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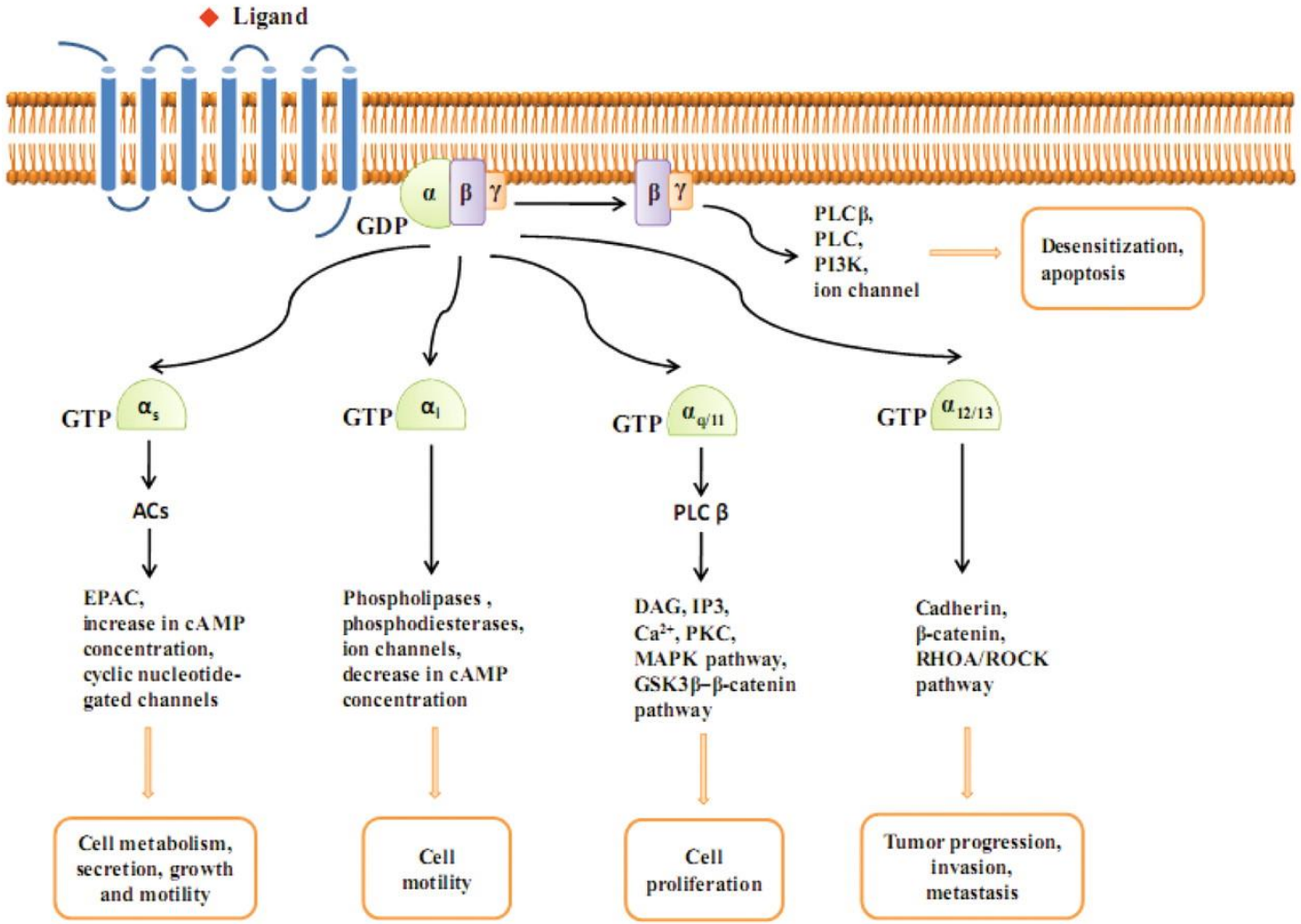
# Dissecting GPCR signaling

Dr. Bart Landuyt

Functional Genomics & Proteomics

# GPCR signaling complexity





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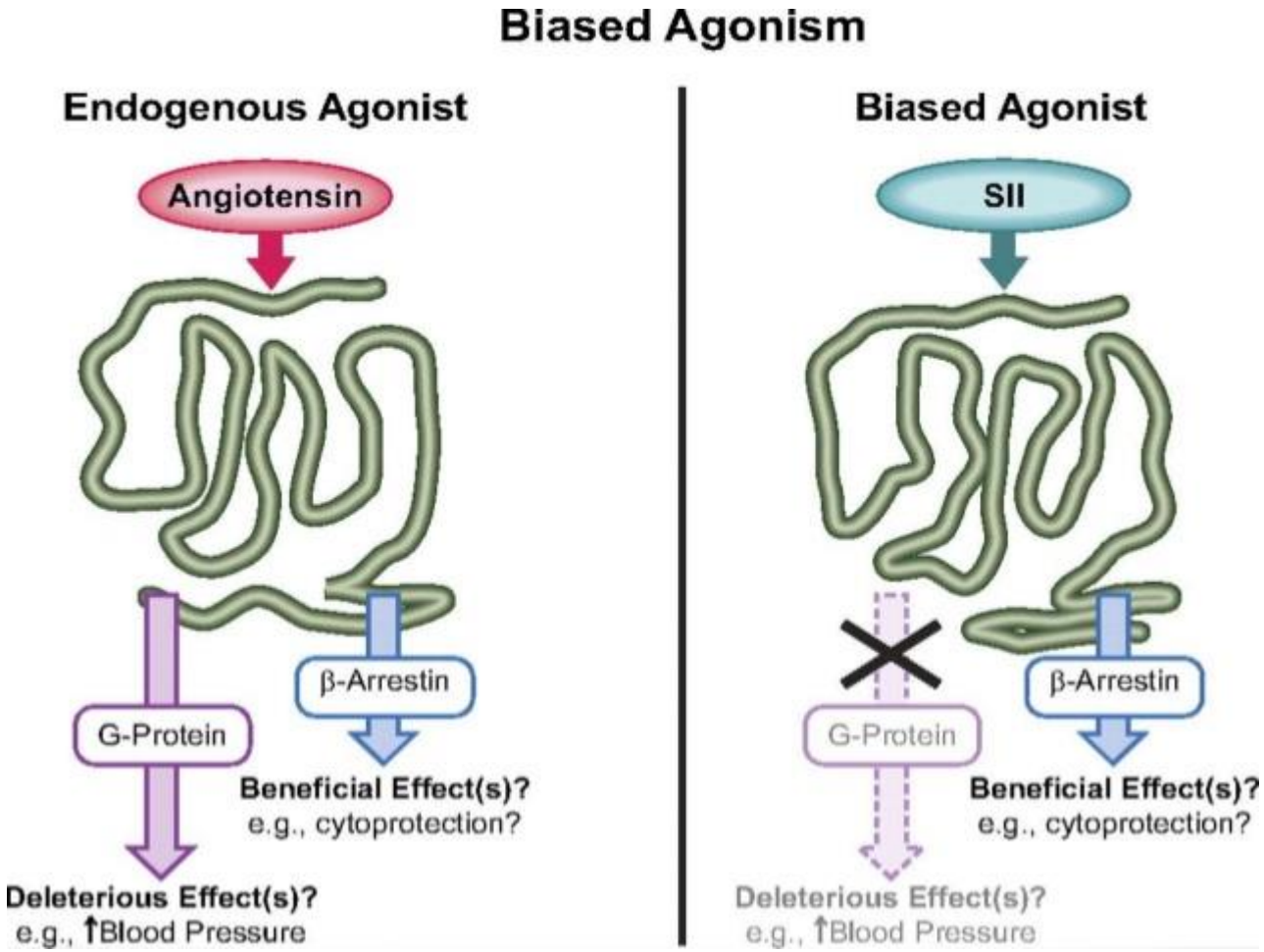
# GPCR signaling complexity



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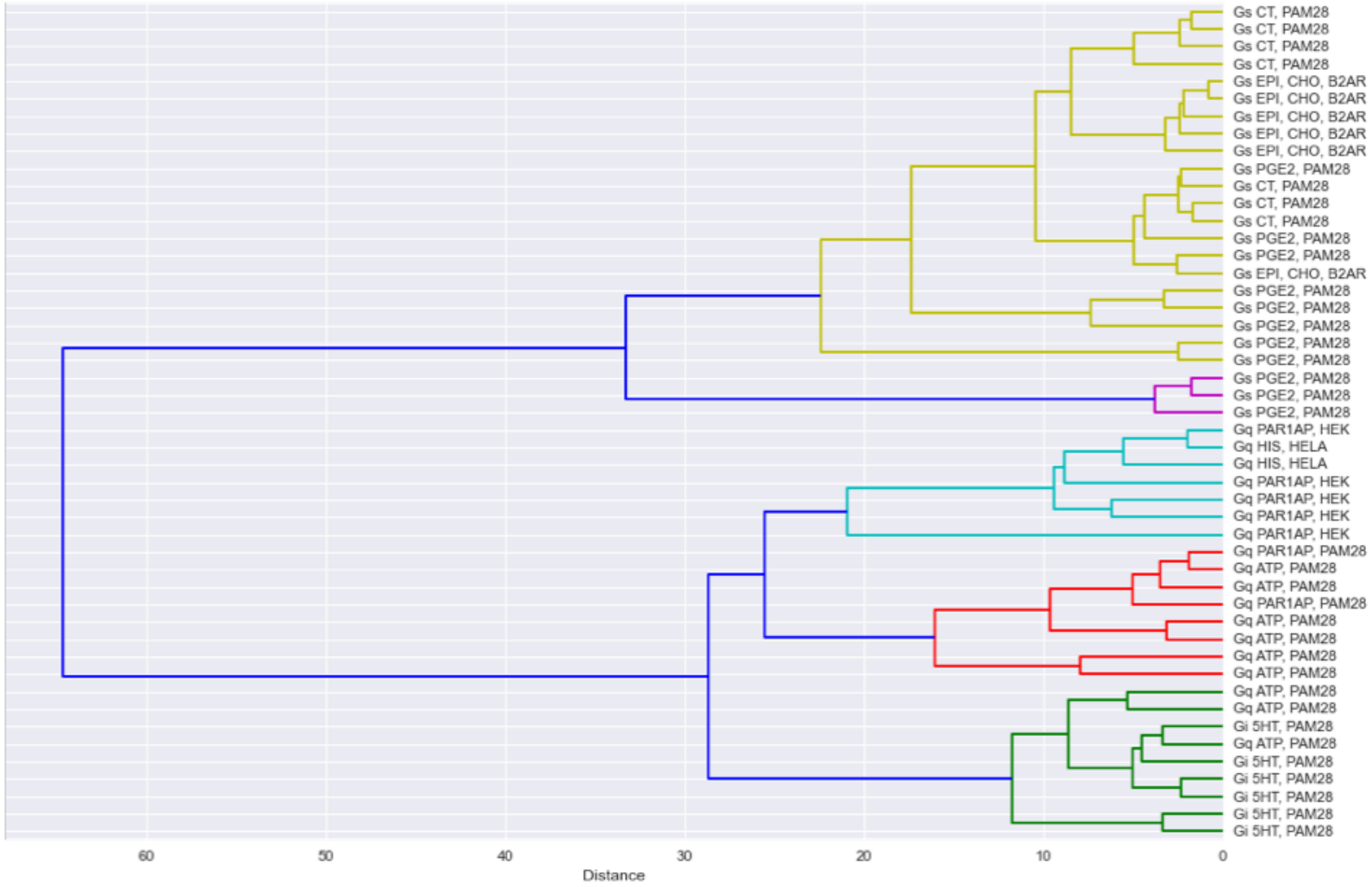
# Complete, label-free, real-time GPCR assays



