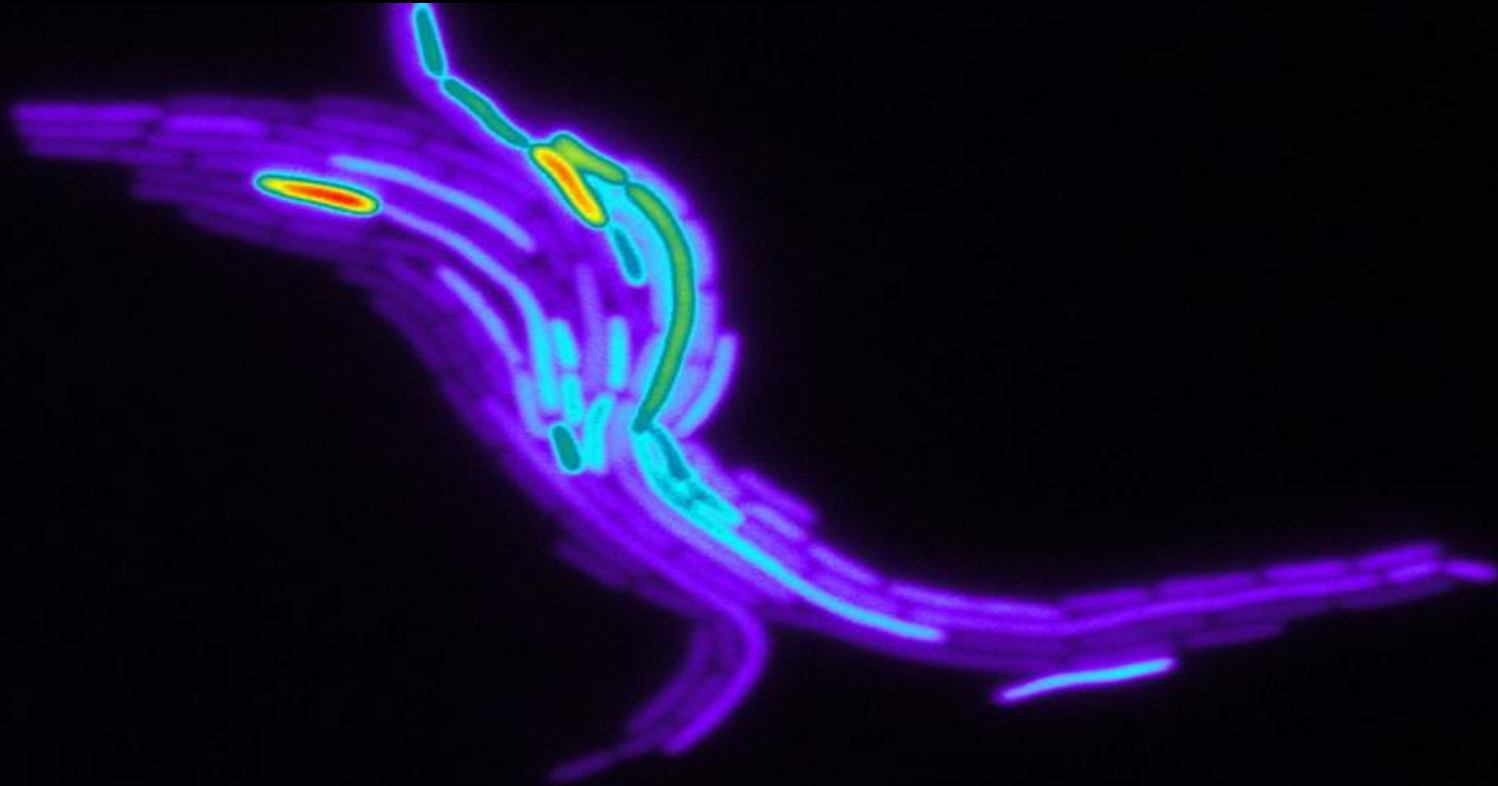


# Driving change at scale by learning through research



**Ariel B. Lindner**

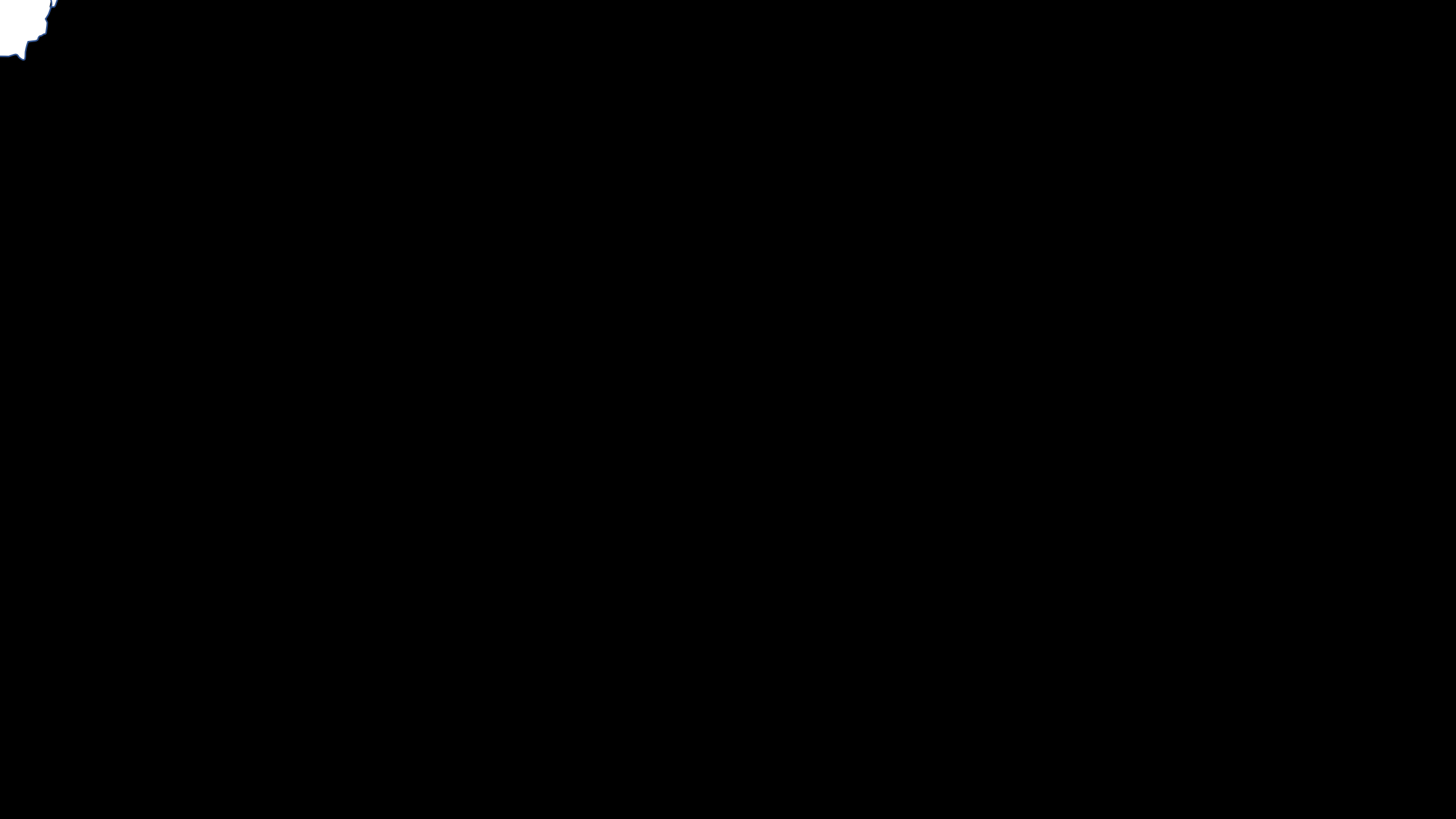
Head, Systems Engineering and Evolution Dynamics  
INSERM, Université Paris Cité

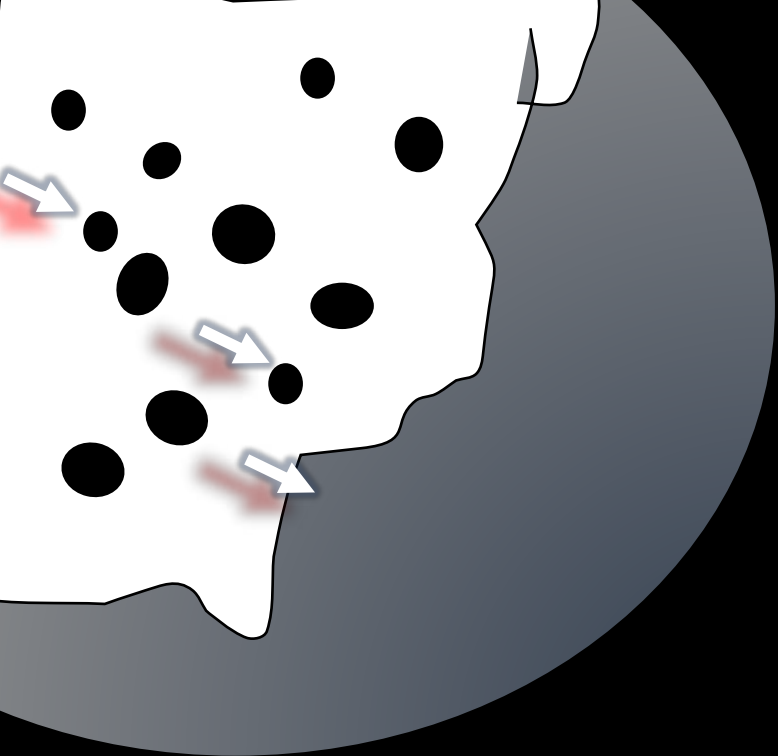
Co-founder, **Learning Planet Institute**













# Breast Health Monitoring & Awareness

Sweekrity Kanodia, PhD Student

*“Let’s start looking at our breasts,  
for in this fight with breast  
cancer, they will be our  
'Breasties'.”*

Supervised by:

Prof Fabien Reyat (Institut Curie)

Prof Jean C Thalabard (UPC)

