

SWISS MEDTECH

DAY 2021

Deep Dive Session 1

Technology

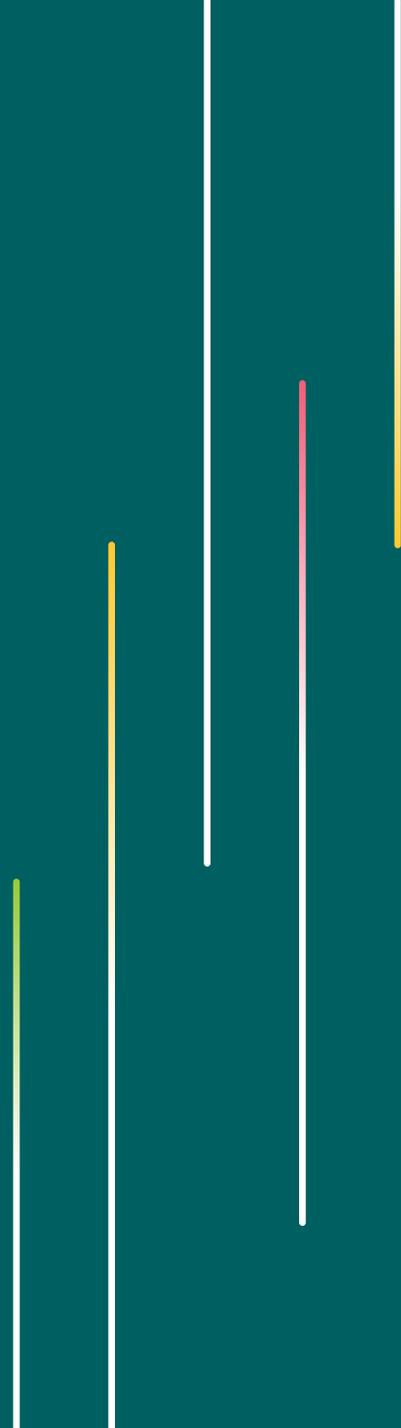
Continuous blood pressure monitoring technology

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Continuous blood pressure monitoring technology and its implementation into a medical digital product

September 8th 2021

AKTi!A



Blood pressure monitoring

- **Office measurement**
 - + Best practice
 - + Direct interpretation
 - Very scarce
 - Affected by white-coat / masked hypertension
 - Affected by blood pressure circadian rhythm
- **Home measurement**
 - + Longitudinal measures possible
 - Relies on patient's compliance
 - Requires patient's training
 - Affected by blood pressure circadian rhythm
- **Ambulatory measurements**
 - + 24h measurements
 - + Self-triggered
 - Cumbersome
 - Disturbed sleep
 - Disrupt daily activities

