



**Throw away your plastic pentorch.**

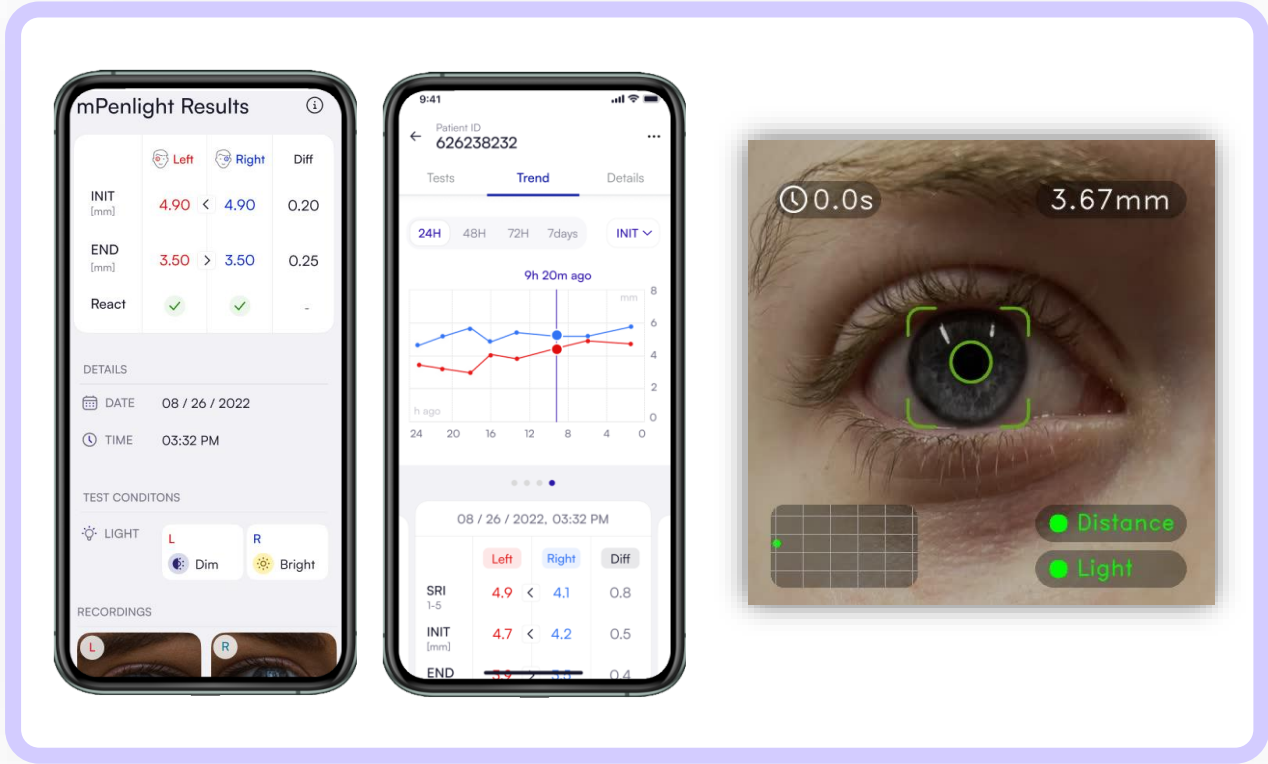
**Time for a novel environmentally  
sustainable smartphone pupillometer**

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# Introduction



- ~ 7 000 critical care beds.
- 35 000 – 70 000 pupillary assessments daily.
- AI-driven smartphone pupillometer.



