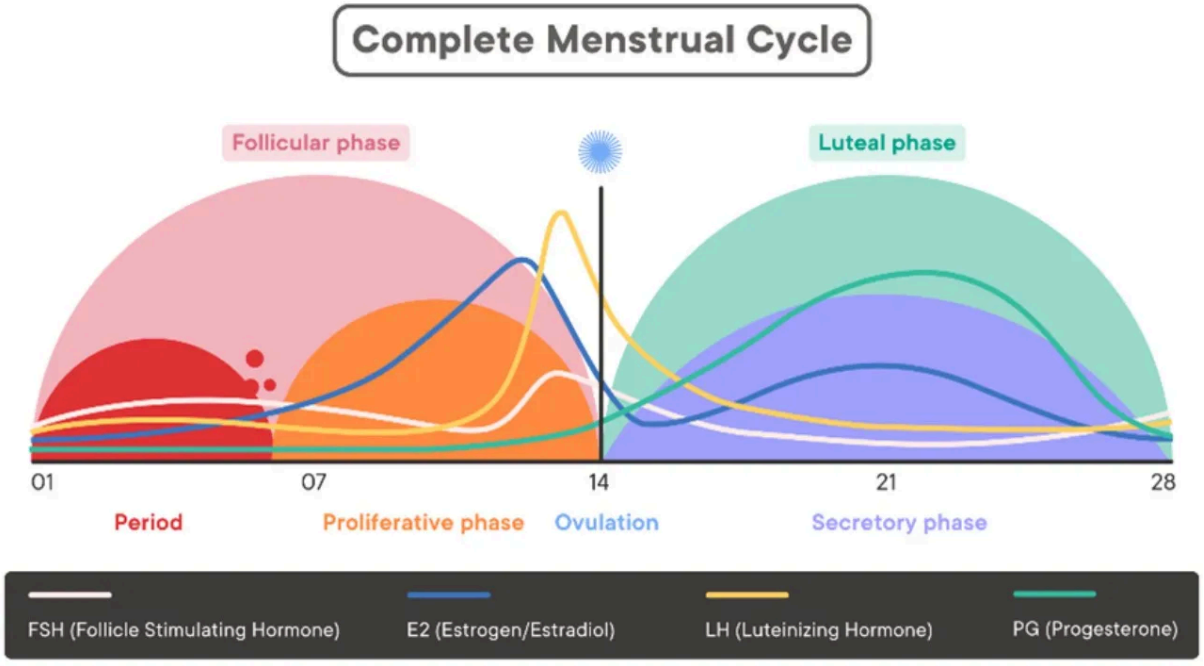
Menstrual Cycle: Basics 🩸

A menstrual cycle is measured from the first day of your period to the day before your next period.



The average length of a menstrual cycle is 28 days, but everyone's cycle is different. For example, teenagers might have cycles that last 45 days, whereas people in their 20s to 30s might have cycles that last 21 to 38 days.

NOTE: Cycle length and period length are 2 different things.

The menstrual cycle has 4 phases:

1. Menstrual Phase: This is when women have a period. The uterus lining sheds and flows out of the vagina. The period contains blood, mucus and some cells from the lining of the uterus. The average length of a period is 3 to 7 days.

2. Follicular phase: This phase starts on the first day of the period and lasts for 13 to 14 days. Changing hormone levels cause the lining of the uterus to thicken and follicles to grow on the surface of the ovaries. Usually only one follicle will mature into an egg.

3. Ovulation phase: This is when a mature egg is released from an ovary. This usually happens once a month, about 2 weeks before the next period. This is also the time when the chances of getting pregnant are the highest.

4. Luteal phase: In this phase, the egg travels through the fallopian tubes to the uterus. The uterus lining continues to thicken in preparation for pregnancy. In case one gets pregnant, they won't have a period, otherwise they will have a period and the menstrual cycle will start over again. (14 days)

Body Parameters and how they vary during a cycle 📊

FACTOR	MENSTRUAL PHASE	OVULATORY PHASE	LUTEAL PHASE
Core body temperature	Decreases	Starts to increase	Further increases and remains high till next period
HRV	Increases	Further increases	Decreases
Resting HR	Decreases	Inconclusive	Mild increase
HR	Decreases	Increases	Further increases
RR	Decreases	Further decreases	Mild increase
Skin perfusion	Higher	Lower	Inconclusive

MENSTRUAL PHASE:

Core body temperature, RHR and RR ⬇️

HR ⬇️ compared to other phases

HRV, Skin perfusion ⬆️

OVULATORY PHASE:

Core body temperature starts to ⬆️

HRV and HR further ⬆️

RR and skin perfusion ⬇️

RHR inconclusive

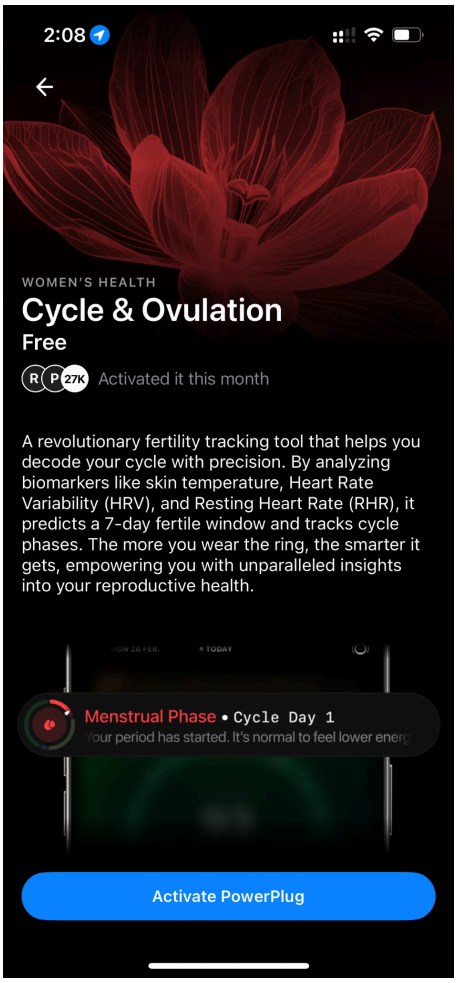
LUTEAL PHASE:

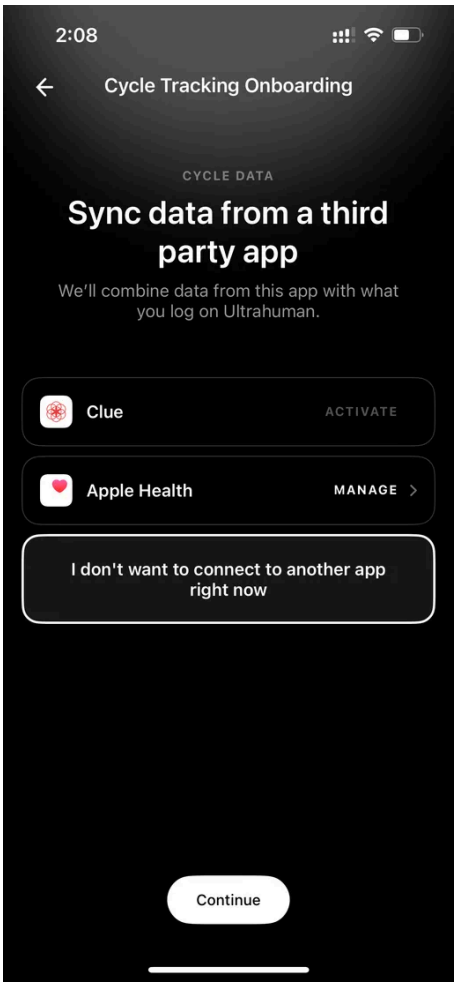
Core body temprature, RHR, HR and RR ⬆️

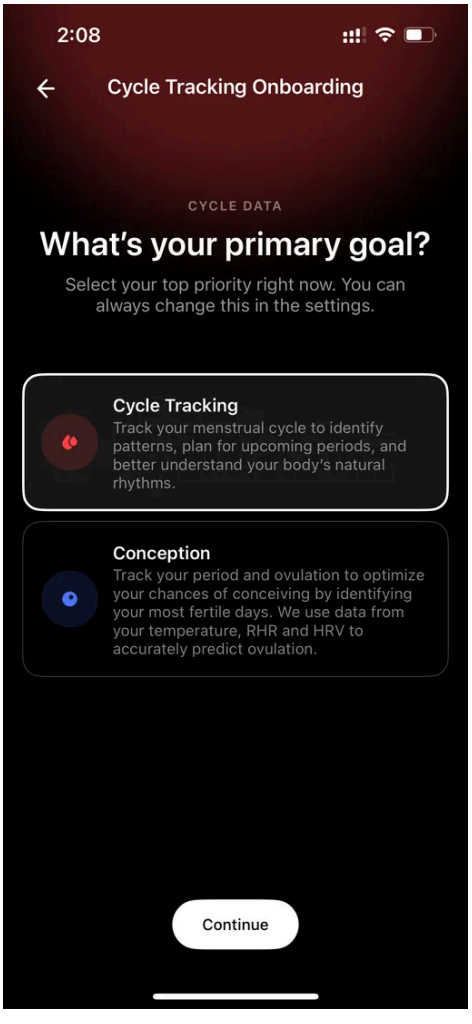
HRV ⬇️

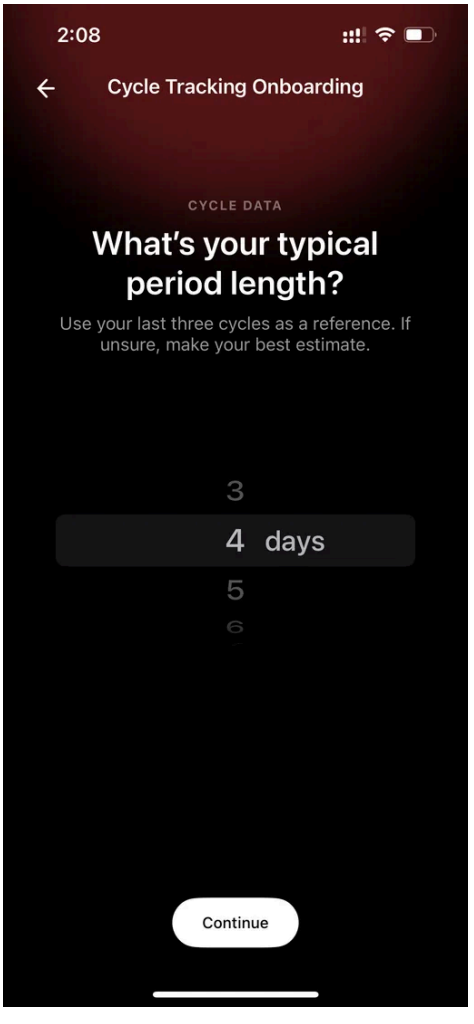
App Onboarding: 📱

Users are prompted to integrate and import their cycle data from a third party app (if any), input their primary goal for using this powerplug, period length, cycle regularity, cycle length, period dates, health conditions (if any) and any birth control used in the last 6 months.


2:08
WOMEN'S HEALTH
Cycle & Ovulation
Free
R P 27K Activated it this month
A revolutionary fertility tracking tool that helps you decode your cycle with precision. By analyzing biomarkers like skin temperature, Heart Rate Variability (HRV), and Resting Heart Rate (RHR), it predicts a 7-day fertile window and tracks cycle phases. The more you wear the ring, the smarter it gets, empowering you with unparalleled insights into your reproductive health.
Menstrual Phase • Cycle Day 1
Activate PowerPlug


2:08
Cycle Tracking Onboarding
CYCLE DATA
Sync data from a third party app
We'll combine data from this app with what you log on Ultrahuman.
Clue
ACTIVATE
Apple Health
MANAGE
I don't want to connect to another app right now
Continue


2:08
Cycle Tracking Onboarding
CYCLE DATA
What's your primary goal?
Select your top priority right now. You can always change this in the settings.
Cycle Tracking
Track your menstrual cycle to identify patterns, plan for upcoming periods, and better understand your body's natural rhythms.
Conception
Track your period and ovulation to optimize your chances of conceiving by identifying your most fertile days. We use data from your temperature, RHR and HRV to accurately predict ovulation.
Continue


2:08
Cycle Tracking Onboarding
CYCLE DATA
What's your typical period length?
Use your last three cycles as a reference. If unsure, make your best estimate.
3
4 days
5
Continue

Integrations 🔗

- We only import period start and end dates from the integrated apps.
- As soon as the user integrates the two apps, the data should sync immediately.
- For the users facing issues logging in their Clue app, flag the cases to Terra on this thread.
- Once the cycle data has been imported into UH from the integrated apps, further changes to the data on the third party app won't change the data in UH. Also, any changes made to the data by the user on UH won't be written back to the integrated app.

Cycle tracking: Tracking for basic cycle health

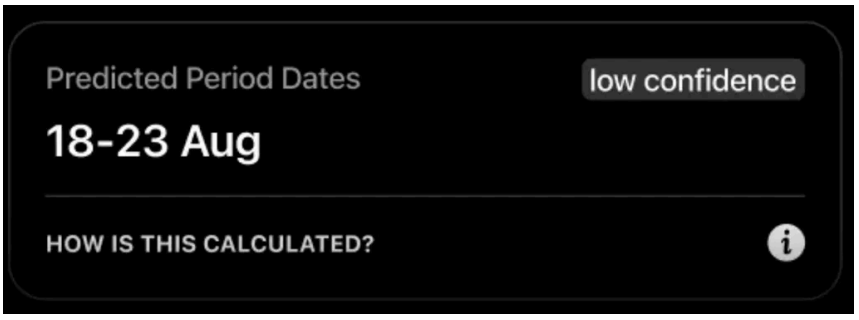
- Input parameters:
    1. `period_ranges`: A list of period ranges, each containing:
        - Start date of a period
        - End date of the same period
    2. `last_cycle_length`: Integer representing the length of the most recent cycle (for irregular cycles)
    3. `typical_cycle_length`: Integer representing the typical cycle length (for regular cycles)