<https://jooinn.com/>



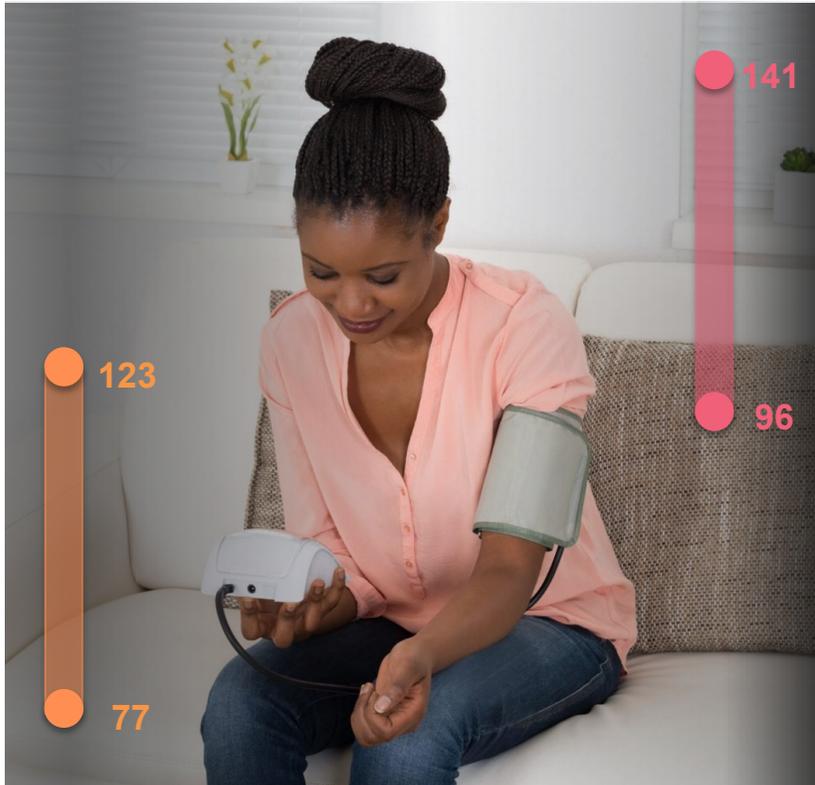
<https://www.healthywomen.org/>



<https://www.ttpventus.com/>



Blood pressure monitoring



Today we see only a snapshot

Main limitations

- Blood pressure cuff readings are taken 1-2 times per week, only during the daytime and often months apart.
- Traditional cuffs are inconvenient and require manual effort.

Consequences

- Incorrect diagnosis
- Clinical inertia
- Lack of actionable feedback

Next generation of blood pressure monitoring

Photoplethysmography is an optical technology measuring light propagation changes through a tissue during the cardiac cycle.

1



PPG Sensor

The PPG sensor shines green light to analyze how the arteries below the skin surface pulsate.

2



Optical Signal

The optical signal is acquired, pre-processed and transferred to the OBPM algorithm.

3



OBPM Algorithm

The OBPM algorithm analyzes the pulse shape of your skin arteries to estimate your actual blood pressure.