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# Contact

bart.landuyt@kuleuven.be

Functional Genomics & Proteomics

Naamsestraat 59

3000 Leuven



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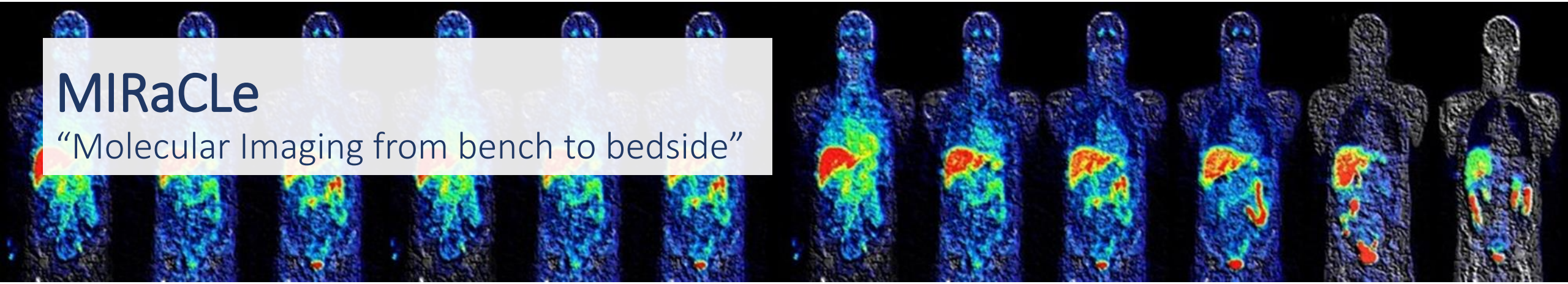


# MIRaCLe

"Molecular Imaging from bench to bedside"

# Molecular Imaging Research and Clinic Leuven


Prof. dr. Koen Van Laere, MD, PhD, DrSc

Prof. dr. Guy Bormans, PharmD

Veronique Daniëls, PhD

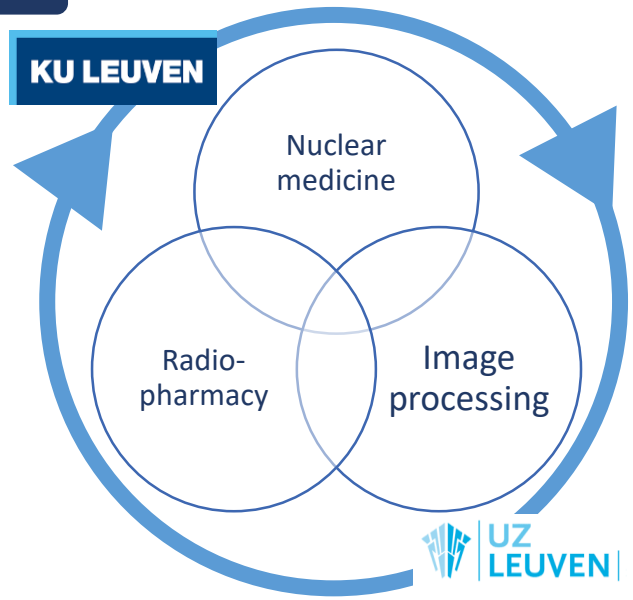
www.mircle.be


KU LEUVEN

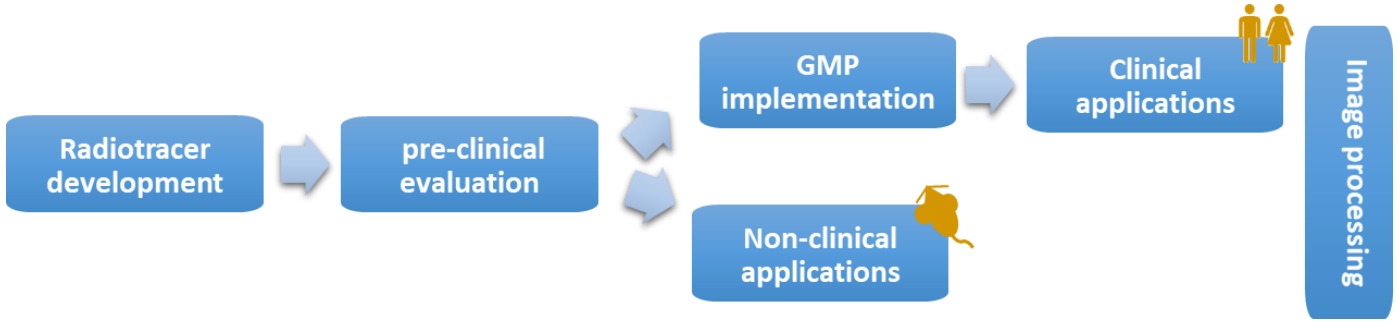
UZ LEUVEN

# MIRaCLe: our concept

## United expertise




## "From bench to bedside"




## MIRaCLe key facts & figures

- GMP certified production unit for PET radiotracers
- Holder of the ISO 9001:2015 quality certificate
- **15+** The number of First-In-Man studies performed by MIRaCLe
- **40+** The number of radiotracers available at MIRaCLe
- **100+** Joint publications on tracer and drug development (last 10 years)
- Marketing authorisation for Glucogast™ – 2-[$^{18}$F]fluoro-deoxy-D-glucose ($^{18}$FDG)

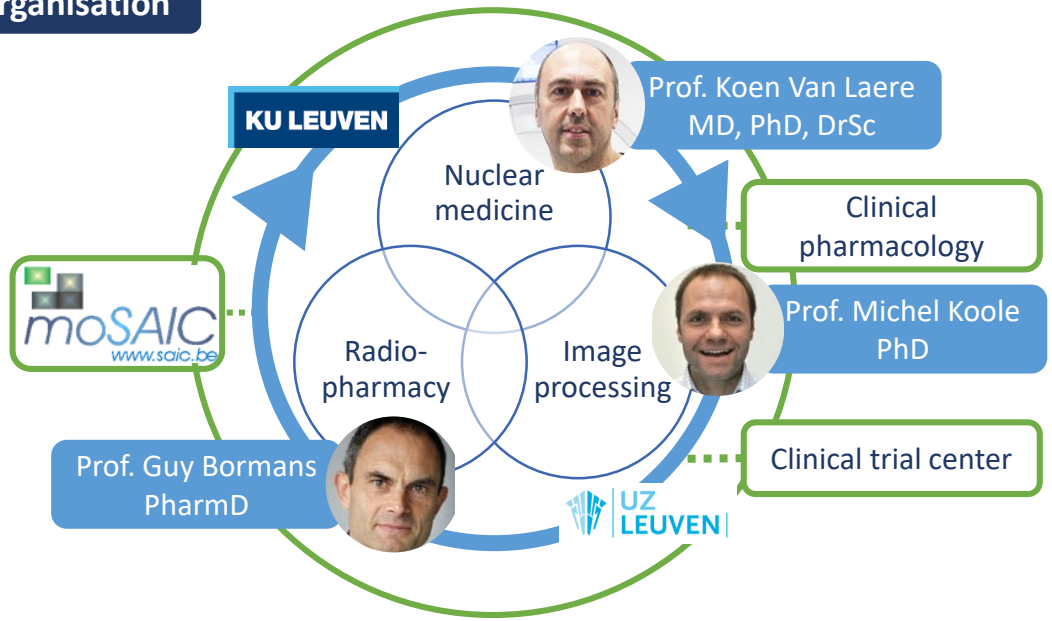
## Supporting

- ✓ Fundamental and academic research
- ✓ Contract research
- ✓ Contract manufacturing

www.mircle.be

# MIRaCLe: who we are

## The organisation




## Our areas of expertise

- ✓ Neurosciences
- ✓ Oncology
- ✓ Cardiology

## The infrastructure

### Nuclear medicine

- Cyclotron: $^{18}F$, $^{11}C$, $^{15}O$, $^{13}N$
- $^{68}Ga$ and $^{99m}Tc$ generators
- Radiochemistry labs (R&D and GMP)
- Clinical imaging hardware

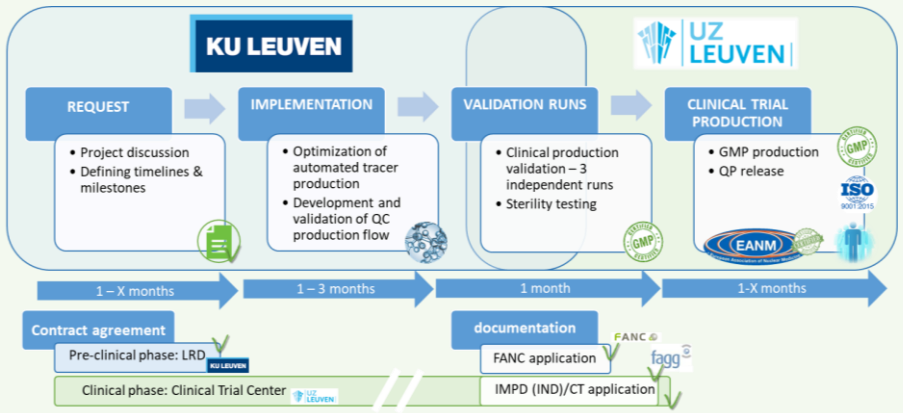
### Radiopharmacy

- Organic synthesis lab
- Radio-LC/MS
- Autoradiography
- QC lab

moSAIC www.saic.be

- $^{3}H$ lab
- Non-clinical imaging hardware (µPET/CT, µPET/MR, MR, CT, bioluminescence,…)

# Work with us




## Clinical contract research

- ✓ Biomarker studies
- ✓ Diagnosis and radionuclide therapy
- ✓ Validation of new radiopharmaceuticals
- ✓ Occupancy and pharmacodynamics

**What We Observe In Vivo Is Not Always What We See In Vitro: Development and Validation of $^{11}$C-JNJ-42491293, A Novel Radioligand for mGluR2**

Gil Leurquin-Sterk[*1], Sofie Celen[*2], Koen Van Laere[1], Michel Koole[1], Guy Bormans[2], Xavier Langlois[3], Anne Van Hecken[4], Paula te Riele[3], Jesús Alcázar[3], Alfons Verbruggen[4], Jan de Hoon[4], Jose-Ignacio Andrés[3], and Mark E. Schmidt[3]

**Quantifying SV2A density and drug occupancy in the human brain using [$^{11}$C]UCB-J PET imaging and subcortical white matter as reference tissue**

Michel Koole[1] · June van Aalst[1] · Martijn Devrome[1] · Nathalie Mertens[1] · Kim Serdons[1] · Brigitte Lacroix[2] · Joel Mercier[2] · David Sciberras[2] · Paul Maguire[2] · Koen Van Laere[1]

**Characterization of the Novel GlyT1 PET Tracer [$^{18}$F]MK-6577 in Humans**

ANIKET D. JOSHI,[1] SANDRA M. SANABRIA-BOHÓRQUEZ,[1] GUY BORMANS,[2] MICHEL KOOLE,[3] JAN DE HOON,[4] ANNE VAN HECKEN,[4] MARLEEN DEPRE,[4] INGE DE LEPELEIRE,[5] KOEN VAN LAERE,[5] CYRILLE SUR,[1,*] AND TERENCE G. HAMILL[1]

## Contract manufacturing

Radiotracer development → pre-clinical evaluation → GMP implementation → Clinical applications

pre-clinical evaluation → Non-clinical applications

Image processing

## Contact us

- ✓ veronique.daniels@kuleuven.be
- ✓ www.mircle.be

**Preclinical Evaluation of a P2X7 Receptor–Selective Radiotracer: PET Studies in a Rat Model with Local Overexpression of the Human P2X7 Receptor and in Nonhuman Primates**

Dieter Ory[*1,2], Sofie Celen[*1], Rik Gijsbers[2,3], Chris Van Den Haute[3,4], Andrey Postnov[3], Michel Koole[3], Caroline Vandeputte[3], José-Ignacio Andrés[6], Jesus Alcazar[6], Meri De Angelis[6], Xavier Langlois[6], Anindya Bhattacharya[6,7], Mark Schmidt[6], Michael A. Letavic[7], Wim Vanduffel[8], Koen Van Laere[3], Alfons Verbruggen[1], Zeger Debyser[2], and Guy Bormans[1]

Journal of Medicinal Chemistry

**Synthesis, Evaluation, and Radiolabeling of New Potent Positive Allosteric Modulators of the Metabotropic Glutamate Receptor 2 as Potential Tracers for Positron Emission Tomography Imaging**

José-Ignacio Andrés,[*,†] Jesús Alcázar,[†] José María Cid,[†] Meri De Angelis,[†] Laura Iturrino,[†] Xavier Langlois,[‡] Hilde Lavreysen,[‡] Andrés A. Trabanco,[†] Sofie Celen,[§] and Guy Bormans[§]

## Non-clinical contract research

- ✓ Development of new radiotracers
- ✓ Non-clinical validation of new radiotracers
- ✓ Quantitative target – disease relationship studies
- ✓ Non-clinical imaging studies in small animals

