

Circadian & Mitochondrial Medicine in Oncology

Integrating Light, Timing and Metabolic Care for Breast and Prostate Cancer



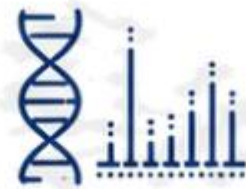
Carolina Crispino, MD, MPH · IPM Congress 2026

The Clinical Paradox

BIOMEDICAL CAPABILITY



Advanced
imaging



Molecular
profiling



Targeted
therapies

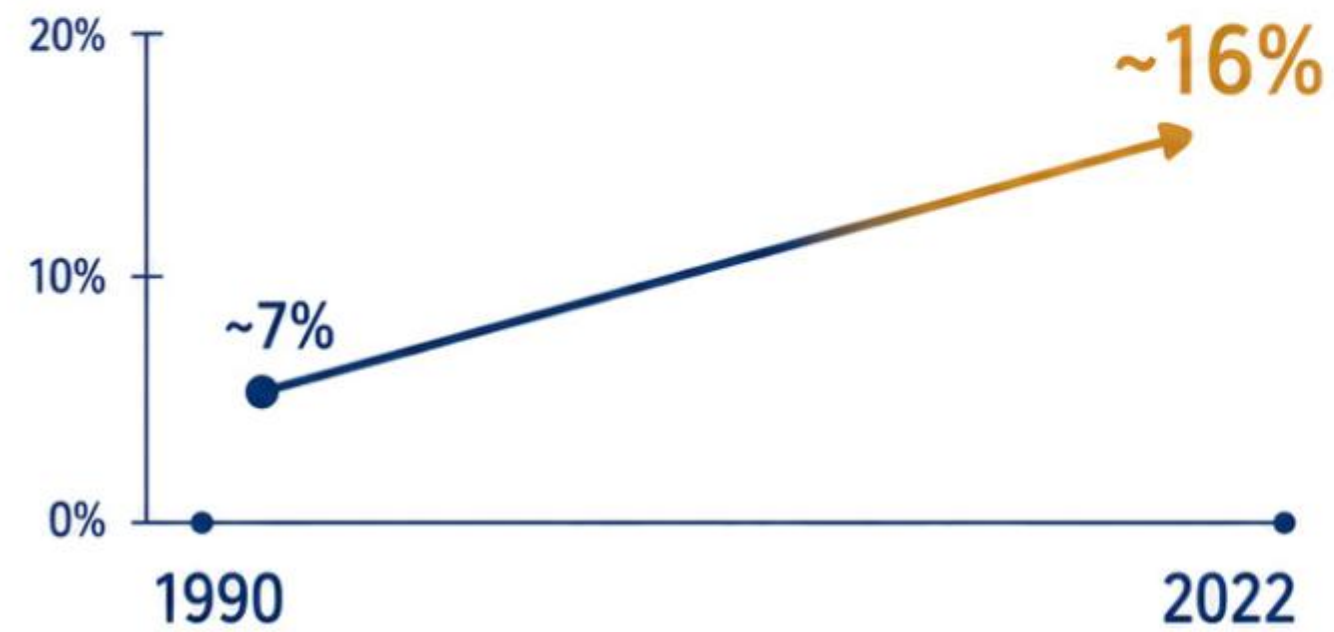


Precision
treatment protocols