Discovered in 18th century

Medical Ruler



Discovered in 19th century

Medical Penlight



Discovered in 20th century

Pupillometer



# Methods



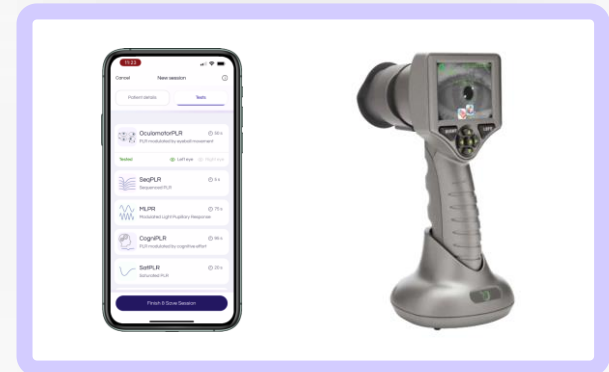
Patients tested **32**



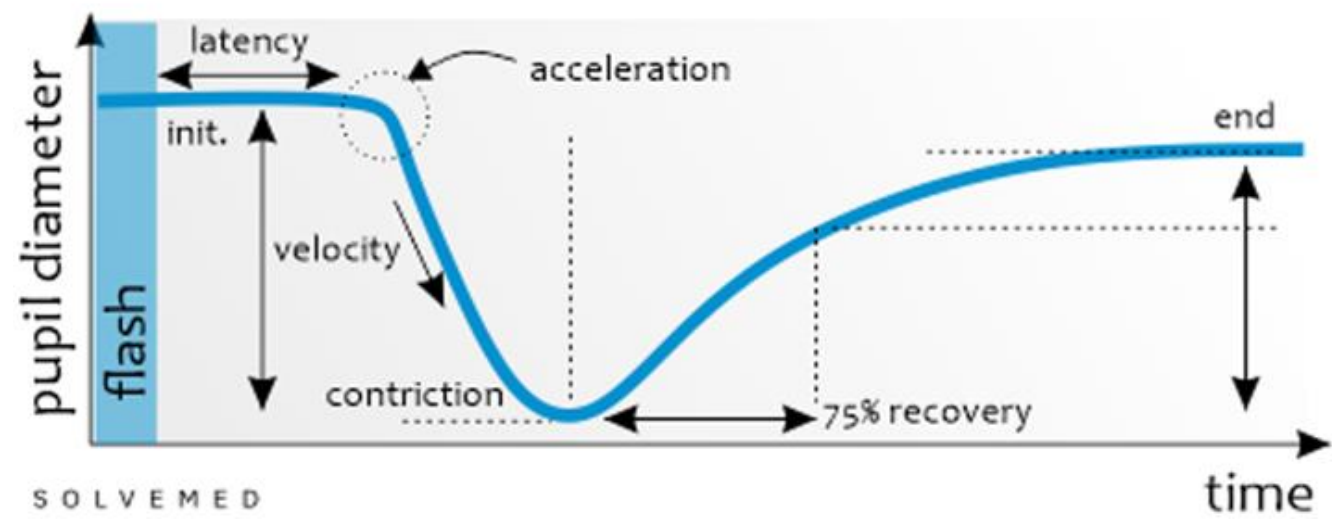
Tests per patient **20**



Tests per per eye **10**

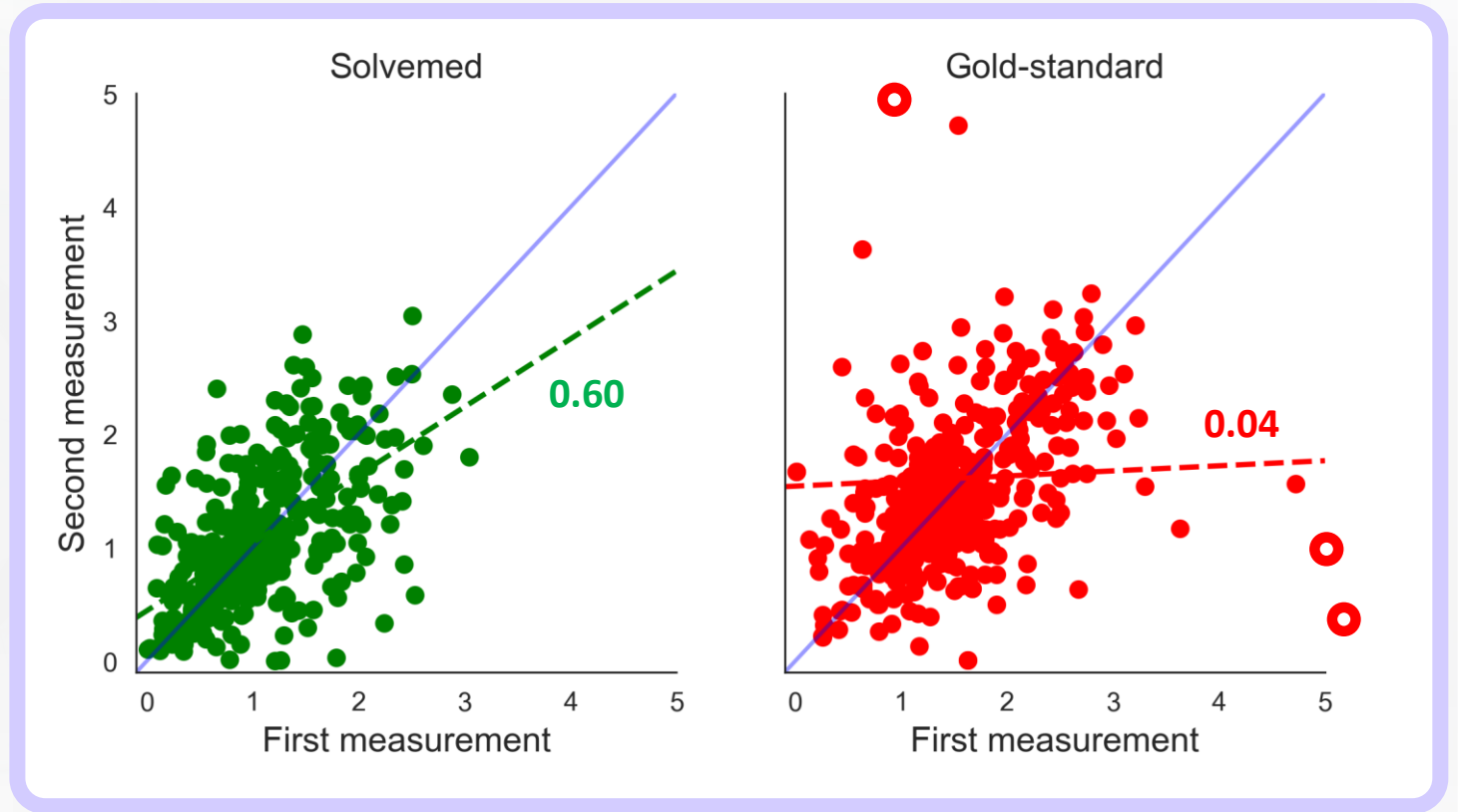


# Methods



Init	Pupil size before stimulation