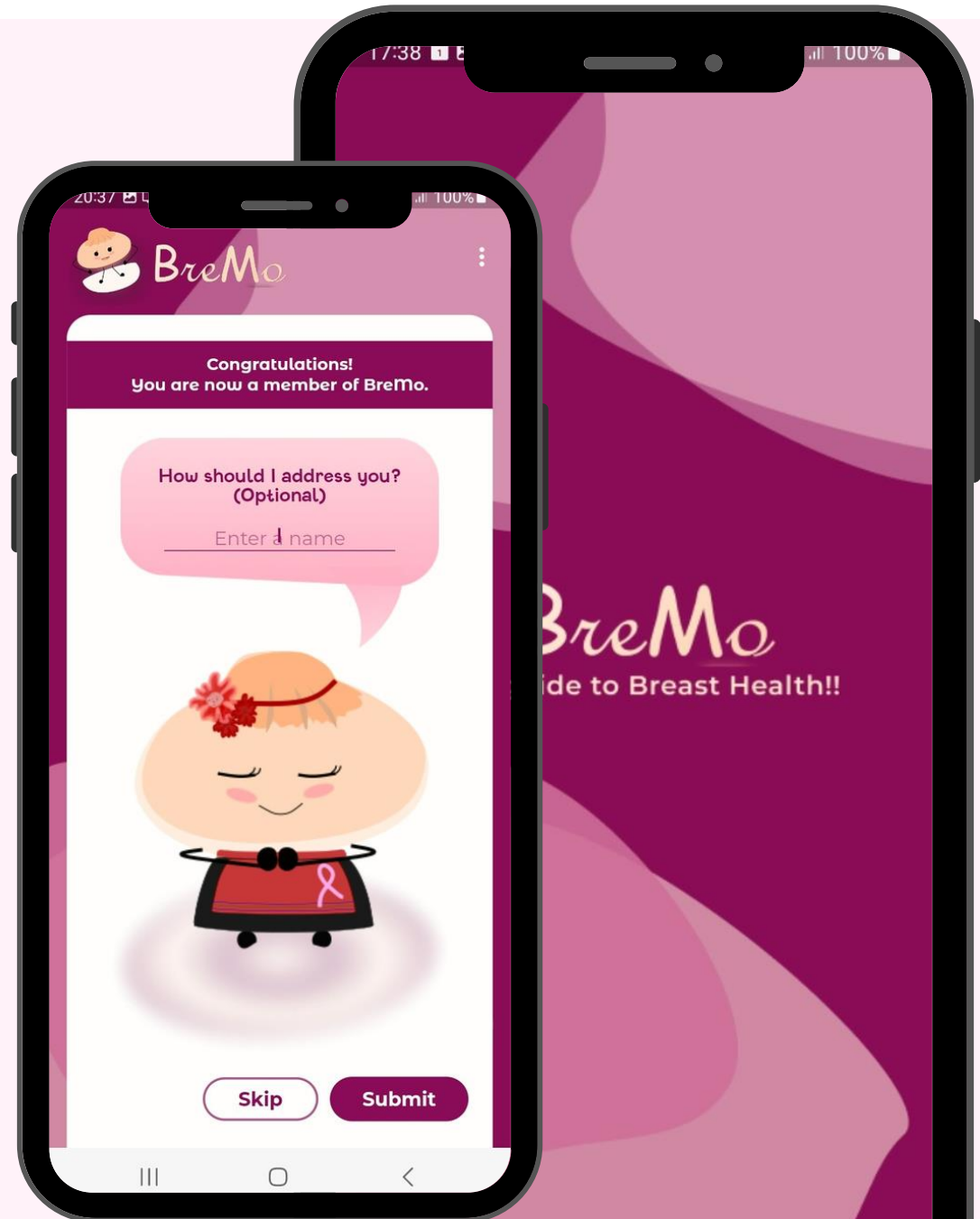
Dr Bradley Stephenson (Dear Mamma)

Dr Parths Basu (IARC, WHO)

Mentored by:

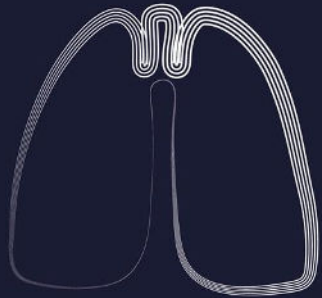
Prof Ariel Lindner

Dr Kevin Lhoste



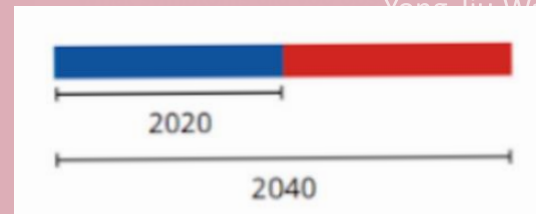
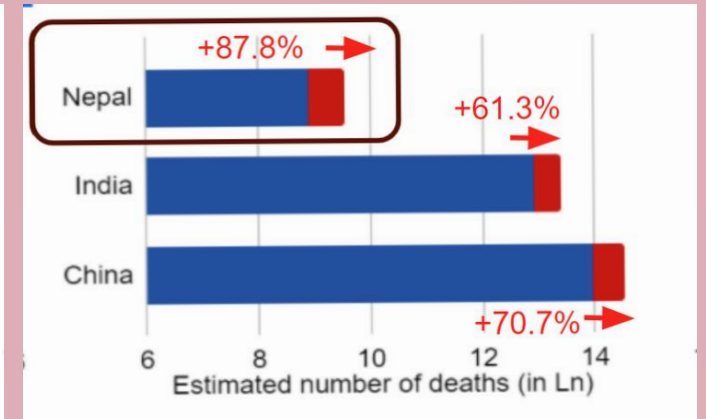
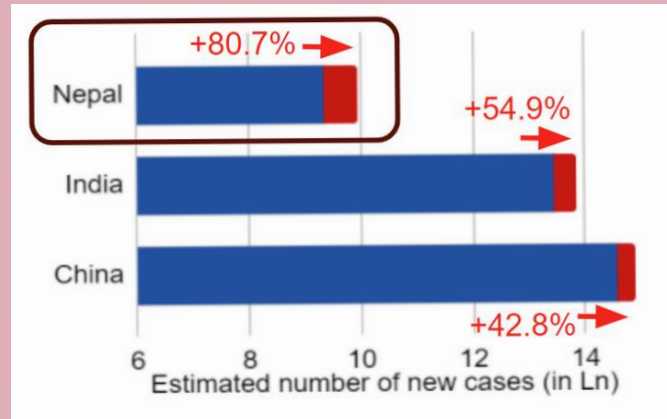
### Female breast cancer

has become the most commonly diagnosed cancer in the world, overtaking lung cancer.



An estimated **2.3 million new cases** and **685 000 deaths** occurred in **2020**.

### Asia contributes to 45% incidences & 50% deaths



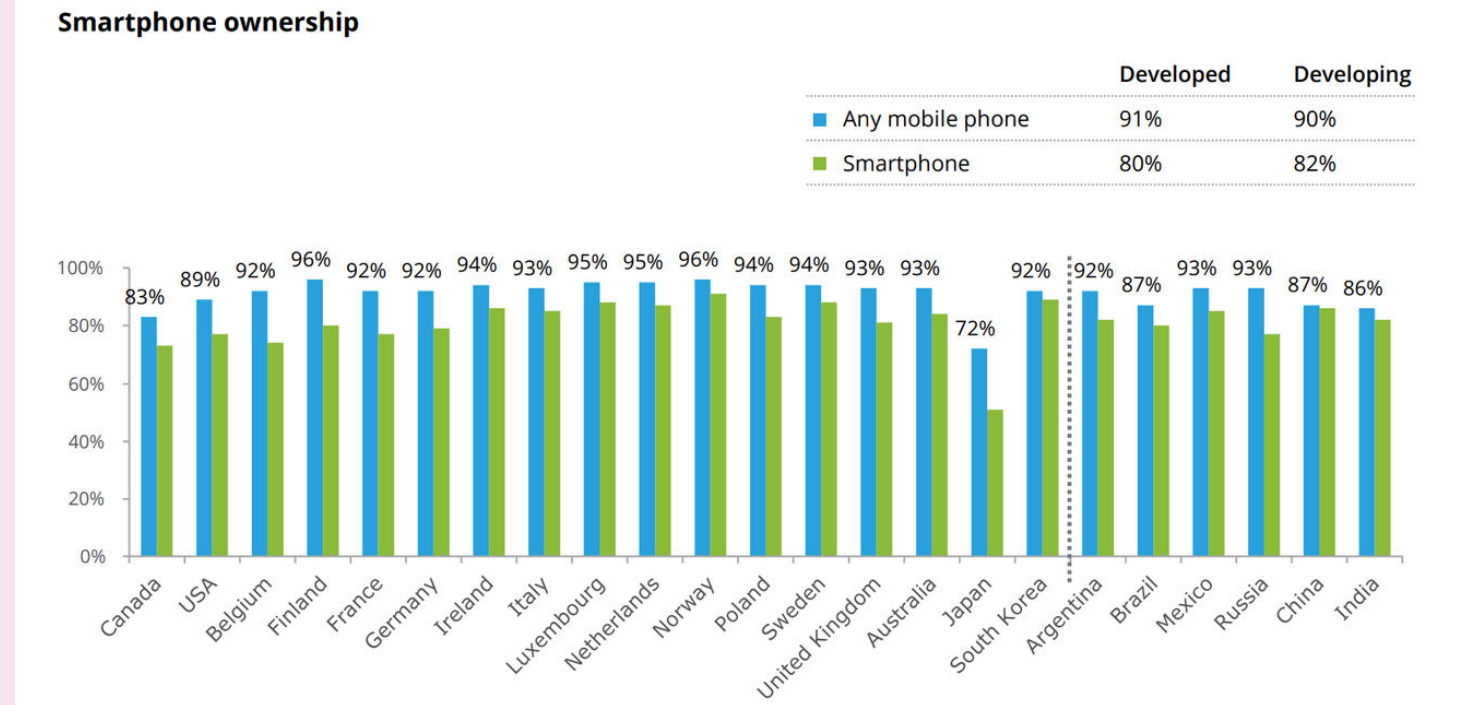
Only 53%<sup>b</sup> globally have general knowledge about breast cancer!!