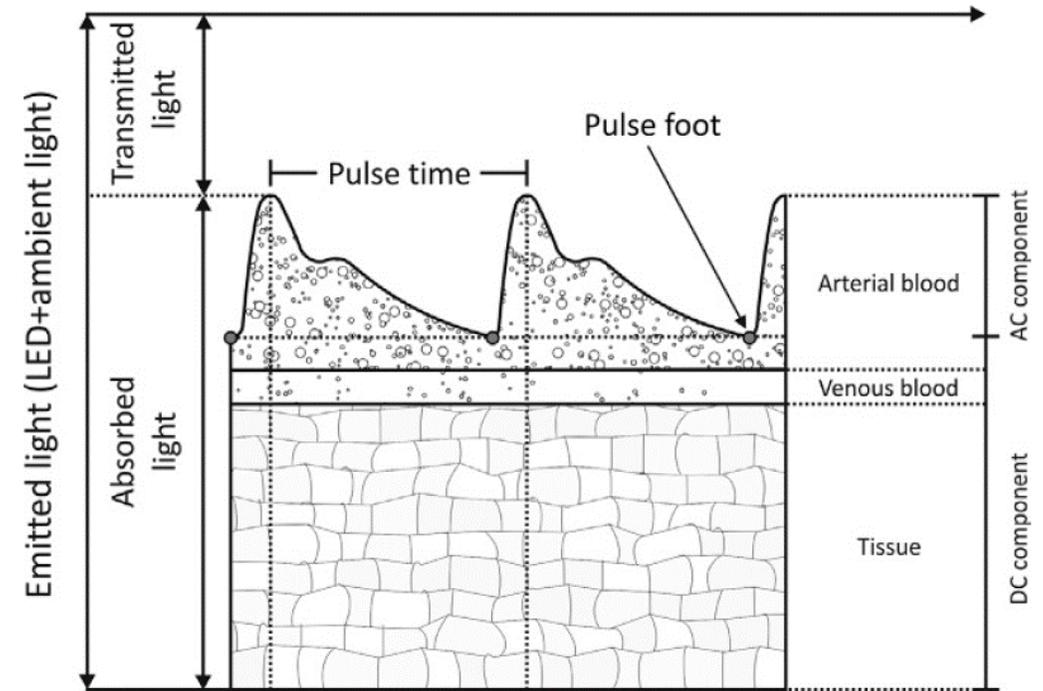
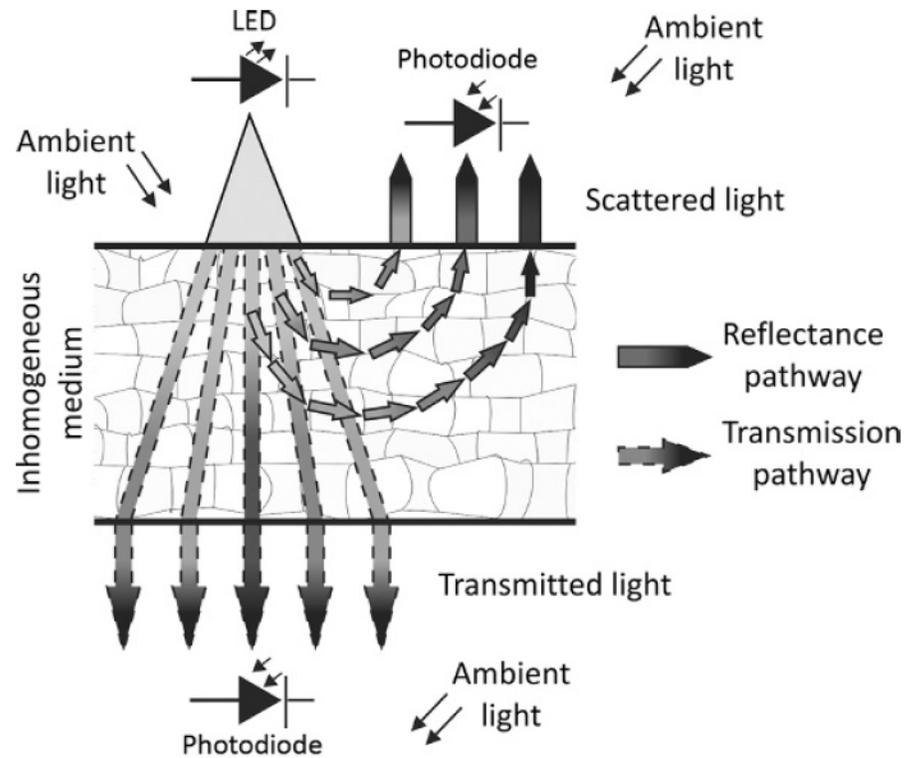