End	Size of maximally constricted pupil
Amp	Amplitude of the reflex
ACV	Constriction velocity
MCV	Maximum of constriction velocity
ADV	Dilation velocity

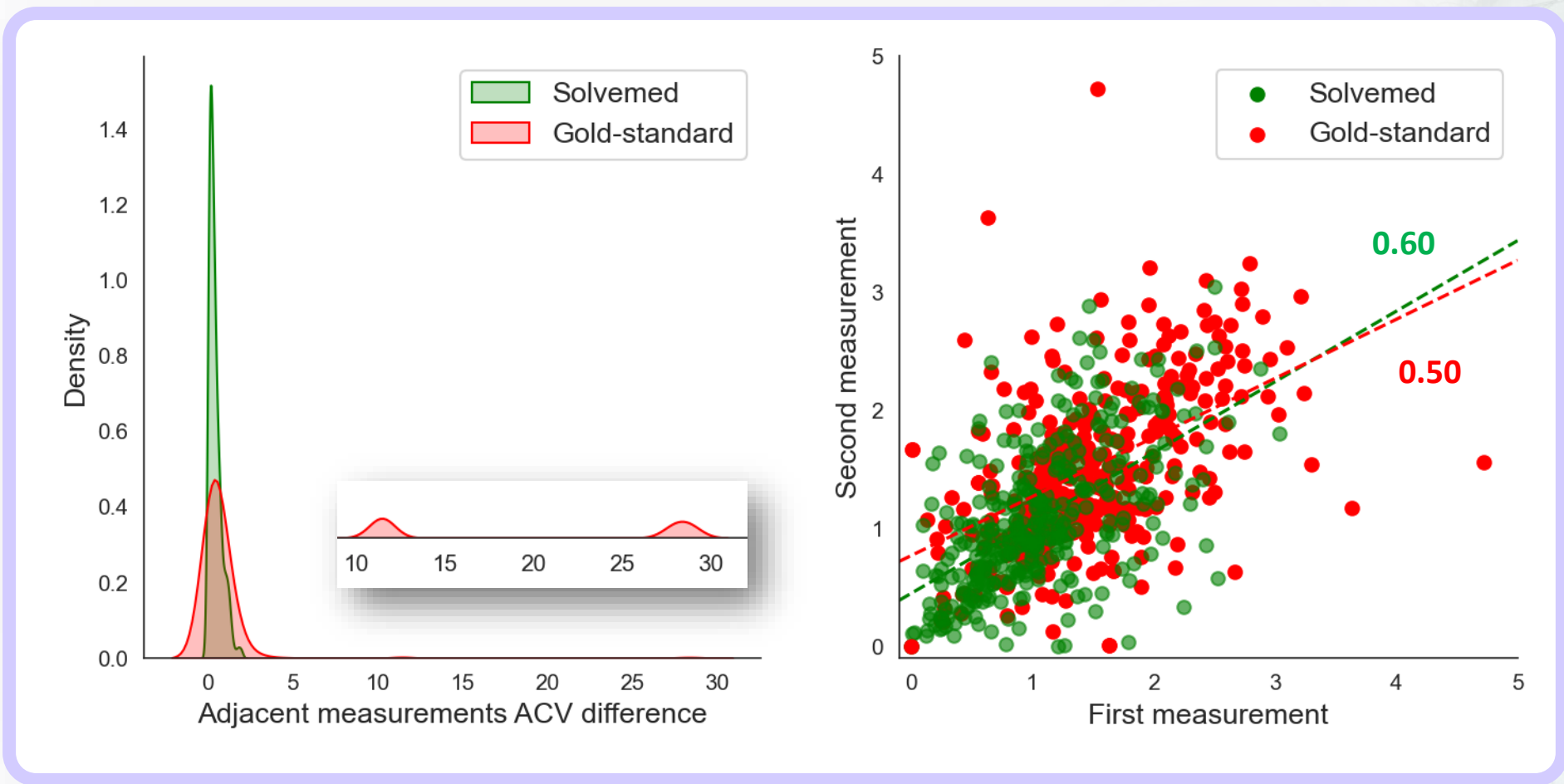
# Results



- Difference between adjacent measurements (eg 1<sup>st</sup> vs 2<sup>nd</sup> , 2<sup>nd</sup> vs 3<sup>rd</sup> etc.)
- Extracted coefficient of a fitted linear regression