- How algo works:

  Take last cycle_start_date > Add typical_cycle_length (for regular cycles) or last_cycle_length (for irregular cycles) to it > You get predicted_cycle_start_date of the next cycle > Take difference of last cycle_end_date and cycle_start_date to get cycle duration > Add to predicted_cycle_start_date to get predicted_cycle_end_date

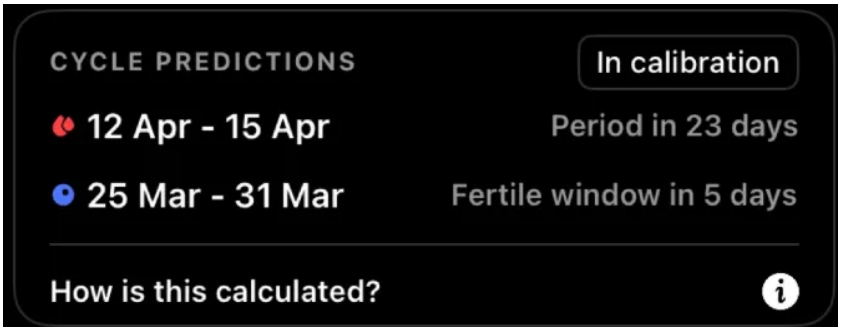
  NOTE: Current algo assumes future cycles will resemble past cycles and doesn't account for external factors that might affect the cycles (like stress, medication, health conditions, etc)

- At any given time, the user would have to be in one of the 6 states:
    1. Menstrual phase: When the user is in their logged menstrual stage (banner shows period start and calculated end dates)
    2. Follicular phase: The phase between menstrual and ovulation phases (banner shows next predicted period dates)
    3. Ovulation phase: When the user is in their ovulation phase (banner shows next predicted period dates)
    4. Luteal phase: Phase between ovulation and predicted menstrual phase dates (banner shows next predicted period dates)
    5. Predicted menstrual phase: Menstrual dates predicted by the algo (banner shows the current predicted dates)
    6. Unconfirmed phase: If user hasn't logged their periods even after 7 days have passed past the predicted menstrual phase dates (no banner shown)

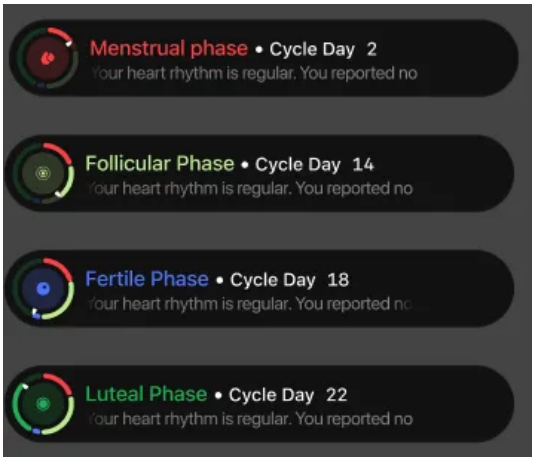


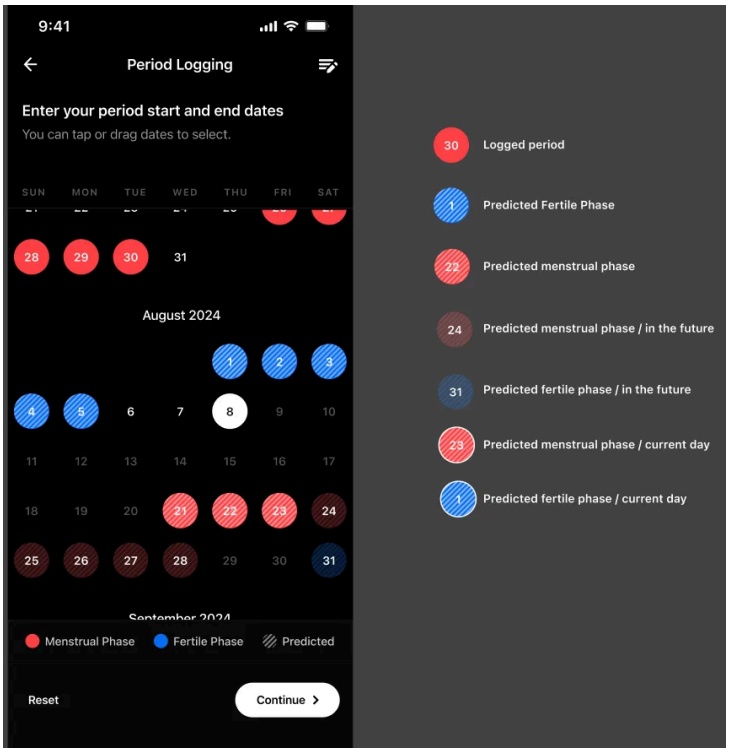
NOTE: At the moment there's a bug in the algo whereby the user's max cycle length gets capped to 30 days once they start using the PP. This isn't an issue for the regular cyclers but for irregular ones, this can result in app showing unconfirmed phase until they log in their next cycle dates.

