circadian rhythm function and the timing of their biological clock. DLMO is typically measured by collecting saliva samples around bedtime at regular intervals in a dimly lit environment and analyzing the melatonin levels in those samples. The DLMO timing provides valuable information about an individual's natural sleep-wake pattern and can be used to:

- Distinguish between sleep physiology and behavioral factors
- Establish if an individual's circadian rhythm is too long, too short, unstable, or misaligned
- Screen for insufficient or overproduction of melatonin or idiosyncratic drug interactions
- Identify optimal timing for sleep therapies (supplementation/bright light) that could otherwise negatively affect an individual's sleep-wake cycle

+ Use For

Routine evening symptoms, spanning early evening to early morning, such as:

- Pre-Sleep Fatigue
- ASPD, DSPD
- Prolonged Sleep Latency
- Insomnia
- Early Morning Awakening

+ Evaluation Criteria

During the evaluation of a patient, it is advised to acquire the temporal aspects and duration of symptom onset, combined with the extent of variability observed in routine bedtime and/or wake times. A patient reported index of sleep latency is particularly valuable when there is a substantial period between bedtime and the actual sleep onset.

+ Patient Collection Schedule

The standard protocol anchors sampling to an individual's desired routine bedtime and generally starts 5 hours before bedtime. Samples are then collected each hour for 7 hours to verify the circadian phase relative to expected sleep onset. However, healthcare providers can opt to anchor sample collection at sleep onset to assess the degree of circadian misalignment from an individual's intended bedtime. This approach offers insights into the magnitude and duration of the phase shift and identifies optimal timing and duration for various sleep interventions and therapies.

For early morning sleep disturbances with normal sleep latency, a recommended approach is to reverse sampling, commencing 1-2 hours pre-bedtime and sampling hourly over a duration of 7 or 9 hours. This sampling strategy effectively covers a time span of 5-6 hours following bedtime.



Quick Start Guide - DLMO

Dim Light Melatonin Testing from biologyofsleep.com

Learn More or Register at:
<https://biologyofsleep.com>

+ 7-Sample vs 9-Sample

A 7-sample DLMO provides sufficient coverage to detect the majority of circadian misalignments. However, a 9-sample DLMO extends the sampling window by 2 samples (~2 hours), at the cost of additional patient burden. If the degree of variability in a patient-reported index of sleep latency extends to more than 2-3 hours, or symptom onset is not covered by the 7-sample assessment, it is recommended to use a 9-sample profile to increase the length of the assessment window in the direction of the symptoms (i.e. sample for 2 hours longer or start 2 hours earlier)

+ Medication

There are two prevailing modalities among healthcare providers regarding the assessment of melatonin production levels in the context of prescription medication and supplements:

1. Discontinue all medications and supplements to determine the baseline circadian profile (increases patient burden) to rule out physiological dysregulation first.
2. Discontinue sleep-related medications only and determine an individual's current circadian profile to rule out physiological dysregulation last. In the event of atypical results, you may discontinue or invert dosing schedules based on the timing of the results to observe effects on sleep behavior.

While most medications do not impact the circadian rhythm directly, there are several classifications of pharmacological compounds that do impact melatonin production, depending on the dosage and the individual's physiology. A general recommendation is to stop any medication that your patient can safely and comfortably discontinue under your care for 3-5 days before beginning the assessment.

Visit <https://biologyofsleep.com/sleep-medicine-interactions> to see the latest index of medications.

+ Melatonin Supplementation

While measurable levels of exogenous melatonin or melatonin-containing supplements typically persist in saliva for up to 24 hours, we frequently observe prolonged circadian dysregulation for a duration of up to 10 days or more post-supplementation. This can manifest as elevated melatonin levels, phase shifts, and oscillating profiles. This phenomenon is inter-individual dependent and influenced by the duration and dosage of routine supplementation. It is recommended to follow a discontinuation/withdrawal protocol for melatonin supplementation as outlined below:

- 3 days (minimum) for ≥ 1.5 mg dosing as needed
- 5 days (better) for ≥ 1.5 mg routine dosing to ≥ 3 mg and dosing as needed
- 10 days (best) for ≥ 3 mg routine dosing to ≥ 5 mg dosing as needed
- 15 days (ultimate) for ≥ 5 mg routine dosing



