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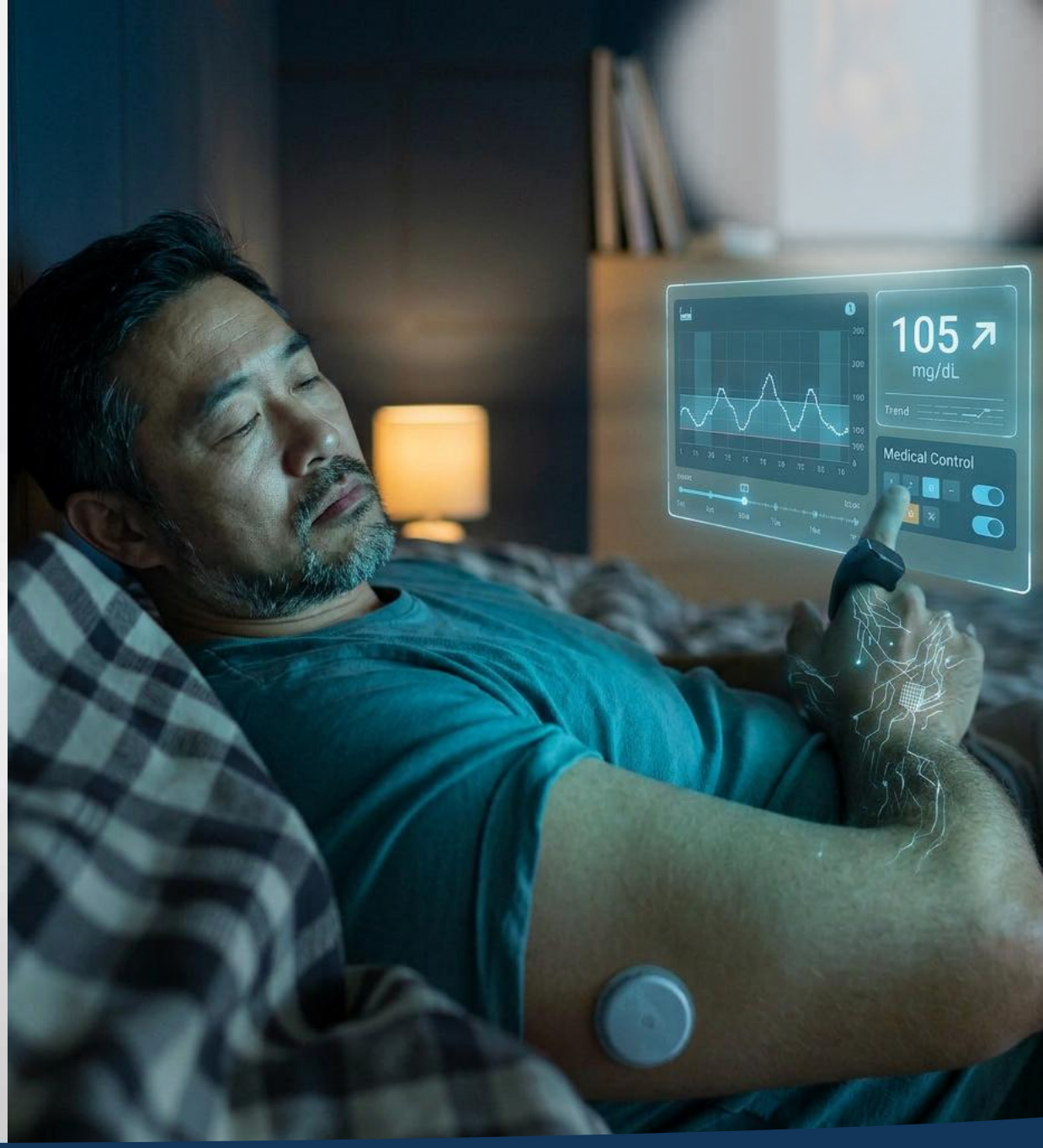
Hospital Authority Convention 2026

INSOMNIA and COMISA Drive Hidden Nocturnal Glycemic Variability in Well-Controlled TYPE 2 DIABETES –

Insights from Multi-Night Sleep and CGM Monitoring



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OBSTRUCTIVE SLEEP APNEA (OSA) in T2DM