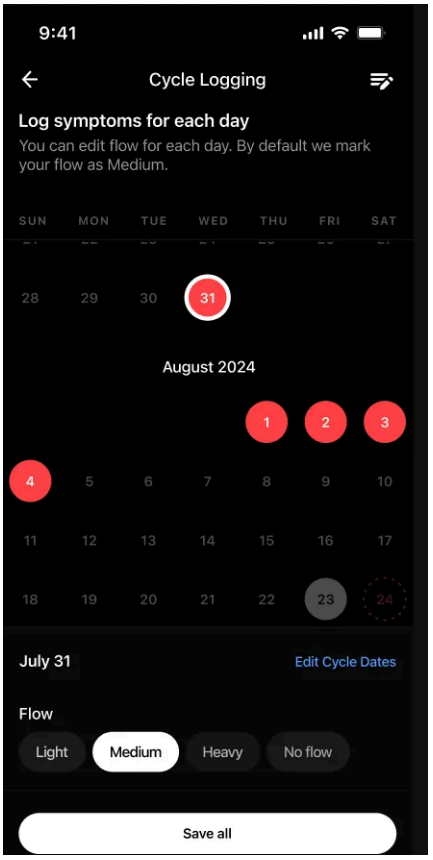
- The powerplug remains 'in calibration' mode until the following criterias are met:
    1. At least 3 cycle start dates
    2. At least 50% biomarker data for those cycles
    3. BMI ≤28, age is ≤ 40



- App Overview:




9:41
Period Logging
Enter your period start and end dates
You can tap or drag dates to select.
SUN MON TUE WED THU FRI SAT
28 29 30 31
August 2024
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
Menstrual Phase
Fertile Phase
Predicted
Reset
Continue
30 Logged period
1 Predicted Fertile Phase
22 Predicted menstrual phase
24 Predicted menstrual phase / in the future
31 Predicted fertile phase / in the future
23 Predicted menstrual phase / current day
1 Predicted fertile phase / current day


9:41
Cycle Logging
Log symptoms for each day
You can edit flow for each day. By default we mark your flow as Medium.
SUN MON TUE WED THU FRI SAT
28 29 30 31
August 2024
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
July 31
Edit Cycle Dates
Flow
Light
Medium
Heavy
No flow
Save all

Tracking to get pregnant

- Definitions:
    1. Fertile window: 5 days before ovulation day, ovulation day and one day after ovulation day. So, 7 days in total.
    2. Outside fertile window: Any day that's outside the above defined fertile window duration.
    3. Approaching fertile window: The day after the period ends up until the start of the fertile window.

- How algo works:
  Divided into 3 phases:

    1. Phase 1: From start of menses upto <40% of cycle duration.

       Uses past data (cycle start date+biomarkers) to predict fertile window

    2. Phase 2: Fertile window (>40% to 70% of cycle duration+5 days)

       Biomarker algo kicks in and predicts new fertile window (only if enough biomarker data is present)

    3. Phase 3: From 5 days past 70% of cycle duration up until the next period start date

       Uses past data to calculate next fertile window

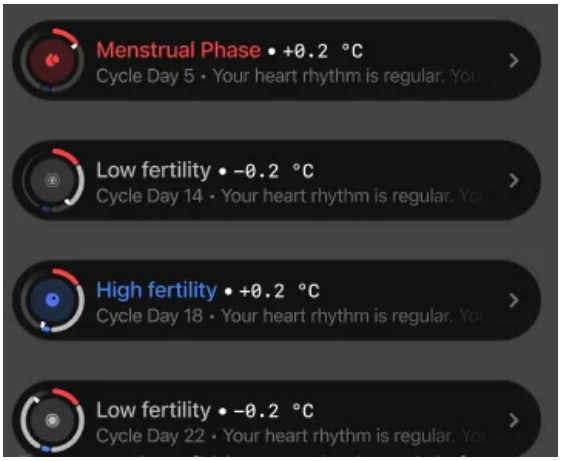
The predicted ovulation window is determined by anchoring to your period start date and detecting a biosignature pattern from your temperature, resting heart rate (RHR), and heart rate variability (HRV). As the cycle advances, additional data improves the algorithm's accuracy in detecting the biosignature. This can sometimes shift the predicted ovulation window, especially because we're forecasting the window in real-time, during the cycle itself.