**Comparison of New Tau PET-Tracer Candidates With [$^{18}$F]T808 and [$^{18}$F]T807**

Lieven Declercq, Pharmacist[1], Sofie Celen, PhD[1], Joan Lecina, PhD[1], Muneer Ahamed, PhD[1], Thomas Tousseyn, Prof, MD, PhD[2], Diederik Moechars, PhD[3], Jesus Alcazar, PhD[4], Manuela Ariza, PhD[4], Katleen Fierens, PhD[4], Astrid Bottelbergs, PhD[3], Jonas Mariën, PhD[3], Rik Vandenberghe, Prof, MD, PhD[5], Ignacio Jose Andres, PhD[4], Koen Van Laere, Prof, MD, PhD[6], Alfons Verbruggen, Prof, PhD[1], and Guy Bormans, Prof, PhD[1]

# Antibody Market

*Largest & fastest growth across industry*

## Advantages

- Superior **approval rates**
  - High target specificity
  - Low toxicity
- **Huge market**

  > 80 marketed mAbs

  > 300 mAbs in development

  Annual sales > $95 B

## Challenges

- **Discovery**
  - Low efficiency
  - Limited hit diversity
  - Extensive engineering
- **Development**
  - Long development time
  - Stability & Aggregation
  - Immunogenicity
  - Need of (companion) diagnostics

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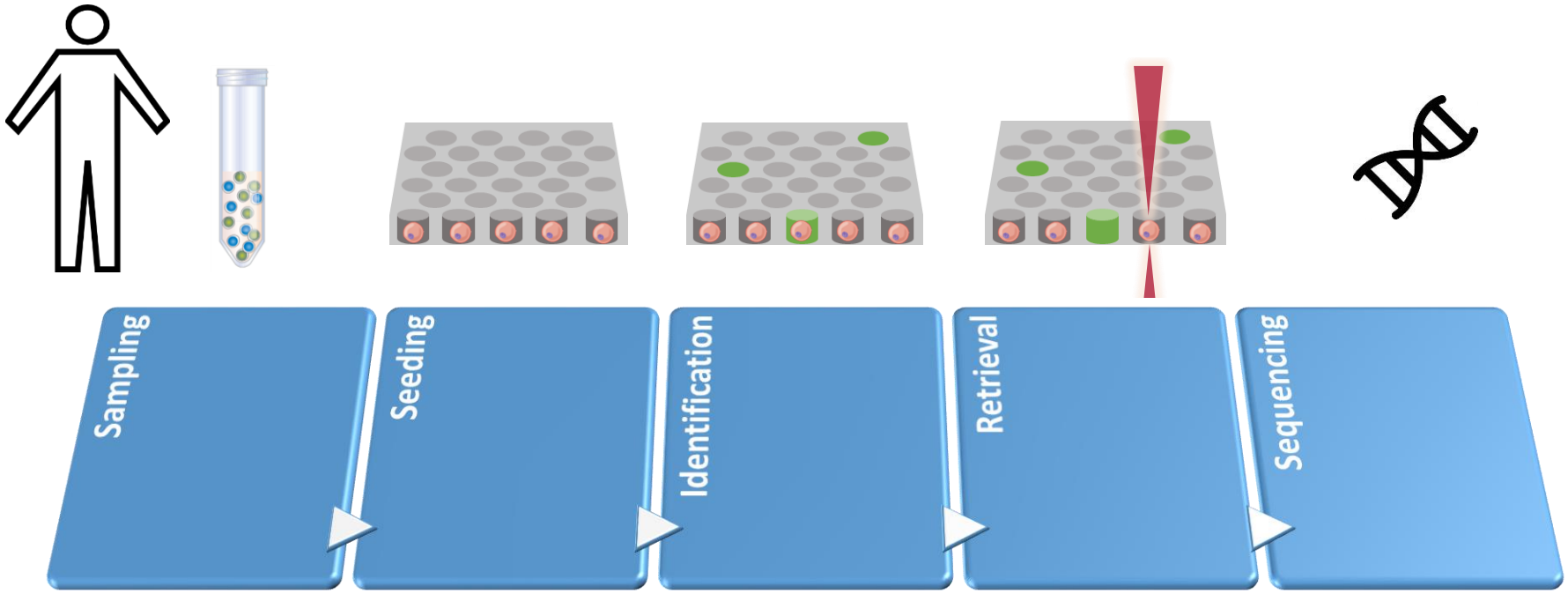
# Our Antibody Discovery Solution

*Microfluidic single B-cell screening*

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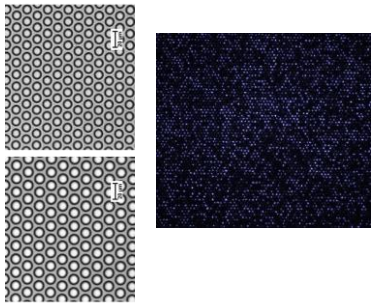
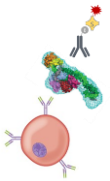
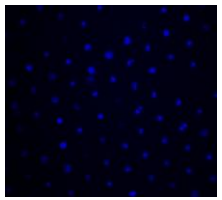
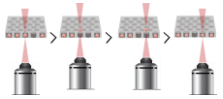
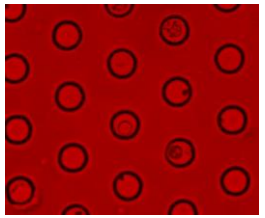
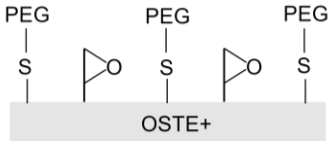
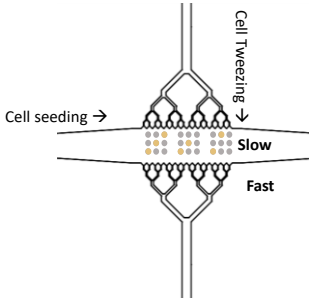
# Impact

## *Unique differentiators and strength*

| Single B-cell seeding and washing | Single B-cell assay and single cell lifting | Microwell coating and single B-cell retrieval |
|---|---|---|
|   |     | PEG 2000 increases hydrophylity and cell adhesion   Single cell transfer   |
| **PROOF OF CONCEPT** | | **DIFFERENTIATION** |

**FASTER** discovery

**DEEPER** screening

**GREATER** diversity

**SUPERIOR** safety

**LOWER** immunogenicity

**EXPLOIT** challenging targets

**HIGH VALUE INDUSTRIAL PARTNERSHIPS AND LICENSE DEALS**

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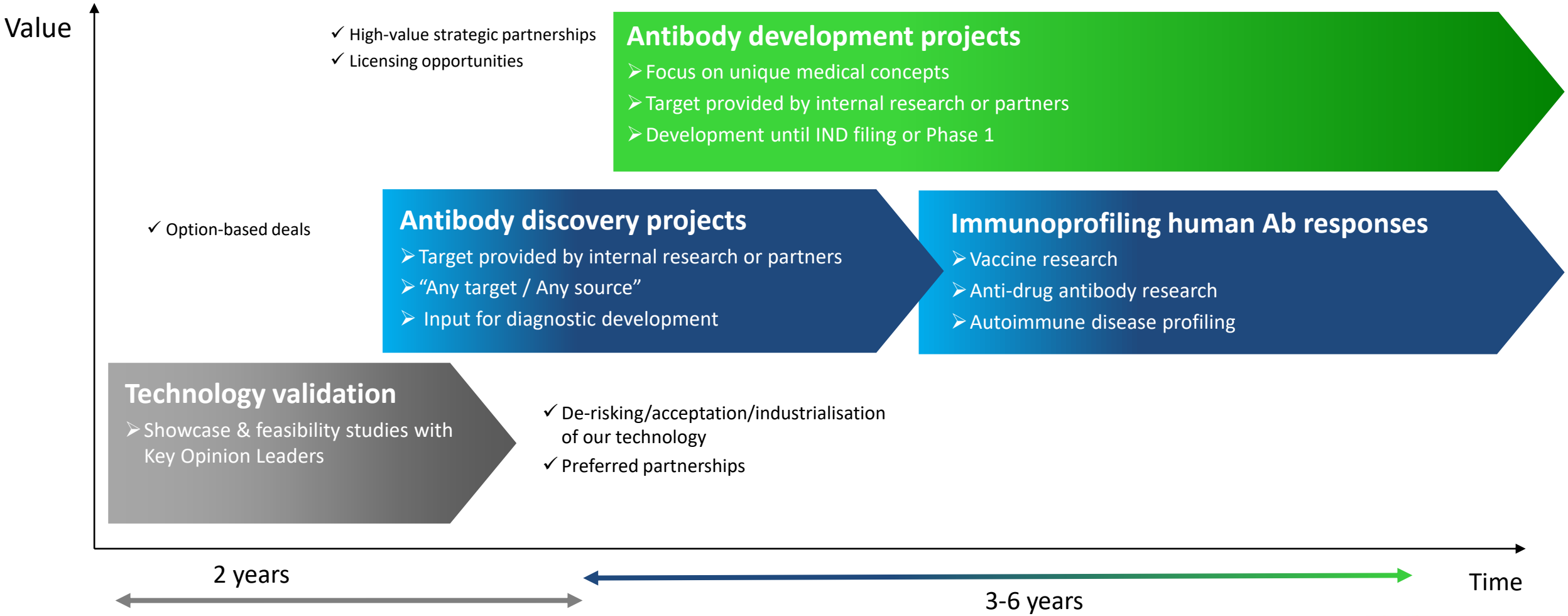
The KU Leuven Antibody Center

# Going Forward

## *de-risking and go-to-market strategy*

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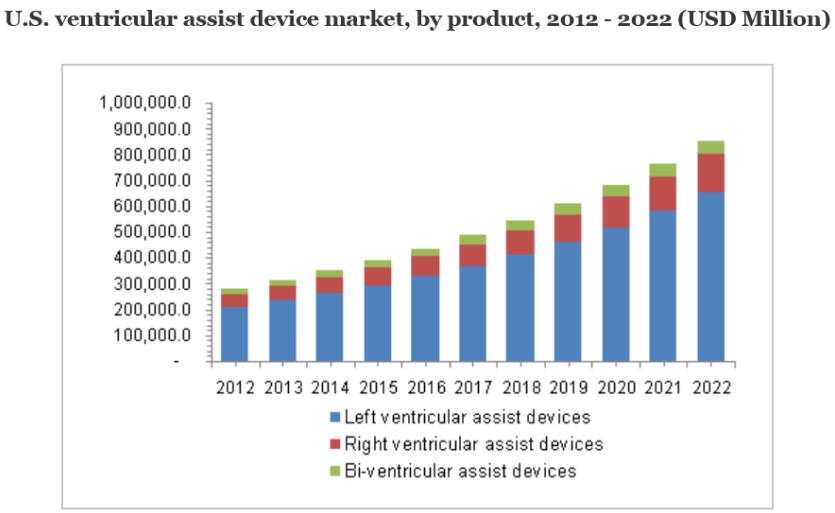
## INDICATION

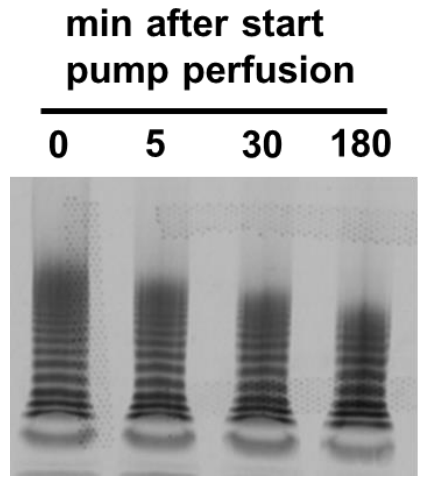
- **Congestive Heart Failure** affects 20 mio people
- Chronic **Ventricular Assist Devices** have already surpassed heart transplants (>30.000 patients)
- The **total VAD market** was valued at $ 600 million in 2018 and is showing continued growth.