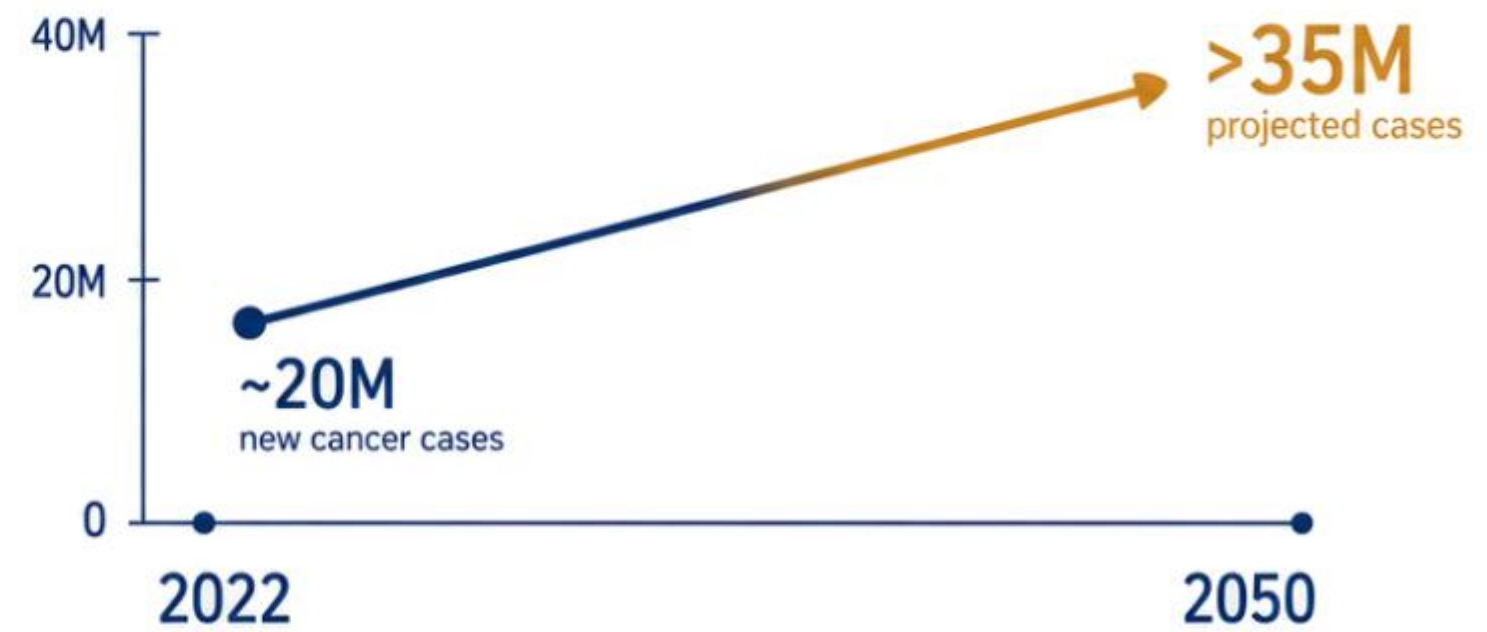
CHRONIC DISEASE BURDEN



Global adult obesity prevalence

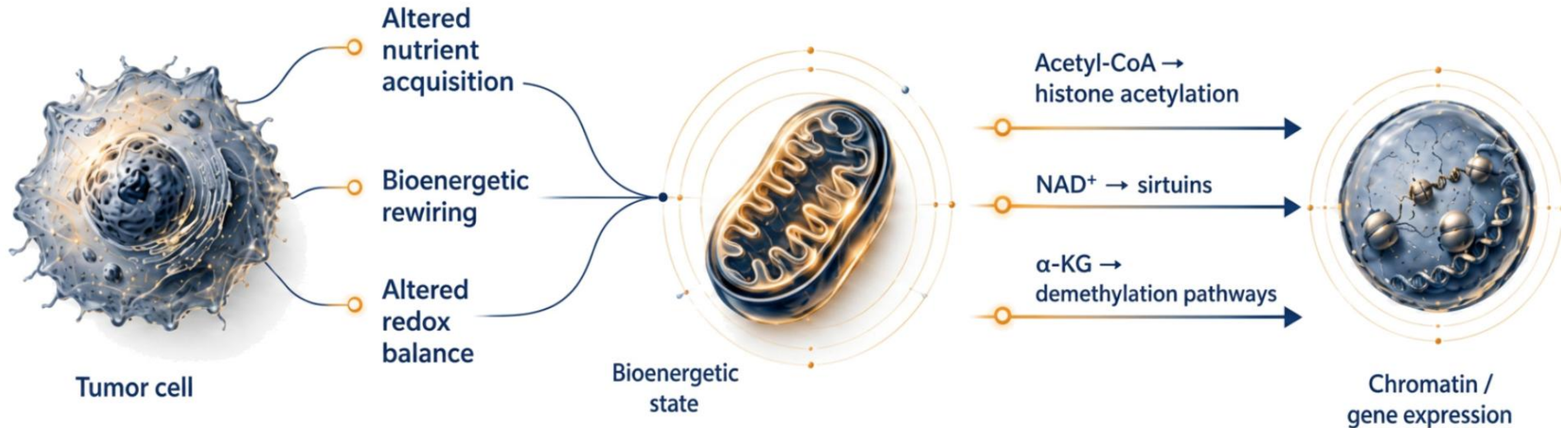


Global cancer burden



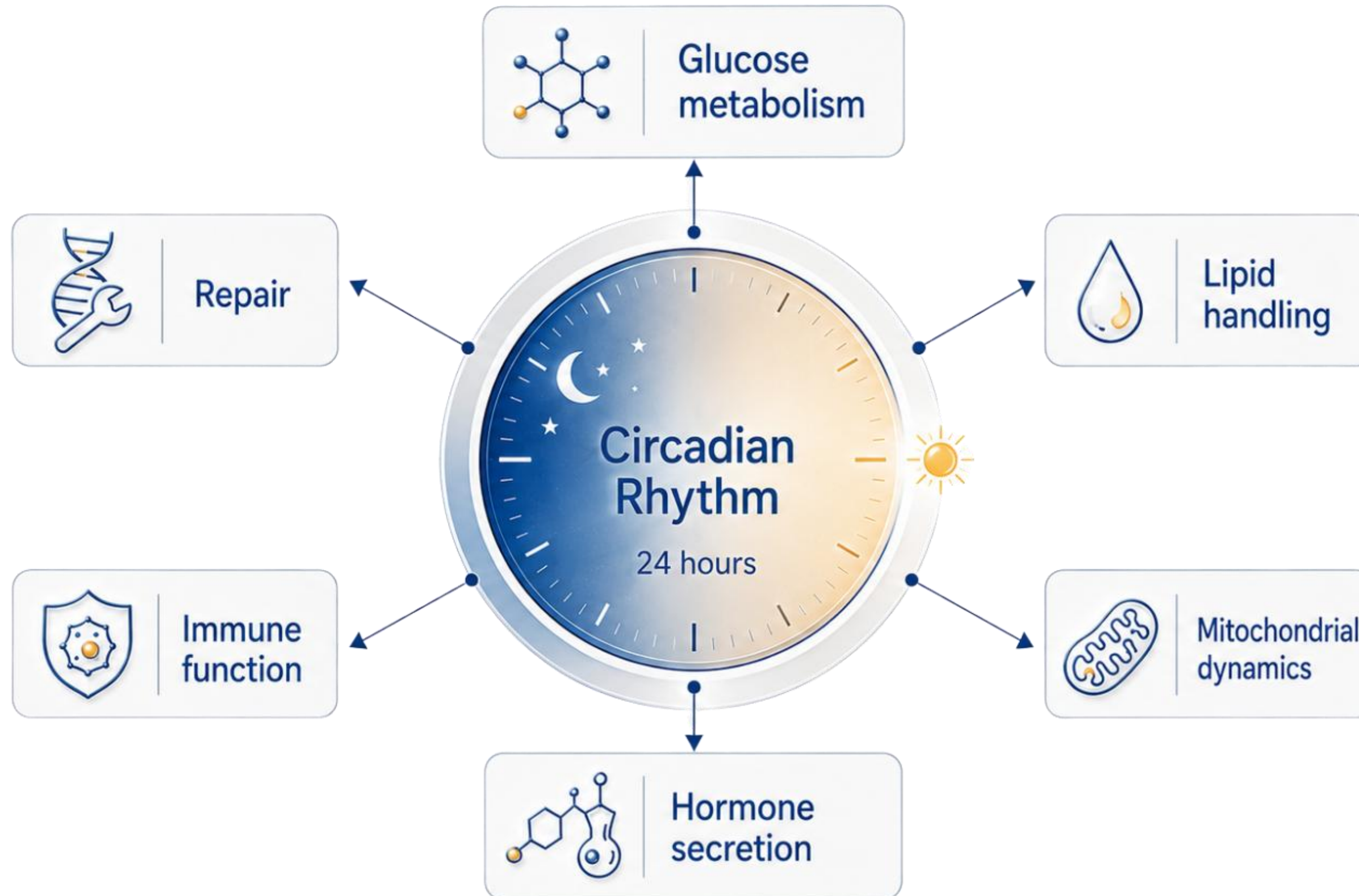
Cancer beyond genetics

Metabolic reprogramming . Bioenergetic state . Epigenetic regulation



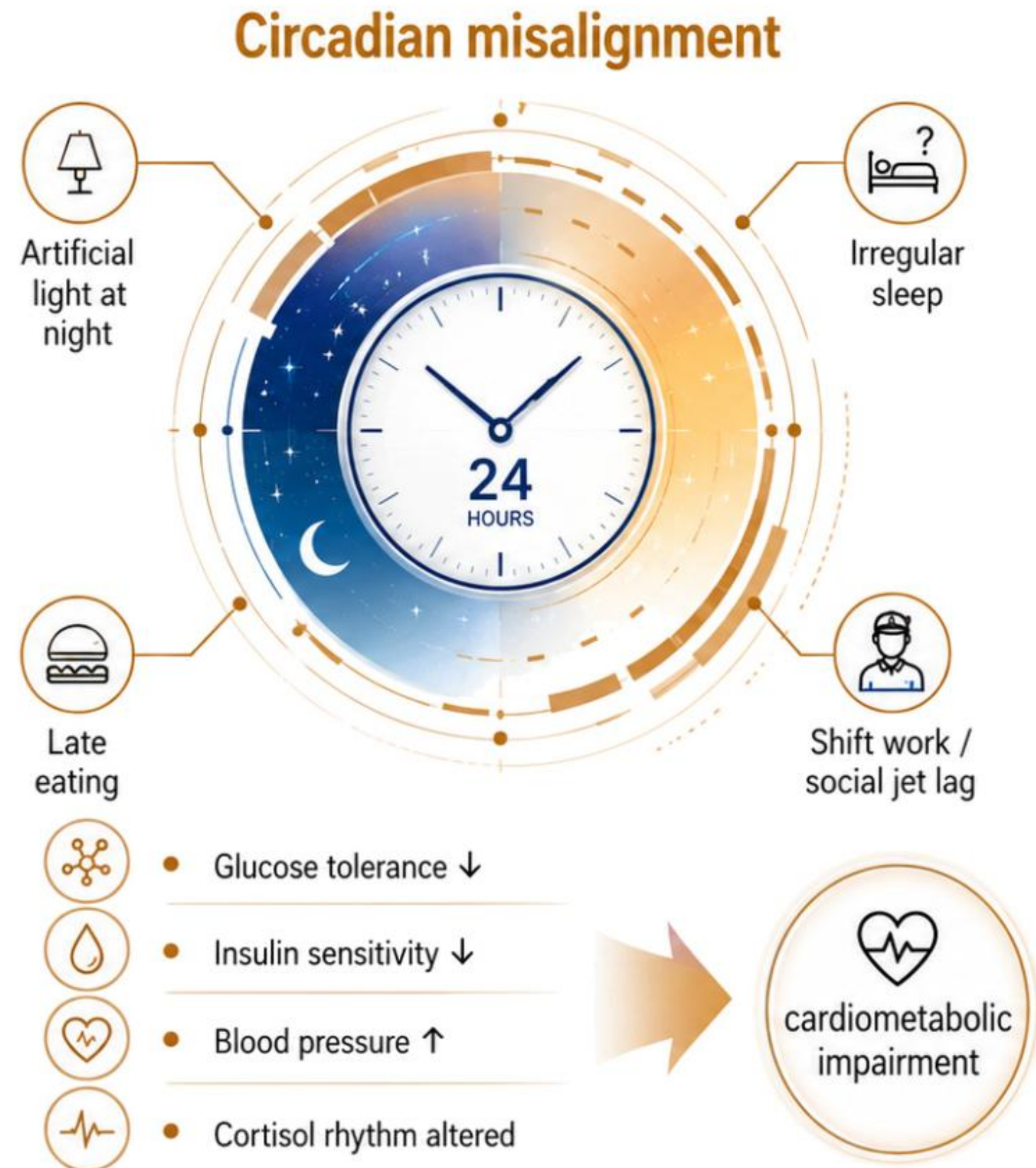
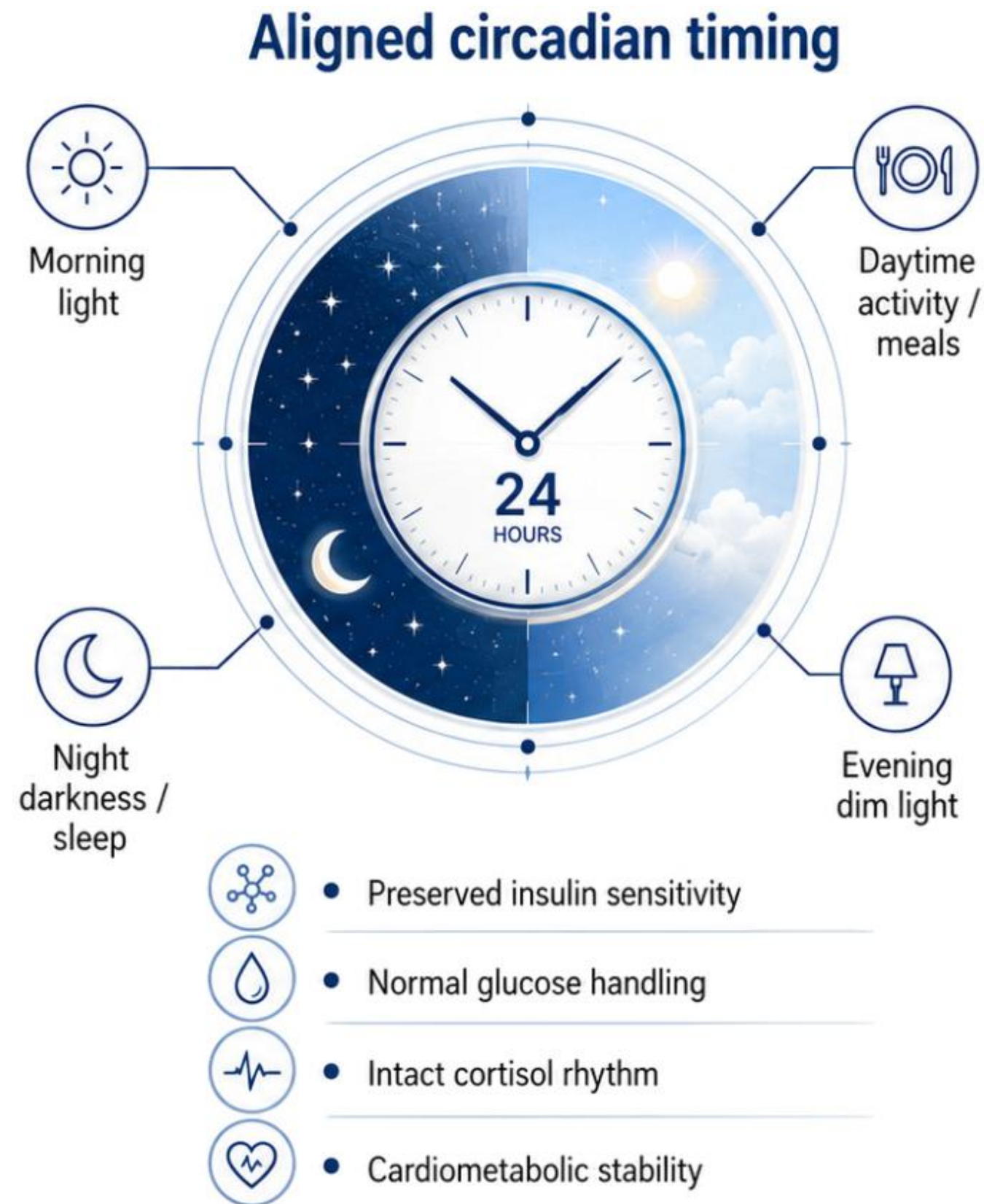
Circadian Regulation as a Master Coordinator