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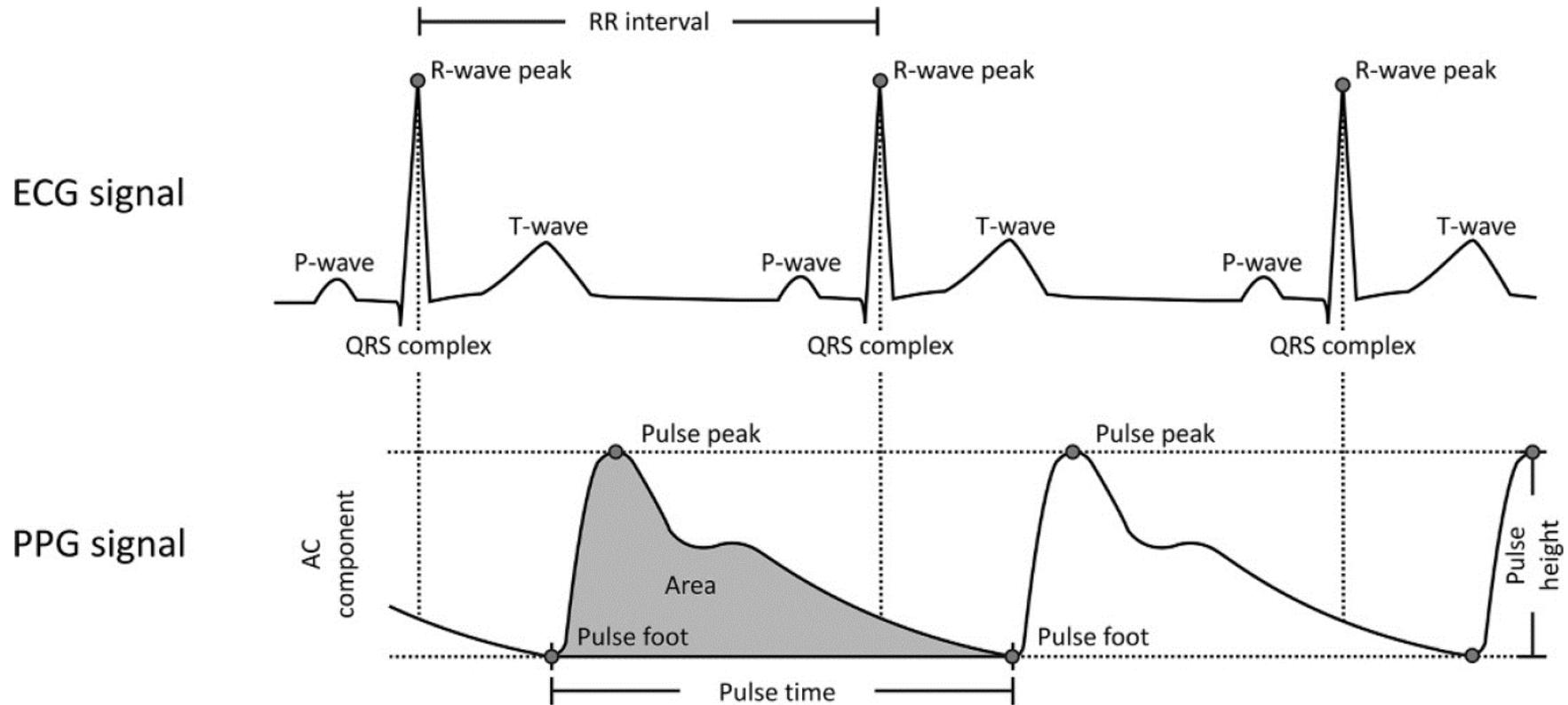
Blood Pressure

