

Halvo.

Drink coffee. Sleep anyway.

An iPhone and Apple Watch app that models the course of caffeine in the body with real pharmacokinetics — and names the point after which the next cup starts costing you sleep.

CATEGORY

Health & Fitness · Sleep

PLATFORM

iPhone · Apple Watch · Widget

DEVELOPER

Jan Mölleken · Indie, Germany

AS OF

September 2026 · Version 1.1

THE SHORT VERSION

The last coffee decides the night.

Only hardly anyone knows when that last coffee was — or how much of it is still working at bedtime.

Halvo shows how much caffeine is active in the body right now, predicts the level at bedtime and names the personal **cut-off**: the point after which the next cup starts costing sleep.

Most caffeine apps count milligrams or work from rules of thumb. Halvo uses the **Bateman equation** with separate absorption and elimination phases, as in clinical pharmacology. The Pro version learns the **individual half-life** from the sleep data of an Apple Watch, Oura, Whoop or Garmin — a value that ranges between 1.5 and 9.5 hours in the literature.

The most unusual part is a refusal: if the signal in the data is too weak, Halvo does **not** claim to be calibrated. The app says plainly “no measurable effect” and carries on with the population value.

All calculations run on the device. Halvo is not a medical device.

1,5–9,5 h

SPREAD OF CAFFEINE HALF-LIFE BETWEEN PEOPLE

Which is why one blanket cut-off for everyone is worthless — and a learned one is the actual heart of the product.

8,8 h

GAP FROM COFFEE TO BED SUGGESTED BY THE META-ANALYSIS

For an ordinary cup (~107 mg). Almost nobody keeps to it — most people have never heard the figure.

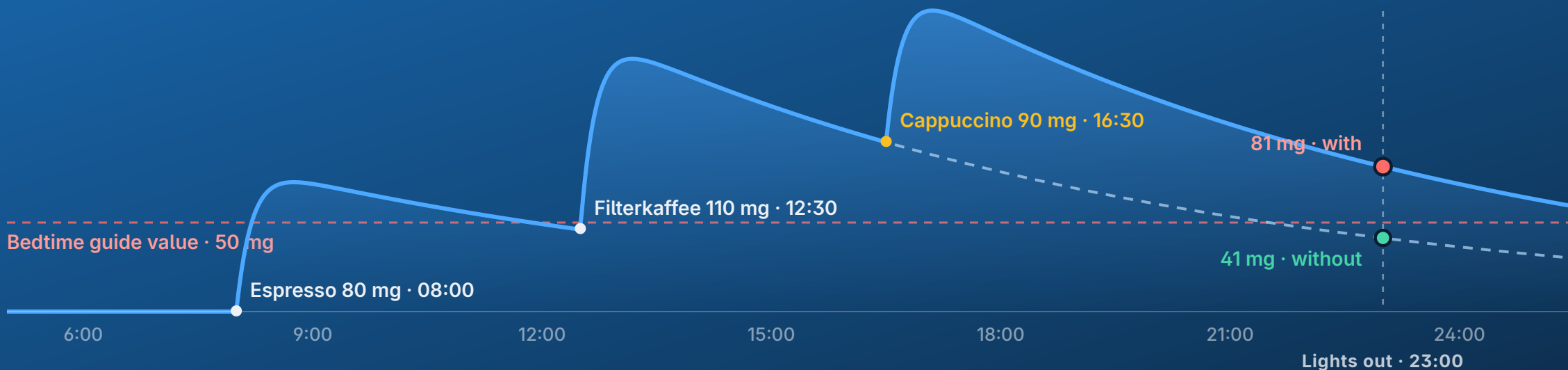
62 %

APPLE WATCH DEEP-SLEEP HIT RATE

The strongest biological caffeine marker is the one the sensor measures worst. So Halvo weights the others.

A cappuccino at half past four doubles what is still working at bedtime.

The same day, once with and once without the cup at 16:30 — 81 milligrams at bedtime instead of 41.



Rise, peak, decay

Halvo models absorption and elimination separately, instead of using a rule of thumb.

The threshold is personal

50 mg is an example. Where your own threshold sits depends on half-life *and* sensitivity.

This becomes the cut-off

Worked backwards, it yields the one time of day that actually matters.

The effects are real — but smaller and stranger than you would think.