The body is not designed to do everything at every moment



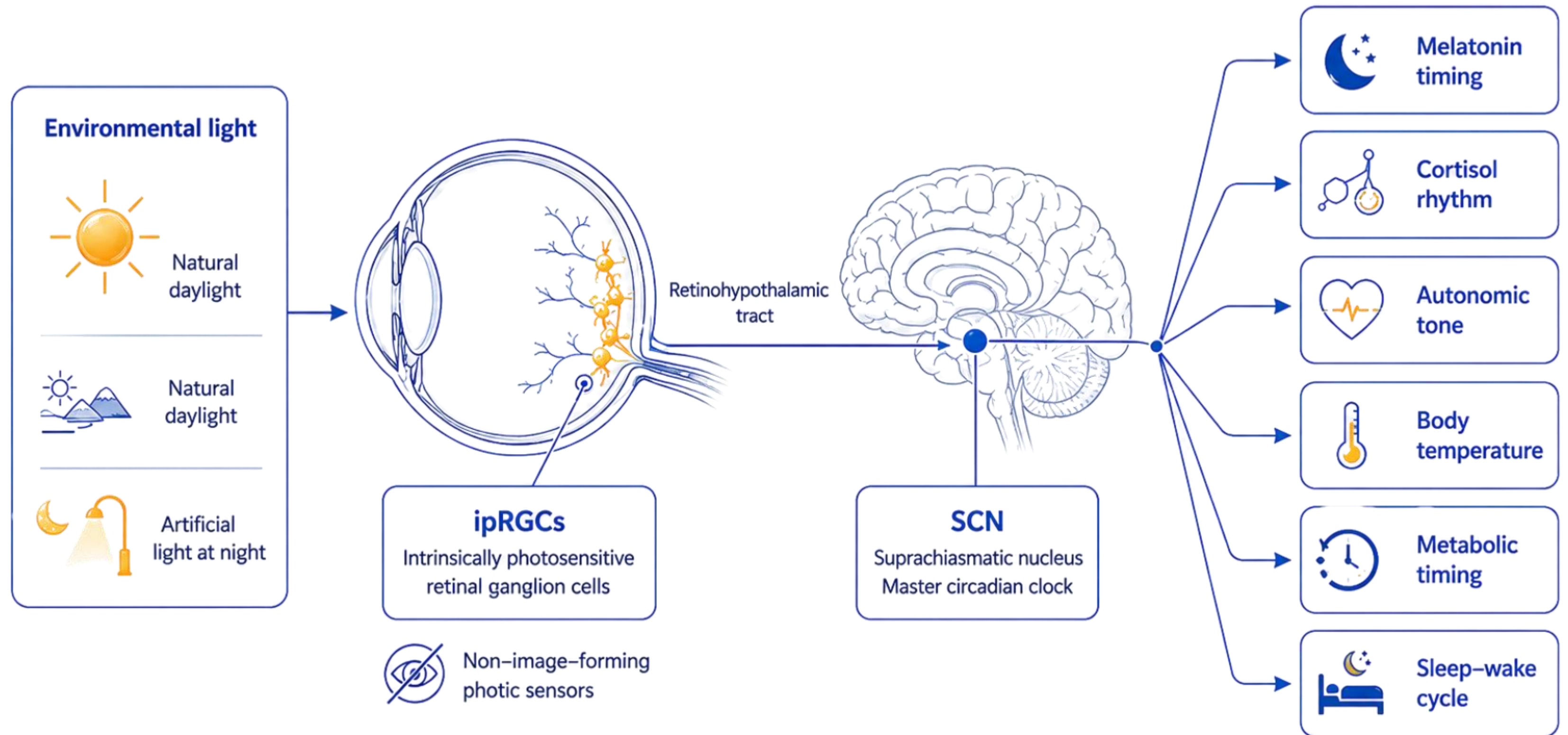
Chronic Circadian Misalignment

Timing is metabolic information

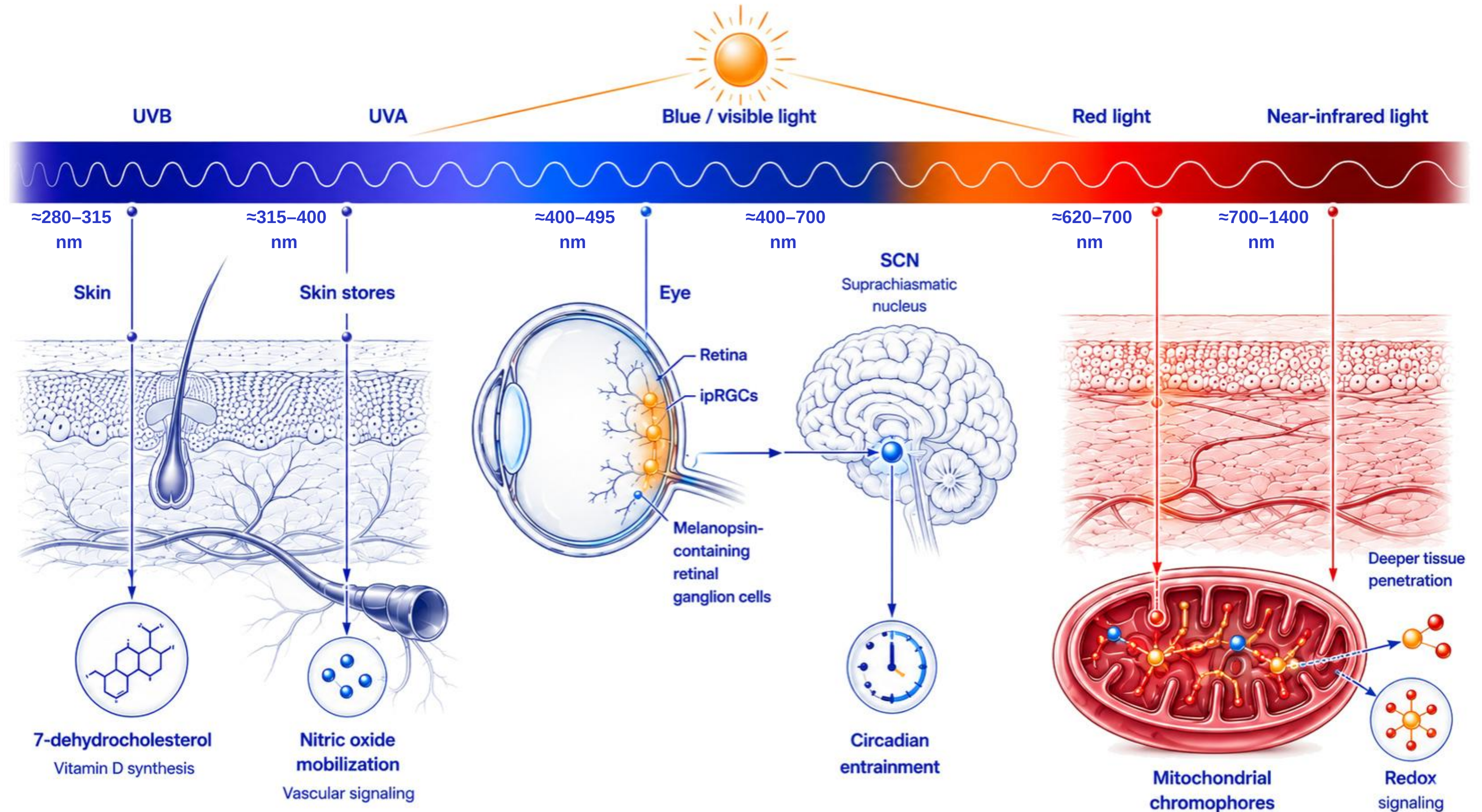


Light as a Biological Signal Beyond Vision

Light is biological information



Sunlight as a Multispectral Biological Signal





Sunlight is not one signal — it is a timed biological spectrum

Different wavelengths, different biological targets

**Healthy signal = bright days +
dark nights**

Melatonin as a Circadian and Mitochondrial Hormone

Pineal Melatonin (Systemic)



Signal of darkness



Systemic
circadian timing



Highly light-sensitive
(suppressed by light at night)

Mitochondrial / Local Melatonin (Cellular)