a - GLOBOCAN 2020,  
b -Yong-Jiu Wang et al., 2022

70% Indians, 66% Chinese use mHealth apps

Conor Stewart  
, Dec 22, 2022

Global mobile consumer trends, Deloitte, 2nd Edition



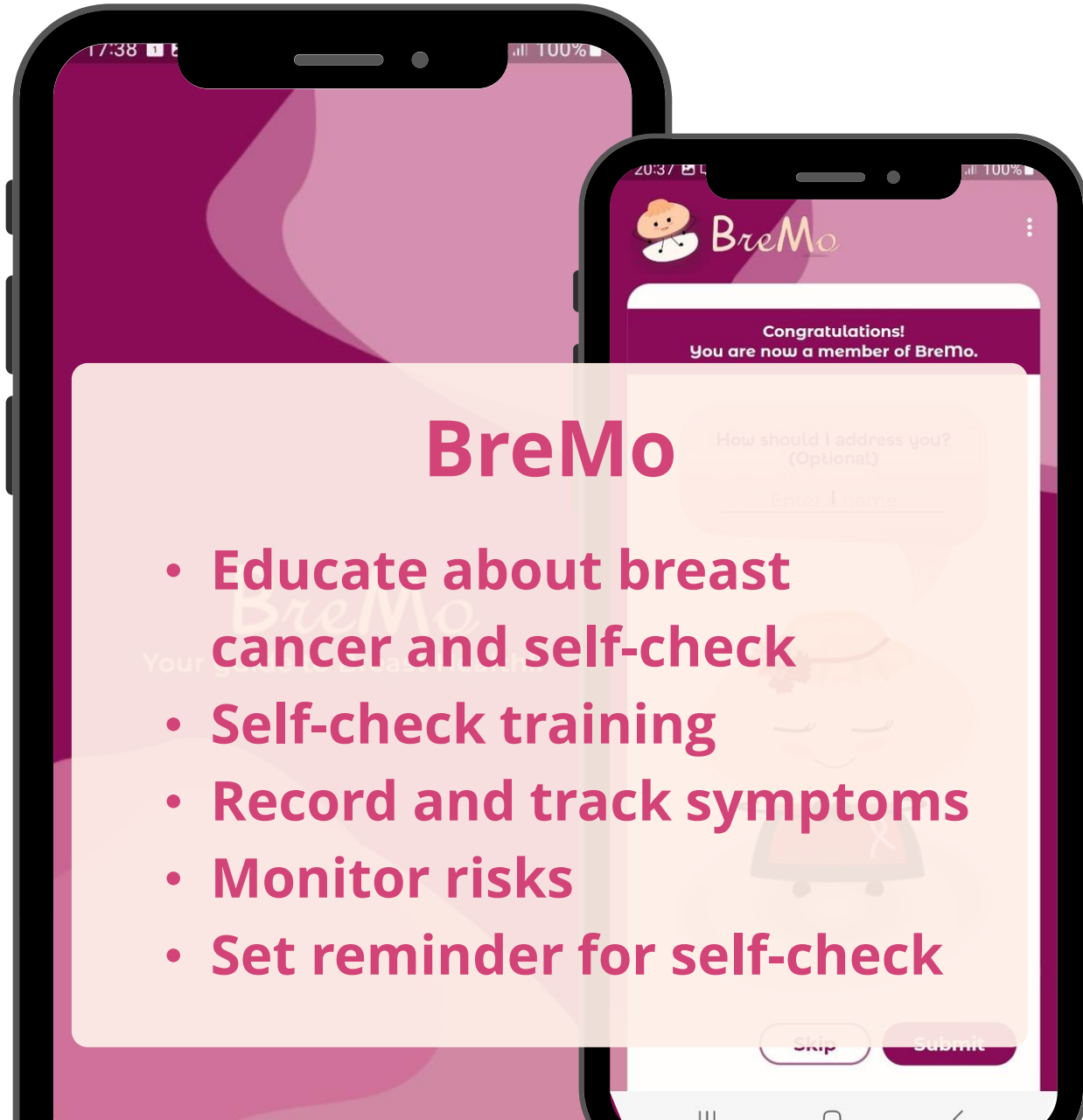
## Approaches

mHealth android app - for general awareness & knowledge of self-check

Frugal 3D breast models - for self check training



# mHealth App



## BreMo

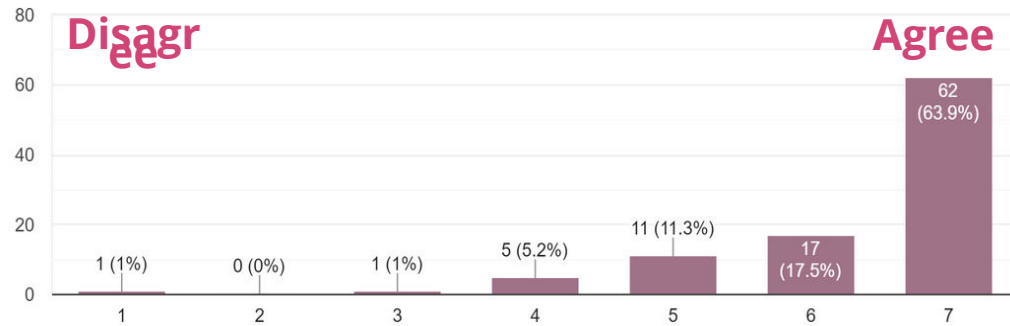
- Educate about breast cancer and self-check
- Self-check training
- Record and track symptoms
- Monitor risks
- Set reminder for self-check

# 3D breast models

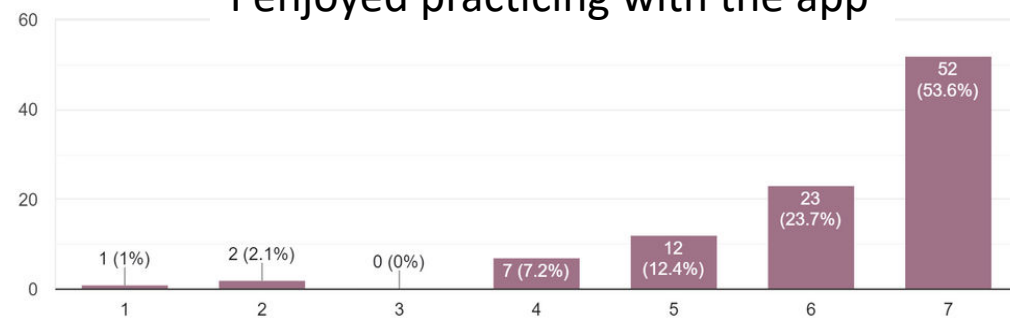


# Some results to demonstrate effectiveness

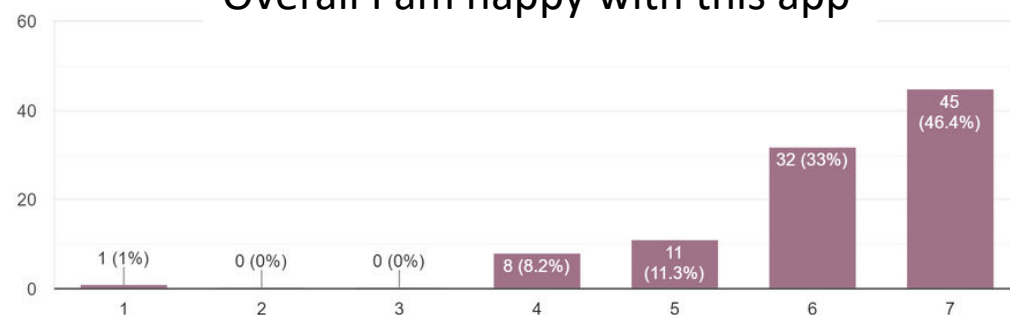
This app will be useful for me to take care of my breasts



I enjoyed practicing with the app

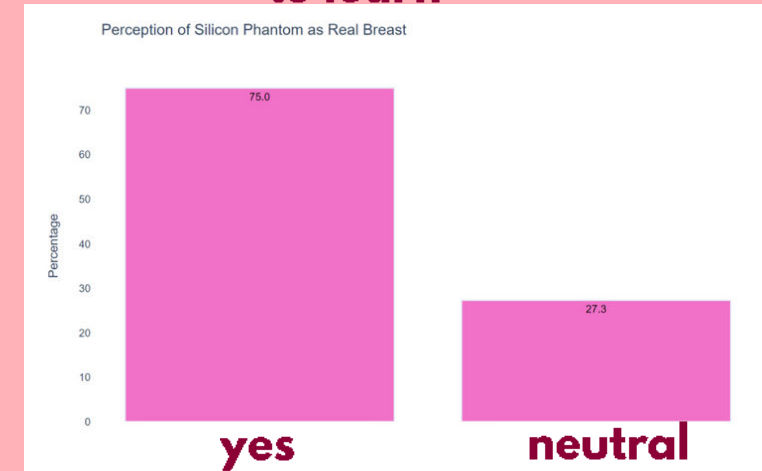


Overall I am happy with this app

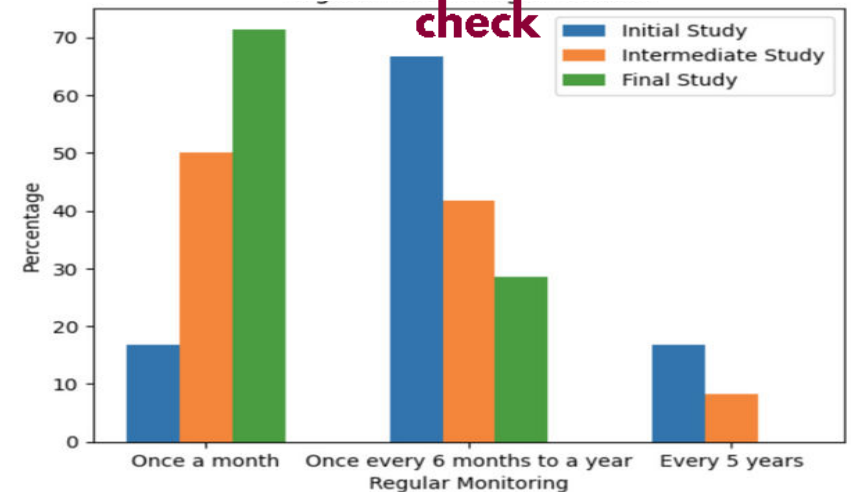


85% comfortable using Breasties board to learn

Silicon breasts felt real

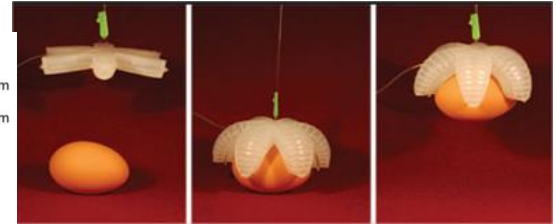
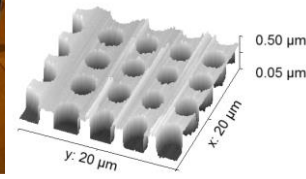
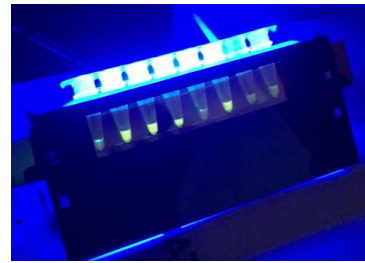
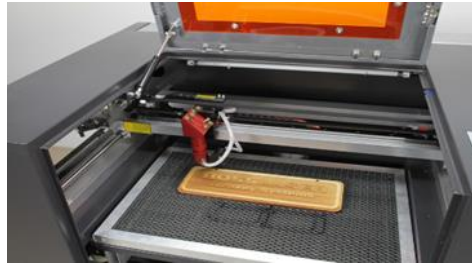
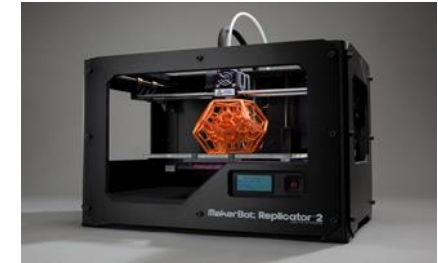