8,8 h

RECOMMENDED GAP BEFORE BED

A meta-analysis across some 24 studies: caffeine lengthens the time to fall asleep, shortens total sleep by about **35 minutes** and reduces sleep efficiency by **4.7 %**. The authors derive a practical rule: an ordinary cup (~107 mg) should come at least 8.8 hours before bed, a pre-workout serving (~217 mg) around 13 hours.

Gardiner et al. (2023) · Sleep Medicine Reviews · *The effect of caffeine on subsequent sleep: a systematic review and meta-analysis*

-51 min

TOTAL SLEEP AT 400 MG, 4 H BEFORE BED

An EEG-controlled crossover with **100 vs. 400 mg** at 12, 8 and 4 hours before bed. The result for the smaller dose is the striking one: **100 mg showed no significant effect at any timing**. 400 mg four hours before bed cost 30 minutes of deep sleep, 26 minutes more time awake and 51 minutes of total sleep.

SLEEP (2024) · Oxford Academic · *Dose and timing effects of caffeine on subsequent sleep*

200 mg

ARE ENOUGH FOR MEASURABLE EFFECTS

Two evening espressos are enough: 200 mg lengthen the time to fall asleep and measurably reduce sleep efficiency, sleep duration and deep sleep. The authors report that **even 200 mg six hours before bed** can cut total sleep by more than an hour — without the sleeper necessarily noticing.

Drapeau & Robillard et al. (2006) · Journal of Sleep Research · *Effects of 200 mg of caffeine in the evening*

Two people, the same cup, two completely different nights.

956

PEOPLE, ALL MEASURED IN A SLEEP LAB

22 controlled crossover studies, all with polysomnography: **-34.7 min** total sleep, **-4.7 %** sleep efficiency, **+8.4 min** sleep-onset latency. Important for how this is communicated: the meta-regression found **no clean linear dose effect** — even low doses hit sleep duration and efficiency. A hard milligram threshold would be scientifically wrong.

Chang et al. (2025) · Sleep Medicine · Age- and dose-specific effects of caffeine on sleep

485.511

PARTICIPANTS, CAUSAL ANALYSIS

Mendelian randomisation on the UK Biobank plus a sleep-lab cohort — a **causal** method, not mere correlation. Result: from roughly **four caffeinated drinks a day** total sleep gets shorter, independently of the timing of any single evening dose. So the plain daily amount counts alongside the timing.

Stucky et al. (2025) · Journal of Psychopharmacology · Community-based causal evidence that high habitual caffeine consumption alters sleep

1,5–9,5 h

INDIVIDUAL HALF-LIFE

Clearance runs through the enzyme CYP1A2 and varies enormously: **smoking halves** the half-life, oral contraceptives **double** it. And clearance is not the same as sensitivity: the adenosine receptor **ADORA2A** decides, independently, how much a given concentration disturbs sleep at all.

CYP1A2 review · PMC11555877 · ADORA2A · Genes (2019), MDPI · rs5751876 and caffeine-induced sleep disturbance

THE ANGLE

Sleep apps lean on exactly the value that wearables measure worst.

Deep sleep is the strongest biological caffeine marker — and at the same time the least reliable sensor value. The Apple Watch recognises it about **62 %** of the time and underestimates it by **43 minutes** on average.

What wearables do capture reliably is time awake at night and, where the device provides it, how long it took to fall asleep — and those markers respond to caffeine as well. So Halvo weights them deliberately rather than deep sleep. A large part of what other apps read as “disturbed deep sleep” is **measurement noise, not biology**.

Sources: Apple, *Estimating Sleep Stages from Apple Watch* (Oct. 2025) · validation studies, SLEEP Advances (2025) and JMIR mHealth (2023)

APPLE WATCH HIT RATE AGAINST THE SLEEP LAB

Deep-sleep detection 62 %



underestimated by ~43 min · mistaken for “core” 38 % of the time

Sleep/wake detection 86–89 %



stable across devices — Apple, Garmin, Oura, Whoop

Sleep-stage classification 50–61 %



the reason stage charts should be read with caution

“Measure the right things —
not the convenient ones.”

THE APP

How much caffeine is working in you right now?

One look at the home screen answers the question every coffee drinker asks themselves in the afternoon.

The level, right now

Not the amount you drank, but the amount that is working — on a real concentration curve with rise, peak and decay.