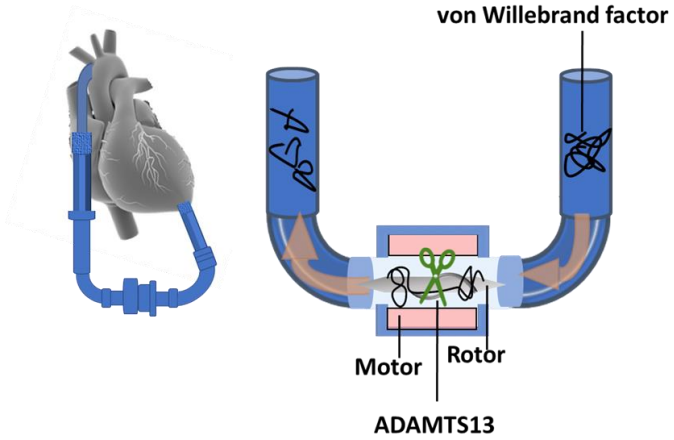

Source: GrandViewResearch

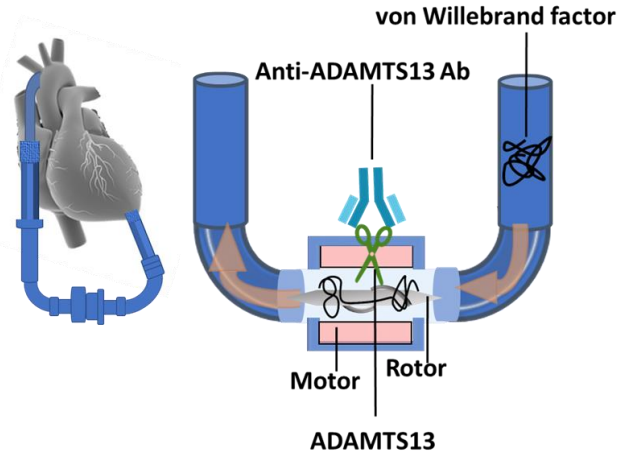
## MEDICAL NEED

- 20% of the LVAD patients have **gastrointestinal bleedings**
- **Acquired von Willebrand syndrome (aVWS)**, characterized by the reduction in von Willebrand factor (vWF) large multimers, is considered as the main cause
- Proteolysis of high molecular weight VWF multimers is caused by **ADAMTS-13** under pathological high shear stress induced by the LVAD
- aVWS dissappears when LVAD is removed

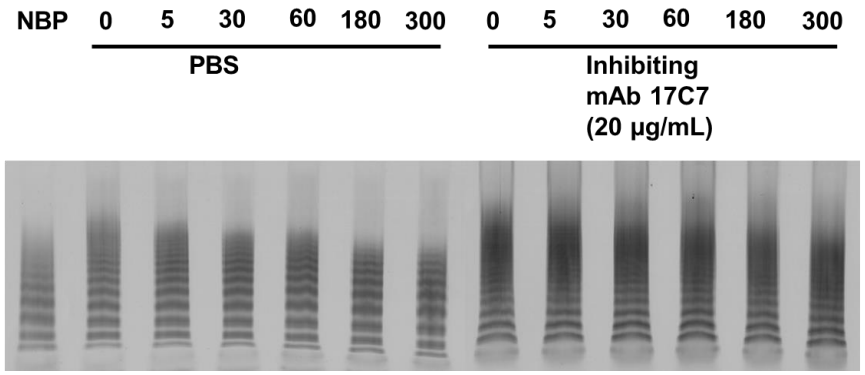


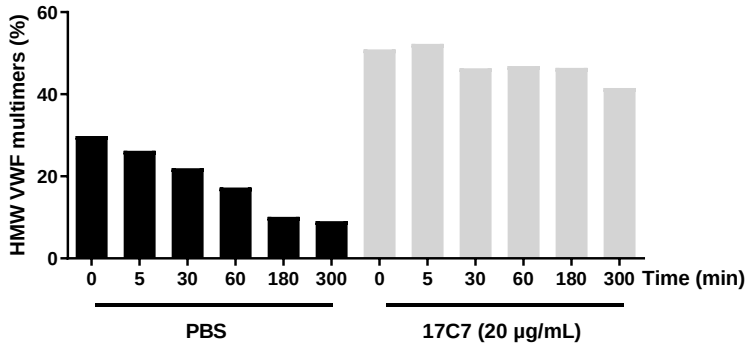
# OUR SOLUTION: TARGETED INHIBITION OF ADAMTS-13




# IN VITRO POC




mAb 17C7 prevents the loss of HMW VWF multimers in an *in vitro* Impella system with calf blood

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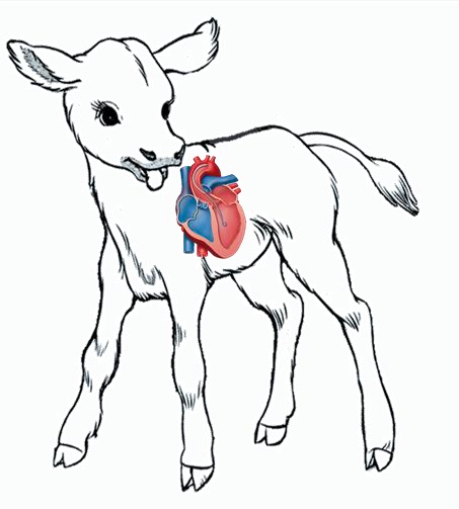
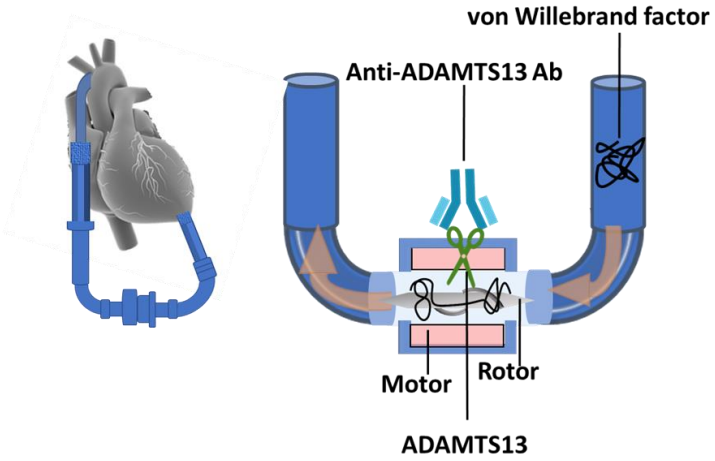
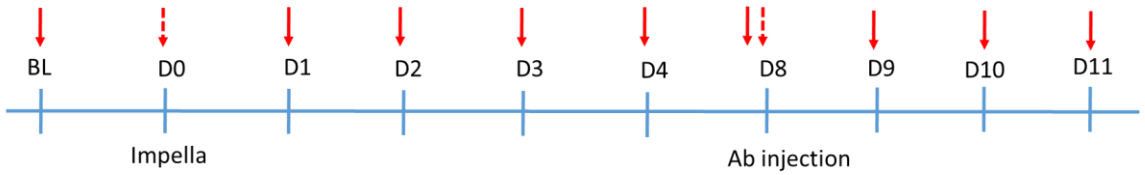
# IN VIVO POC

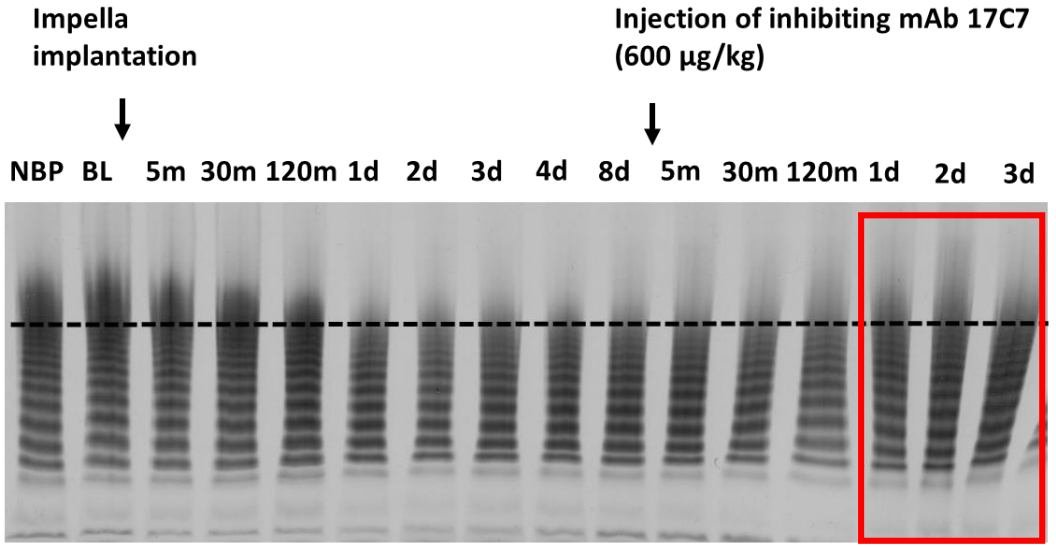




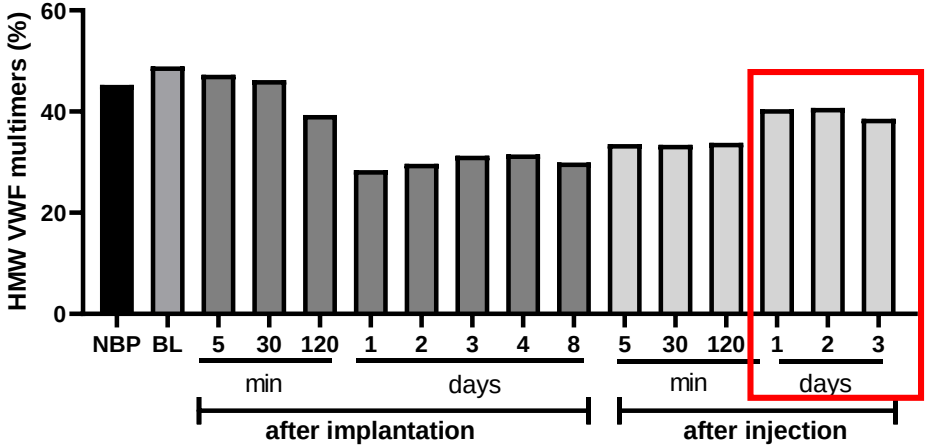




Blood sample after 5,30 and 120 minutes

Blood sampling




NBP, Normal bovine plasma
m, minutes; d, days

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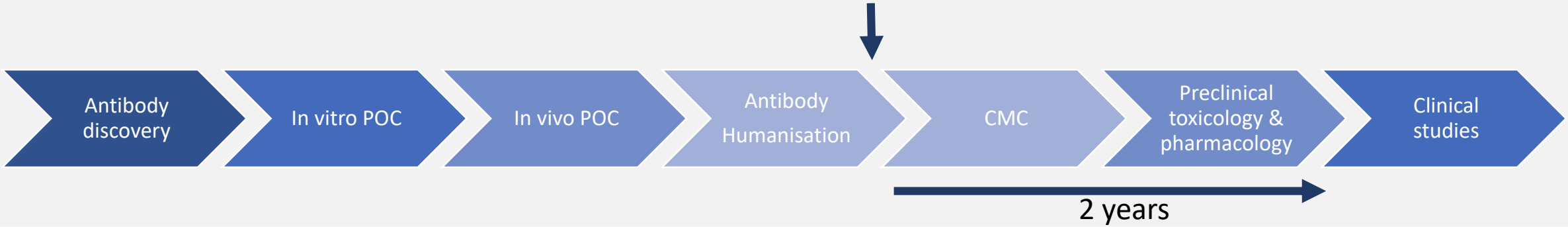
# INTELLECTUAL PROPERTY RIGHTS

WO 2017/097889 A1

- International search rapport indicates that **all claims are novel, inventive and of industrial use** for anti-ADAMTS-13 mAbs with 80% homology on CDR's sequences.
- FTO analysis: **No competing patent protection** for an antibody that targets ADAMTS-13 and uses thereof. **Compound / indication is free**.

# CURRENT STAGE OF DEVELOPMENT




# AVAILABLE FOR

- Treatment of LVAD-induced bleedings (also high potential for treatment of aortic stenosis and VWD type 2A)
  - As **licensing/ co-development opportunity**
  - **Orphan designation** possible

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The KU Leuven Antibody Center

# MinTR

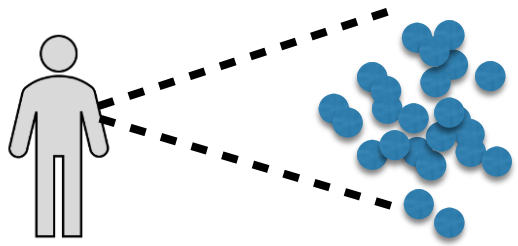
## Mining T cell receptor patterns for biomedical insights

Industry meets University, March 19th 2019, Grimbergen

Dr. ir. Tom Bosschaerts, Valorisation Manager Life Sciences

Universiteit Antwerpen

# T cell receptor sequencing – Functional analysis



**Individual immune system**

**Sequencing**

**T cell repertoire**

Key player in the adaptive immune system

**T cell receptor sequences**

Repertoire of millions of unique T cell sequences

TRBV4-2*01
*V region*

CASSQRRANSPLHF
*CDR3 region*

TRBJ1-6*02
*J region*

1037
*Reads*

?

