

Day 2: Tuesday 12.9.23, Biocity

9:00 – 9:05 Welcome

Day 2	With SAB until Lunch break	
9:00 – 10:30	Project pitches: AlloCARTreg. CAReNKAID, ECP-CAR, Thera Star, ZellTWund, MSCPrestige	6 Projects pitches 5 min.+ 7 min. discussion
10:30 – 10:50	Break	All
10:50 – 12:30	Break-out session 2 -> each group hands in report/slides+ SAB Meeting	All
12:30 – 13:30	Lunch Break Parallel Meeting SAB & Speaker	All
13:30 – 14:00	Report Break-out sessions & Action planning	Reporters of each break out group
14:00 – 14:30	Outlook to the next phase, Thank you and good bye	Speakers 30 Min
14:30	End of the meeting and Vereinsgründung	Founding members

Project pitches #3: 5 min + 7 min



Day 2: Tuesday 12.9.23

9:00-10:30

AlloCARTreg Anke Fuchs (CRTD, MSNZ), Anke.Fuchs1@tu-dresden.de

CAReNKAID Jiri Eitler (DRK Blutspendedienst), j.eitler@blutspende.de

ECP-CAR Vladan Vucinic (UKL), vladan.vucinic@medizin.uni-leipzig.de

Thera Star Anja Feldmann (HZDR), a.feldmann@hzdr.de

ZellWund Marta Torregossa (UKL), Marta.Torregossa@medizin.uni-leipzig.de

MSCPrestige Tino Hammer (MDTB) & Simone Sonnenberg (DKMS SCB),
tino.hammer@mdtbcells.com ; sonnenberg@dkms-stemcellbank.de