The value at bedtime

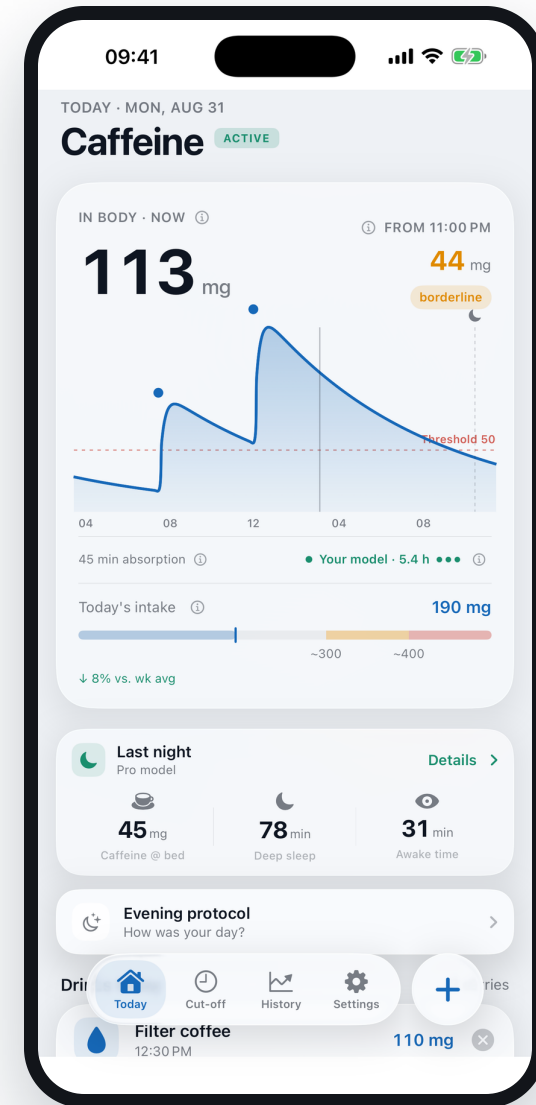
Halvo predicts how much will still be active at bedtime and grades it: fine, borderline, too high.

Logged in seconds

Coffee, espresso, tea, energy drinks, cola, mate or your own pre-workout in a few taps — straight from the widget too.

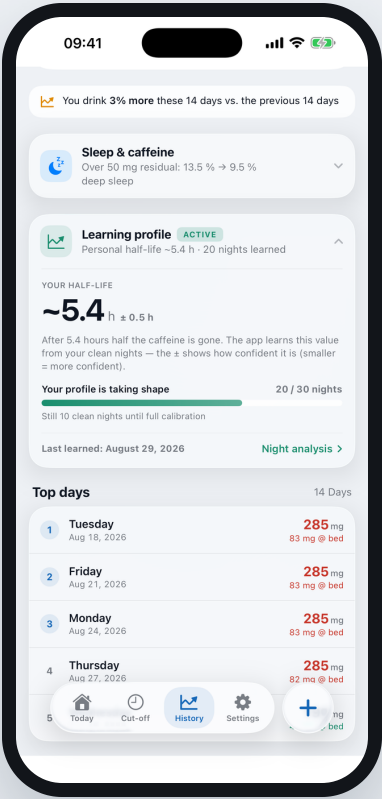
The daily total in view

A soft band rather than a hard limit, grounded in the EFSA figure and the research on habitual intake.



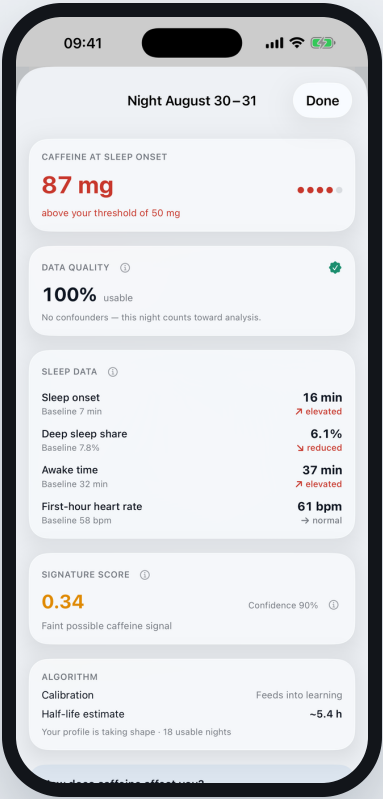
AT A GLANCE

Four views, one idea.