Increase in rate of monthly self-check



# Driving Innovation by Open Technology

Education. Creativity. Open science. Frugal

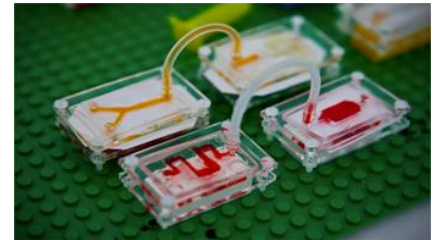
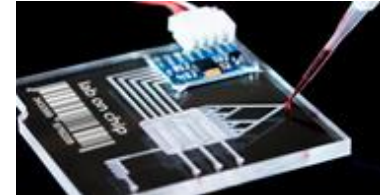
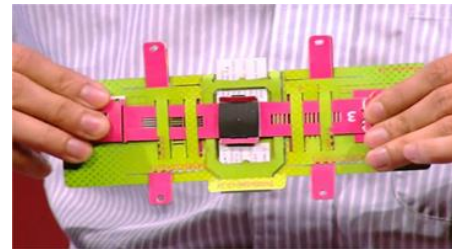
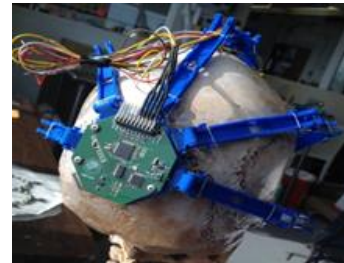
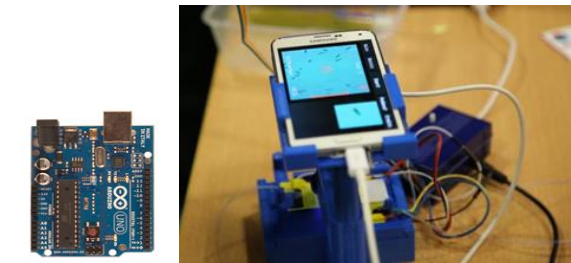


Open RT LAMP

OpenPCR

AFM

Soft Robotics



OpenBCI

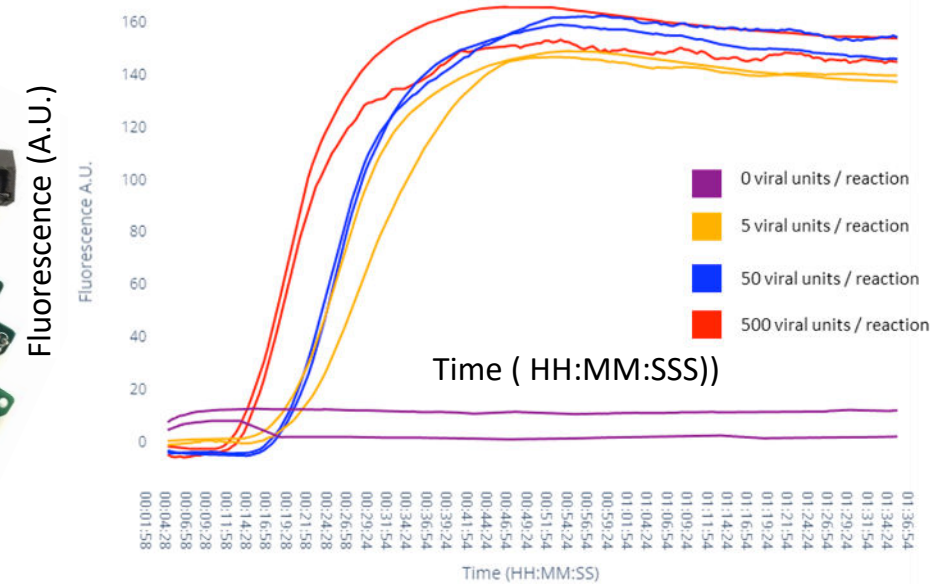
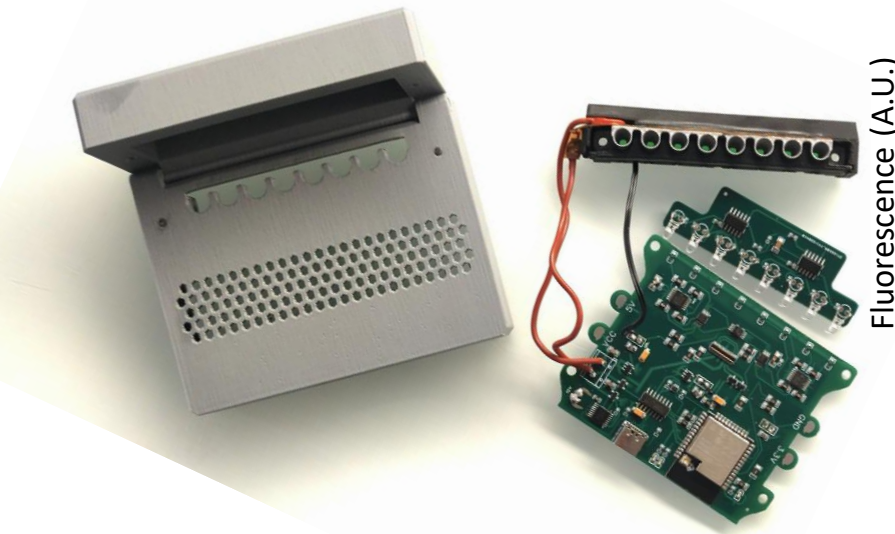
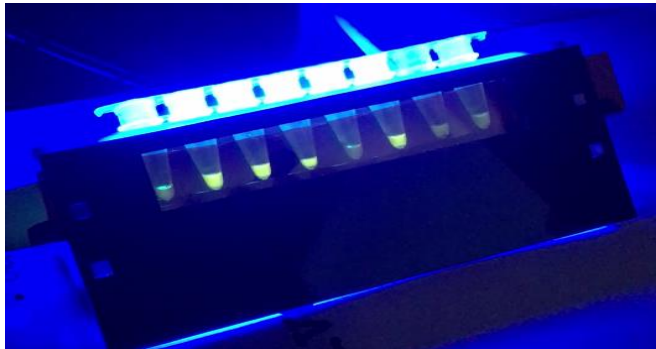
Foldscope origami

Printable biochip

Little device

# Frugal DNA Detection using Loop-mediated isothermal amplification (LAMP)

Guy Aidelberg (PhD student), Francisco Quero, Hortense Vielfaure (MSc students  
Dr. Samuel Sakyi and collaborators - Ghana Team  
Dr. Fernán Federici and collaborators – Chile team  
Dr. Jenny Molloy – Cambridge UK