Mitochondrial
redox balance

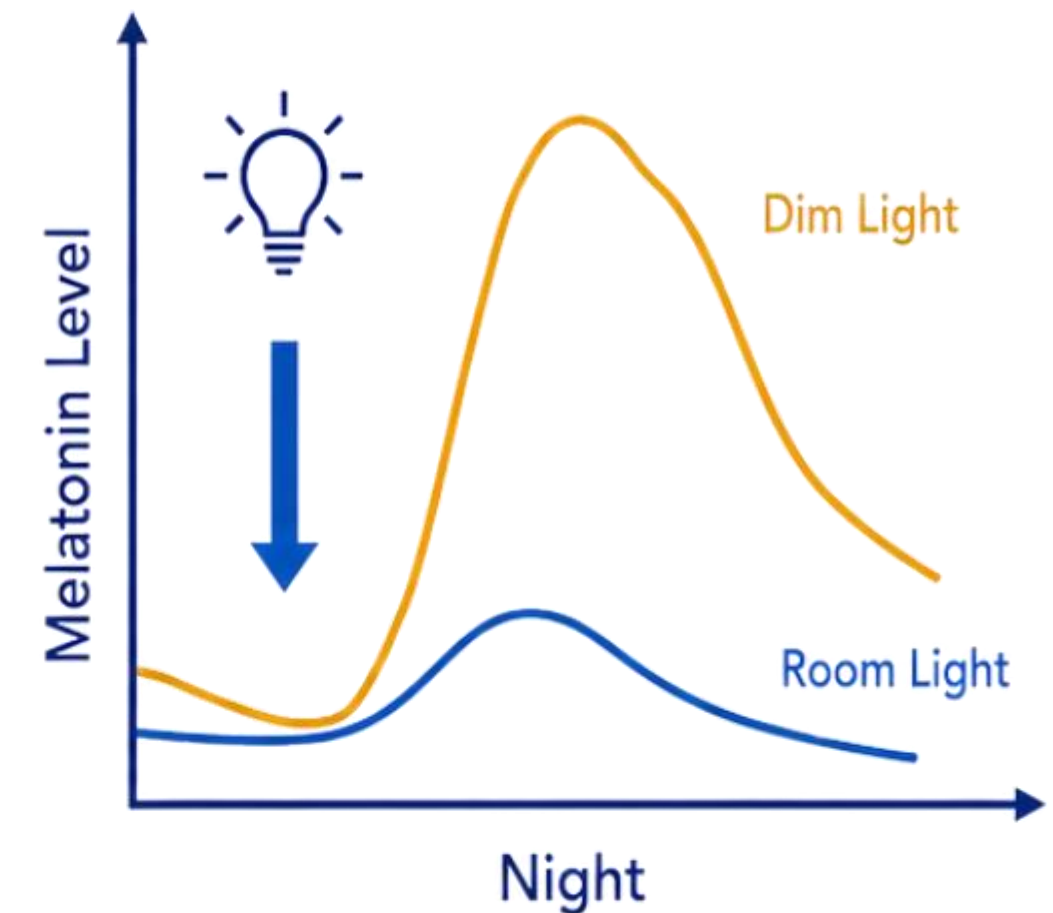


Mitochondrial
protection



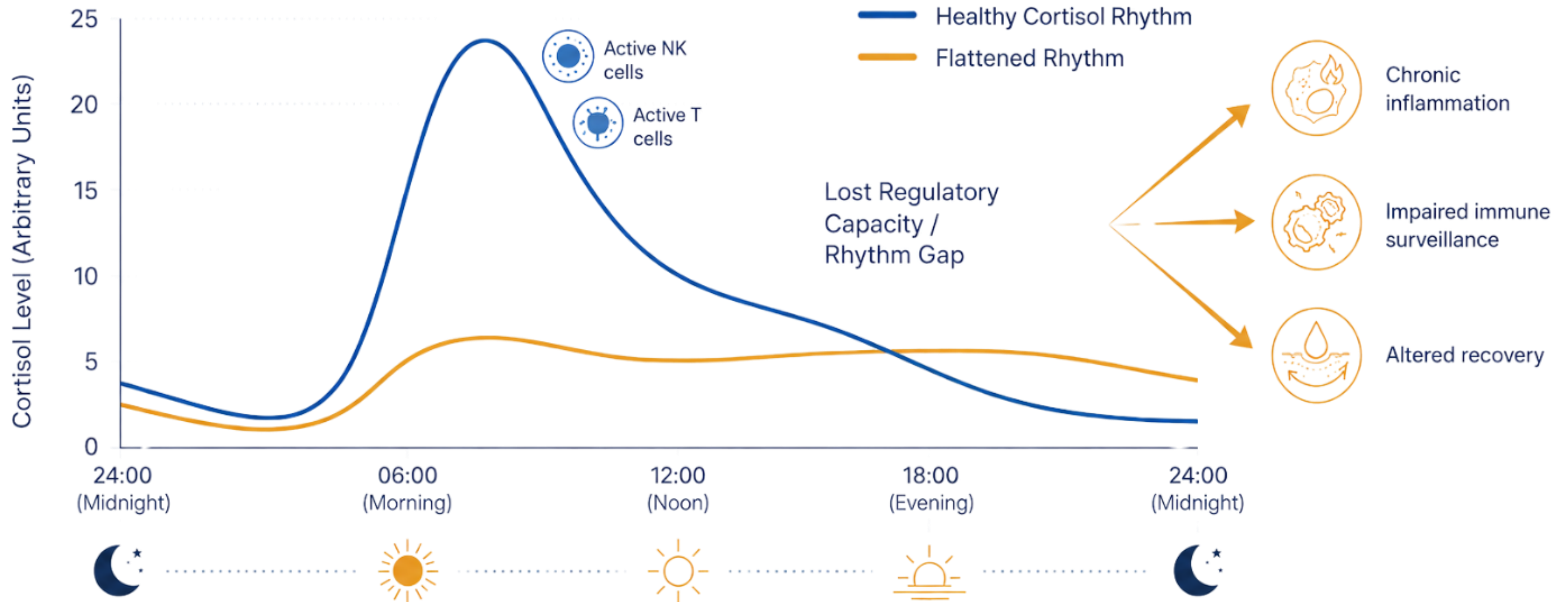
Apoptotic signaling

Melatonin suppression
under room light vs. dim light