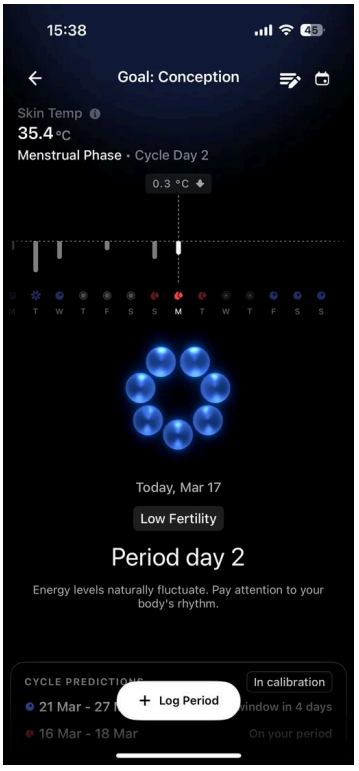
NOTE (1): Even 1 day of inaccurate data can affect C&O forecasts. However, we use a 3 day rolling window for data prediction, hence, the user will start seeing major shifts in their fertile window predictions if the data remains inaccurate for 3 days continuously.

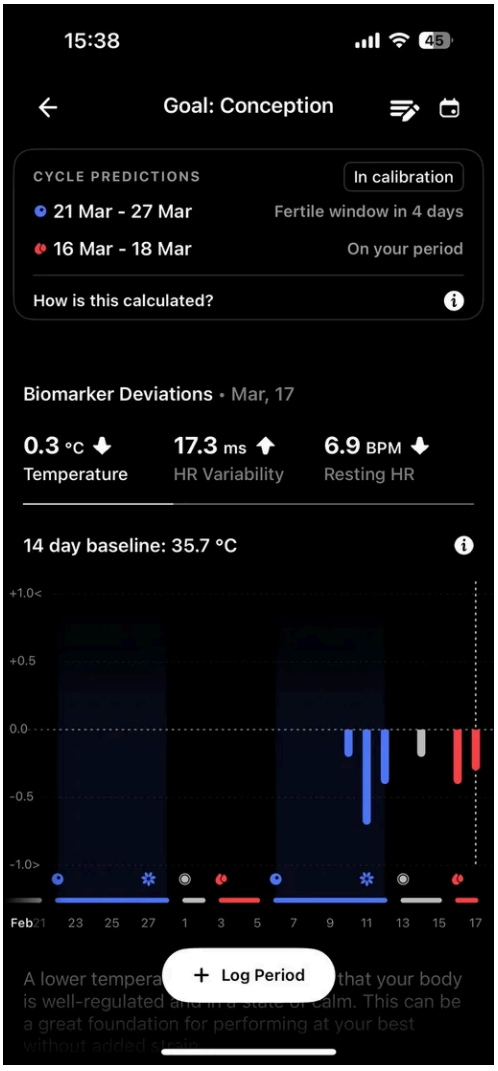
NOTE(2): The temperature deviation shown in the powerplug tile is different from the skin temperature deviation captured on the home page of the app. This is because we use a 30 day rolling baseline for the calculation of temp deviation for C&O powerplug.

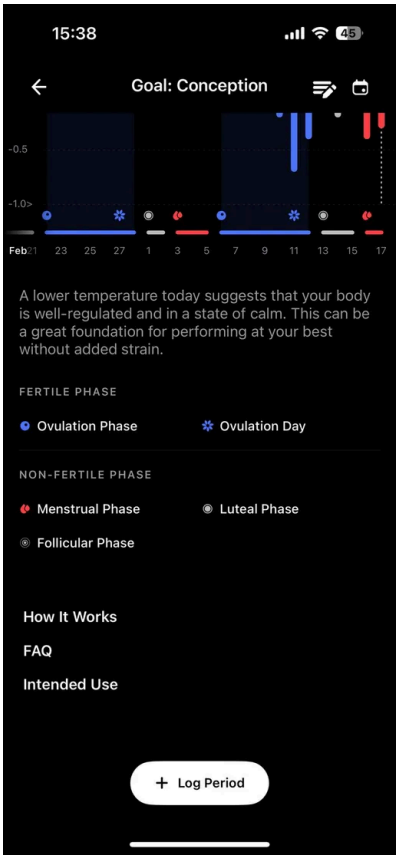
Ref thread link.