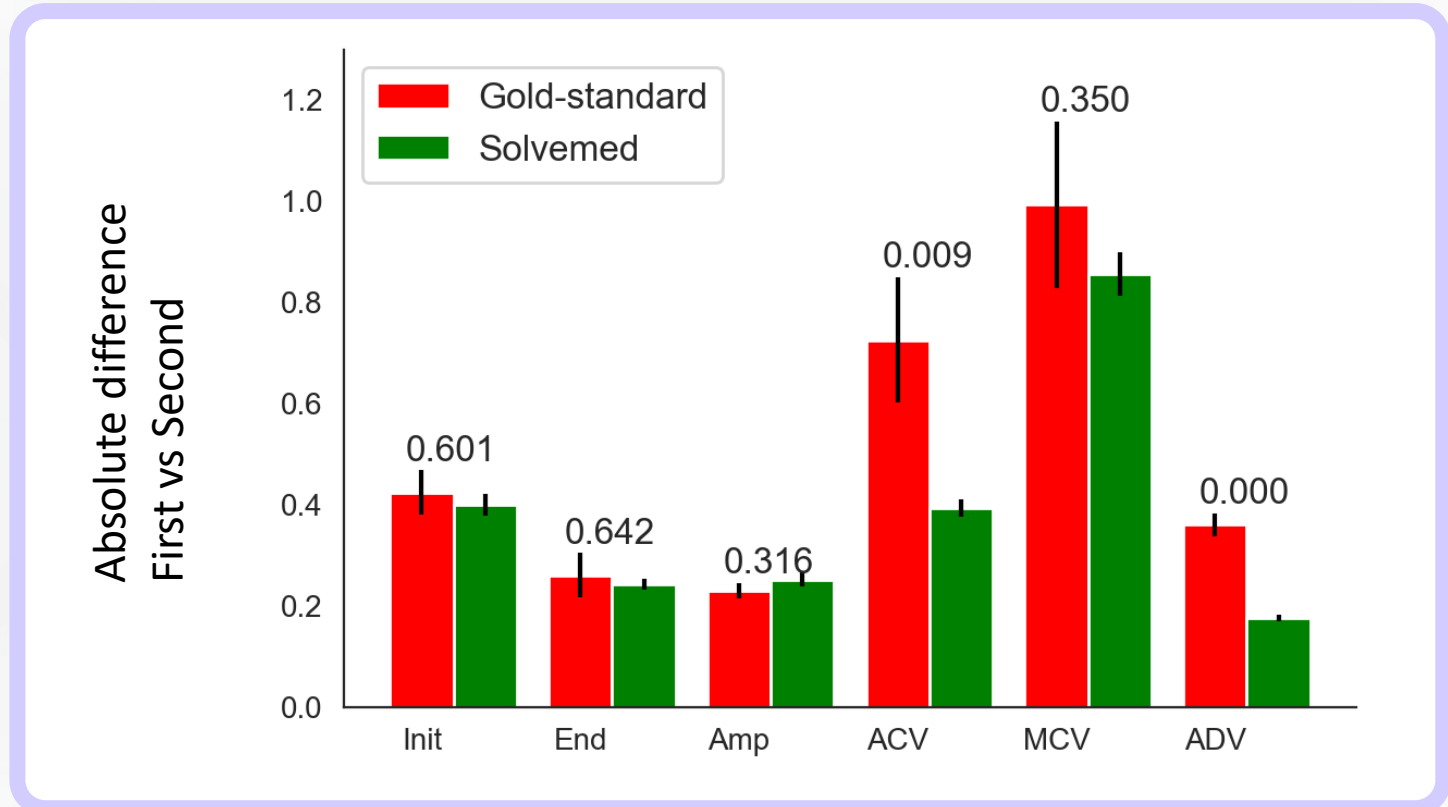


# Results



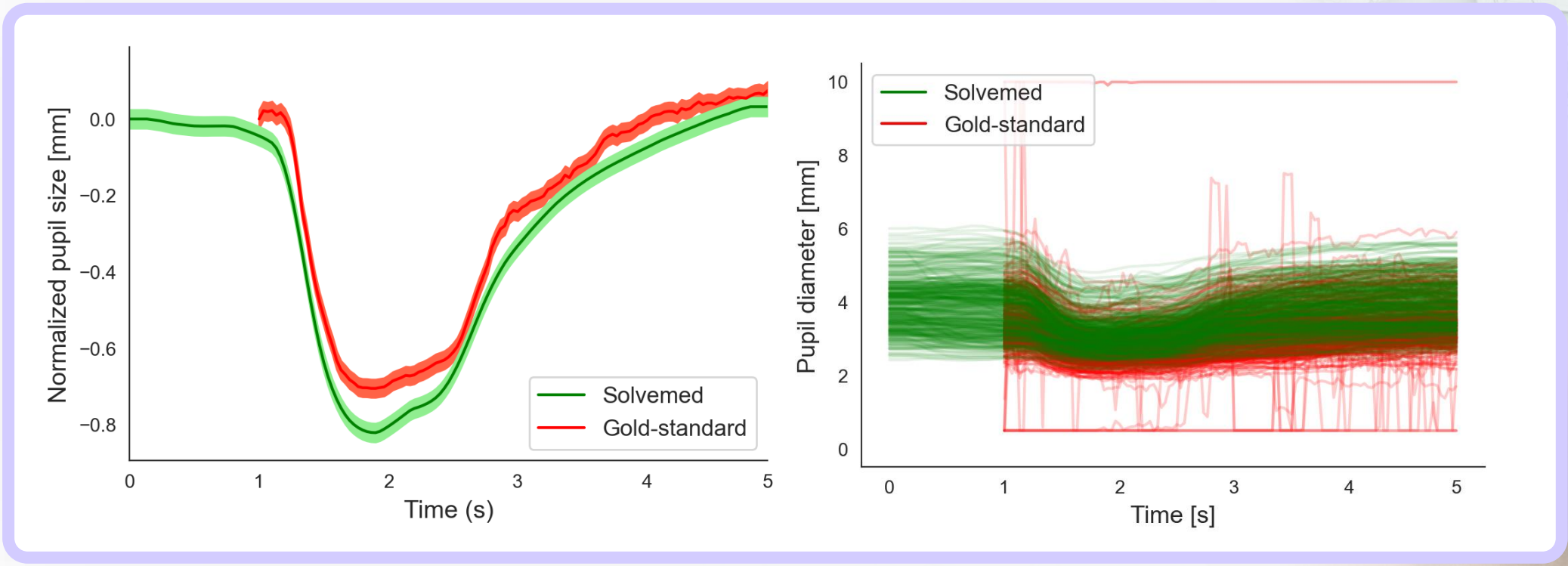
- Distribution of absolute differences indicating outliers
- Scatter plot with removed outliers in gold-standard data