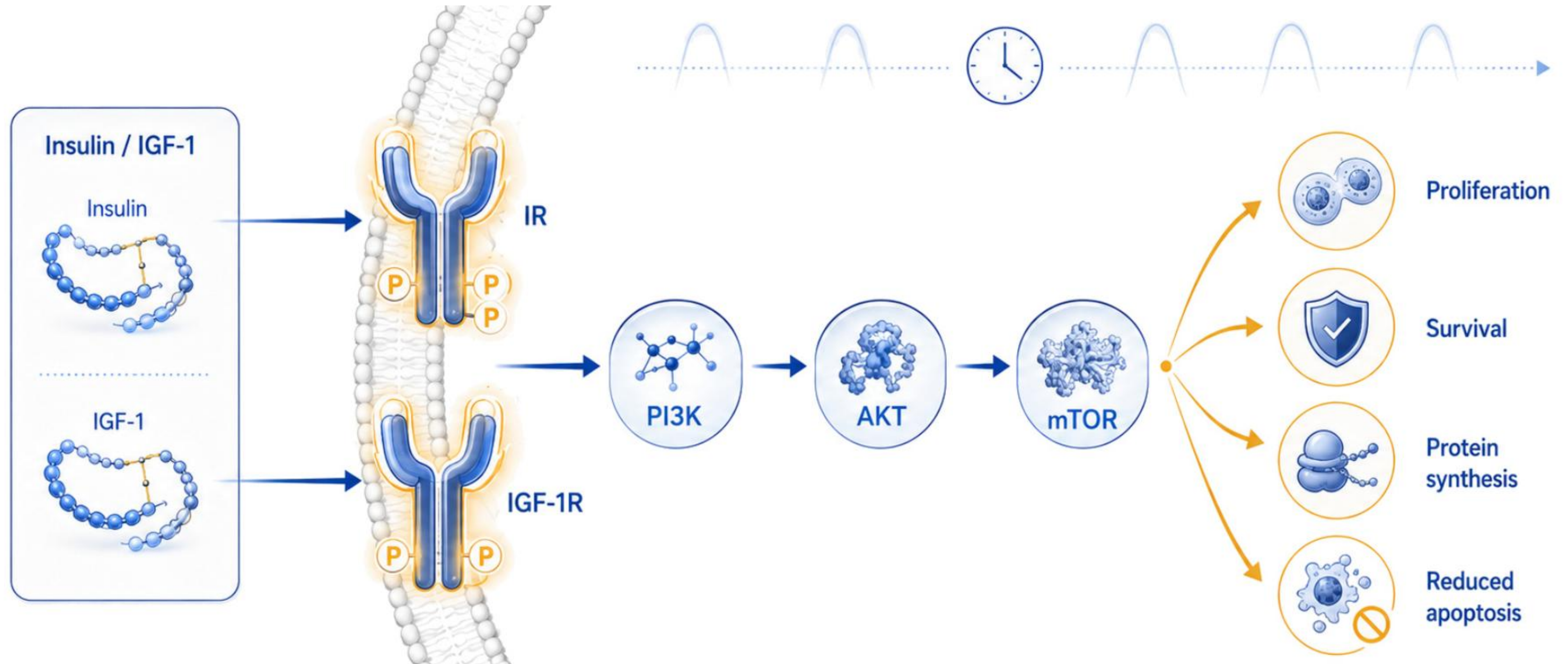
Stress Physiology and Immune Modulation

The body loses rhythm — and with it, regulatory capacity



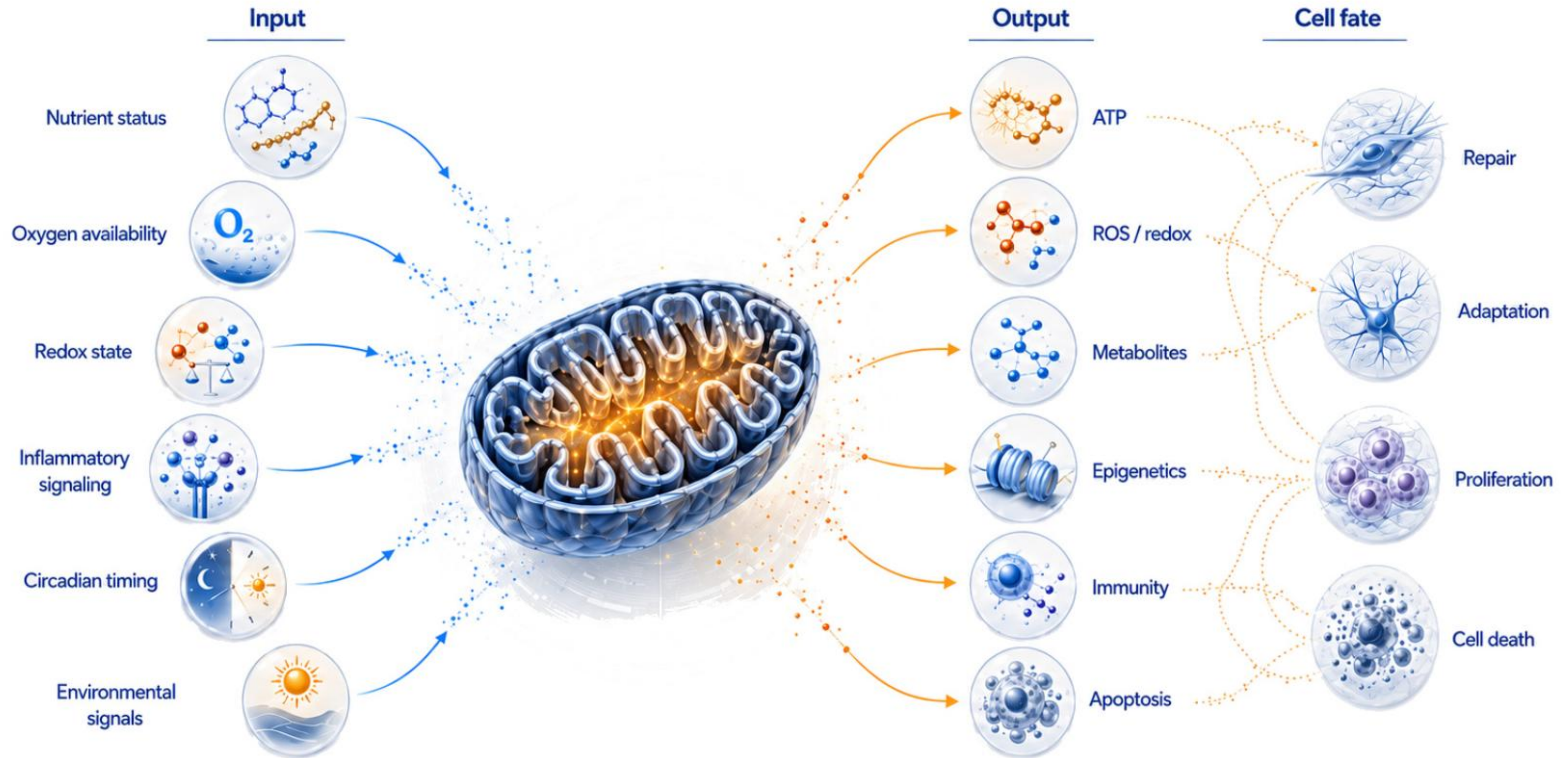
Insulin Signaling and Proliferative Pathways