- Exceeded 50% globally *(Reutrakul et al. Chest 2017)*
- Estimated 17.5% in Chinese diabetic patients *(Lam et al. Chest 2010)*
- 30-60 aged Chinese subjects with OSA have 5-fold risk of metabolic syndrome. *(Lam et al. Respir Med 2006)*

INSOMNIA in T2DM

- Estimates for clinical insomnia (ISI>14) 9.1% among aged 60+T2DM in the HK Diabetes Register
- Insomnia is an independent risk factor for chronic cognitive impairment, nearly tripling the risk of developing dementia *(O et al. J Diabetes Complications 2023)*

COMISA in T2DM

- Prevalence is roughly 41%
- Associated with higher cardiovascular risk *(Hein et. al. Sleep Sci 2022)*

Unmet Need:
Scarce PSG resources; lack of objective, multi-night sleep tracking; insensitive questionnaires → underdiagnosis and delayed treatment

BI-DIRECTIONAL RELATIONSHIP

Sleep disturbance and Glycemic Variability (GV) in T2DM

Vicious cycle → synergistic health risks

Sleep Disturbance

- Intermittent nocturnal hypoxia
- Sleep fragmentation/deprivation
- Sympathetic activation
- Oxidative stress
- Systemic inflammation
- Insulin resistance

Diabetes complications

- Obesity
- Autonomic dysfunction
- Systemic inflammation
- Neuropathic pain
- Psychological stress
- High/low blood glucose levels

Healthcare Burden:
↑ hospitalization and premature mortality

Treatment Options:

Insomnia

- CBTi reduces HbA1c 0.43% at 12 months

OSA

- 12 weeks CPAP treatment improved glycemic control

Zhang HZ et al. World J Diabetes 2021;
Chasens et al. Endocr Pract. April 2022

Punjabi et al. Am J Respir Crit Care Med 2002; Kantroo et al. Apollo medicine 2025; LeBlanc et al. BMJ Open Diabetes Care Res Care 2018; Vgontzas et al. diabetes Care 2009

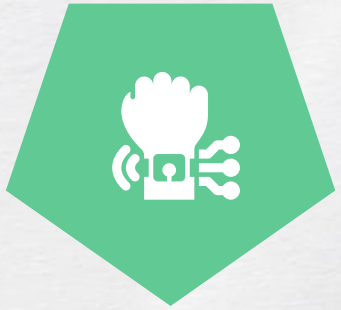
WHAT IS LACKING ?

in Well-Controlled, Chinese Diabetics

LOW EFFICIENCY

Underdiagnosis of OSA, Insomnia and COMISA

Lack of objective, home-based tracking for insomnia symptoms



HIGH DEMAND

LIMITED SELF-HEALTH MANAGEMENT

Absence of evidence-based, self-monitoring devices to engage patients in lifestyle modifications

AIM

This study evaluated whether **insomnia**, **OSA**, **and their co-occurrence (COMISA)** have distinct **nocturnal GV profiles** in a real-world cohort of well-controlled, Chinese, Type 2 Diabetics

METHODOLOGY

Analysis focus | Group comparisons | Nightly GV endpoints | SLP-CV / CONGA | Repeated-night GLMM

1 Recruitment

Screening in T2DM Outpatient Clinic:
(excluded known OSA)

i) ISI≥8 OR
ii) STOP-Bang≥3 & ESS ≥ 9

2 Baseline

Blood Testing

i) HbA1c
ii) fasting glucose

3 Monitoring

14-day paired Monitoring

i) Belun Ring
ii) FreeStyle Libre 2

4 Analysis

Sleep Phenotype
HRV Metrics

CGM metrics

COMISA
Insomnia
OSA

SLP-CV[1]
CONGA-1[2]
Nocturnal GV

Synchronized tracking of sleep and CGM metrics empowers healthcare professionals and patients to track their dynamic metabolic improvement upon personalized strategies for sleep interventions.