# Results



- Mean of absolute differences between adjacent measurements for each parameter.
- P-values (t-test) shown above bars.

# Results

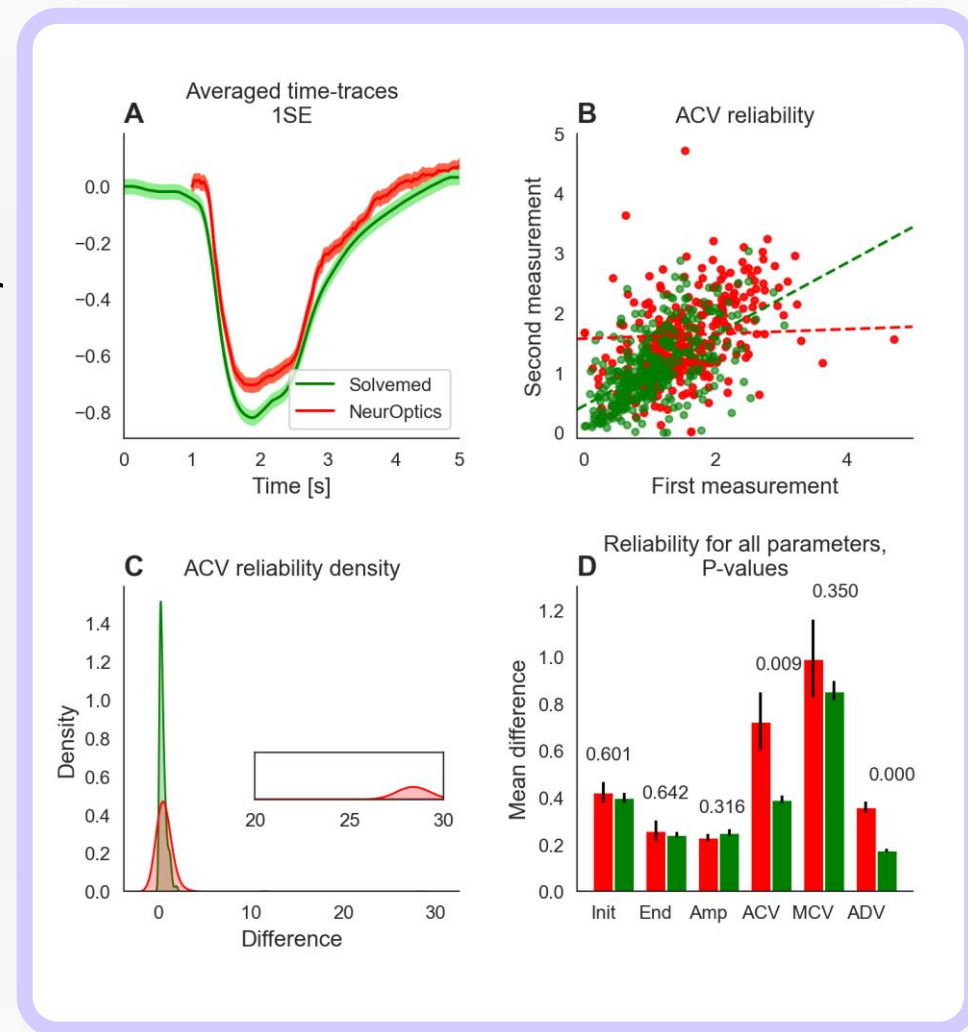


- Averaged time traces of pupil size with indicated SEM.
- All time traces without shift.