Insulin is not only a glucose hormone — it is a growth signal



Mitochondria as Bioenergetic Decision Hubs

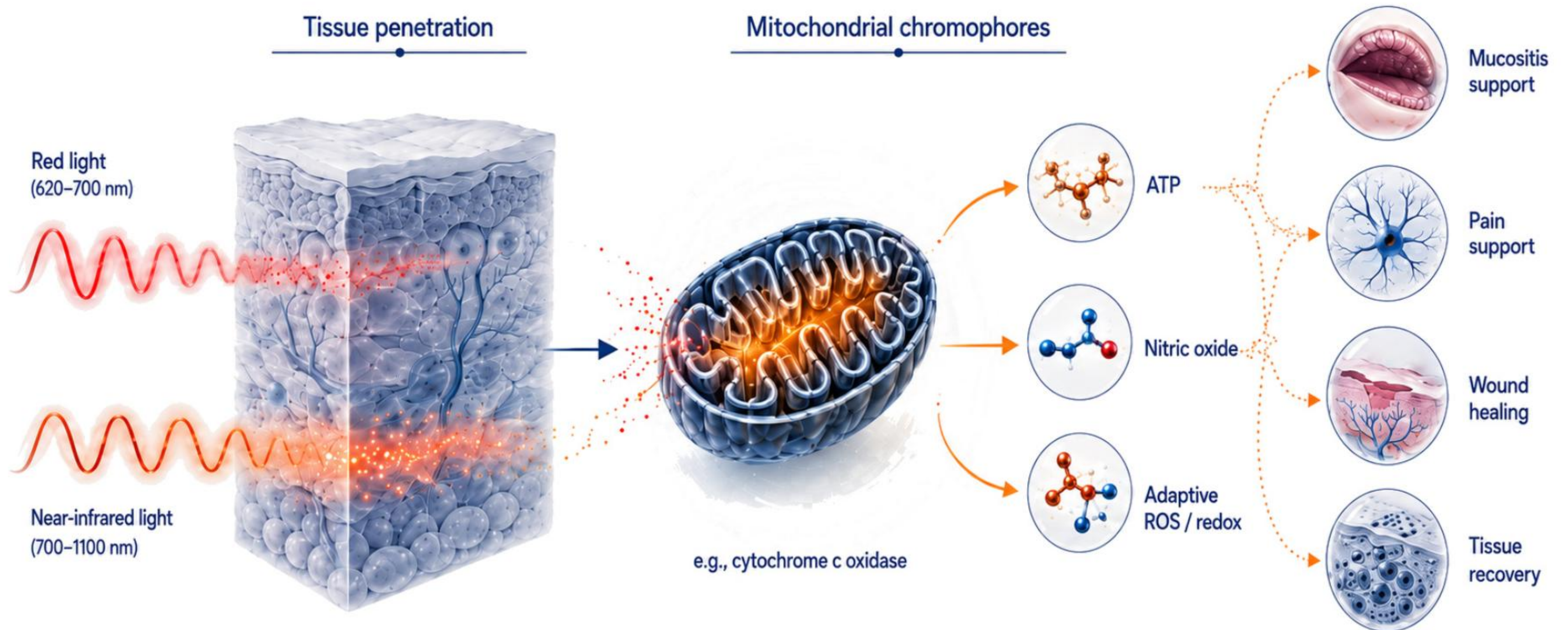
Impaired bioenergetics is disordered signaling



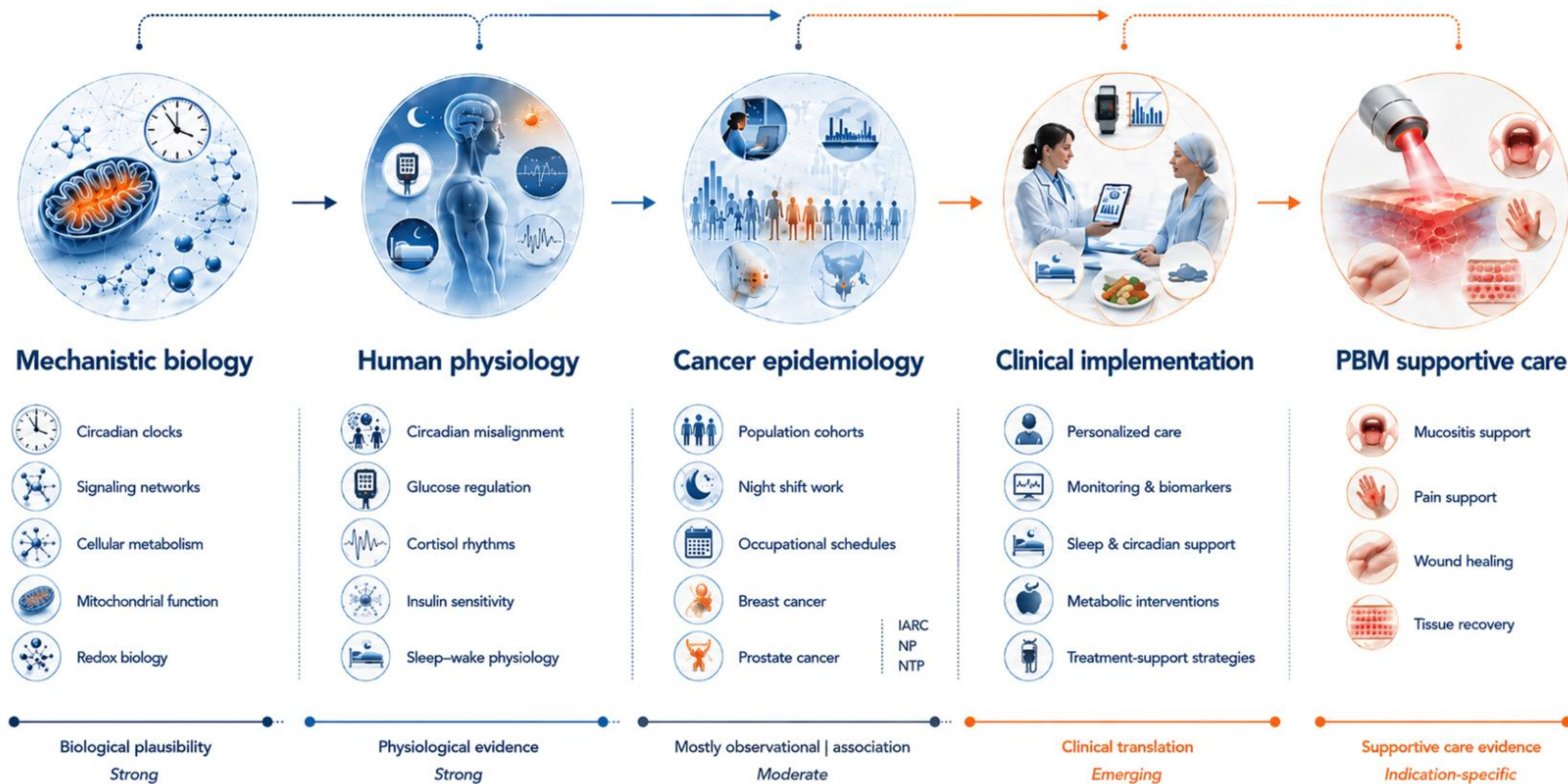
Near-Infrared Light, Mitochondria and Supportive Photobiology