# Endpoint hardware

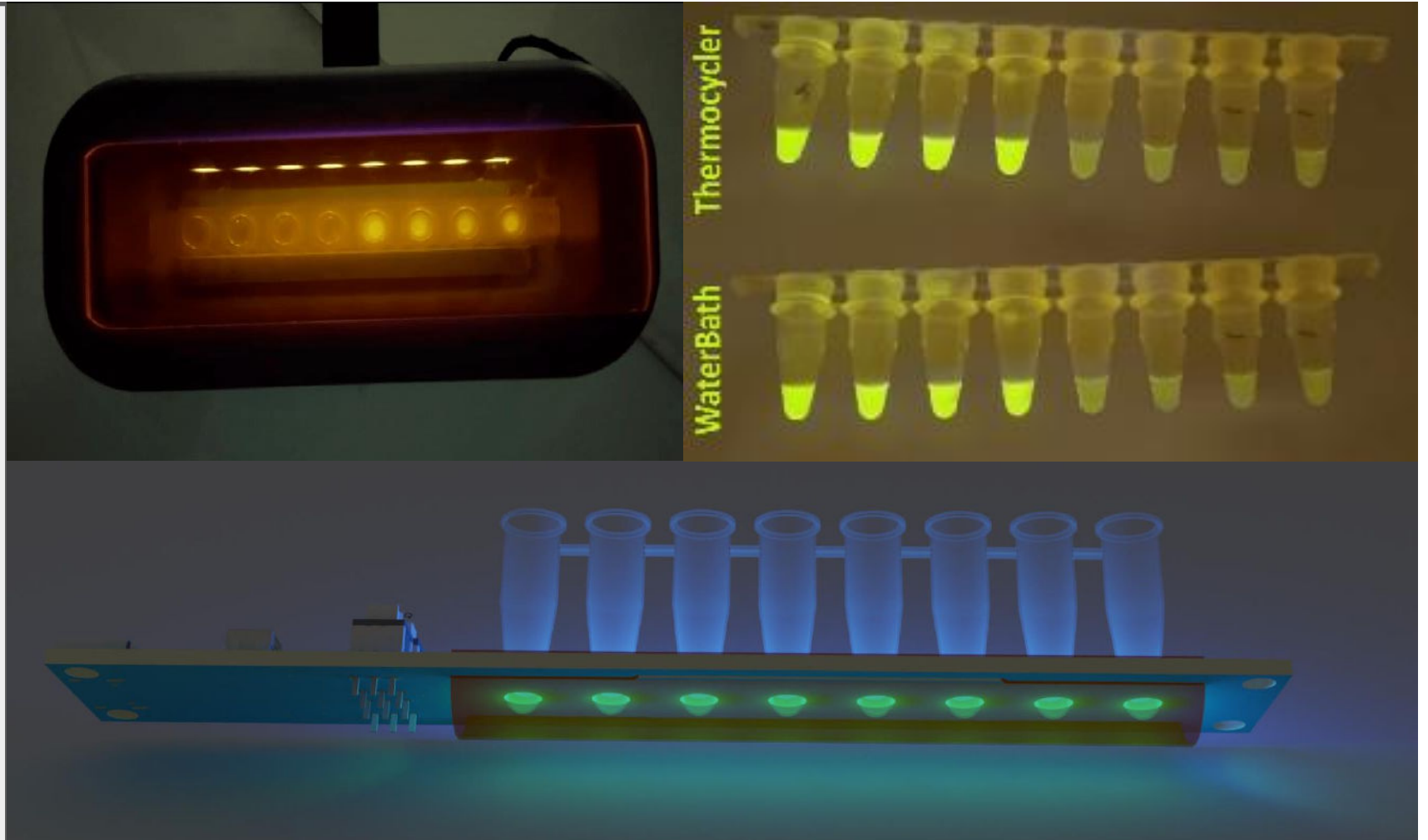
## Main features

- ★ Extremely low price
- ★ Fast results (20 min)
- ★ Portable
- ★ Simple to use

-----

## Potential applications

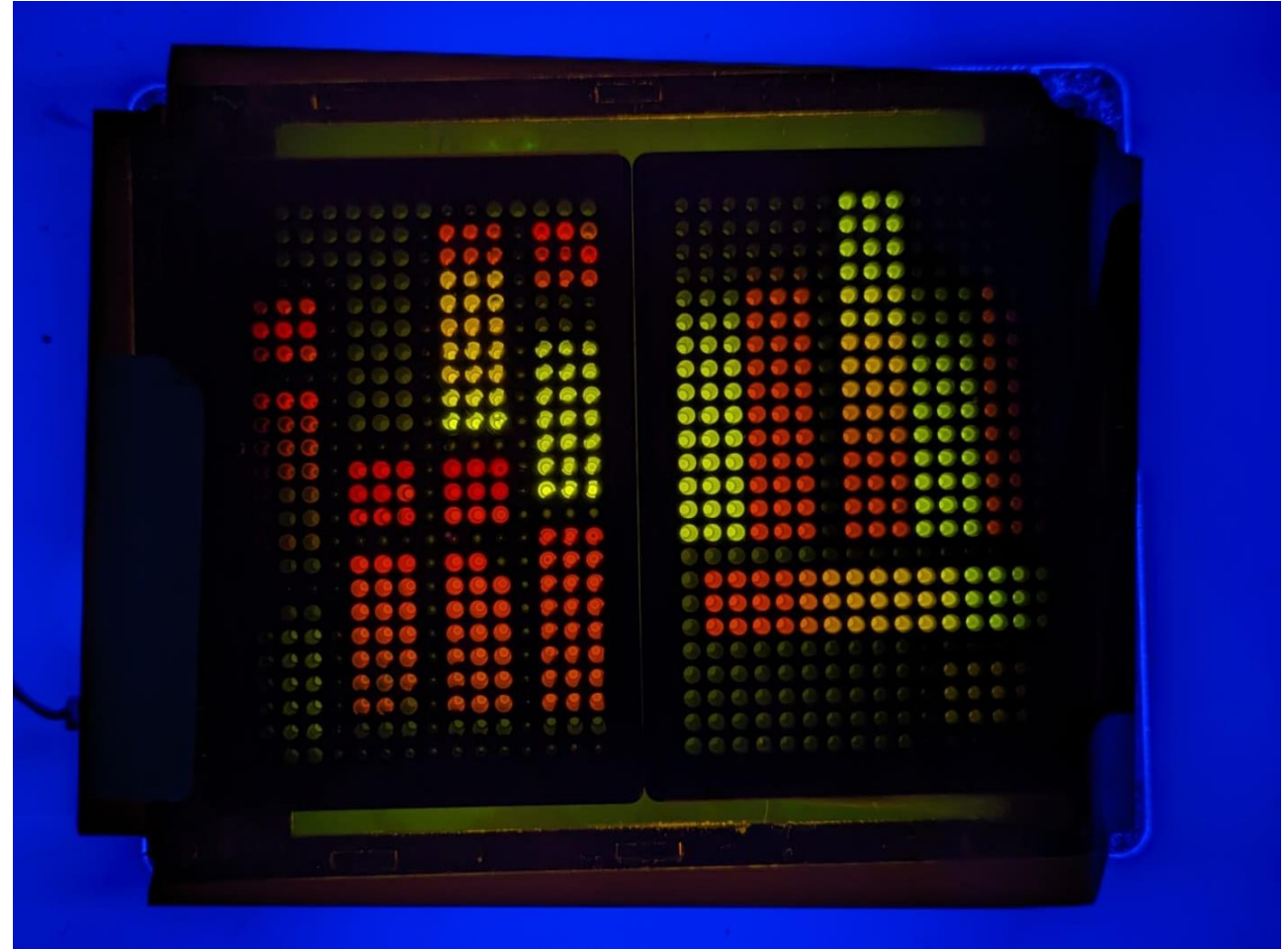
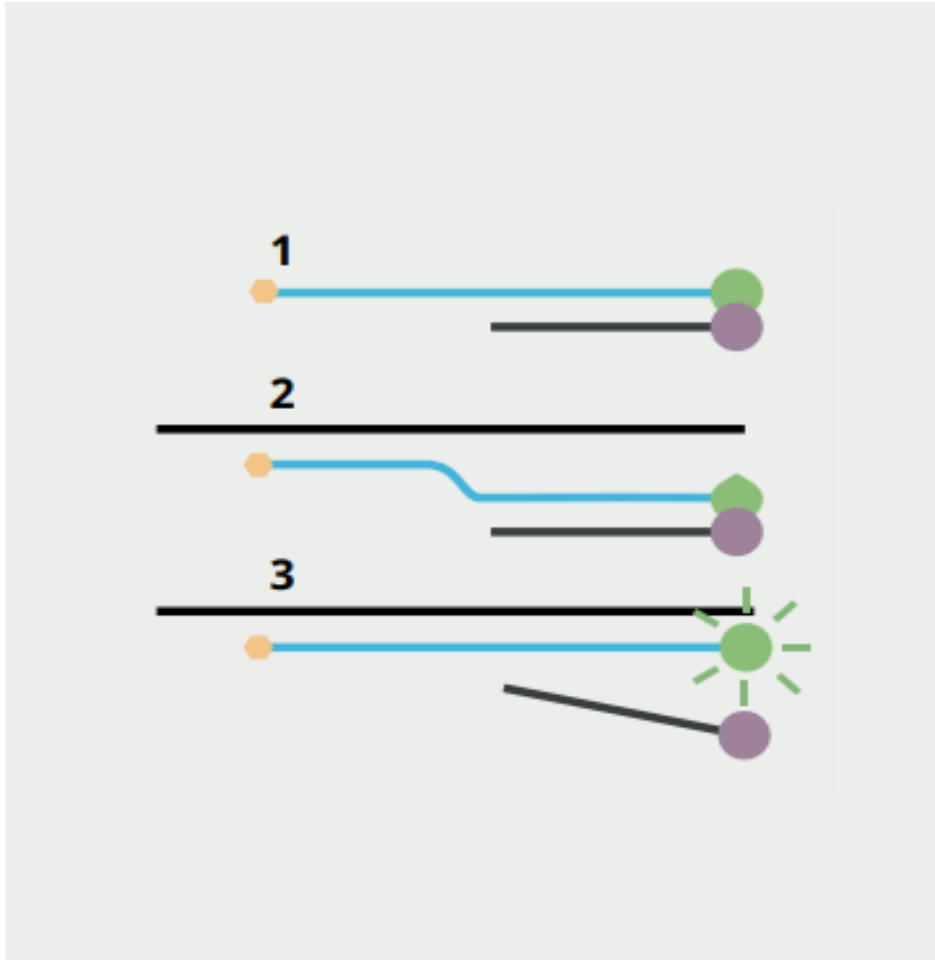
- ★ *Environmental screening*
- ★ *Distributed diagnostics*



# QUASR-LAMP - leuphilised, multiplexed

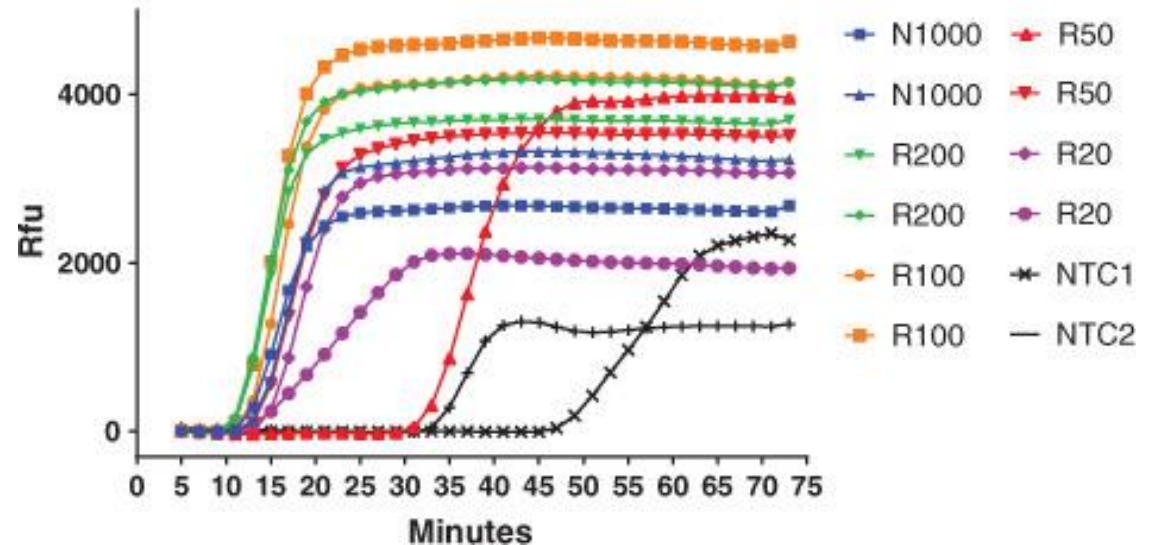
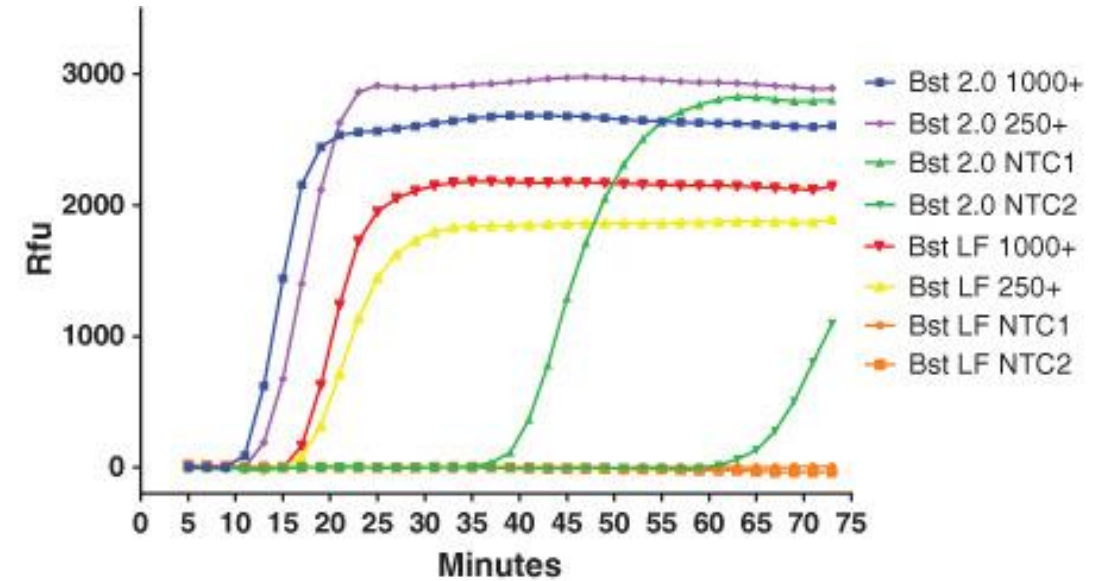
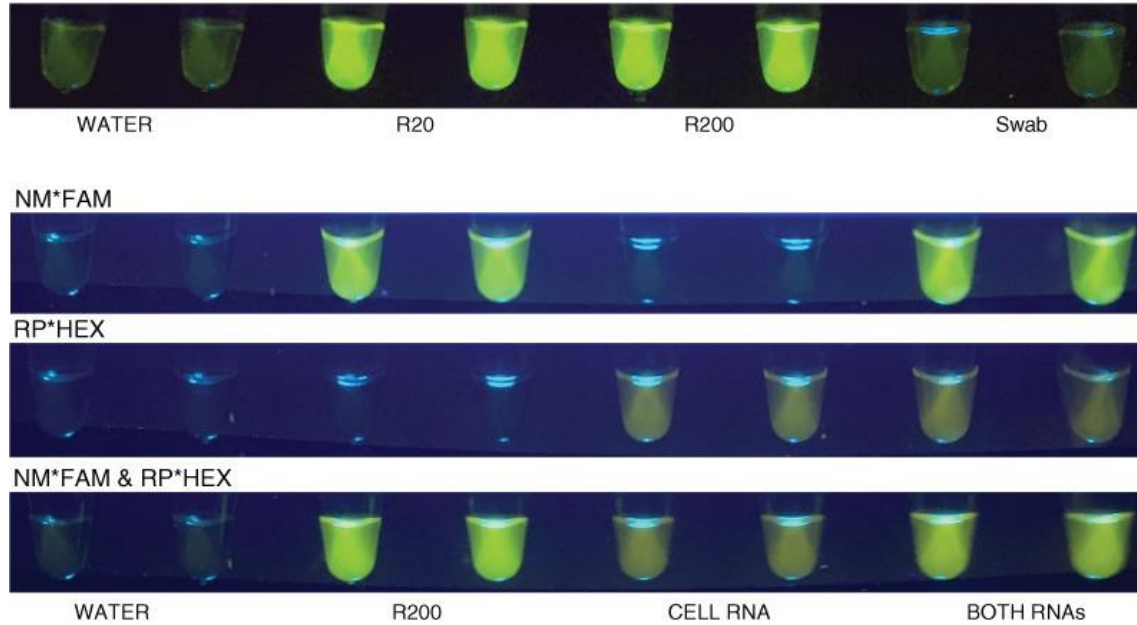
Working principle