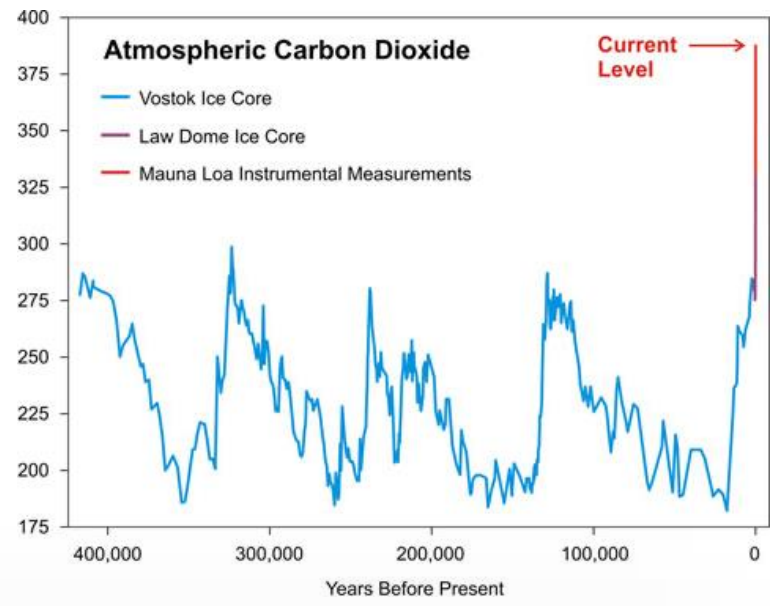
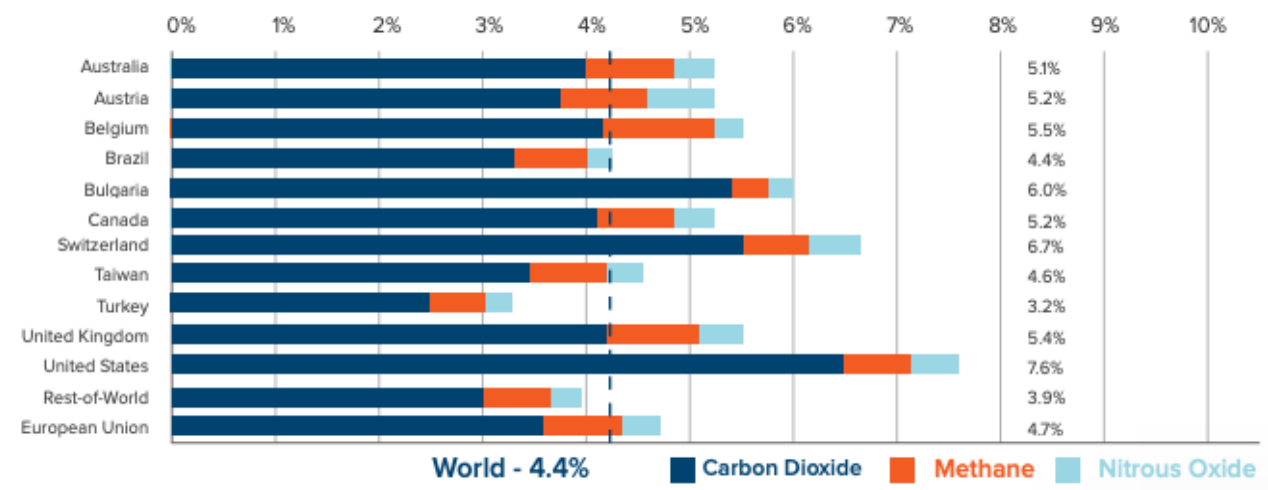
# Conclusion

- AI-driven smartphone pupillometer provides a reliable way of measuring pupil light response.
- It offers **equal or better** reliability of measurements.
- It limits the number of outliers.

