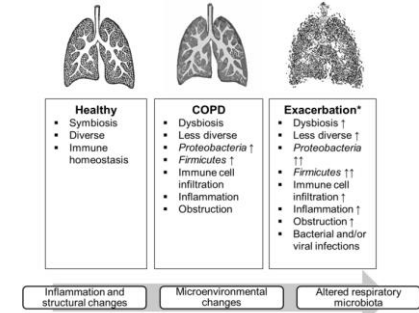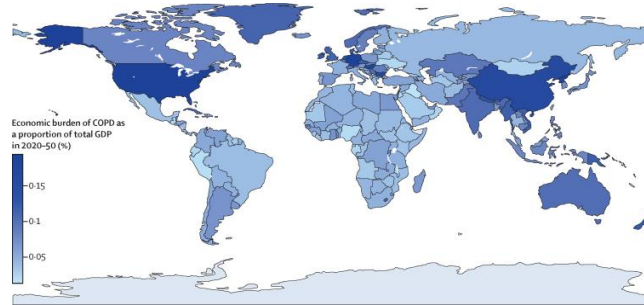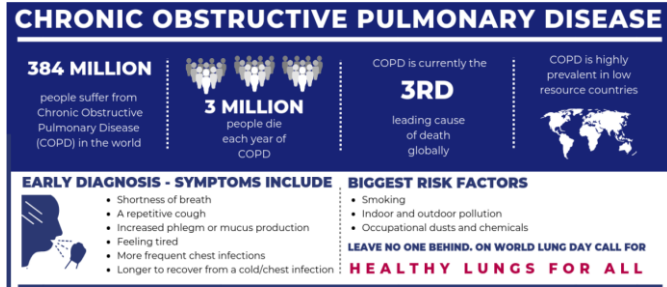# Transforming the way we diagnose…

Improving Quality of Life and Life Expectancy for COPD patients

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Problem: COPD – A Growing Global Health Crisis

Chronic Obstructive Pulmonary Disease (COPD) is one of the leading causes of death worldwide. End stage COPD patients at age 65 have an average reduced life expectancy in the US + EU5 of 5.8 years.
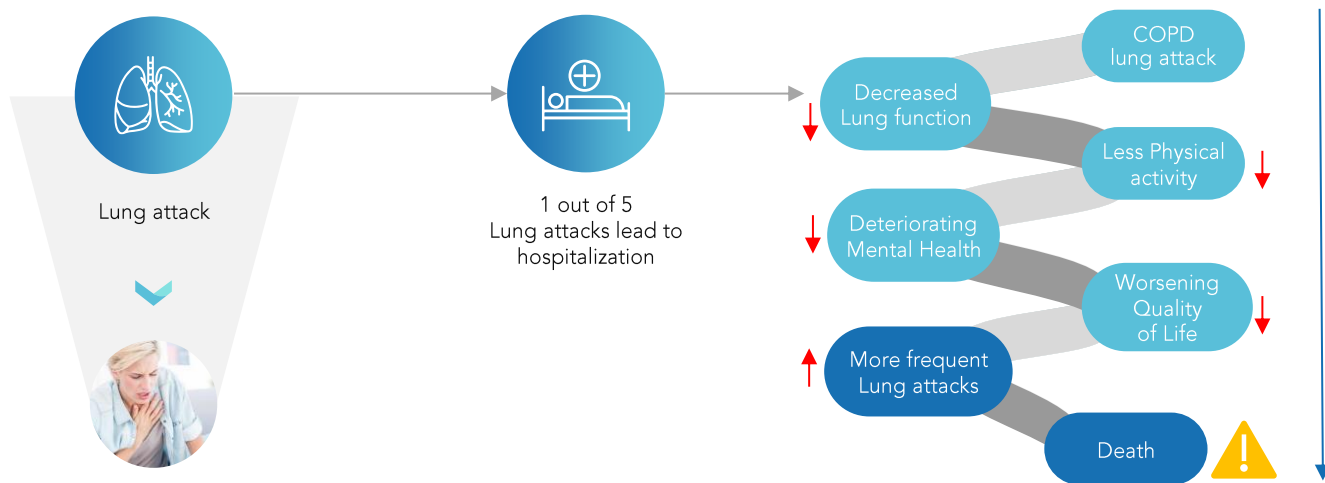
The economic burden of COPD is significant with some countries projected to spend up to 0.2% of their total GDP on treatment. The USA alone is projected to spend up to $1.3 trillion between 2020 and 2050.