- App Overview:

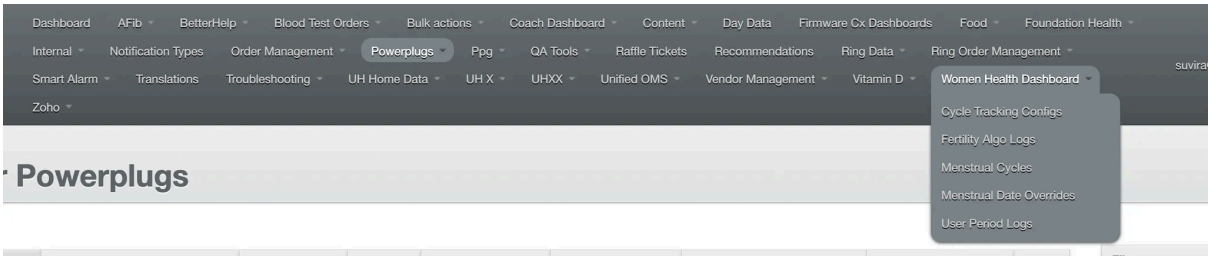




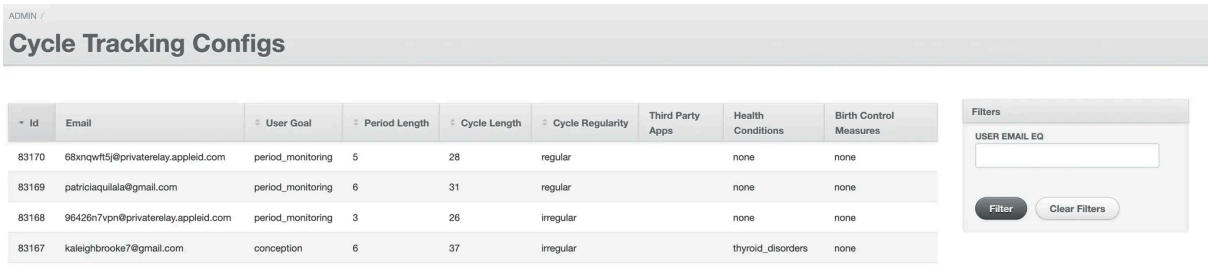




Women’s Health Dashboard

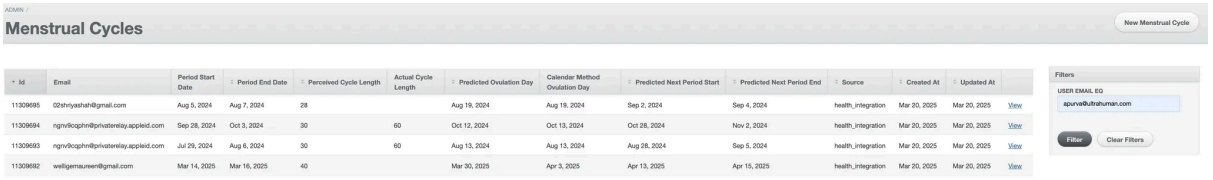


Cycle Tracking Configs Dashboard:



This dashboard gives all the details filled by the user while onboarding into their Cycle & Ovulation Powerplug

Menstrual Cycles Dashboard:



This dashboard shows all of the cycles and their data tracked by the user along with the predicted cycle dates computed by our algorithm.

NOTE: We use this dashboard only to check cycle data and other onboarding details filled by the user. This is intended to give a complete overview of the data being shown to the user on their app.

NOTE: To troubleshoot any technical issue with the user's powerplug, updating their ring's firmware, resets or making them re-onboard the powerplug is not going to help. We would have to flag it to the tech team.

- User feels their ovulation dates predicted by the app aren't correct:

  Troubleshooting: Currently its not possible to input/log/correct ovulation day that is predicted by the system. But this is an enhancement planned in the next version for April.

  Ref thread link.

- Users complain that their predicted period days aren't correct: Troubleshooting: They can always "log" their period by tapping the calendar icon on the top right next to the edit cycle details button and we'll revise that to recalculate their phases.

  Ref thread link.

- The user feels there are days where their temperature has not been recorded (in cycle tracking): When deviation from the recorded baseline is very close to 0, there are no bars shown on the graph. We're working on improvements to the feature so that this is clear going forward. (Currently may also show as "- -" on a given day, on the app)

  Ref thread link.