1: sleep-time glycemic coefficient of variance (SLP-CV) 2: sleep-time continuous overall net glycemic action (CONGA-1)

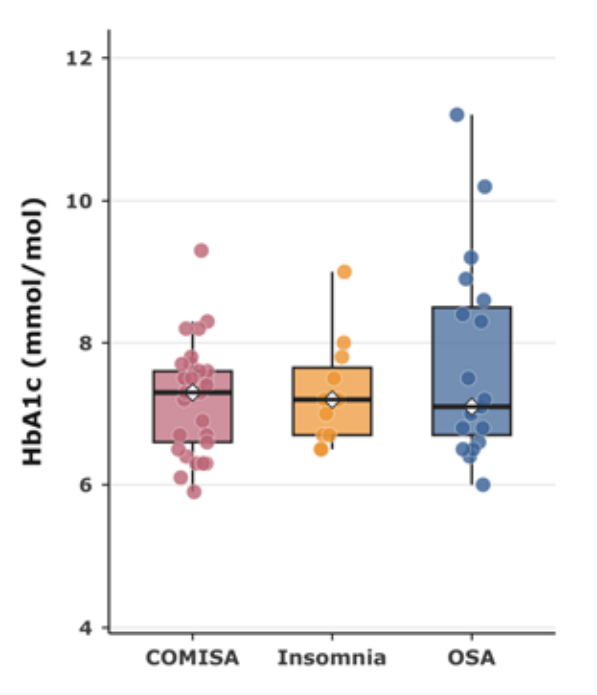
RESULTS - Demographics

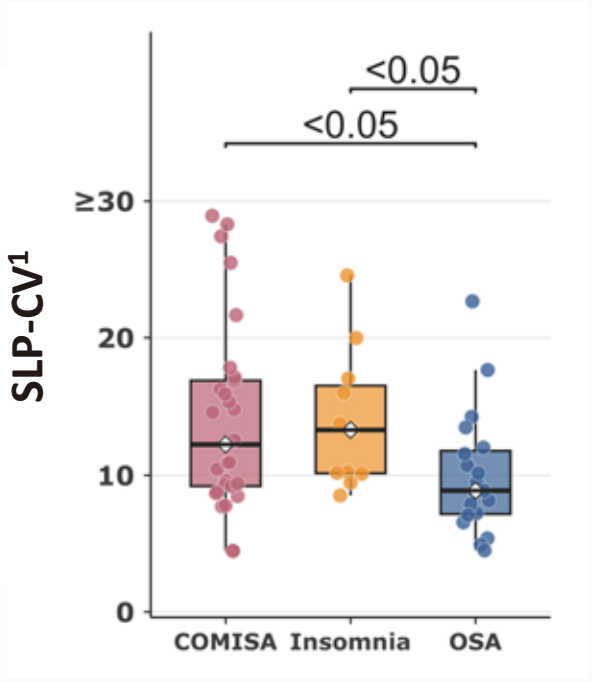
Among 59 subjects with suspected sleep disorders,

- 100% have diagnosed either with OSA, Insomnia or COMISA.
- Almost half (49%) of the subjects are diagnosed with COMISA.

Parameter	All	COMISA	Insomnia	OSA	P-value
Subject (%)	59 (100%)	29 (49%)	11 (19%)	19 (32%)	–
Sex (%) Male Female	 29 (49%) 30 (51%)	 14 (24%) 15 (25%)	 5 (8%) 6 (10%)	 10 (17%) 9 (15%)	0.83[a]
Age (y)	62.0 (55.0–67.0)	64.0 (61.0–68.0)	66.0 (62.0–68.5)	53.0 (48.5–57.5)	**<0.001[b]**
BMI (kg/m^2)	26.0 (22.7–29.5)	26.0 (24.1–30.0)	21.9 (20.6–28.8)	26.0 (23.4–28.2)	0.50[b]
HbA1c (mmol/mol)	7.2 (6.7–7.8)	7.3 (6.6–7.6)	7.2 (6.7–7.7)	7.1 (6.7–8.5)	0.81[b]
FBG (mmol/L)	6.8 (5.6–7.8)	6.8 (5.5–7.9)	7.2 (6.3–7.9)	6.6 (5.7–7.6)	0.72[b]
Tested Night	14.0 (12.9–15.0)	14.0 (11.0–15.0)	14.0 (13.0–14.0)	14.0 (12.5–17.5)	0.35[b]

Higher variability of nocturnal GV in diabetics with insomnia complaints *with comparable HbA1c.*