Undetected and untreated exacerbations lead to severe lung damage and eventually to death. Early detection would severely increase quality of life of patients and reduce healthcare costs of COPD significantly

Early detection of COPD exacerbations can significantly improve patients' quality of life and life expectancy while drastically reducing the economic burden of the disease.

1. Boers E, Barrett M, Su JG, Benjafield AV, Sinha S, Kaye L, Zar HJ, Vuong V, Tellez D, Gondalia R, Rice MB, Nunez CM, Wedzicha JA, Malhotra A. Global Burden of Chronic Obstructive Pulmonary Disease Through 2050. JAMA Netw Open. 2023 Dec 1;6(12):e2346598. doi: 10.1001/jamanetworkopen.2023.46598. PMID: 38060225; PMCID: PMC10704283.
2. Chen S, Kuhn M, Prettner K, Yu F, Yang T, Bärnighausen T, Bloom DE, Wang C. The global economic burden of chronic obstructive pulmonary disease for 204 countries and territories in 2020-50: a health-augmented macroeconomic modelling study. Lancet Glob Health. 2023 Aug;11(8):e1183-e1193. doi: 10.1016/S2214-109X(23)00217-6. PMID: 37474226; PMCID: PMC10369014.
3. Tan WC, Bourbeau J, Hernandez P, Chapman KR, Cowie R, FitzGerald JM, Marciniuk DD, Maltais F, Buist AS, O'Donnell DE, Sin DD, Aaron SD; CanCOLD Collaborative Research Group. Exacerbation-like respiratory symptoms in individuals without chronic obstructive pulmonary disease: results from a population-based study. Thorax. 2014 Aug;69(8):709-17. doi: 10.1136/thoraxjnl-2013-205048. Epub 2014 Apr 4. PMID: 24706040; PMCID: PMC4112491.

Problem: Lung attacks today cannot be detected early in COPD patients leading to high hospitalization rates and early death