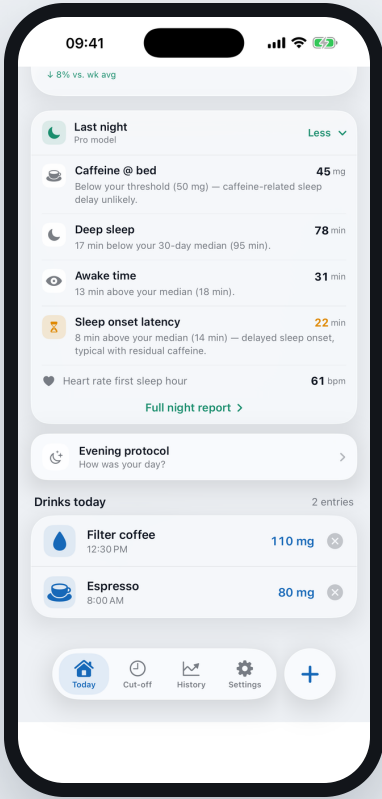
Learning profile

The personal half-life, learned from clean nights — with an uncertainty figure.



Night report

Caffeine at bedtime, data quality and sleep values — including confidence.



Sleep analysis

Every value against the personal 30-day median, explained in plain words.



Widget & Watch

Level and cut-off without opening the app — automatic “lights out” in the evening.

Five points where Halvo deliberately chose differently.

01 Real pharmacokinetics, not a rule of thumb

The Bateman equation with separate absorption and elimination phases, as in clinical pharmacology. The name nods to the half-life — the heart of the model.

03 A controlled experiment, built in

Optional test nights walk you through an N-of-1 crossover: a defined dose at a defined time, paired against normal nights. The same method medicine treats as the strongest evidence for an individual.

05 On the device, with no health claims

Health data is read only where access is granted, and processed locally. Nothing is shared or sold. Halvo positions itself as an information product, not a medical one.

02 Honest when the data gives nothing

If the signal is too weak, the app says “no measurable effect” and carries on with the population value, instead of claiming a precision it does not have. The rarest thing in this category.

04 The right markers, not the convenient ones

Weighted towards waking periods, heart rate and, where available, sleep-onset latency — caffeine-sensitive *and* reliably measured. Plus HRV, which most caffeine apps ignore entirely.

**“Other apps detect your half-life after three nights.
We wait for a real signal.”**

The essentials at a glance.

App name	Halvo: Caffeine Tracker · <i>Halvo: Koffein-Tracker</i> (DE)
Category	Health & Fitness · Sleep · Quantified Self
Platforms	iPhone, Apple Watch with complication, home-screen widget
Languages	English and German · metric and imperial units
Availability	worldwide on the App Store
Released	10 July 2026 · current version 1.1 with widget
Wearables	Apple Watch, Oura, Whoop, Garmin — via Apple Health, never directly
Privacy	processed on the device · never shared, never sold
Developer	Jan Mölleken · indie / solo · City · Germany
Website	halvo.jnmcloud.de
App Store	apps.apple.com/app/id6775926229

PRICING

Basic Logging, curve, cut-off, widget	free
Pro · monthly	3,99 €
Pro · yearly	24,99 €
Pro · lifetime one-off, no subscription	49,99 €

WHAT PRO ADDS

The personal learning model for your own half-life, the nightly sleep analysis, guided test nights and the Apple Health connection. Basic stays usable with no time limit.

Payment through the Apple account. Subscriptions renew automatically unless cancelled at least 24 hours before the period ends. Prices may vary by region.

CONTACT & MATERIAL

Happy to say more — test access, figures, background.

I provide newsrooms with TestFlight access and will explain the methodology in as much depth as you want — including its limits.

PRESS CONTACT

Jan Mölleken

[insert press email](#)

PRESS MATERIAL

[link to asset folder](#) — icon, iPhone & Watch screenshots, demo video

WEBSITE

halvo.jnmcloud.de

BOILERPLATE — TO PASTE AT THE END OF ANY STORY

Halvo is an indie app for iPhone and Apple Watch that connects caffeine intake with sleep. It tracks how much caffeine is active in the body right now, predicts the level at bedtime and calculates the personal cut-off time. The model is built on established pharmacokinetics (the Bateman equation); the Pro version learns the individual half-life from the sleep data of an Apple Watch, Oura, Whoop or Garmin. All calculations run on the device. Halvo is not a medical device — it helps people make better-informed decisions about their caffeine. Built by Jan Mölleken in [City](#).

ANGLES FOR A STORY

Why caffeine apps manufacture false precision · What the research actually says about dose and timing · Why wearables measure deep sleep badly but sleep onset well · How a solo developer builds a scientifically grounded model