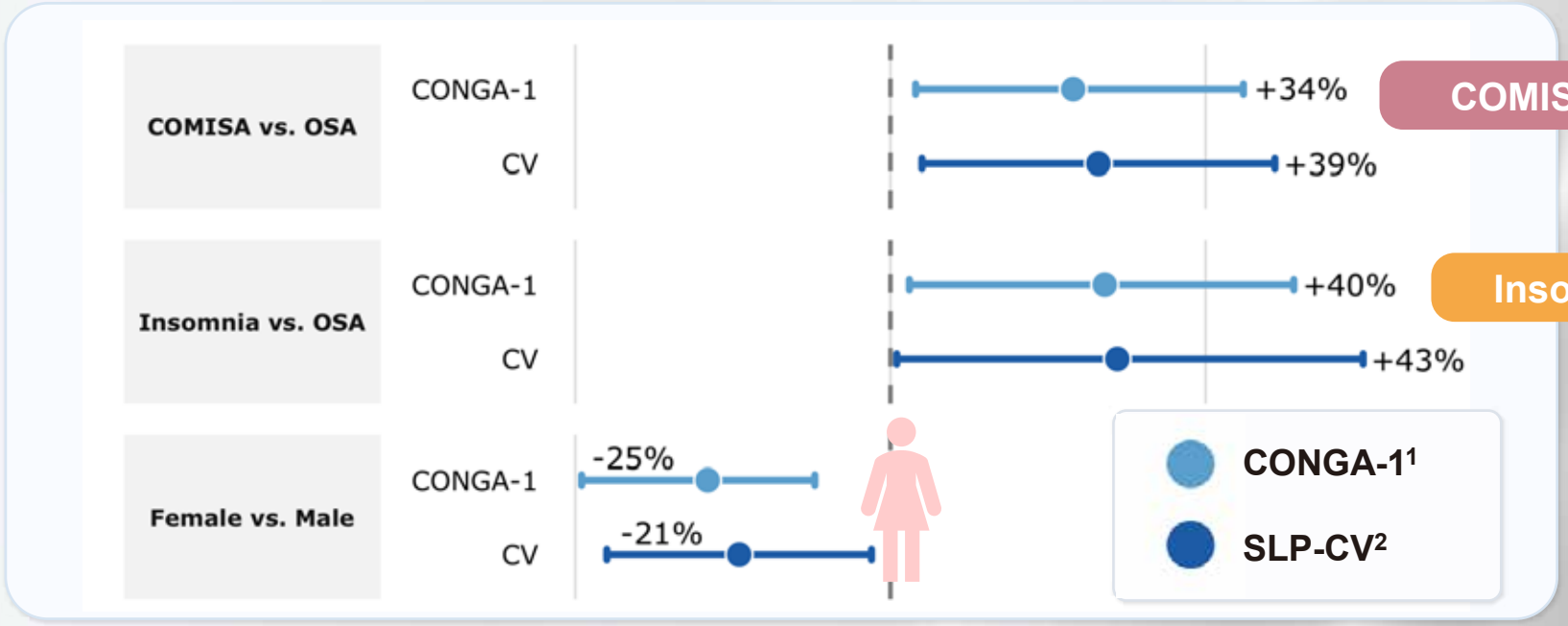




COMISA
Insomnia
OSA

1 : sleep-time glycemic coefficient of variance (SLP-CV)

- More than 34% higher in SLP-CV and CONGA-1 in diabetics with insomnia complaints (Both insomnia and COMISA).
- Women demonstrated as contributor to lower SLP-CV and CONGA-1.



OSA and male were treated as reference groups in the models using Forrest plot.

Synchronized sleep and CGM tracking helps clinicians create comprehensive metabolic profiles.

Workflow Impact & Value

IMPROVE EFFICIENCY

- Ensure proper sleep disorder screening for at-risk diabetic patients.
- Accelerate diagnosis and reduce wait times using **AI** *(e.g., Belun Ring, CGM).*

ADDRESS DEMAND VIA TECH

- Enable objective, multi-night sleep tracking in real-world settings.
- Drive personalized treatment and long-term monitoring by linking sleep phenotypes with demographics

SELF-HEALTH MANAGEMENT

- Empower immediate lifestyle modifications through real-time tracking.
- Facilitate agile treatment adjustments using objective glycemic and sleep metrics.

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Potential benefits:

- Faster diagnosis (OSA, insomnia, COMISA)
- Personalized interventions
- Streamlined remote monitoring
- ↓ Complications
- ↓ T2DM Healthcare burdens

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THANK YOU!

Wishing everyone a better sleep and metabolic health