AlloCART_{reg} – Project Overview

Universitätsklinikum
Carl Gustav Carus



CRTD
Center for Regenerative
Therapies TU Dresden

TECHNISCHE
UNIVERSITÄT
DRESDEN

HZDR
HELMHOLTZ ZENTRUM
DRESDEN ROSSENDORF



Martin Bornhäuser



Anke Fuchs



Frank Buchholz



Anja Feldmann



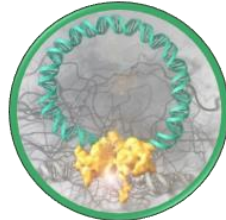
Michael Bachmann



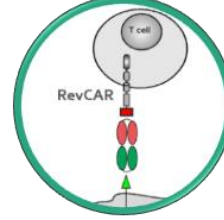
Hematology
Cell therapy incl. Treg



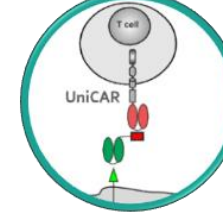
Treg manufacture
GMP / ATMPs



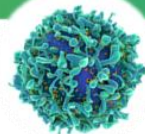
Gene editing
Designer recombinases



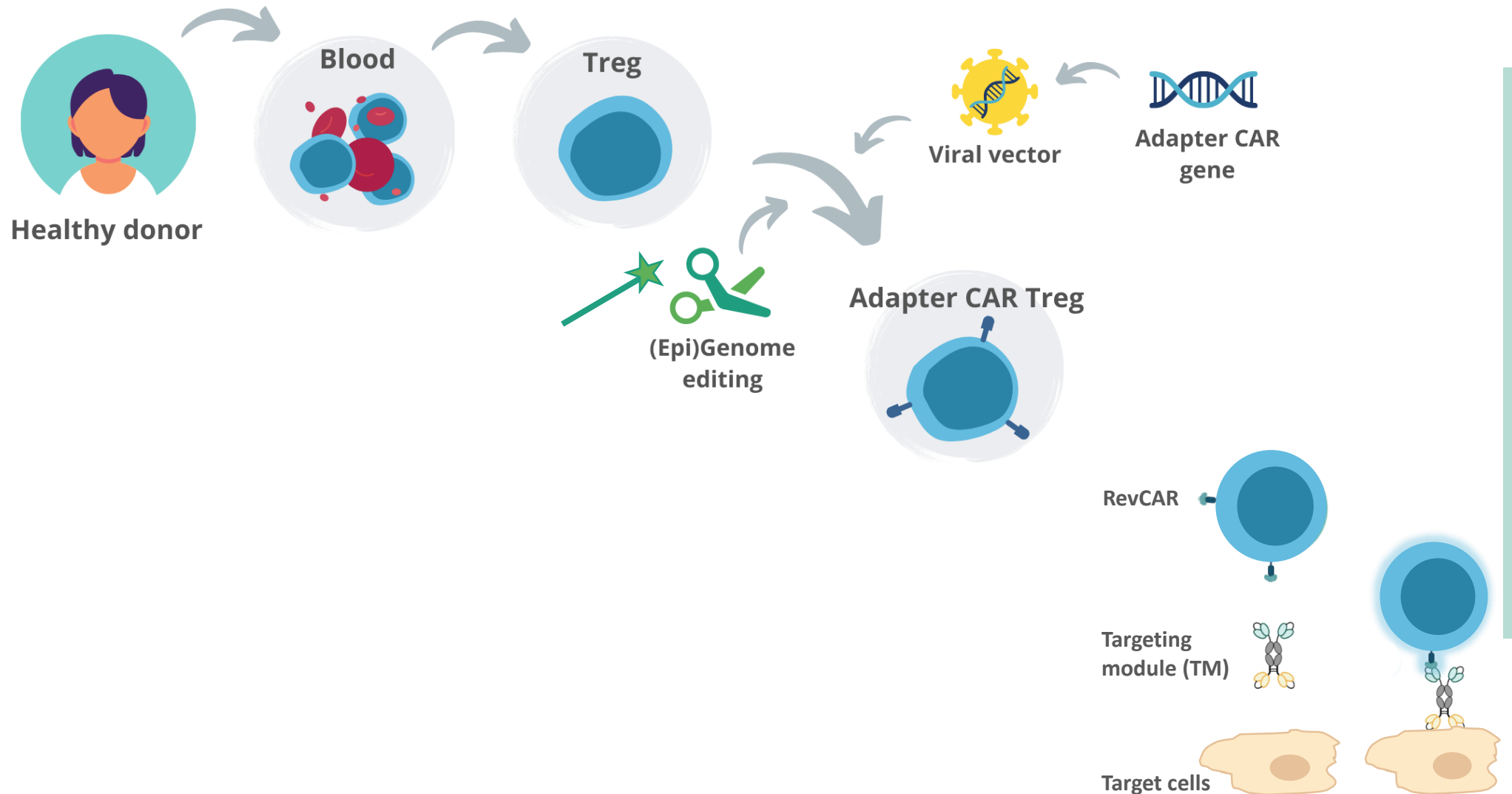
Flexible unique adapter CAR technology



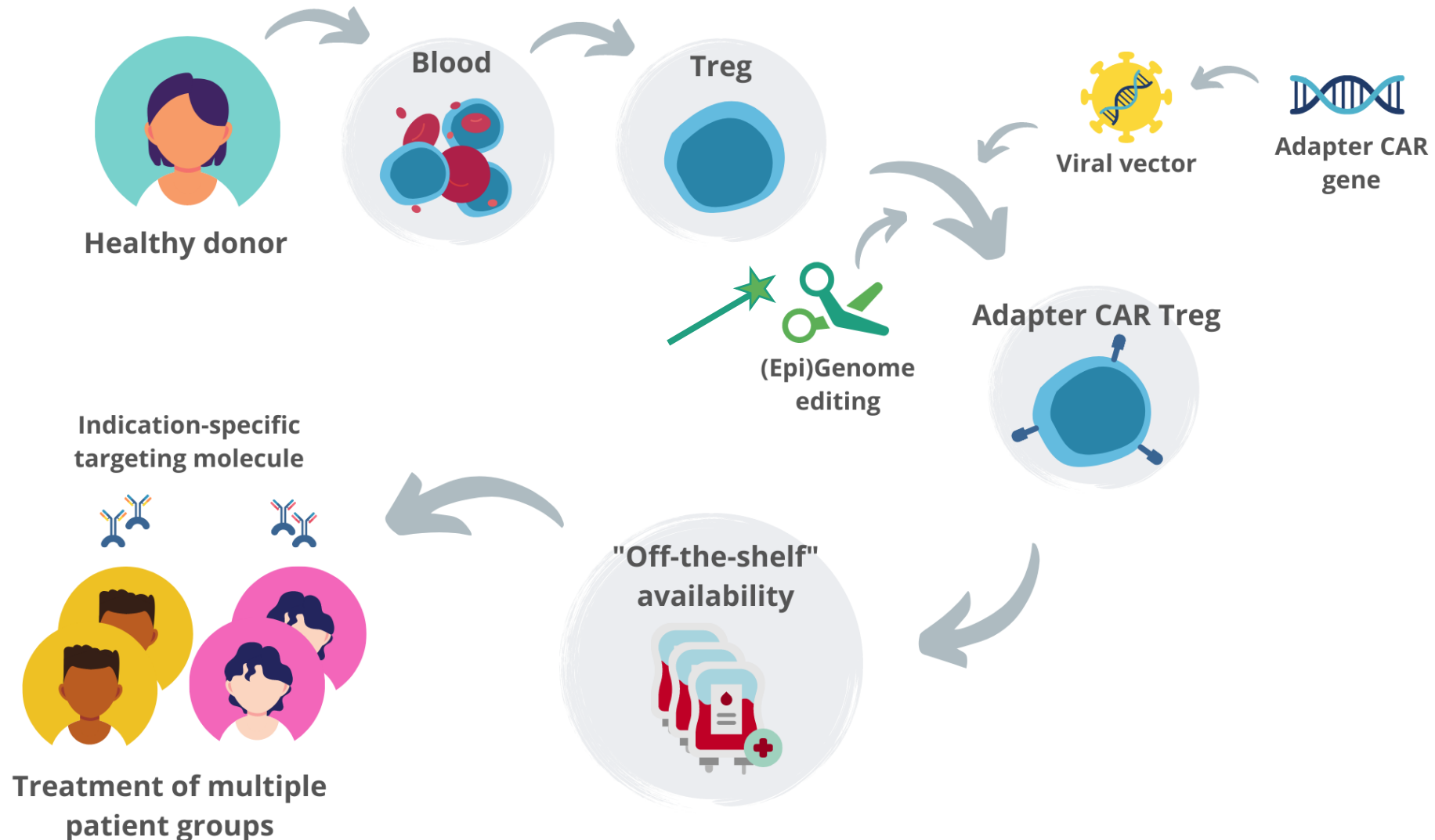
Next generation Treg cell therapy



AlloCART_{reg} – Project Overview



AlloCART_{reg} – Project Overview

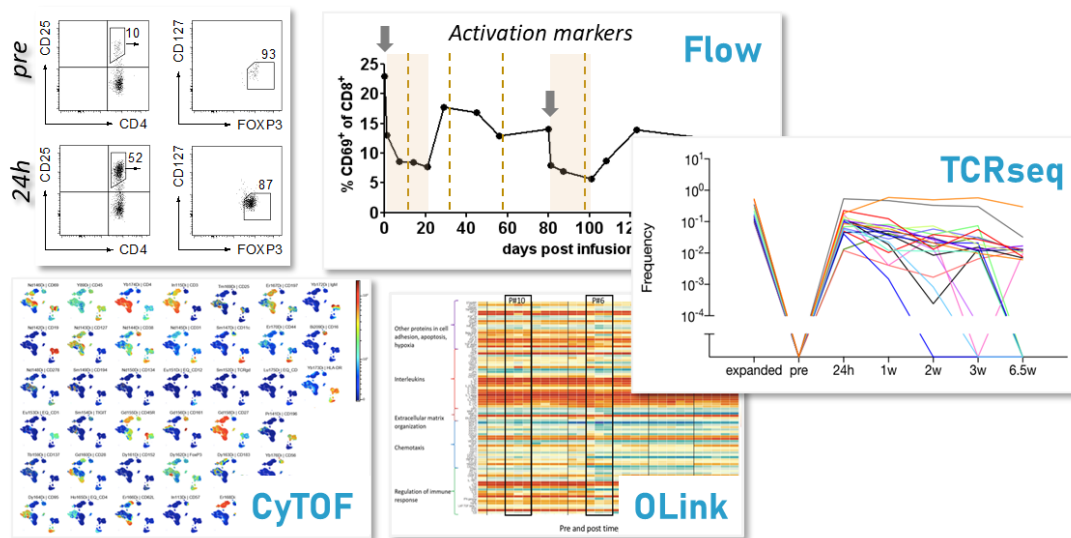


AlloCART_{reg} – Objectives

Polyclonal Treg therapy for cGvHD ✓

Automation ✓

Immunomonitoring ✓



Transient response / late treatment
Systemic

Theil(Fuchs) et al. 2015, Theil(Fuchs) et al. 2017, Marín Morales et al. 2019

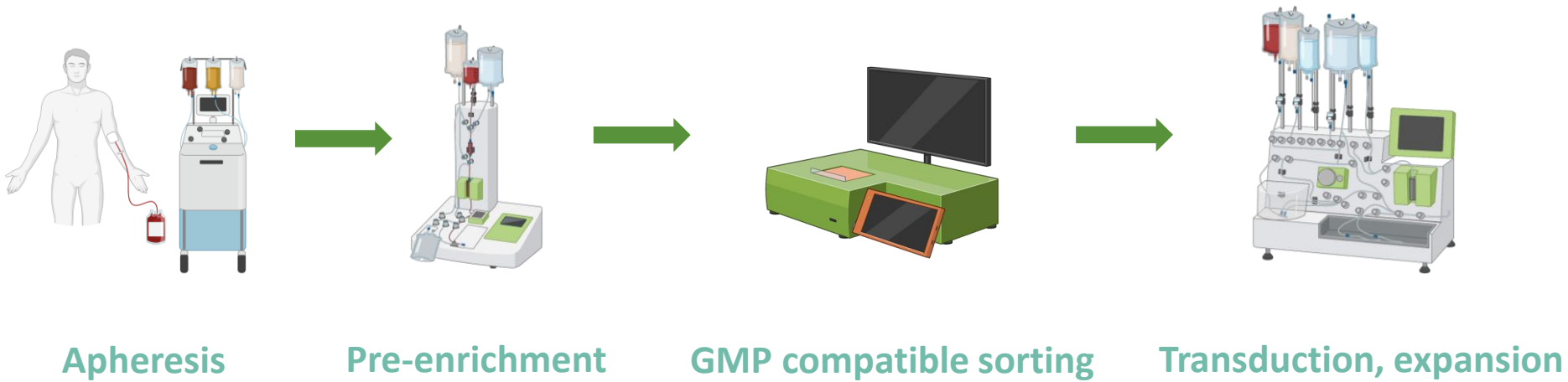