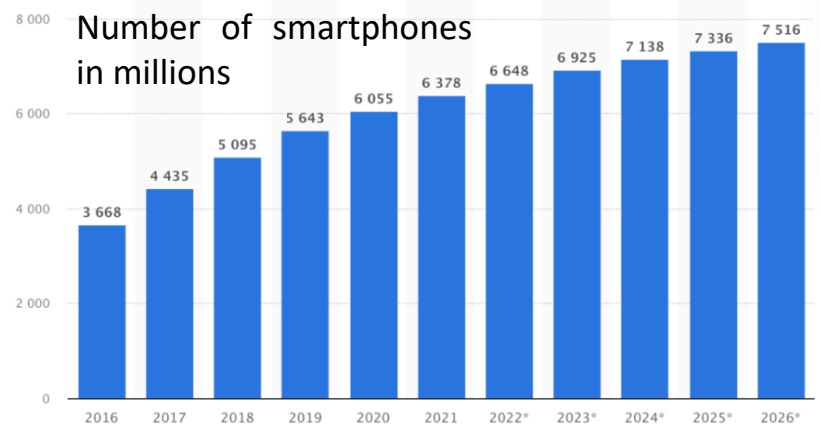


# Conclusion

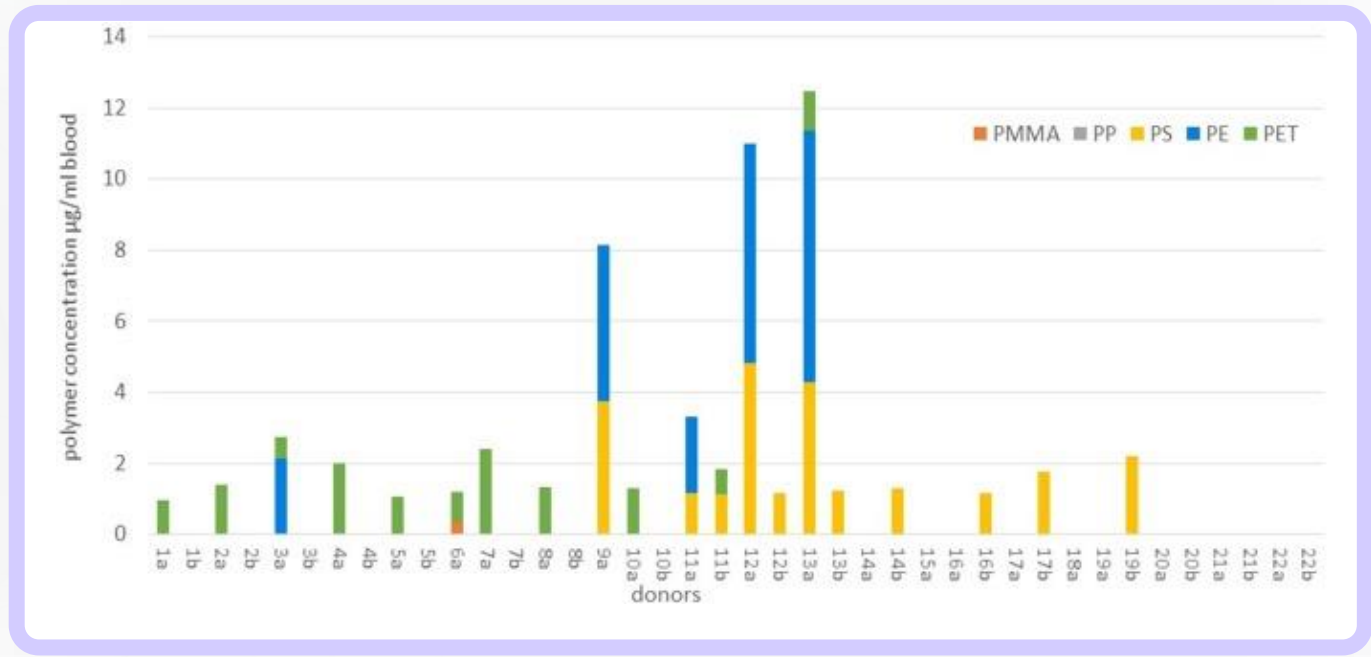
Health care footprint as % of national footprint



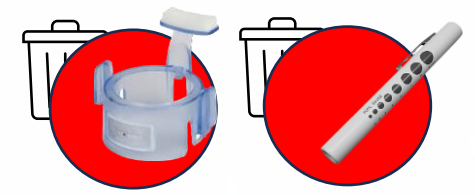
- If the health care sector were a country, it would be the fifth-largest emitter on the planet.
- Computers and electronics are responsible for only 0.2% of health care carbon footprint.