384 format



# Corona Detective: a simple, scalable, and robust SARS-CoV-2 QUASR-LAMP

Covid RNA



Aidelberg, G. et al (2021). Corona Detective: a simple, scalable, and robust SARS-CoV-2 detection method based on reverse transcription loop-mediated isothermal amplification. *Journal of biomolecular techniques* : [JBT, 32\(3\), 89-97.](#)



# Real Time LAMP Hardware



# Open qLAMP: Real Time measurements

## Main features

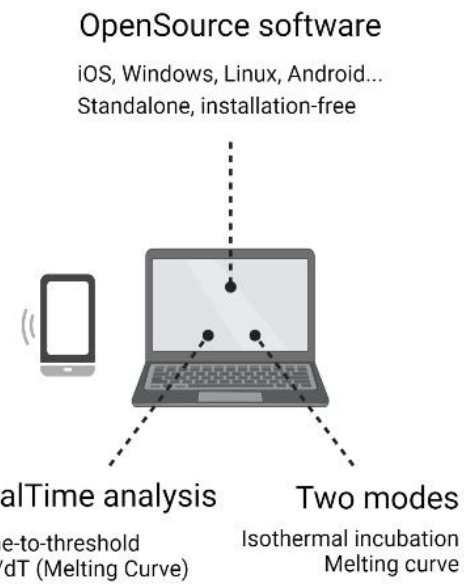
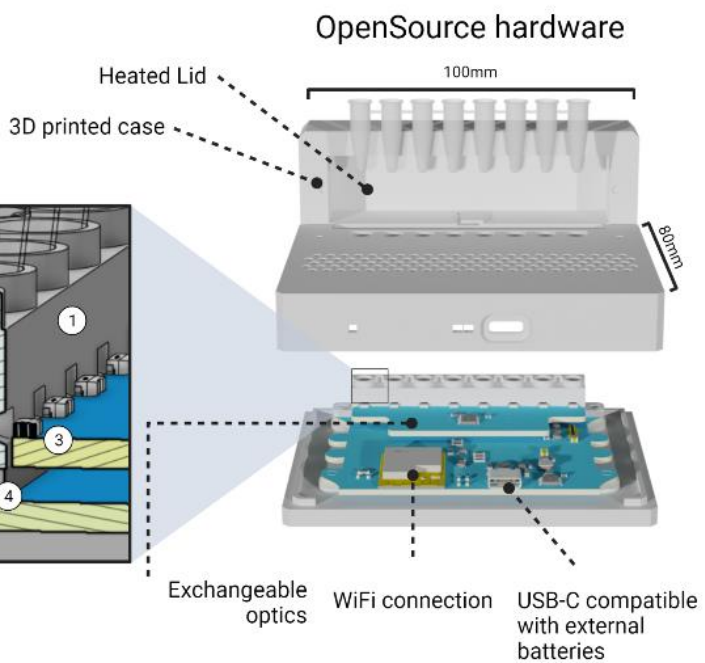
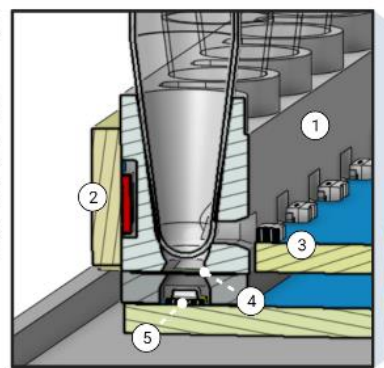
- Low-cost
- High accuracy (No F+)
- Real-time monitoring
- Versatile
- Quantitative
- Melting curves

## Applications

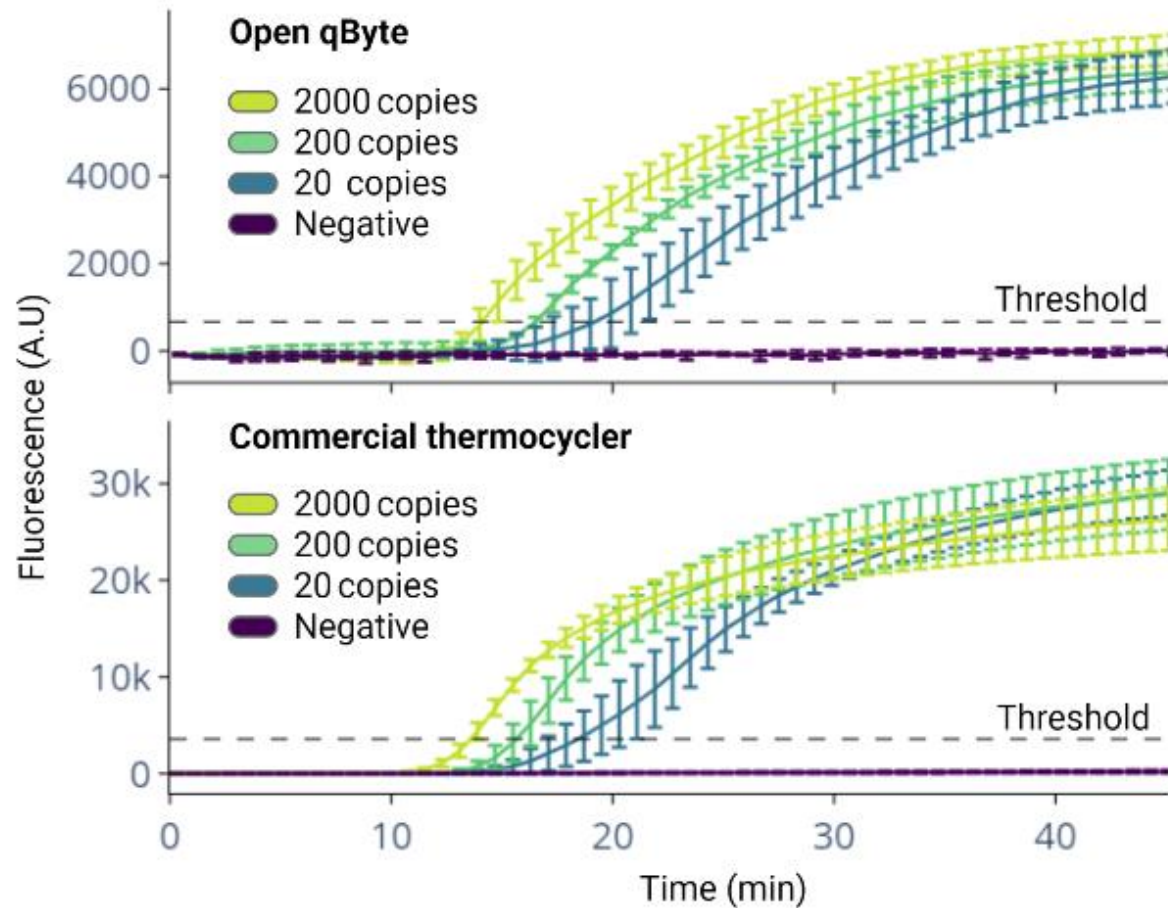
- Real Time Isothermal Amp.*
- Enzyme activity quant.*
- SNPs detection*
- AMR screening*
- Characterization of genetic constructs*

Price	Component
40€	PCBs
5€	Heat block
2€	Case
>0.1€	Filter

- 3D printed aluminium heat block ①
- PCB heater ②
- 470nm LED ③
- Green-light filter ④
- Photodiode ⑤