NIR bridges sunlight biology and clinical photobiomodulation

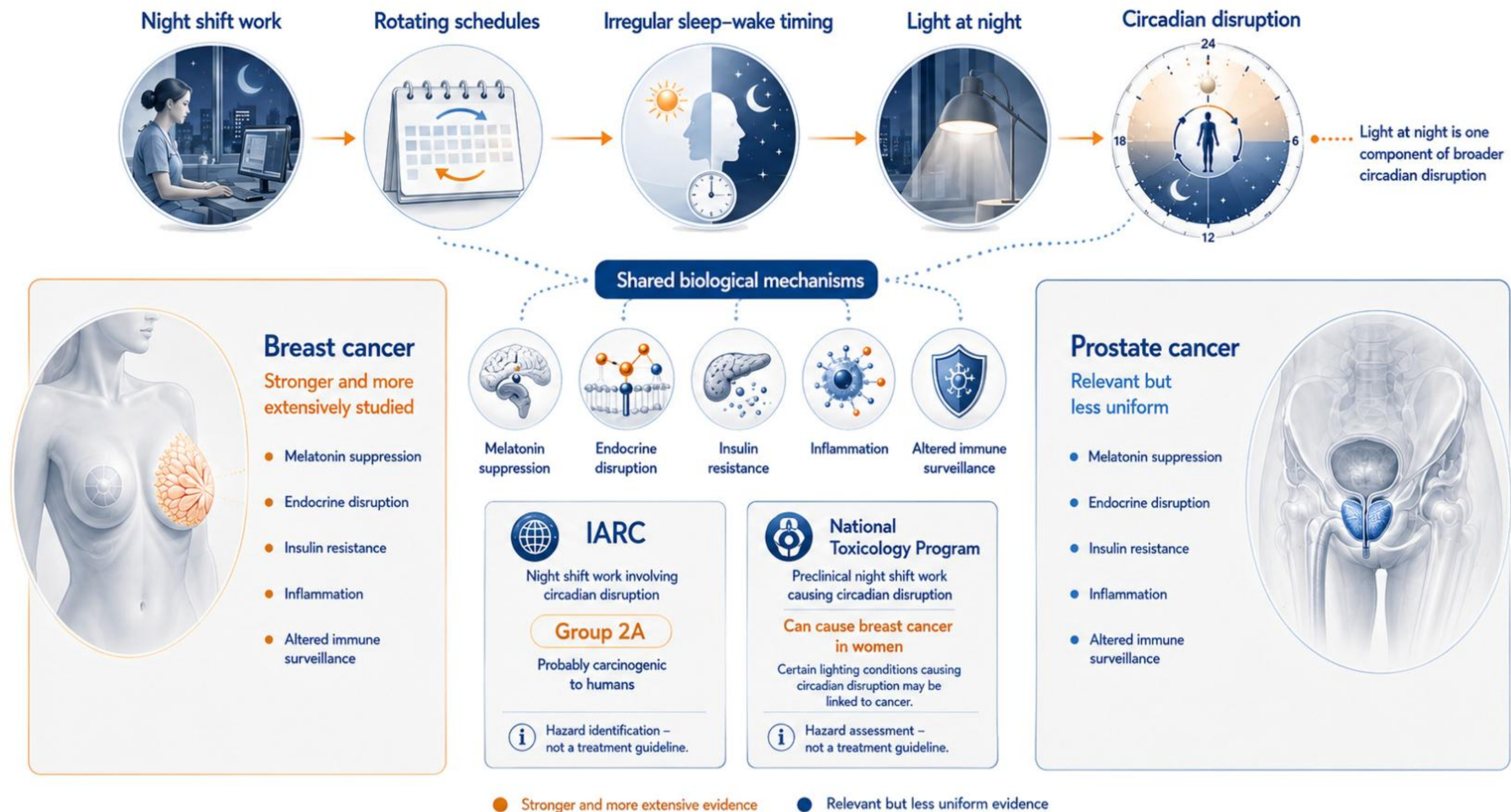
Supportive care, indication-specific



From Mechanism to Bedside: Levels of Evidence

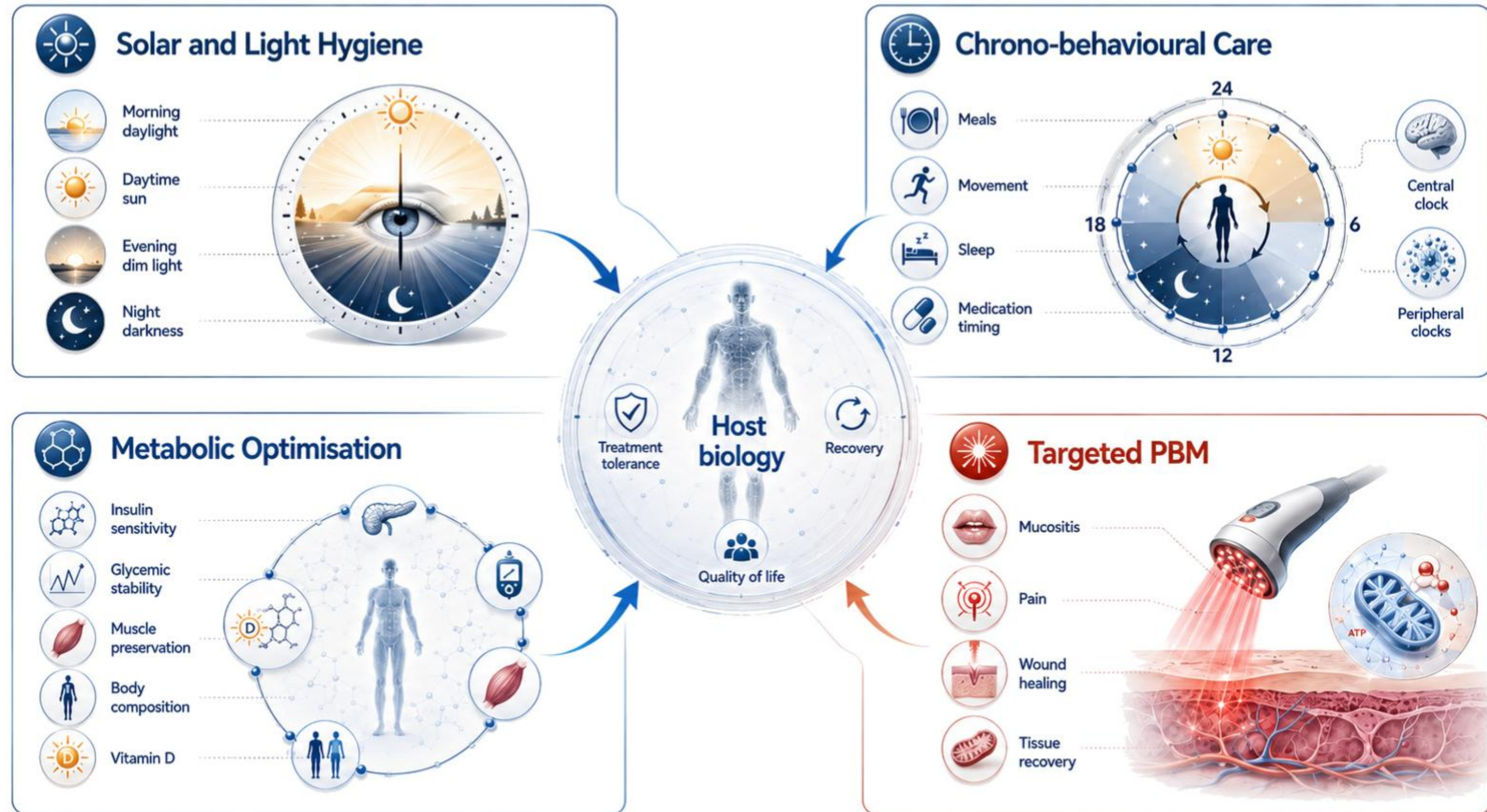


Circadian Disruption in Breast & Prostate Cancer: Human Evidence



The 4-Pillar Clinical Framework

Circadian and metabolic care: structured · measurable · clinically grounded



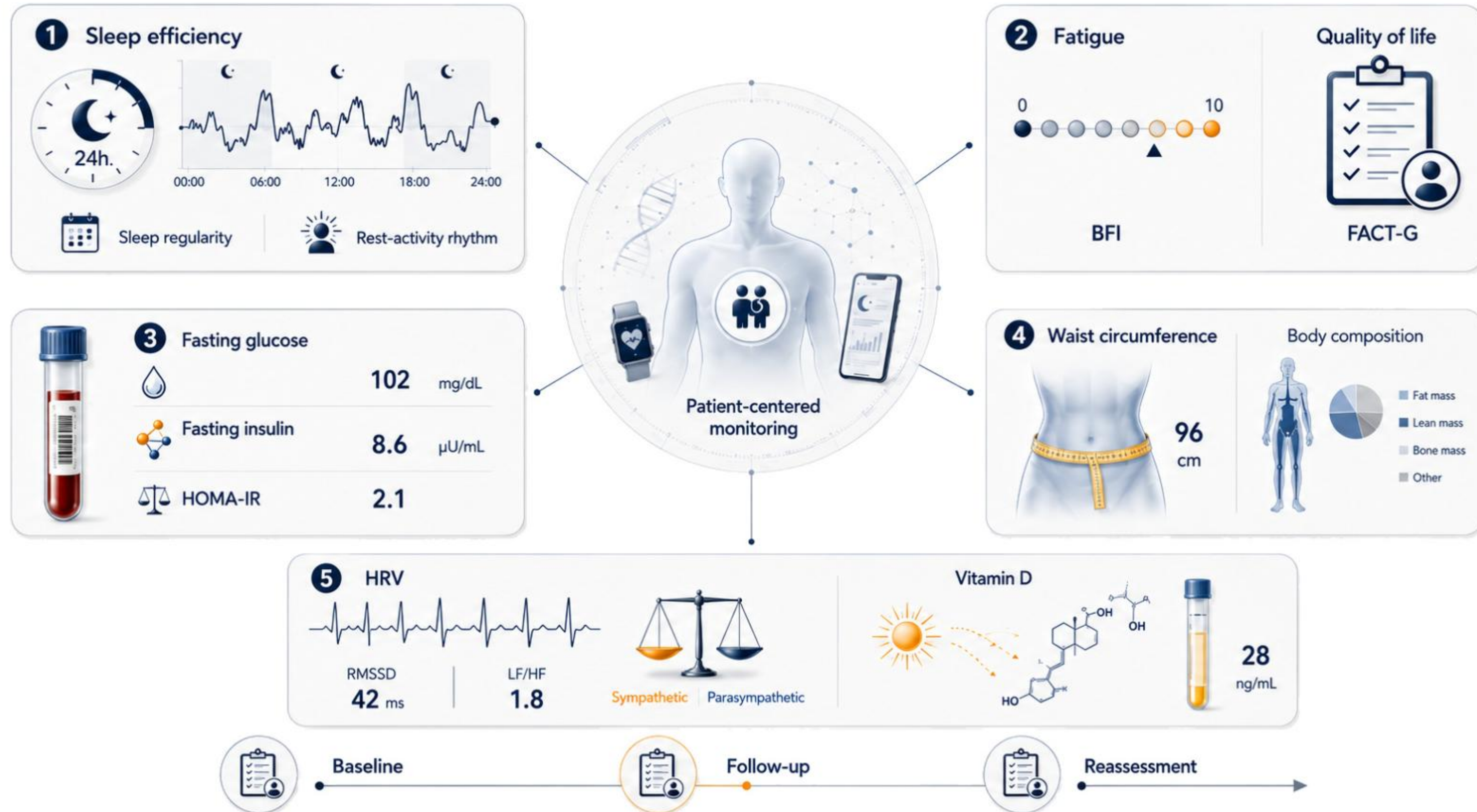
Clinical Implementation: A Daily Light and Timing Prescription