**Functional analysis and medical action**

**MinTR**

**Data mining platform to translate T cell receptor sequencing data into actionable insights**

# MinTR technology potential

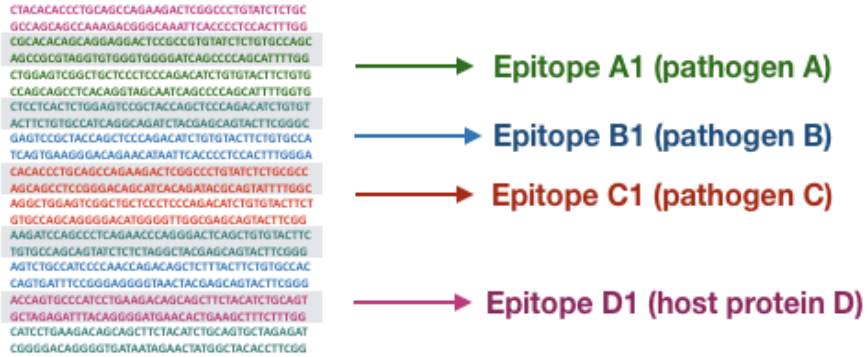
- Diagnostic platform
- Clinical monitoring of immunotherapy
- Research platform

- Infectious diseases
- Oncology
- Auto-immune disorders

**Single blood test**

MinTR

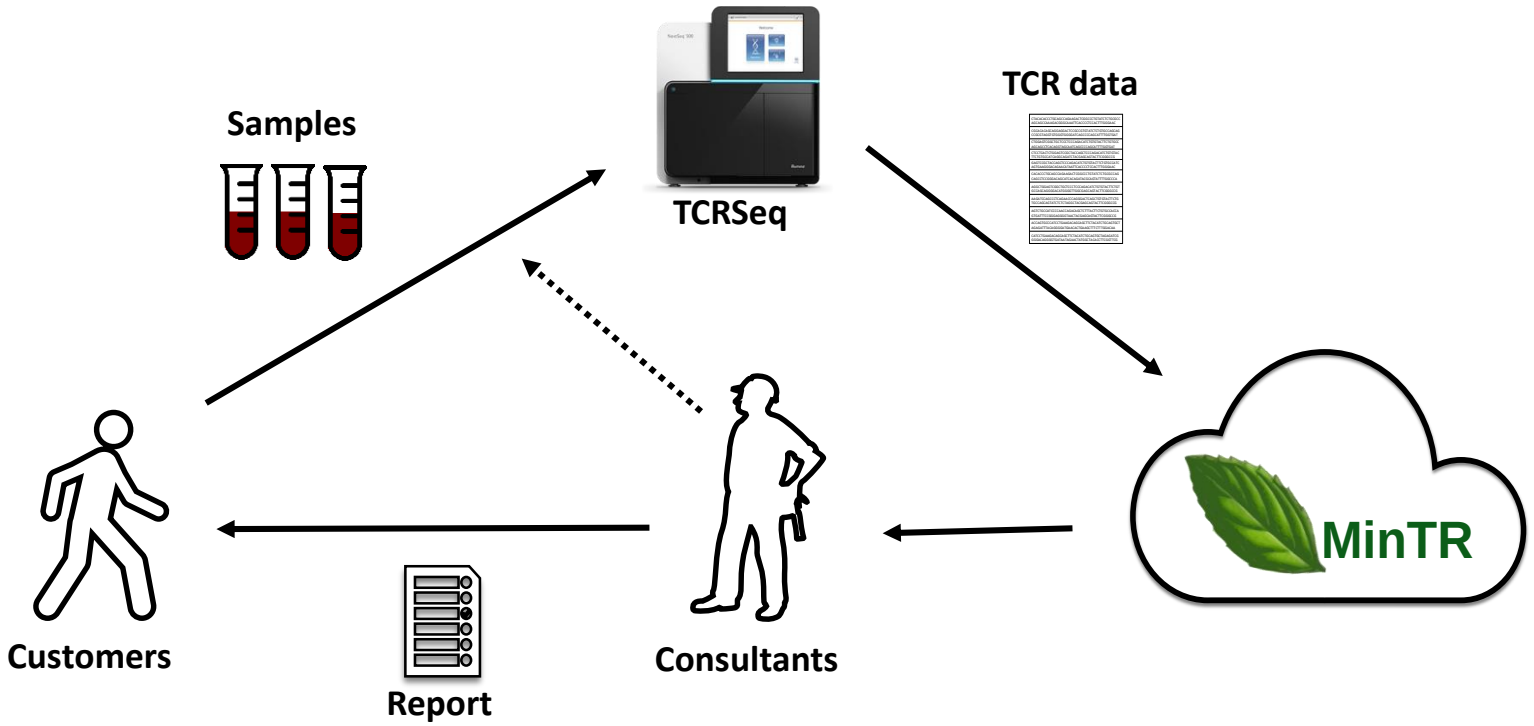
**Functionally annotated T cell receptor repertoire**




**Proof-of-concepts established**

- Fast and unique platform that can predict the probability of binding a set of epitopes for bulk T cell receptor sequencing data
- Multiple successfull use cases in vaccine immunomonitoring and oncology

# MinTR fee-for-service platform (dry lab and/or wet lab)




- **Software platform** as a collection of trained data mining algorithms and T cell receptor association databases
- **One-stop shop** for T cell receptor sequencing and sample preparation
- **Expert team** to analyse data and translate to biomedically relevant knowledge

FACULTY OF
BIOSCIENCE ENGINEERING

**DEPARTMENT BIOTECHNOLOGY**
LABORATORY OF APPLIED BIOTECHNOLGY (LAB)

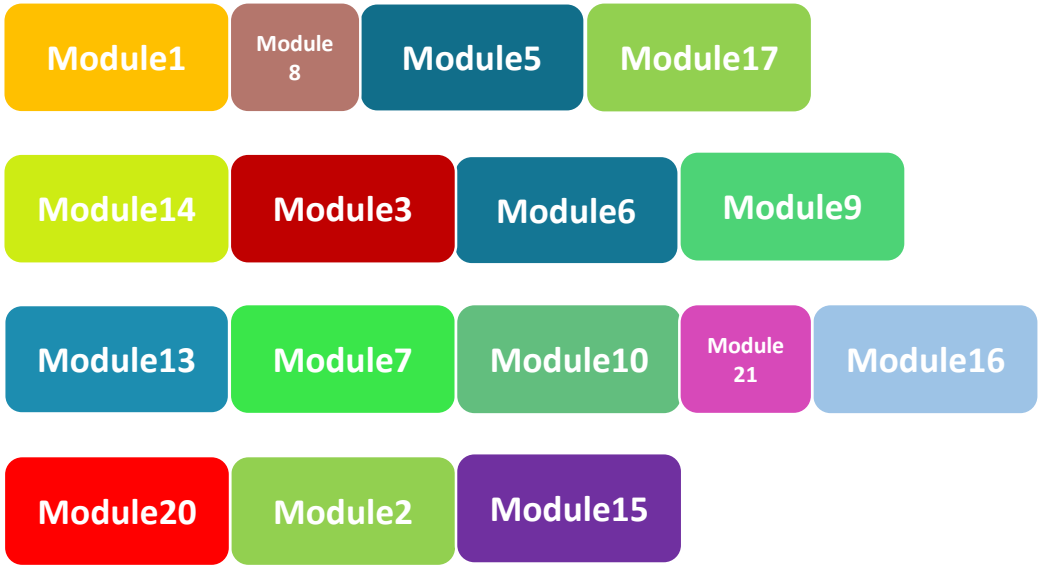
# SYNTHETIC BIOLOGY OF MODULAR PROTEINS WITH APPLICATIONS IN INDUSTRIAL AND MEDICAL BIOTECHNOLOGY

**Prof. Yves Briers**

**Presented by dr. Koen Tyberghein**
**IOF consortium Protein Technologies Ghent**

GHENT
UNIVERSITY

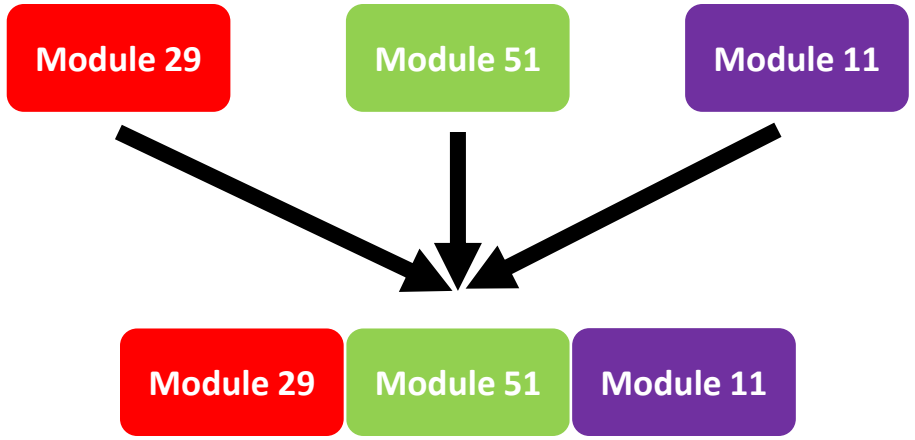
# Synthetic biology of modular proteins



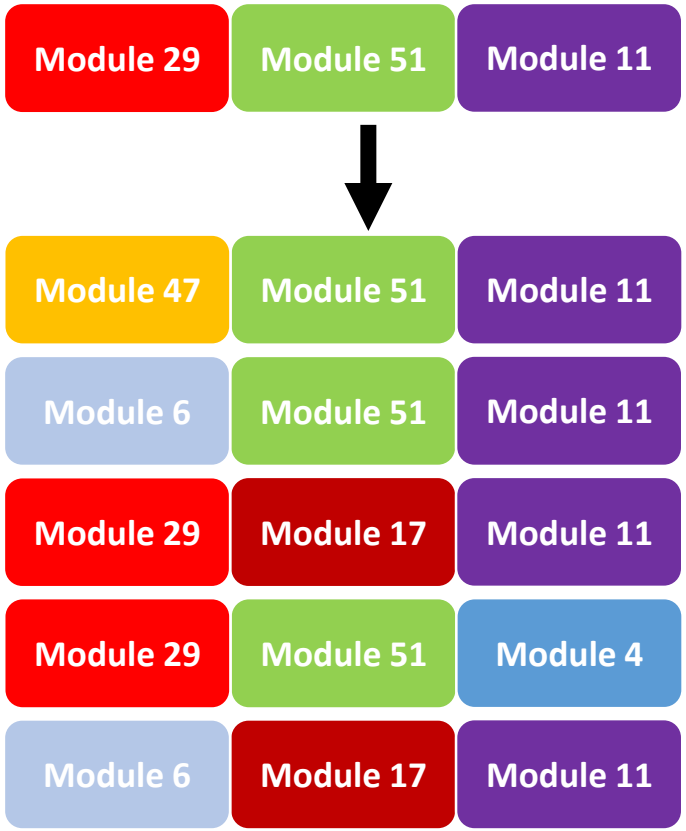
# Synthetic biology of modular proteins

Neofunctionalization

"New to nature"