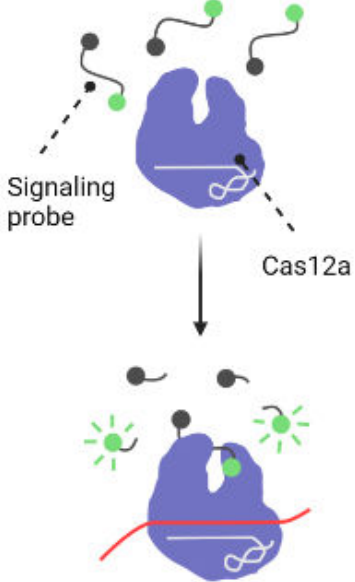
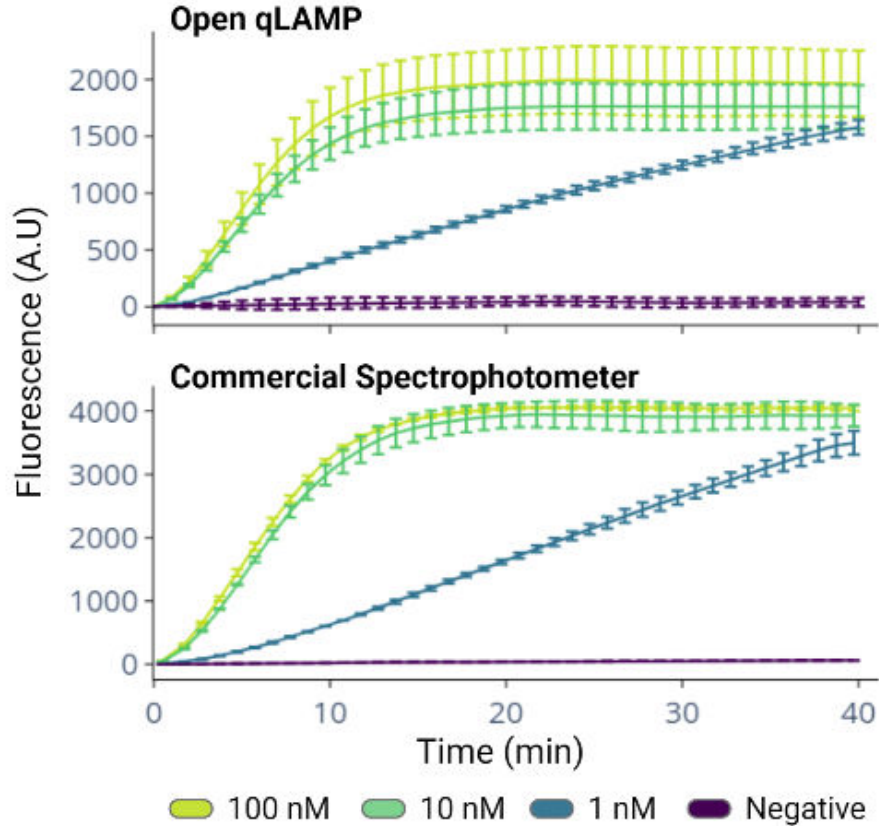
# OpenSource is comparable to commercial hardware



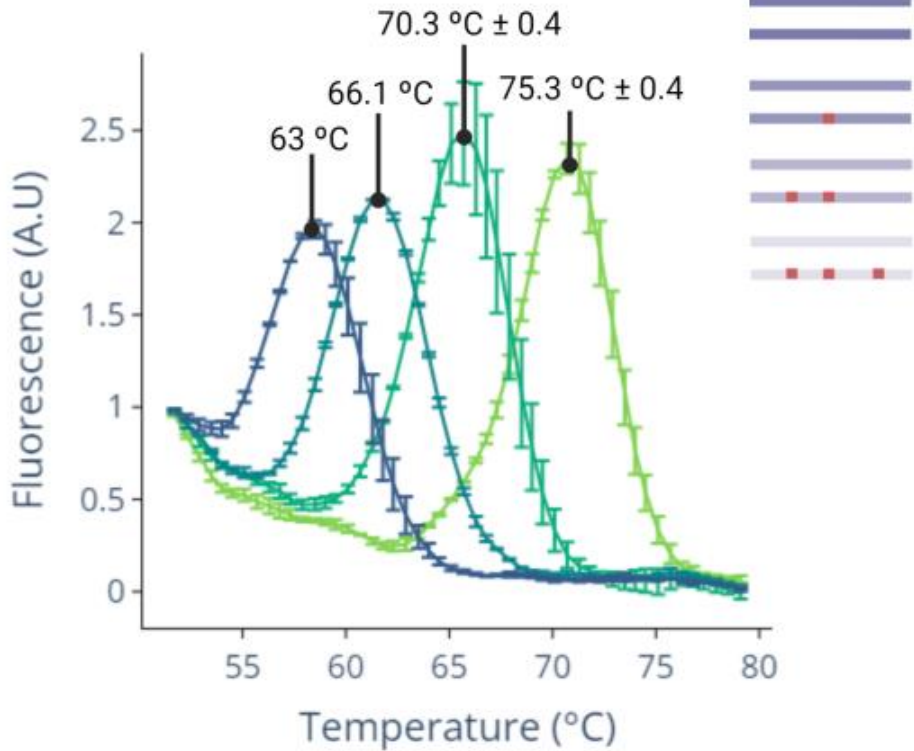
- GMO detection
- Covid19 screening
- Agricultural pathogens
- Blood parasites

# Open qLAMP: Real Time measurements

## CRISPR detection

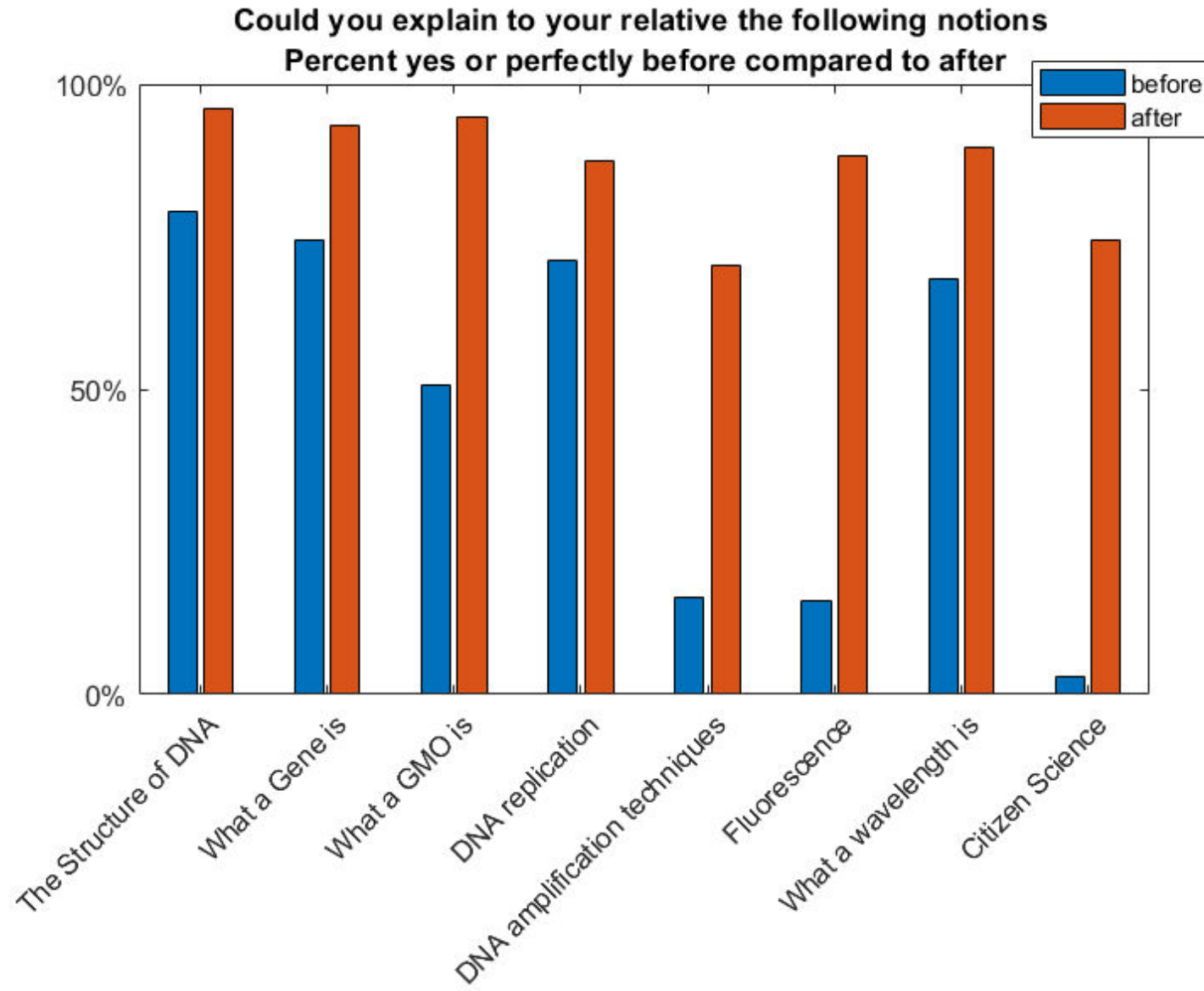


## SNP detection



# GMO detective as a learning tool

## Robust LAMP in the hands of Untrained public



<b>Double blind detection</b>	<b>Overall correct</b>
Correct/All	64/68 (94%)

## Open Access tools for managing chronic kidney disease (CKD) in low-resource settings



**Chetan Kumar VELUMURUGAN**

PhD Candidate

Systems Engineering and Evolution Dynamics (SEED) Lab | INSERM U1284

Learning Planet Institute, Université Paris Cité



# THANK YOU

Pr. Marc HAZZAN, Doyen Médecine, Université de Lille, France

Dr. Victor FAGES, Chef de Clinic, Department of Nephrology, CHU Lille, France

Pr. Thierry LOBBEDEV, Chef de Service, Department of Nephrology, CHU Caen, France

Dr. Clémence BÉCHADE, Maître de Conférence Universitaire - Praticien Hospitalier, CHU Caen, France

Dr. Prashanth THANKACHAN, Associate Professor, Division of Nutrition, St. John's Research Institute, India

Dr. Anil VASUDEVAN, Head, Department of Pediatric Nephrology, St. John's Medical College Hospital, India

Dr. Jose GOMEZ-MARQUEZ, Co-director, Little Devices Lab, MIT, USA

Pr. Abdou NIANG, Chef de Service, Nephrology-Dialysis-Internal Medicine, CHU Dalal Jamm, Senegal

Dr. Mansour MBENGUE, Nephrologist, CHU Dalal Jamm, Senegal

Dr. Ibrahima GUEYE, Associate Professor of Computer Science, École Polytechnique de Thiès, Senegal