Lung attack

1 out of 5 Lung attacks lead to hospitalization

Decreased Lung function

COPD lung attack

Less Physical activity

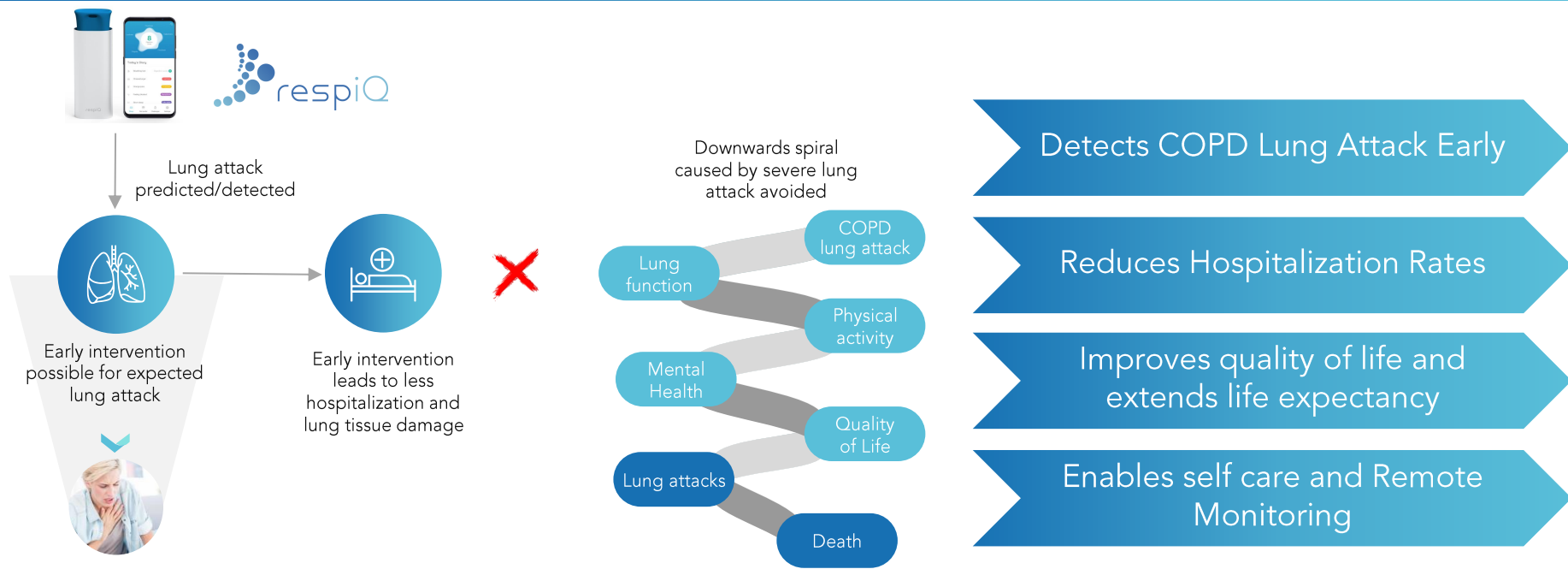Deteriorating Mental Health

Worsening Quality of Life

More frequent Lung attacks

Death

Undetected lung attacks lead to severe reduction in quality of life, early death and expensive hospitalizations

Solution: Our breath analyser is able to detect COPD exacerbations early allowing faster medical intervention and preventing the degenerative aspects of the desease

Lung attack predicted/detected

Early intervention possible for expected lung attack

Early intervention leads to less hospitalization and lung tissue damage

Downwards spiral caused by severe lung attack avoided

Lung function

COPD lung attack

Physical activity

Mental Health

Quality of Life

Lung attacks

Death

Detects COPD Lung Attack Early

Reduces Hospitalization Rates

Improves quality of life and extends life expectancy
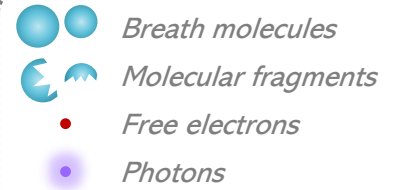
Enables self care and Remote Monitoring

Early detection of COPD exacerbations enables simple treatment with medication and prevents significant degeneration and hospitalizations
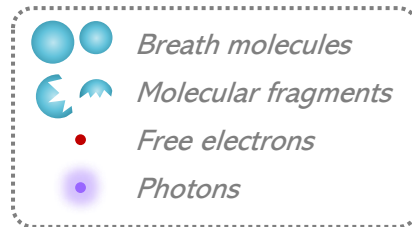
Our solution: how it works

1 Patient breathes into handheld device and breath sample is prepared before entering the microchip

Breath molecules

Molecular fragments

Free electrons

Photons

Our solution: how it works

1. Patient breathes into handheld device and breath sample is prepared before entering the microchip

2. High voltage dissociates molecules in the measuring chamber

Breath molecules
Molecular fragments
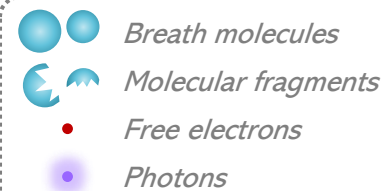Free electrons
Photons