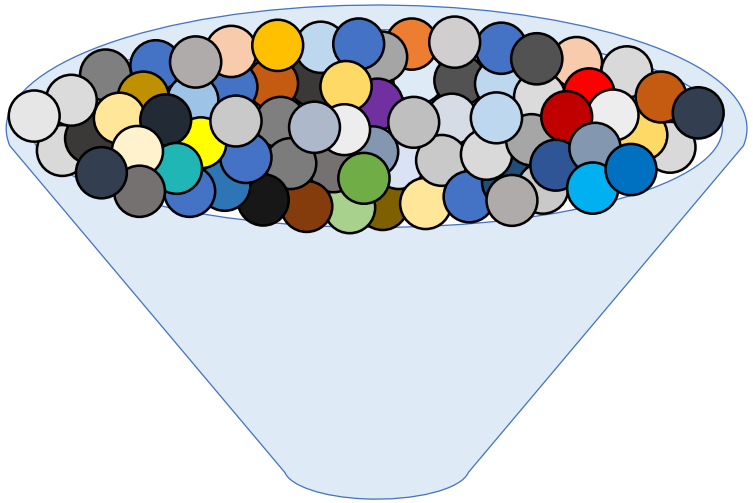



Improving properties



# VersaTile technology

Step 1:
Make your TILE repository



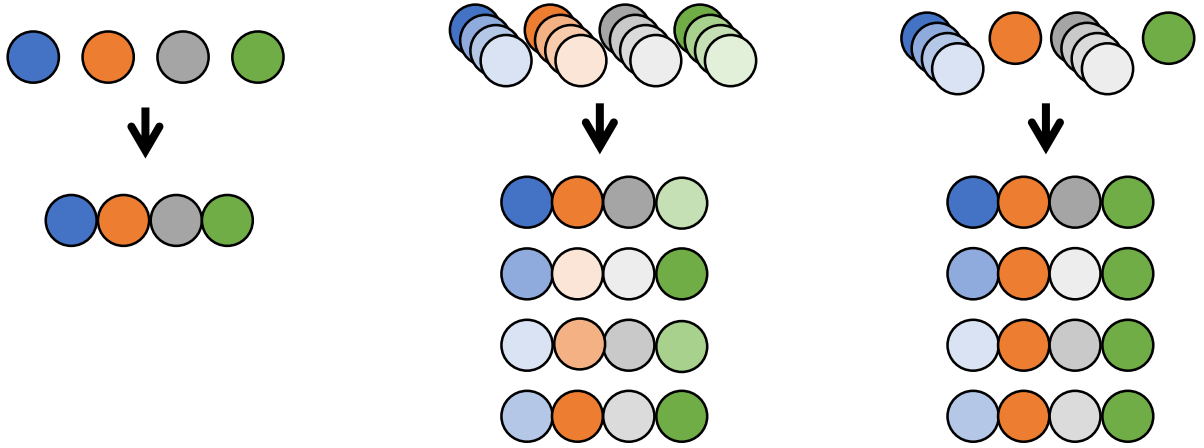
VersaTile Cloning

Step 2: Shuffle TILES in a versatile way

RATIONAL ASSEMBLY

COMBINATORIAL ASSEMBLY

SEMI-RANDOM ASSEMBLY

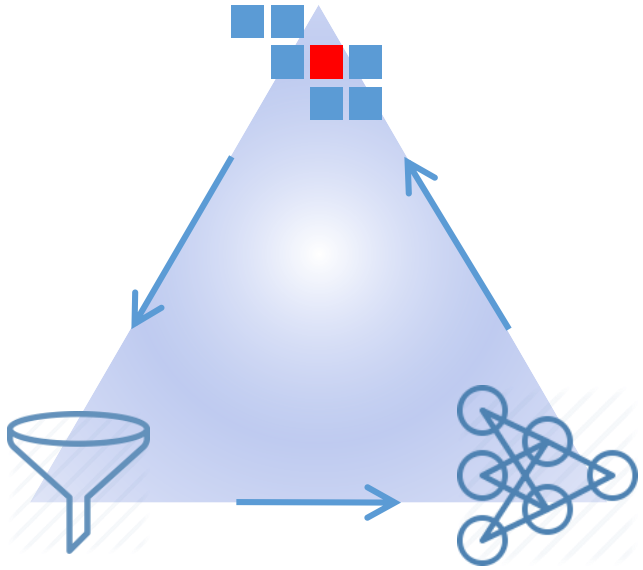


VersaTile Shuffling

# Approach

**VersaTile technology**

1. **VERSATILE CLONING**
2. **TILE REPOSITORY**
3. **VERSATILE SHUFFLING**



**High-throughput screening**

**Design Rules**

**Lead characterization**

FACULTY OF
BIOSCIENCE ENGINEERING

**Email:** Koen.Tyberghein@Ugent.be

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GHENT
UNIVERSITY

# Fast and label-free detection of human exposure to carbonaceous particles

An Voets, PhD –
business developer
UHasselt - BIOMED

KU LEUVEN

UHASSELT

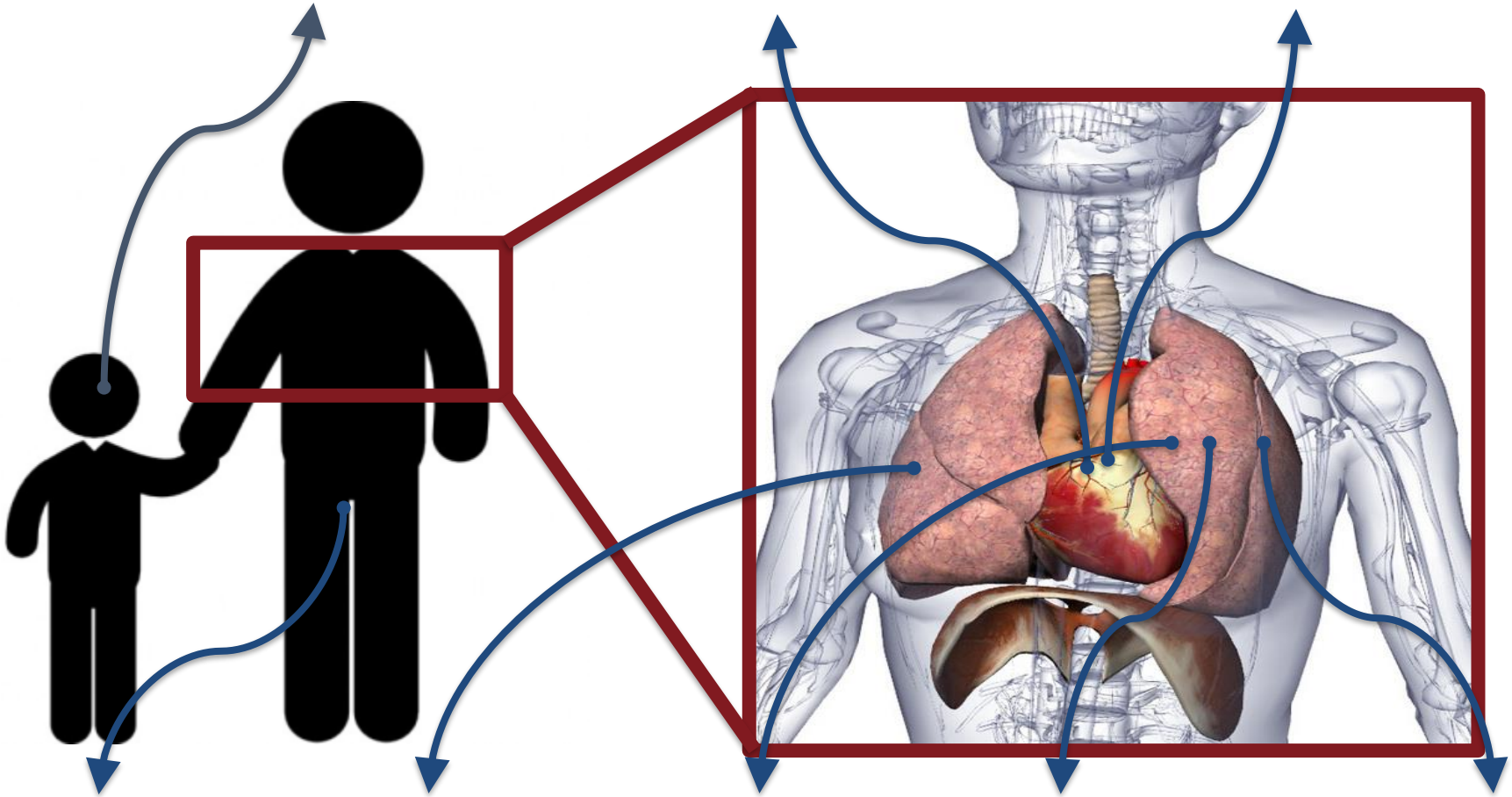
# Air pollution leads to 4 million deaths worldwide

PREMATURE DEATH

DEVELOPMENTAL HARM

HEART ATTACK

CARDIOVASCULAR DISEASES



REPRODUCTIVE HARM

LUNG CANCER

ASTHMA

SUSCEPTIBILITY TO INFECTION

LUNG TISSUE DAMAGE

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UHASSELT

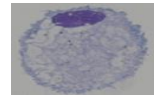
# State of the art - Diagnostic screening is lacking

Black Carbon/soot = one of the most toxic substances of air pollution

**Current detection practice: Aethalometers**

= non-individual measurement via filter detection at specific locations

**Attempts for individual measurements:**

| **Laser induced incandescence**  | **Radioactive labels**  | **Bright-field microscopy**  |
|---|---|---|
| Not biocompatible | Biocompatible | Biocompatible |
| Real exposure | No real exposure | Real exposure |
| No long-term studies | No long-term studies | Long-term studies |
| Non-invasive sampling (air) | Semi-invasive (blood) | Semi-invasive sampling (sputum) |
| Sensitive | Semi-sensitive | Not sensitive |
| No sample preparation | Sample preparation | Sample preparation |

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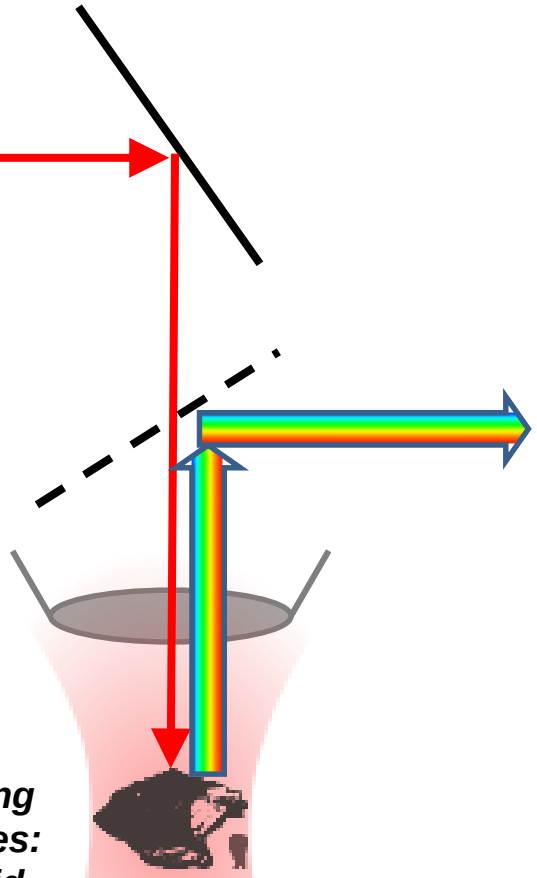
# OUR SOLUTION

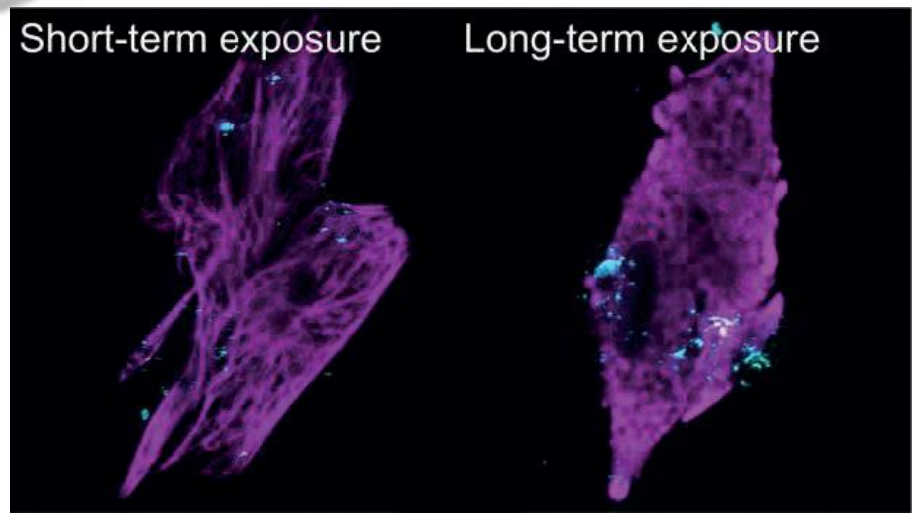
## Novel method: White Light Generation under femtosecond illumination

**Typical laser source for multiphoton microscopy**

Femtosecond illumination
810 nm, 150 fs, 80 MHz
5 mW laser power



***Specimen containing carbon nanoparticles: Cell, tissue or liquid***






Bové H., Steuwe C., *et al*. "Biocompatible Label-Free Detection of Carbon Black Particles by Femtosecond Pulsed Laser Microscopy." *Nano letters* 16.5 (2016): 3173-3178.

