Vertical Illuminance — Eye-Level (lx)

The better proxy for circadian stimulus

Definition

Illuminance on a vertical plane at eye height; more predictive of non-visual responses than horizontal lux.

Recommended Ranges

|  |  |
| --- | --- |
| Optimal | 300–500 lx vertical (daytime). |
| Caution | 200–299 lx (weak circadian drive); >800 lx (check glare/UGR). |

Biological Effects

Hormones (Endocrine)

Adequate vertical light efficiently suppresses melatonin by day; supports robust cortisol rhythm.

Skin (Photobiology & Peripheral Clocks)

Minimal direct effect absent UV; effects are retinally mediated.

Nervous System (ipRGC → SCN → CNS)

Triggers c-Fos in SCN; resets molecular clock (CLOCK/BMAL1→PER/CRY).

Enhances locus coeruleus and basal forebrain activity → alertness, memory encoding.

Biochemical Pathways (Mechanistic Detail)

Light pulses → NMDA-dependent Ca²⁺ influx → CREB → Per1/Per2 expression → phase adjustment.

SCN outputs modulate pineal AANAT via sympathetic chain.

Classroom Recommendations

Measure vertical lx at student eye positions across the room.

Combine with spectral tuning to meet melanopic targets (see mEDI).

Quick Checklist

Vertical lx verified during morning hours.

No direct view of high-luminance sources.

References

WELL Building Standard — Vertical light at eye guidance.

Brown TM et al. (2022) — Circadian-relevant measures.