Our solution: how it works

1. Patient breathes into handheld device and breath sample is prepared before entering the microchip

2. High voltage dissociates molecules in the measuring chamber

3. Broken chemicals bonds emits lights at specific wavelengths.

Breath molecules
Molecular fragments
Free electrons
Photons

Our solution: how it works

1. Patient breathes into handheld device and breath sample is prepared before entering the microchip

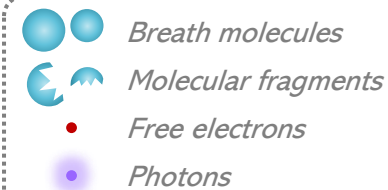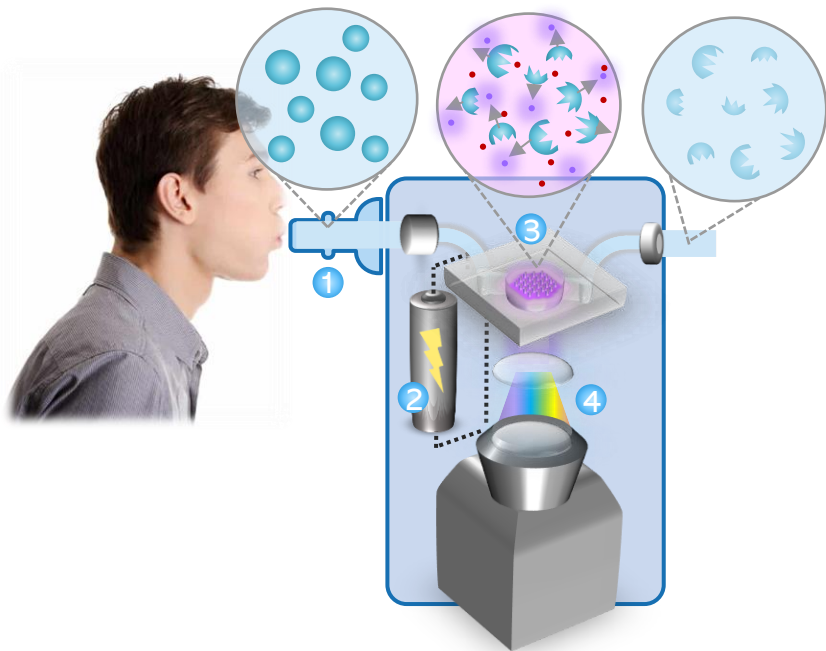2. High voltage dissociates molecules in the measuring chamber

3. Broken chemicals bonds emits lights at specific wavelengths.

4. Spectrometer measures the intensity and wavelength of the emitted light

- Breath molecules
- Molecular fragments
- Free electrons
- Photons

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Our solution: how it works

Breath molecules
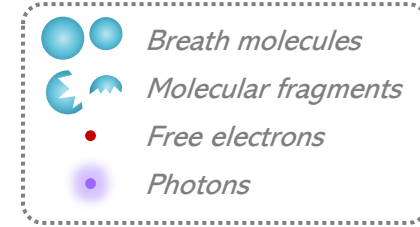**Molecular fragments**
Free electrons
Photons

1 Patient breathes into handheld device and breath sample is prepared before entering the microchip

2 High voltage dissociates molecules in the measuring chamber

3 Broken chemicals bonds emits lights at specific wavelengths.

4 Spectrometer measures the intensity and wavelength of the emitted light

5 Data is wirelessly transferred to app for analysis
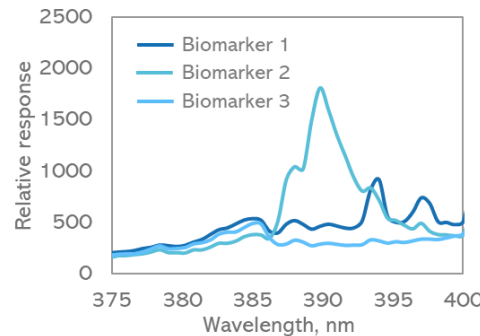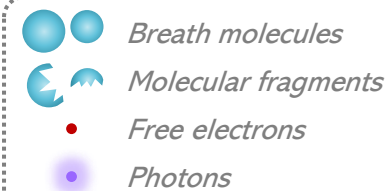
Our solution: how it works

1. Patient breathes into handheld device and breath sample is prepared before entering the microchip

2. High voltage dissociates molecules in the measuring chamber

3. Broken chemicals bonds emits lights at specific wavelengths.

4. Spectrometer measures the intensity and wavelength of the emitted light

5. Data is wirelessly transferred to app for analysis

6. Identification and quantification of biomarkers using AI

Breath molecules
Molecular fragments
Free electrons
Photons

Market Size: COPD is a large and Growing Market with very high costs for the healthcare system worldwide

$3 Billion Late-stage COPD patients (6.4million) in US, UK & EU5[1] assuming a 10% adoption rate[4]

SOM

$2.58 Trillion 60% costs due to lung-attack hospitalizations Global estimated hospitalization costs[2,3].

SAM

$4.3 Trillion Global 2020-2050 addressable market 2023 estimate[3].