# Conclusion



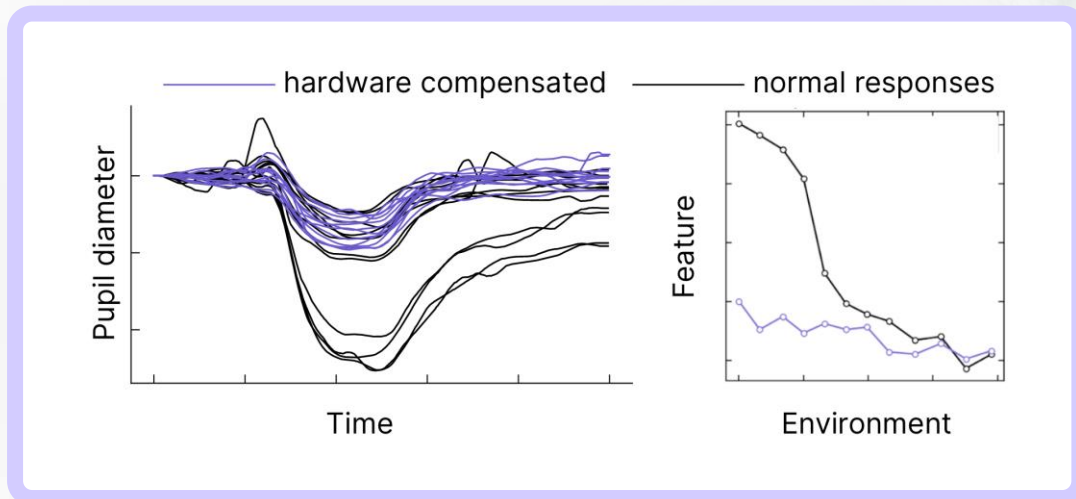
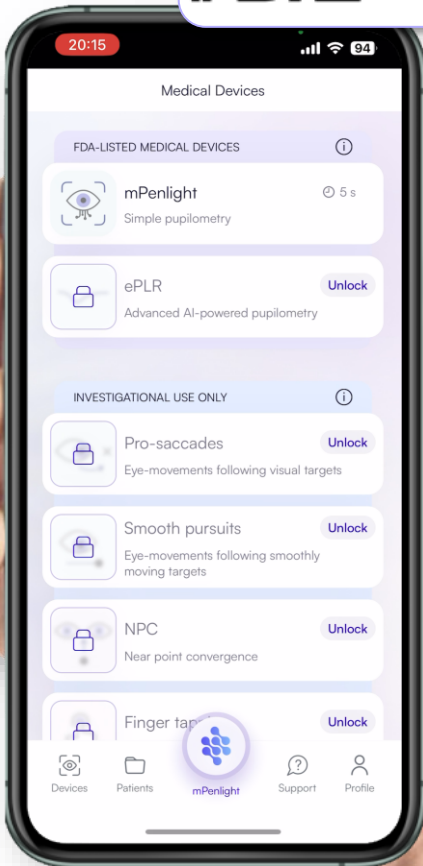
- We have microplastics not only in the environment but also in our blood.
- **No generated waste** while maintaining non-contact measurements.





# Conclusion

**FDA** listed Class I medical device

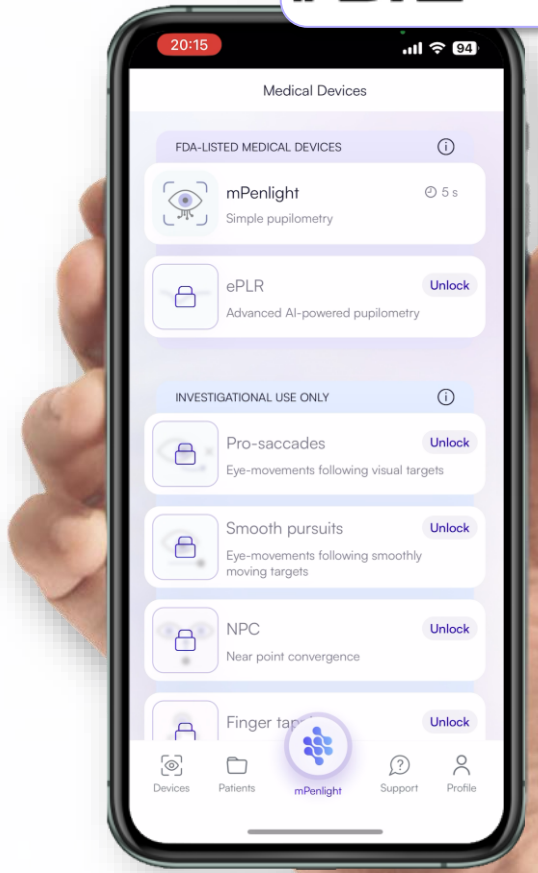



- This technology saves time – its high reliability eliminates uncertainty of the measurement and the need for the second examiner.
- It increases the quality of care – it offers reliability of a hardware pupillometer while being easier to use than a pentorch.

# Conclusion


**FDA** listed Class I.  
medical device


**Big Data**  
External Control Arms  
AI diagnostics



  
**Patients' data**

- Medications,
- Age,
- Neurological conditions,
- Ophthalmological conditions,
- [...]

  
**Proprietary biomarkers.**  
**Easy export and data handling on scale.**



- Ultimately, Solvemed's smartphone pupillometer introduces a breakthrough in sustainable, neuro-ocular diagnostic technology.
- This technology facilitates **large-scale research** on neuro-ocular biomarkers and multiple conditions with next generation data processing.

Decoding Neurology. In the blink of AI.

Thank you for your time!

Presenter:  
Ivo John, MD Eng.



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