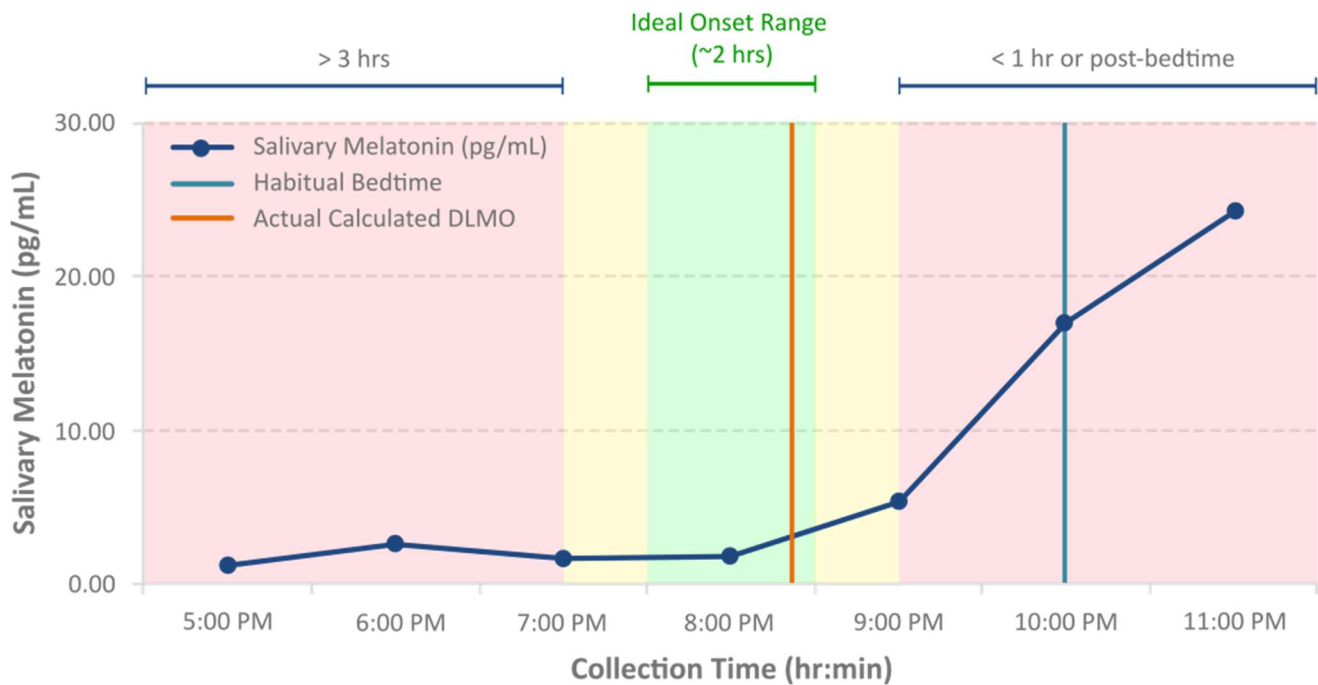
Quick Start Guide - DLMO

Dim Light Melatonin Testing from biologyofsleep.com

Learn More or Register at:
<https://biologyofsleep.com>

+ Typical Results Profile

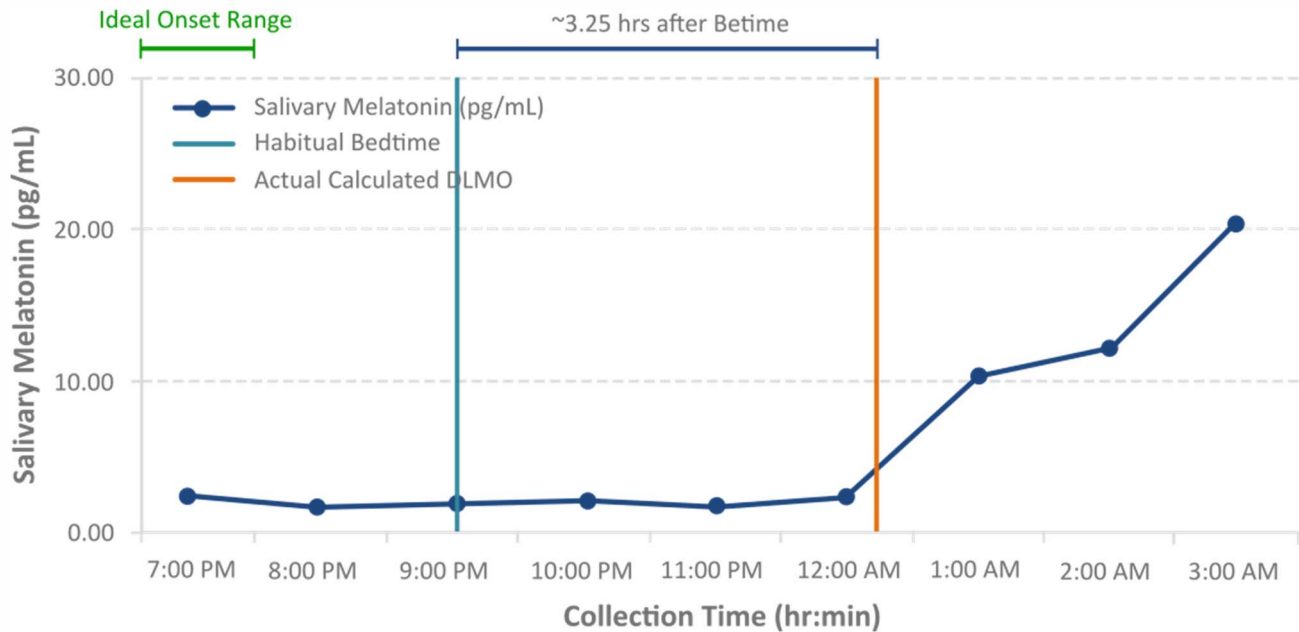
DLMO typically occurs approximately ~2 hours before bedtime (green zone). The yellow zone (approximately +/- 30 minutes outside of the ideal range) may suggest a mild sleep disruption, whereas the red zone usually indicates a significant phase shift. A typical phase-response curve exhibits a pronounced increase in melatonin levels (depending on age) following DLMO, which persists at elevated levels and gradually decrease until awakening. Peak levels and decline vary by age and individual physiology and are less indicative of overall circadian alignment and function than overall profile shape and DLMO timing in relation to bedtime.