# KEY FEATURES

## ADVANTAGES

- **Label-free** detection of **actual exposure**
- **Sensitive** detection – strong emission
- Straightforward and **flexible** detection (good signal to noise)
- **Non-invasive** and easy sample collection
- **Multidisciplinary** team

## MARKET POTENTIAL

- 4 million premature deaths worldwide due to air pollution
- Linked to several clinical pathologies
- Follow-up the effect of prevention measures

## OPPORTUNITY

Patent applications available for licensing:

EP3403068

US2019025215

High-throughput prototype in development

KU LEUVEN

UHASSELT

**Contact:** An Voets, an.voets@uhasselt.be - +32 11 269323

# 5 ULB-Labeled technology platforms

Available for academic & industrial partners

- Collaborative research
- High added-value services
- Training

ULB

## Technology platforms

1. CMMI - Integrated preclinical Imaging Facility | 2. Flow cytometry
3. Transgenic mice and gene invalidation | 4. BRIGHTcore | 5. Human functionnal neuroimaging

BiR&D



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# cmmi
excellence in preclinical imaging

CENTER FOR MICROSCOPY AND MOLECULAR IMAGING

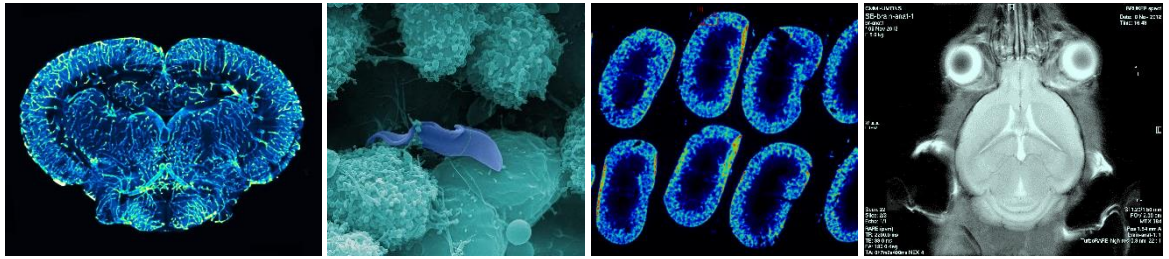
ULB

In vivo imaging (PET, SPECT, µCT, MRI, OI, MSOT)
Light and electron microscopy
Digital pathology
Customized image analysis

Biopark Charleroi Brussels South

20 F.T.E.

- Preclinical imaging facility
- Created by ULB and UMONS with the support of EU and Wallonia
- R&D and services for academic and industrial partners



http://www.cmmi.be/

BIR&D LIEU LIAISON ENTREPRISES-UNIVERSITÉS

www.enmieux.be

FEDER UNION EUROPÉENNE Wallonie
LE FONDS EUROPÉEN DE DÉVELOPPEMENT RÉGIONAL ET LA WALLONIE INVESTISSENT DANS VOTRE AVENIR

UMONS Université de Mons BIOPARK CHARLEROI BRUSSELS SOUTH

# Service proposal & technical specificities

## From the molecule to the animal

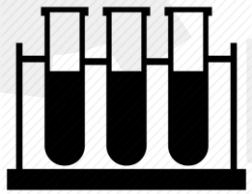
- Microscopy
- In vivo, ionizing
- Digital pathology
- In vivo, non-ionizing

## CMMI strengths

- State-of-the-art instruments
- GMP-like practices
- Relevant animal models
  Access to the BWBiobank
- Multidisciplinary scientific expertise

## CMMI workflow

Experimental design



Sample preparation

Image acquisition

Data interpretation

# Industry applications

**Oncology** | **Cell therapy**

**Neurosciences** | **Immunology**

>Validation of animal models, biomarkers, antibodies, contrast agents, radiotracers or companion diagnostics

>Tumor monitoring studies

>Biodistribution of cell therapy products in vivo and ex vivo

>Screening of drug target or protein expression

>Biomarker imaging in cancer, angiogenesis, atherosclerosis, inflammation, etc.

>Analysis of biomaterials and nanoparticles

Working with academia and industry:
challenge accepted !

Last 2 years:

- contracts with ~20 companies
- Partnerships with industry in 3 projects (BioWin, CWALITY, FIRST Entreprise)
- ~40 scientific publications

CMMI meets industry
May 17, 2019
http://actu.biopark.be/event

# Process & Contact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# ULB Gosselies- Flow Cytometry Platform

Immunophenotyping, Immunomonitoring, Design of Preclinical and clinical studies, Cell sorting

Biopark Charleroi
Brussels South

Immunology labs : >70 F.T.E.

- Fundamental, preclinical and translational Immunology
- Research themes: Infectious diseases, inflammation, oncoimmunology, vaccines
- Participation in national and international Research and Training networks
- Strongly implanted in the Biopark Ecosystem

# Service proposal & technical specificities

## ▷ THE OFFER

- Immunology consultancy
- Support in project development
- Multiparametric analysis of up to 23 parameters
- Enrichment and cell sorting of specific cell populations
- Adapted platform for preclinical as well as exploratory clinical studies

## Distinctive specificities

- ✓ Strong scientific expertise and network
- ✓ Translational Immunology
- ✓ Level II and III Biosafety cell culture rooms
- ✓ SPF animal facility
- ✓ Preferential partnership with CMMI and CER

## Organization / Certification

- ✓ Management of human samples
- ✓ SOPs
- ✓ Non GLP environment
- ✓ Audited by GSK and recently by PATH – June 2018

# Industry applications

## SOME APPLICATIONS

>Functional analysis: immunophenotyping, viability study, multiparametric analysis of cytokine, transcription factor, and phosphoprotein expression, in mice and human models

>Identification and isolation of various cell populations

>Four populations cells types simultaneous sorting in tubes

>Single cell sorting in plate (96 and 384 wells) for cellular and molecular analysis

## MAJOR EQUIPMENTS

> 2 Cell sorters Becton Dickinson Facs Aria III®

> 2Cytometers Cytoflex LX Beckman Coulter® – 6 lasers, 21 colors

> Cytometers Cytoflex Beckman Coulter® – 3 lasers, 13 colors

> Cytometer Becton Dickinson LSR Fortessa® – 3 lasers, 14 colors

> Cytometer Beckman cyan ADP ®- 3 lasers, 9 colors

>BioRad Bioplex-200® for quantitative bioassays

# Process & Contact



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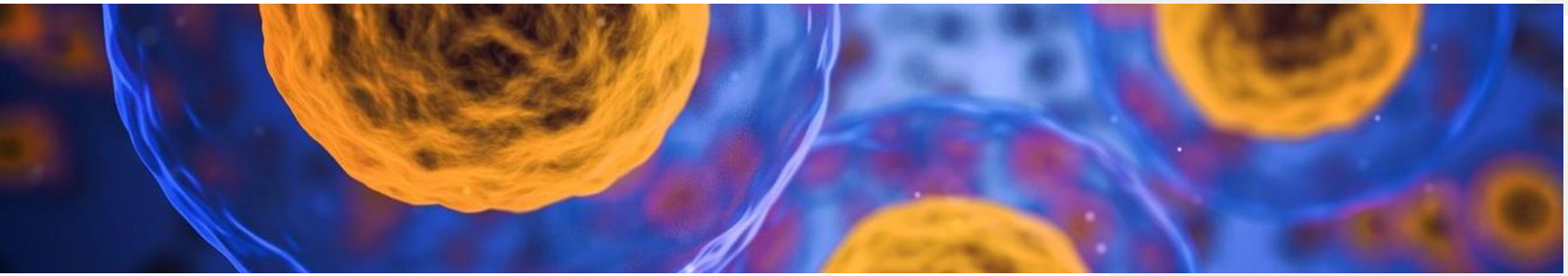
# MOUSE TRANSGENIC FACILITY

- **Mouse Support Services** (sperm/embryo cryopreservation, IVF/revitalization of mouse line, rederivation/embryo transfer)
- **Transgenic Mouse Services** (Knock-Out/Knock-In, Es cells mediated transgenesis, CrispR Cas9 model)

Near Erasmus Hospital

3 F.T.E.

- Offers development of protocols and services linked to transgenic mice (mouse support services, transgenic mouse services)
- Located in the prestigious Institute of Interdisciplinary Research (IRIBHM)
- Deep expertise in signal transduction, developmental biology, neuroscience and cancer.
- Complementary to cell and molecular biology approaches.



https://iribhm.org/

# Service proposal & technical specificities

## • Services proposal

### ○ Mouse Support Services

- Rederivation (transfer lines of conventional status to a specific SPF/SOPF status)
- Mouse Sperm/Embryo Cryopreservation
- Mouse line revitalisation by In Vitro Fertilization

### ○ Transgenic mouse services

- Microinjection of zygotes in chosen genetic backgrounds,
- Knock-out/ Knock-in mice using Es cells,
- CrispR Cas9 model

### ○ Collaborative Research projects

## • Distinctive specificities

- ✓ Pathogen-Free rooms
- ✓ Genome Editing expertise and support mouse methodologies to assists clients to define and realize their studies
- ✓ **Indirect access to ULB proprietary models**

# Process & Contact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# BRIGHTCore - Brussels Interuniversity Genomics High Throughput Core

Next Generation Sequencing, devices to perform high-throughput/output genetic assays

UZ-Jette Bruxelles (VUB) – Campus Erasme (ULB)

13 F.T.E.

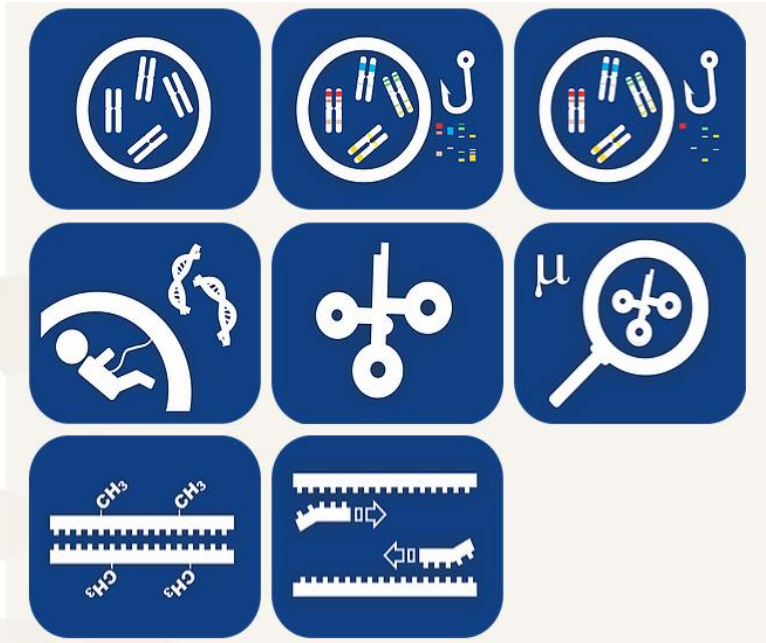
- BRIGHTCore is an interuniversity platform, servicing both ULB and VUB universities
- Closely linked to Hôpital Erasme & Hôpital Huderf and UZ Brussel (easier clinical samples access)
- Hosts heavy – expensive – genomics equipments (HTS and microarray)
- IT infrastructure to perform primary analysis of large genomic datasets
- Bioinformatics support and tailor made IT tools

http://www.brightcore.be/

# Service offers

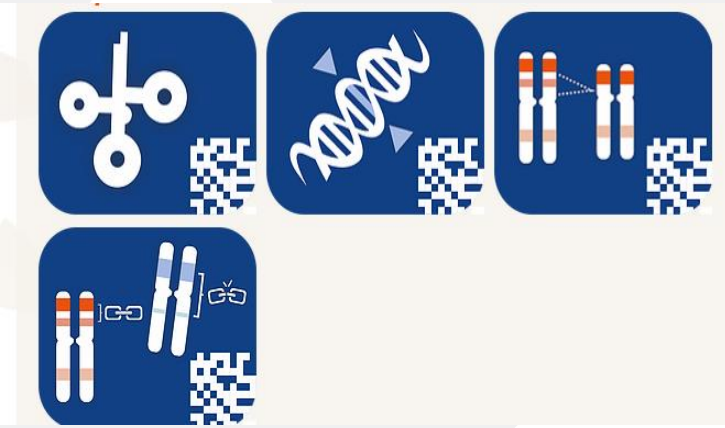
## Massive Parallel Sequencing

- Whole genome sequencing
- Whole exome sequencing (main organisms : human, mouse, other organisms on request)
- Gene panel sequencing
- Amplicon based sequencing (including CRISPR/Cas9 cut site characterization)
- Transcriptome analysis
- **Spatial transcriptomic**
- microRNA seq
- Methylation profiling
- ATACseq (open chromatin characterization)
- nCounter NanoString profiling