The first prescription is not a device. It is the sky



Clinical Metrics and Monitoring

If we can measure the terrain, we can personalize the intervention



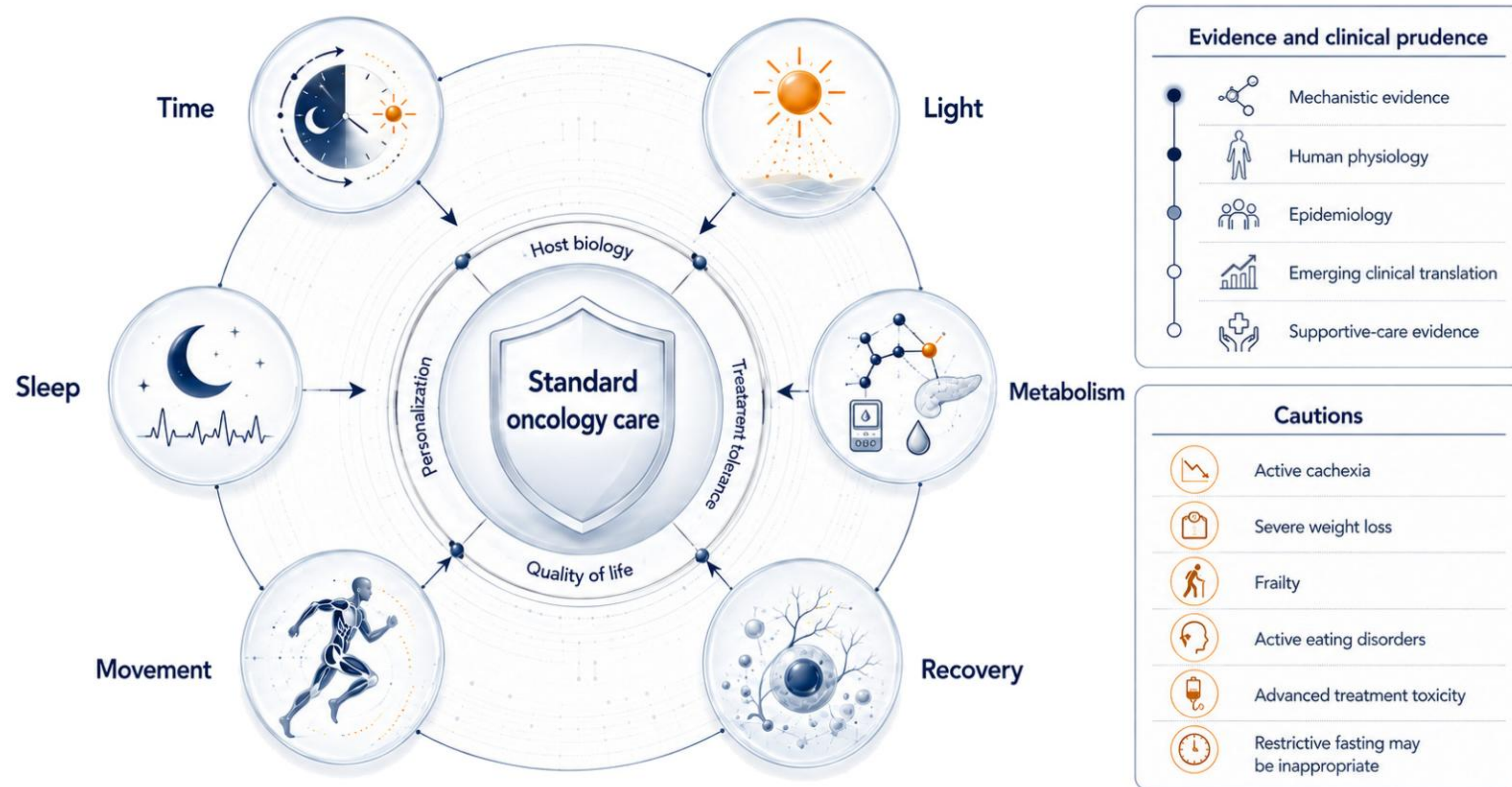
Illustrative Clinical Vignette: ER+ Breast Cancer



Illustrative Clinical Vignette: High-Risk Prostate Cancer



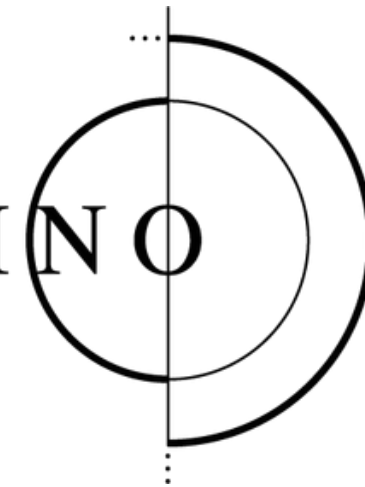
Integration, Limitations, and Clinical Perspective



Thank you!

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