Example Profiles

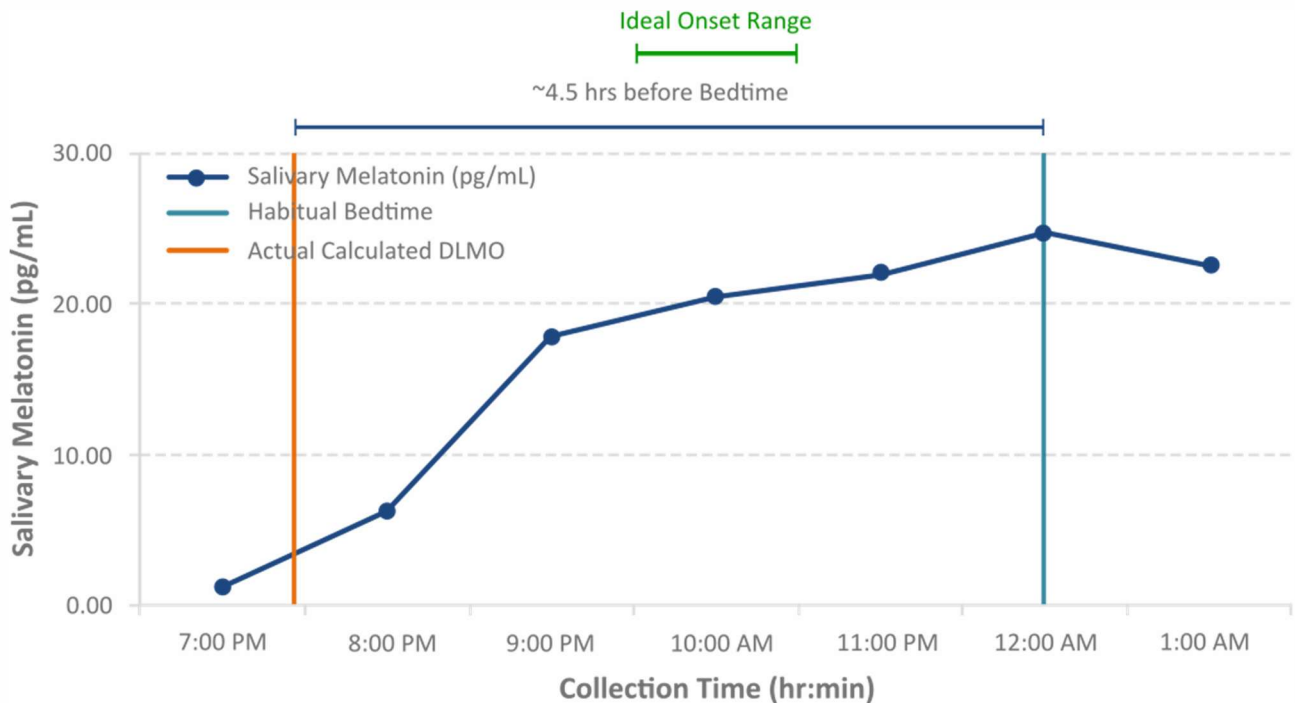
Dim Light Melatonin Testing from biologyofsleep.com

+ Late Onset (9-Sample) Profile Example



This profile exhibits a DLMO 3.25 hrs **after** bedtime, which indicates that their body would not be physiologically prepared for sleep until ~5 hours after bedtime. Often reflective of a delayed sleep phase.

+ Early Onset (7-Sample) Profile Example



This profile exhibits a DLMO ~4.5 hrs **before** bedtime, which indicates that their body was physiologically prepared for sleep ~2 hours before bedtime. Often reflective of an advanced sleep phase.