Blood pressure estimations are displayed to the user.

Photoplethysmography basics



Photoplethysmography basics



Blood pressure monitoring

Aktiia solution

- + Worn on the wrist for comfort
- + Self-triggered 24/7 monitoring
- + Optical sensor (non-inflating)
- + Preclude masked and white-coat bias
- + Robust to body posture
- Indirect blood pressure measurement
- Only measures when patient is still
- Monthly calibration with a cuff still necessary

Aktiia delivers the full picture



Validation study

Representative cohort of 86 volunteers in sitting position

- Male and female
- Hypotensive, normotensive and hypertensive
- Aged 21 to 65 years
- Different skin pigmentations (Fitzpatrick scale from 1 to 5)
- Different hair follicle densities

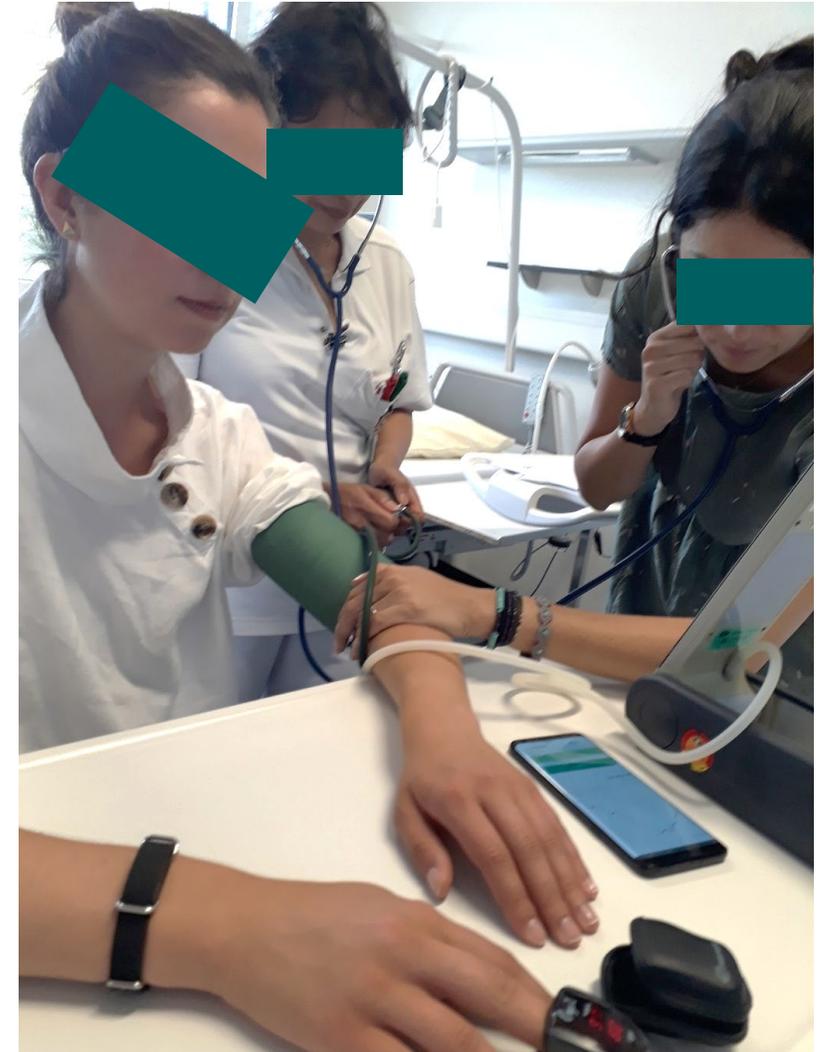
Protocol

- 4 visits over one month

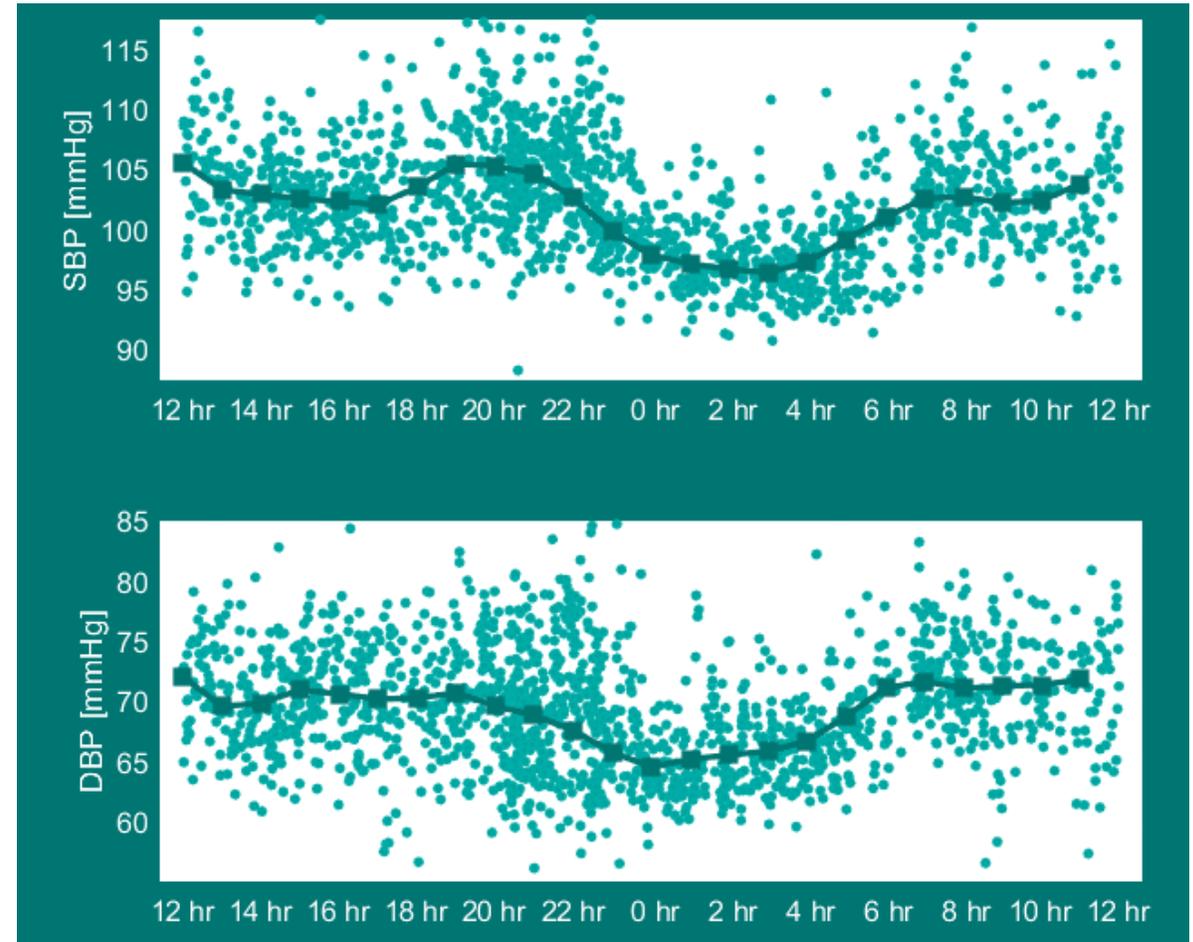
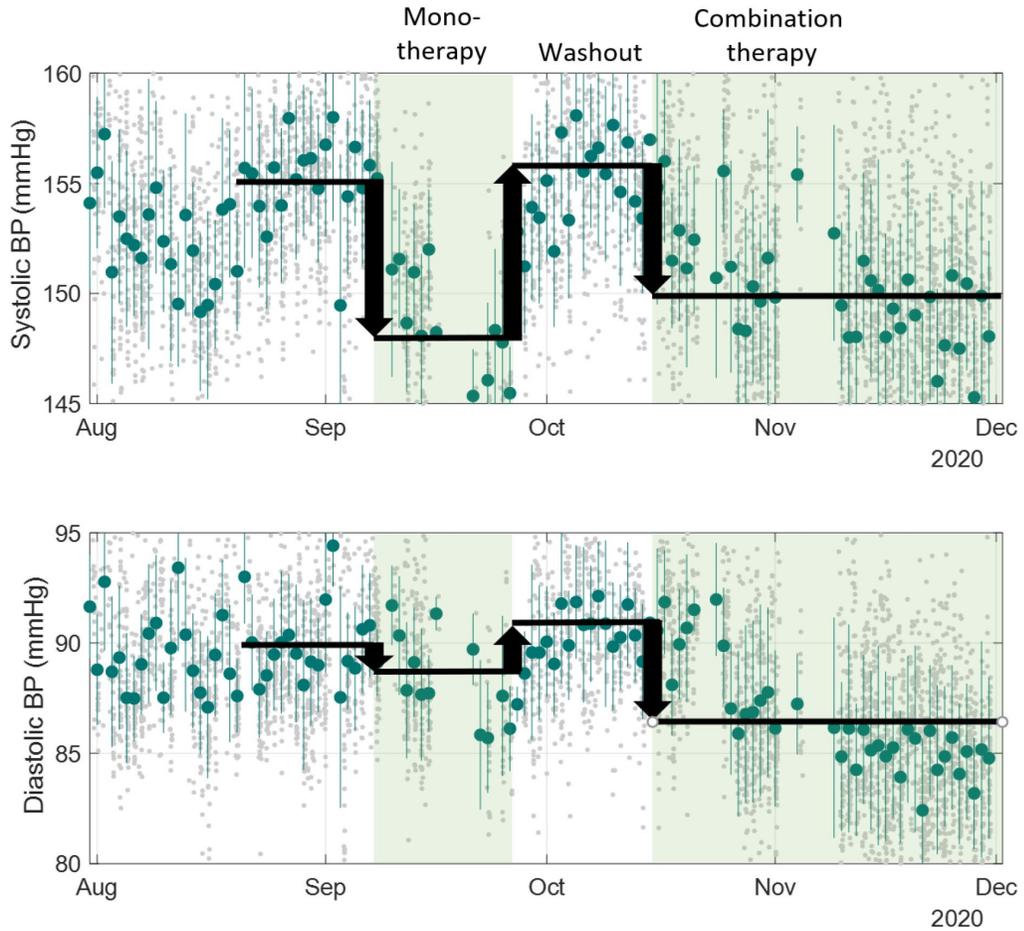
Blood Pressure Monitoring

Blood pressure from the optical Aktiia Bracelet: a 1-month validation study using an extended ISO81060-2 protocol adapted for a cuffless wrist device

Vybornova, Anna^a; Polychronopoulou, Erietta^b; Wurzner-Ghajarzadeh, Arlène^b; Fallet, Sibylle^a; Sola, Josep^a; Wuerzner, Gregoire^b



Examples: drugs effect and circadian profile



Sola Josep, Fallet Sibylle, and Wuerzner Gregoire, "Monitoring the personalised effects of antihypertensive drugs using the Aktiia optical device: a 4-month follow-up", *Cardiovasc Med.*, 2021, 24:w10054.

Conclusion

Self-triggered cuffless devices introduce a new paradigm for longitudinal persistent monitoring of blood pressure.

- They will also leverage Round-the-clock, persistent data collection for advanced analytics
- Accurate estimation of the night-dipping pattern
- Accommodating nocturnal blood pressure
- Correlation with cardiovascular risk factors

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