Mr. Francisco QUERO, Research Engineer, SEED Lab, INSERM U1284, LPI, France

Dr. Kevin LHOSTE, Head of Maker Lab, LPI, France



Université  
Paris Cité



St. John's  
Research Institute



CONTEXT

# CHRONIC KIDNEY DISEASE (CKD) - MAGNITUDE OF THE PROBLEM



**10%**

Population worldwide is affected by CKD<sup>1</sup>

**1,230,168**

Deaths directly related to CKD in 2017<sup>2</sup>

**5<sup>th</sup>**

Leading cause of deaths worldwide by 2040<sup>3</sup>

**80,000**

Kidney transplants worldwide every year<sup>4</sup>

**13.3%**

Prevalence among Ghanaians<sup>5</sup>

**63.1%**

Hemodialysis machines in Greater Accra region<sup>6</sup>

**0%**

Peritoneal Dialysis not practiced in Ghana<sup>6</sup>

<sup>1</sup>National Kidney Foundation; <sup>2</sup>Bikbov B et al., 2020; <sup>3</sup>Foreman KJ et al., 2018;

<sup>4</sup>WHO-ONT Global Observatory on Donation and Transplantation; <sup>5</sup>Adjei et al., 2018;

<sup>6</sup>Tannor et al., 2018, J Himmelfarb et al., 2020

redesign **di**alysis  
for patients in low-resource settings

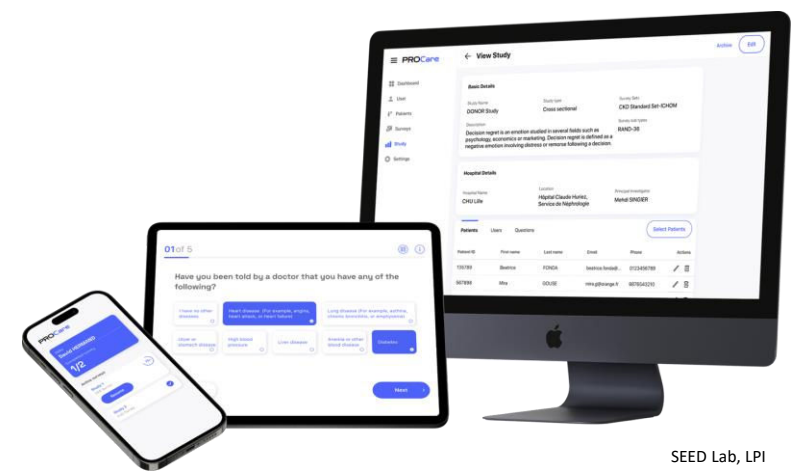
1. Point-of-care diagnostic tools for screening at-risk populations
2. Design and develop a portable peritoneal dialysis machine
3. Mobile application for measuring patient reported health outcomes



Point-of-care diagnostic tool



Portable Dialysis Machine

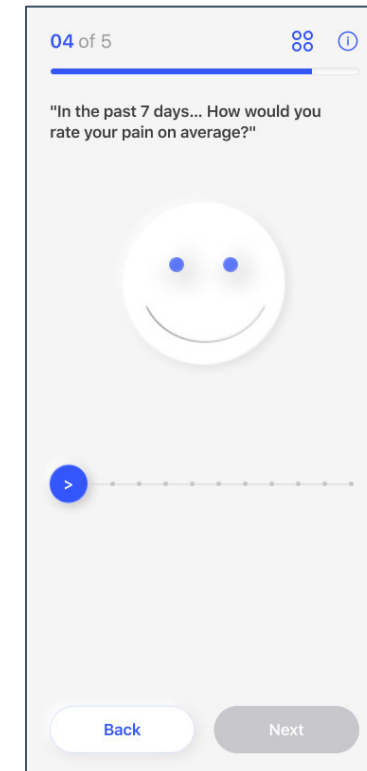
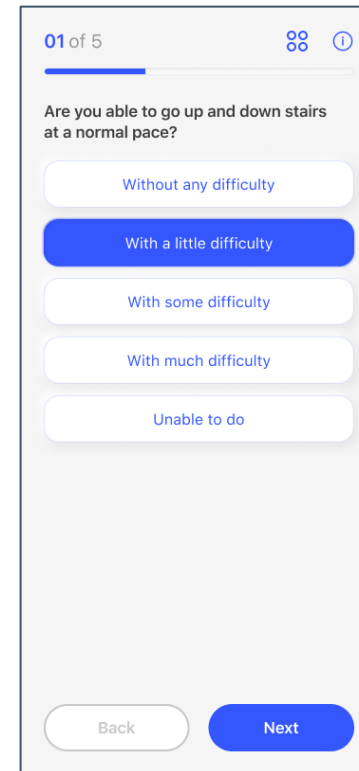
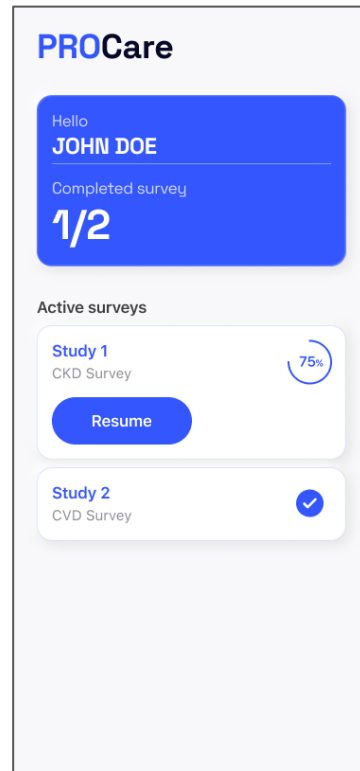
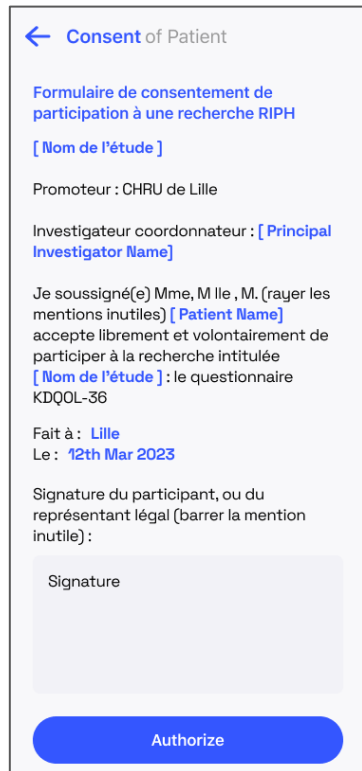
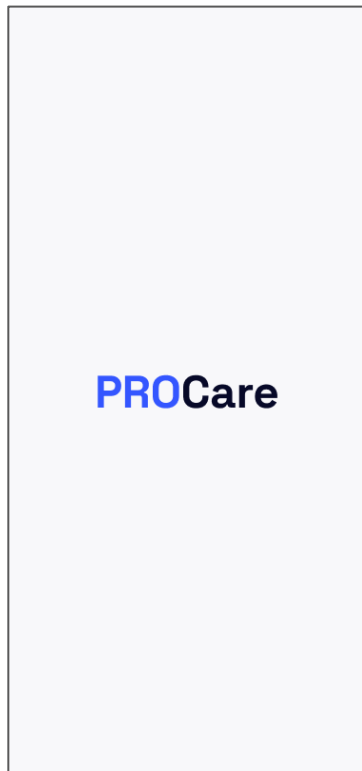


PROCare Application



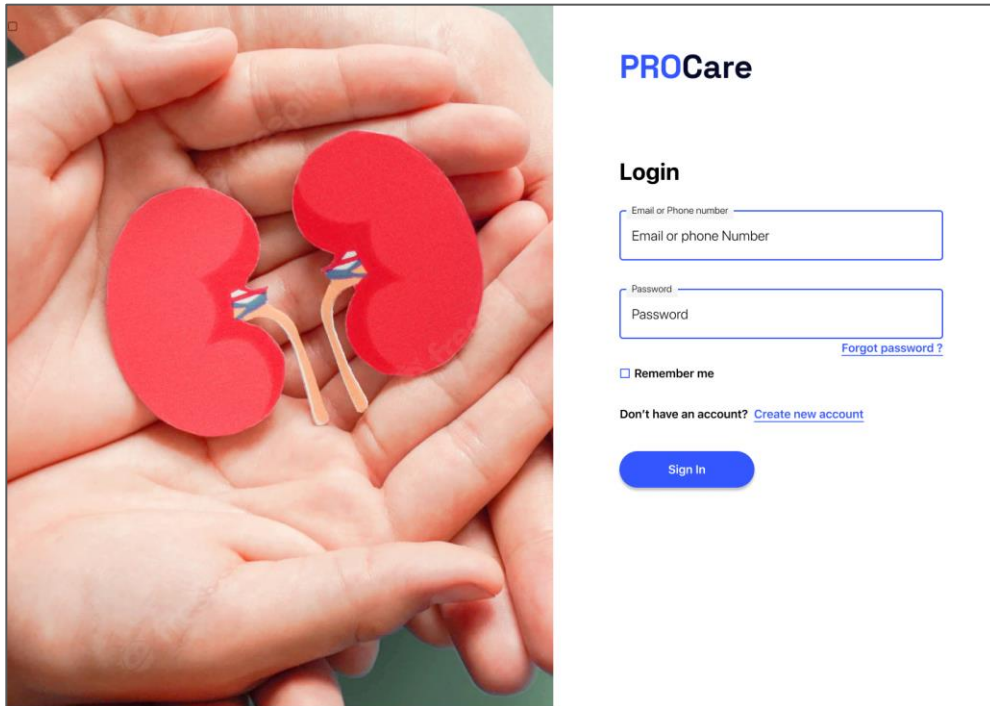
# MOBILE APPLICATION FOR PATIENTS

- Mobile app allows patients to respond to PROMs at home or in a clinical setting
- Produces real-time data on the overall impact of a treatment
- Enables continuous improvement of patient care pathways



# DASHBOARD FOR MEDICAL PERSONNEL AND RESEARCHERS

- Allows physicians and researchers to create studies and manage patients and users
- It has a list of standardized questionnaires like the EORTC QLQ-C30, ICHOM Sets for Breast Cancer, Colorectal Cancer, Lung Cancer
- It allows the creation of custom PROMs



**PROCare**

**Studies**

Search Export Import Add User

Survey ID	Study Name	Study type	Survey Set	Hospital Name	Principal Investigator	Status	Actions
1234	EvaSel	Longitudinal	RAND-36	CHU Lille	CULHANE	In Progress	<a href="#">Edit</a> <a href="#">Delete</a>
5678	DONOR	Longitudinal	RAND-36	CHU Caen	FONDA	In Progress	<a href="#">Edit</a> <a href="#">Delete</a>
9845	Test	Cross Sectional	KDQOL-36	CHU Lille	GOUSE	Inactive	<a href="#">Edit</a> <a href="#">Delete</a>
9900	RePROM	Longitudinal	PROMIS-29	CHU Lille	LEVIN	In Progress	<a href="#">Edit</a> <a href="#">Delete</a>

John Doe >



“Building together  
a learning society to rise  
to the challenges of our time”

[learningplanetinstitute.org](http://learningplanetinstitute.org)