- Users complain that they are seeing the 'in calibration' banner even after logging in past 3 cycles data and wearing the ring continuously: Troubleshooting: We show the "In calibration" if we can't come up with a fertility high confidence. This high confidence is decided on some factors as described.

  Ref thread link.

- User notices that predicted ovulation window changes on a given day: We predict the ovulation window for a user based on 3 biomarkers (temperature deviation, RHR and HRV) - hence, if on any day we find that these biomarkers are more (or less) predictive towards a certain day, the algorithm will change basis the stronger suggestive biomarker pattern. Hence, the predicted ovulation window may dynamically change. Ref thread link.

- Users complain that the temperature being shown in their sleep index section and the one being shown inside the powerplug are different.

- Troubleshooting: For the temperature you see on the Sleep Index details page, we calculate it by excluding nap sleep. This gives you an average skin temperature during your main sleep period, without naps affecting the value.

  However, the skin temperature in the Cycle Tracking details page is pulled from your baseline temperature, which includes all temp data within sleep boundaries—naps included. Hence, the difference.

  Ref thread link.

WIP 🛠️

- Expanding period logging limits from the current min 3 and max 10 days capability.
- Handling non bleeding users

Non-bleeding users:

"Amenorrhea," or the absence of menstruation,

can be normal during certain periods like before puberty, during pregnancy or breastfeeding, or after menopause, but can also be a sign of various medical conditions or lifestyle factors

.

Here's a breakdown of the different aspects of non-bleeding menstrual periods:

1. What is Amenorrhea?

- Definition:Amenorrhea refers to the absence of menstruation, which is the regular bleeding that occurs during a woman's reproductive years.
- **Types:**
  - **Primary Amenorrhea:** Occurs when a girl who is 16 years old has never had a menstrual period, or if a girl has not developed secondary sexual characteristics (like breast development and pubic hair) by age 13.
  - **Secondary Amenorrhea:** Occurs when a woman who has previously had regular periods stops having them for three months or more.

2. Normal Situations for Non-Bleeding:

- **Before Puberty:** Before a girl starts menstruating, it's normal to not have periods.
- **During Pregnancy:** A missed period is a common early sign of pregnancy.
- **While Breastfeeding:** Exclusively breastfeeding can suppress menstruation.

- **After Menopause:** Menstruation naturally ceases after menopause, which typically occurs between the ages of 45 and 55.
- **Hormonal Contraception:** Some hormonal birth control methods, like the progestogen-only pill, contraceptive injection, or intrauterine system (IUS), can lead to reduced or no bleeding.

3. Potential Causes of Amenorrhea (Other than Normal Situations):

- **Medical Conditions:**
    - **Polycystic Ovary Syndrome (PCOS):** A hormonal disorder that can cause irregular periods or amenorrhea.
    - **Pituitary or Thyroid Disease:** Problems with these glands can disrupt hormone production and affect menstruation.
    - **Eating Disorders:** Conditions like anorexia nervosa can cause amenorrhea due to low body weight and poor nutrition.
    - **Excessive Exercise:** Overexercising, especially in combination with low body weight, can lead to amenorrhea.
    - **Asherman's Syndrome:** A rare condition where scar tissue forms inside the uterus, potentially blocking the flow of menstrual blood.
    - **Genetic Disorders:** Certain genetic conditions, like Fragile X syndrome, can cause menstrual periods to stop early.
- **Lifestyle Factors:**
    - **Stress and Anxiety:** High levels of stress can disrupt the menstrual cycle.
    - **Weight Changes:** Significant weight loss or gain can affect menstruation.
- **Other:**
    - **Travel:** Changes in routine and jet lag can sometimes disrupt periods.
    - **Illness:** Certain illnesses can also cause irregular periods or amenorrhea.

SPOTTING:

Spotting refers to **light vaginal bleeding that occurs outside of your regular menstrual period**

Spotting can have various causes, including hormonal fluctuations, ovulation, birth control methods, pregnancy (implantation bleeding), or even certain medical conditions.

Spotting is lighter and less prolonged than a regular period, and it usually doesn't require the use of pads or tampons

- Make provision to input LH result
- Increase temp data to upto 2 decimal places.
- Freezing ovulation prediction beyond a certain point of time and not letting it keep shifting.

- And many more…

Specific improvements we're working on to address some of the issues over the next few weeks:

1. **Stabilizing the ovulation window** — Once a high-probability ovulation window is identified, we'll prevent multiple shifts later in the same cycle.
2. **Marking ovulation day** — You'll be able to manually mark your ovulation day to refine predictions and improve future accuracy.
3. **Bug fixes for irregular cycles** — We're fixing issues that impact predictions for users with irregular cycle lengths.