TAM

1. EU5 = NL, DE, FR, IT, ES
2. Global Data, Rehman, et al, 2018, WebMD, Foo, 2016, Chen 2023
3. Chen, S., Kuhn, M., Prettner, K., Yu, F., Yang, T., Bärnighausen, T., Bloom, D. E., & Wang, C. (2023). The global economic burden of chronic obstructive pulmonary disease for 204 countries and territories in 2020–50: a health-augmented macroeconomic modelling study. *The Lancet Global Health*, *11*(8), e1183–e1193. https://doi.org/10.1016/S2214-109X(23)00217-6
4. Please refer to appendix 3 for a bottom up sales forecast

Business opportunity: even taking conservative assumptions we can quickly achieve significant revenue levels and profitability after launch

Subscription fee[1]
Per patient per year, EU & US

Treated patients
US, NL, DE, FR, IT, ES

Market share potential
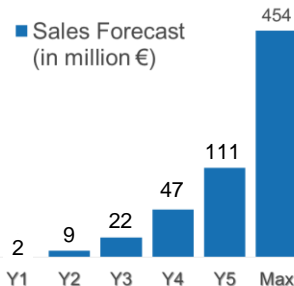
Adoption rate

Revenue forecast [1]

| US $940 EU €860 | × | 540,000 | × | 10% | × | 60% | = | |

Sales Forecast (in million €)

Y1	Y2	Y3	Y4	Y5	Max
2	9	22	47	111	454

Subscription model as main source of revenue. Exploring database commercialization.

Our solution has features that Uniquely Differentiates It From The Competition

1 Unique <u>patented</u> detection technology
(specific, simultaneous biomarker detection)

2 Distinctive breath print
(a new parameter for disease monitoring)

3 Built for today's healthcare needs
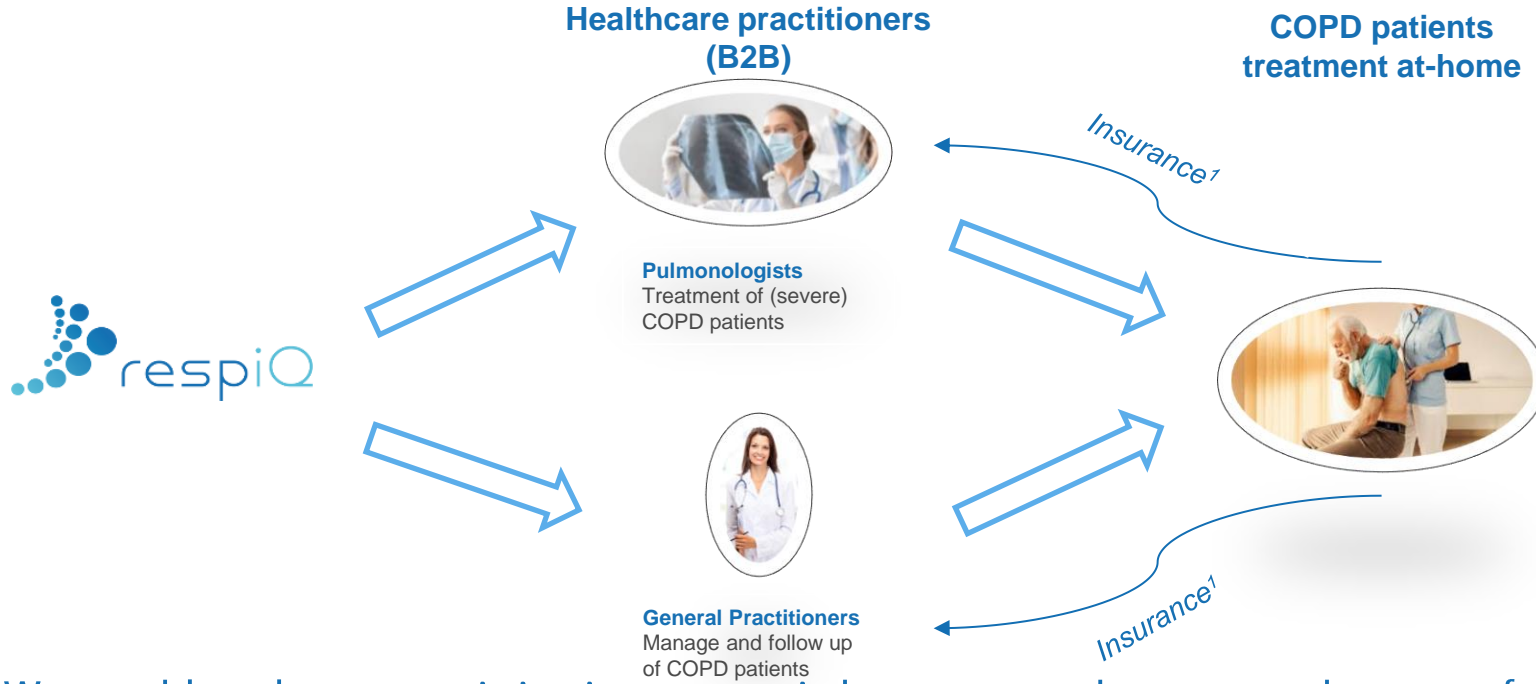(Affordable, non-invasive, real-time)
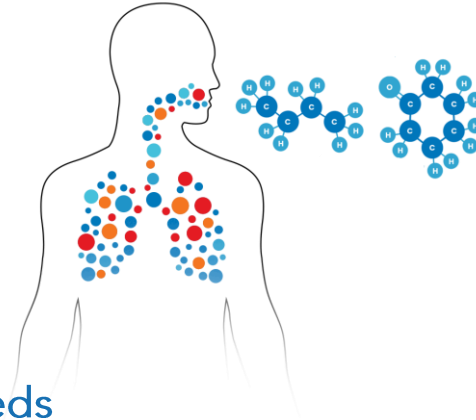
Our solution offers a superior combination of affordability, ease of use, portability, accuracy and sensitivity compared to our competitors whose technology is inherently unable to detect multiple bio-markers at the required sensitivity