## Arrays

- Transcriptom array (RNA expression profile and splice variations)
- SNP genotyping
- LOH CNV detection
- Linkage analysis



# Service processing and quality management

## Scope of support

**Preanalytical phase**
(DNA extraction / fragmentation)

**Analytical phase**
1. Library preparation, automation
2. Array - Digital counting - sequencing

**Postanalytical phase**
(Bioinformatics)

Options :
- Full support
  - Optimization, validation, routine setup
- Tech transfer
  - Optimization & validation
- Assistance
  - Help on setting up experiments

## Certification and quality control

- ✓ The platform is embedded within the Centre for Medical Genetics at UZ Brussel
- ✓ Certified ISO15189 since 2013
- ✓ minimal risk on sample contamination :
  - ✓ Separated activities (DNA/RNA extraction, pre amplification lab, post amplification lab, cell culture lab,...)
  - ✓ Air locks at the entrance of every molecular lab
  - ✓ UV sterilization facilities

# Process & Contact

## Genomics Solutions

Massive Parallel Sequencing

Array

Bioinformatics



DNA/RNA QC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# Human Functional Neuroimaging Platform

Experimental paradigms, data acquisition, signal processing, magnetoencephalography, high-density eletroencephalography

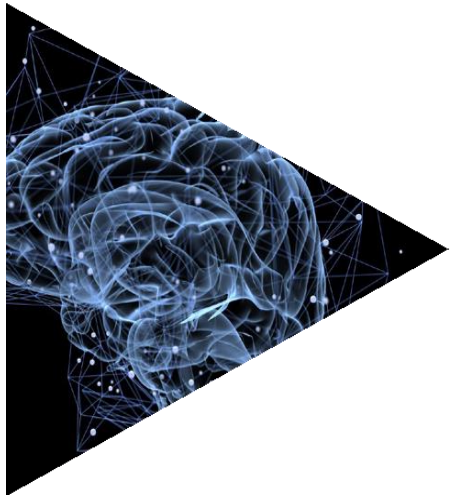
ULB Solbosch Campus

4 F.T.E

- Hosted at the LCFC, the platform provides a state of the art expertise in human functional neuroimaging (experimental paradigms, data acquisition, signal processing, etc.)
- Access to high standards neuroimaging equipment's set (MEG, EEG, PET-CT, RMI, NIRS)
- Neurosciences dedicated infrastructures: dedicated babylab and sleep lab
- Radiochemistry/radiopharmacy services

http://www.ulb.ac.be/rech/inventaire/unites/ULB706.html

# Service proposal & technical specificities



## Offer and equipement set

- Magnetoencephalography (simultaneous EEG recording available )
- High-density electroencephalography (compatible for simultaneous hdEEG/MEG recordings)
- Positron emission tomography combined with magnetic resonance imaging
- Electroencephalography combined with fMRI
- Repetitive Transcranial Magnetic Stimulator coupled with Neuronavigation
- Positron Emission Tomography
- Cyclotron
- Radiochemistry/radiopharmacy laboratory

## Distinctive specificities

- Neurosciences specialisation and state of art exeprtise
- Only Belgian laboratory with MEG as a functional neuroimaging technique
- One of a minority laboratories offering a joint access to MEG and PET/MRI across Europe

# Applications

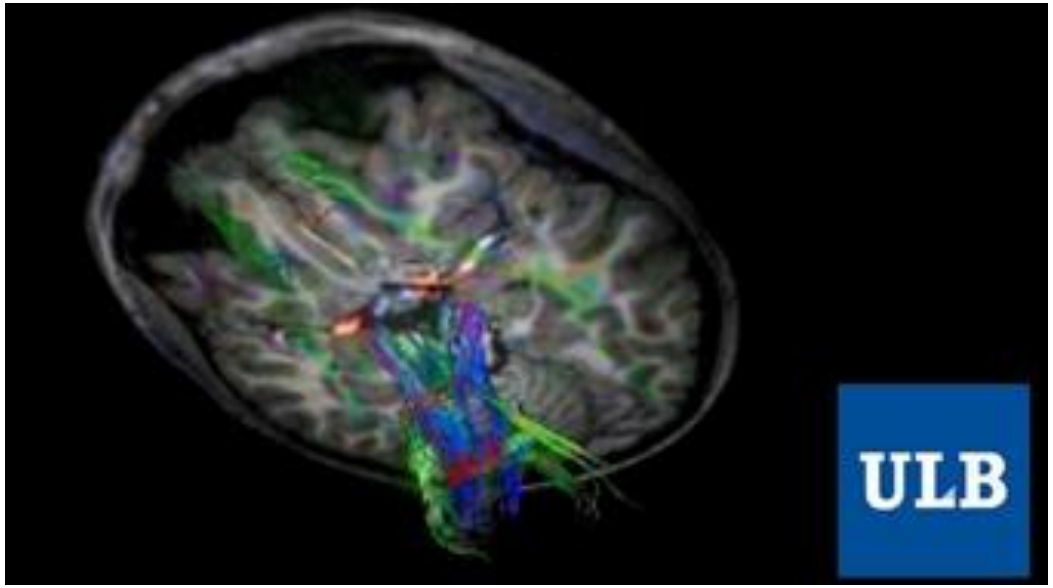
## Pharmaceutical applications

- Diagnosis methods validations
- Treatment efficiency
- Cerebral biomarkers imaging

## Examples of studies

- Neurophysiology of epileptic activities and their impact on cognition and language, and sleep-dependant processes
- Sleep-dependant processes of language development in specific language impairment
- Study of the respective impacts of MEG and EEG-fMRI on the presurgical evaluation of epileptic patients candidates to surgery
- Study using MEG of neural bases of learning with and without consciousness
- Study of location of sensorimotor regions using cerebral multimodal functional imaging (fMRI, MEG and TMS) in neurosurgery
- Study of the maturation of somatosensory pathways using diffusion tensor imaging and MEG in preterm infants

# Process & Contact

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# Thanks for your attention!

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# CIRM technological platforms

LIÈGE université
Center for Interdisciplinary Research on Medicines

Transversal expertise in support of the whole drug development process

**CIRM**

**114** Researchers

(51 PhD students and 16 post-docs)

**23** Principal Investigators (PI)

**11** Laboratories

**1** Quality system unit

https://www.cirm.uliege.be

BiR&D LiEU LIAISON ENTREPRISES-UNIVERSITÉS

# Service proposal & technical specificities

LIÈGE université
Center for Interdisciplinary Research on Medicines

## 3 platforms of expertise

**Drug Discovery Platform:**

- Drug synthesis (chemical library, organic synthesis)
- Natural product isolation
- Molecular pharmacology
- *In vitro* and *in vivo* evaluation
- Metabolomics

**Clinical Platform :**

- Preclinical ADME - tox profiling
- Clinical analysis for clinical trials (chemistry, microbiology, toxicology, hematology)
- Clinical phase I and early phase II (ATC, CHU)

**Drug formulation and Analytical Platform:**

- Quality control, in-process, drug counterfeiting & bioanalysis
- Characterization of solid dosage form
- Stability studies
- Method development and transfer
- Drug formulation development

BiR&D LiEU LIAISON ENTREPRISES-UNIVERSITÉS

# Service proposal & technical specificities

LIÈGE université
Center for Interdisciplinary Research on Medicines

## 4 technological hubs

### MaS-Santé Hub
**(TQ-MS/MS, IMS-QTOF, CE, LC-Chip)**

**Expertise:**
Sensitive quantitation in biological fluids
Characterization of drugs, biomarkers, biopharmaceuticals
Coupling to nanofluidics (LC and CE)
***Fields***: -omics, (pre)-clinical studies, microbiology, forensic and clinical biology

### NMR-Santé Hub
**(500 MHz LC-SPE-NMR TCI Cryoprobe GMP, liquid handler, 700 MHz TCI Cryoprobe Sample Jet)**

**Expertise:**
1D and 2D Metabolomics
Structural analysis of synthetic and natural products
Quality control of drugs
Q-NMR

### Vibra-Santé Hub
**(Raman, FT-IR-FPA)**

**Expertise:**
Vibrational spectroscopy (PAT), Raman and FT-IR imaging
Surface-enhanced Raman scattering (SERS) nanosensors
Hyperspectral multivariate data analysis

***Fields***:
Drug quality control, nanoparticles, plant and biological materials

### ScF-Santé Hub
**(high pressure reactor for ScF)**

**Expertise:**
Liposome production, particle engineering for inhalation, drug loading, sterilisation, separation methodology

***Fields***:
Drug formulation, drug quality control, extract from plants

BiR&D LIEU LIAISON ENTREPRISES-UNIVERSITÉS

# Contact

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Center for Interdisciplinary Research on Medicines


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# Virtual Belgium in Health

*WBHealth program, 2014-2017*

*UNamur-UCLouvain-AVIQ*

## Context of ageing population

**Need to plan and forecast health care needed by elderly people with a fine spatial granularity**

**➔ What will be the health care needs by 2030 in Belgium?**

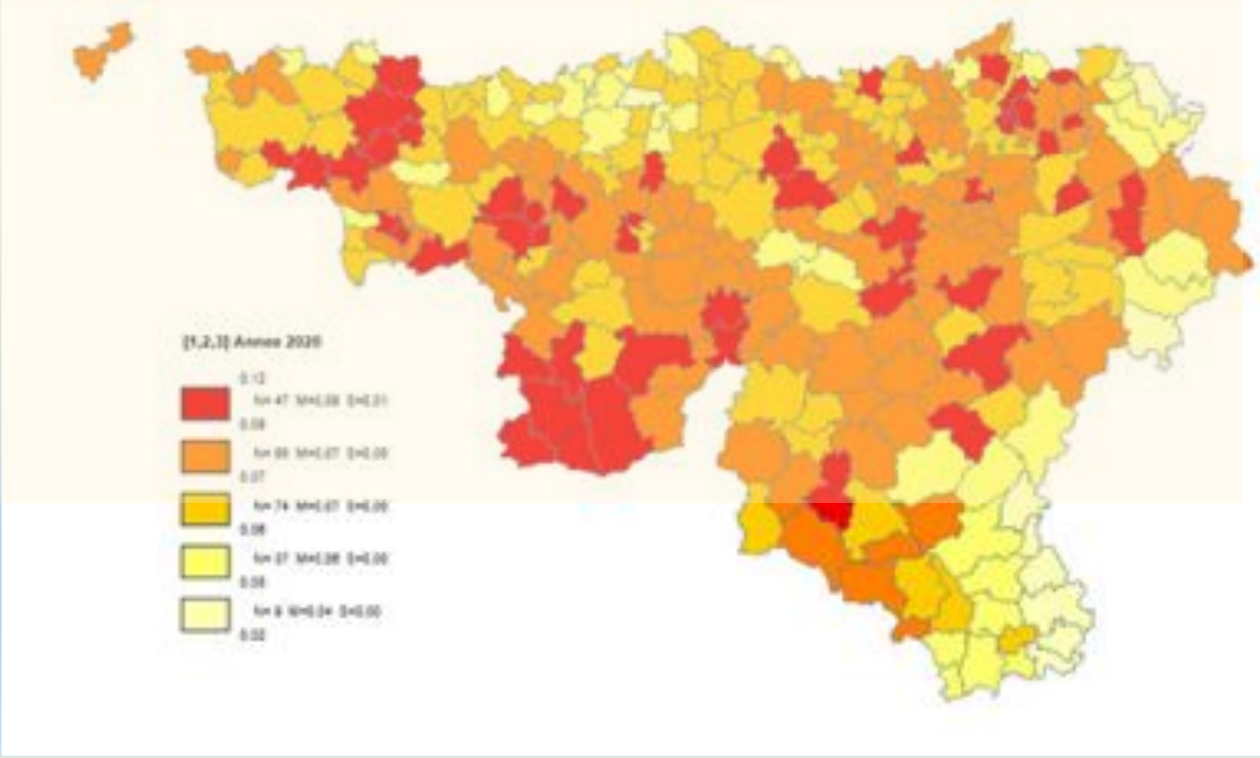
**➔ Impacts on planning of health infrastructures, healthcare staff…**

# Virtual Belgium in Health (VBIH)

**A synthetic population platform as decision-support for planning and forecasting health care needed by elderly people with a disaggregated spatial mesh without privacy concern.**

**A tool for a detailed spatial analysis of future health care needs.**

**A mathematical tool for conducting prospective studies (in health but also in various fields of application such as mobility, employment…)**



# More info?

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