Technology	Ease of Use	Accuracy	Portability	Affordability
RespiQ Plasma - Optical Emission Spectroscopy	✅	✅	✅	✅
Menssana Research Gas Chromatography Mass Spectrometry	-	✅	-	-
Owlstone Medical High-field Asymmetric Waveform Ion MS	-	✅	-	-
Breathonix IMS, HPPI-TOFMS, SIFT-MS, PTR-MS	-	✅	-	-
FoodMarble/Bedfont Scientific Electrochemical/MOS sensors	✅	-	✅	✅

Go-To-Market Approach

We continue to build partnerships with prominent COPD professionals to achieve fast and extensive adoption

Healthcare practitioners (B2B)

COPD patients treatment at-home

Insurance[1]

Pulmonologists
Treatment of (severe) COPD patients

General Practitioners
Manage and follow up of COPD patients

Insurance[1]

We are able to leverage existing insurance reimbursement codes to cover the costs of use for our device

Experienced DeepTech team

Trang Anh Nguyen, PhD
MEMS and Microfabrication Specialist

TECHNISCHE UNIVERSITÄT DRESDEN

Mira Gleisberg
Cofounder & CEO and CFO

2nd time founder
Head Philips
Health Solutions

McKinsey & Company   NUMICO

PHILIPS

Cristian D'Alessandro, PhD
CTO

Medical Device R&D

SYNCHRON   TSC The Surgical Company

Satadal Dutta, PhD
Experimental Scientist

UNIVERSITY OF TWENTE.

TUDelft
Delft University of Technology

Sarah Hubar-Fisher
Venture Builder, 21 years of strategic healthcare experience

J&J

Team Highlights

- Experience leading devices from R&D to the market
- Highly skilled team: PhD's in key positions of R&D and employees from the most renown universities in the Benelux and Germany.
- Recognized professors as advisor in relevant fields
- Engineering team with expertise in; Medical device development, RA, QA, QMS (ISO 13485), AI, Data Science, MEMS, Spectroscopy, Plasma, IEC 60601, IEC 62304, IEC 62366, ISO 14971

Advisors & Partners

Prof. Maitland-van der Zee

Pulmonary disease & breath analyses

Amsterdam UMC

Prof. Mona Bafadhel

Respiratory Medicine and COPD expert

KING'S College LONDON

Giulio Goletto

Business Development & scale up

ANTLER
accenture

Prof. Han Gardeniers

Micro and nano-fabrication

UNIVERSITY OF TWENTE.

Vitalii Vorkov, PhD

Data Science Advisor, Co-Founder

KU LEUVEN
Meta

Prof. Paul Maguire

Microplasmas and Nanofabrication

Ulster University

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Future direction: Datasets with valuable (disease) insights

Continuous patient data collection

Market development
(Food intolerance, Menstrual health, Volatolomics in other sectors)

Breathprint database with valuable health insights

E.g., medication effectiveness, disease prediction.

Predictive analysis

Disease management

Clinical validation data

Transforming the way we diagnose…

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