- „Off-the-shelf“ product allowing early treatment, multiple doses, cost effectiveness
- Targeted suppression, multiple indications in inflammatory and autoimmune disease



AlloCART_{reg} – Results so far



Clinical Scale RevCAR Treg manufacturing process ✓



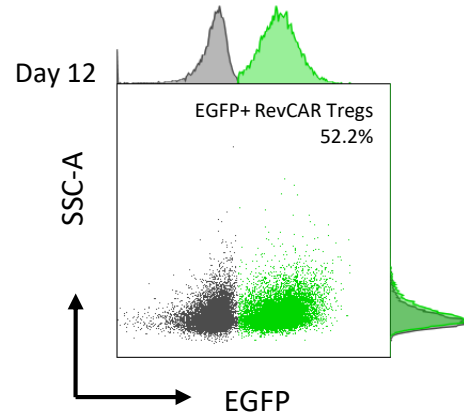
AREA 1 – CAR-T



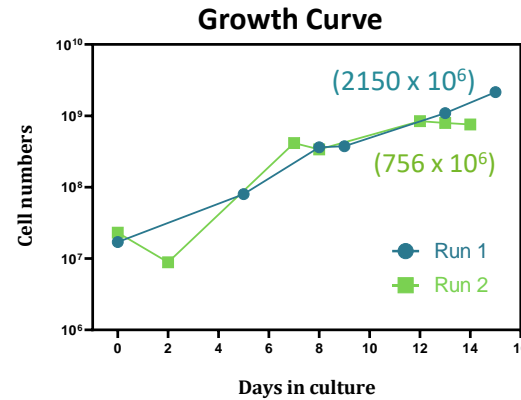
AlloCART_{reg} – Results so far



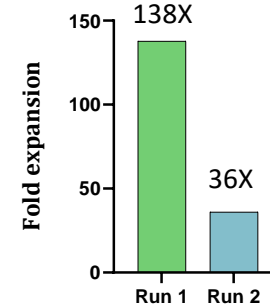
Good RevCAR transduction efficiency



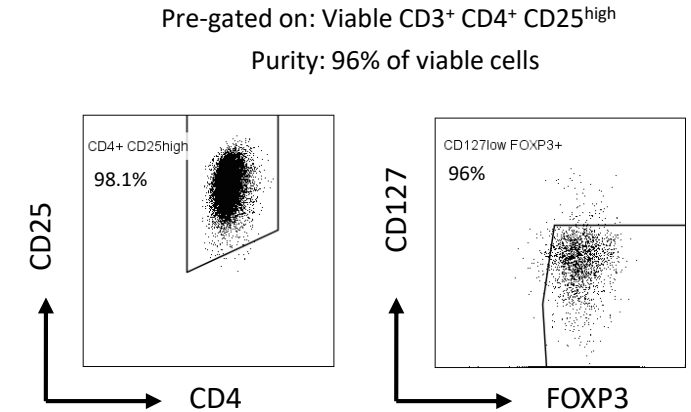
High yield after expansion



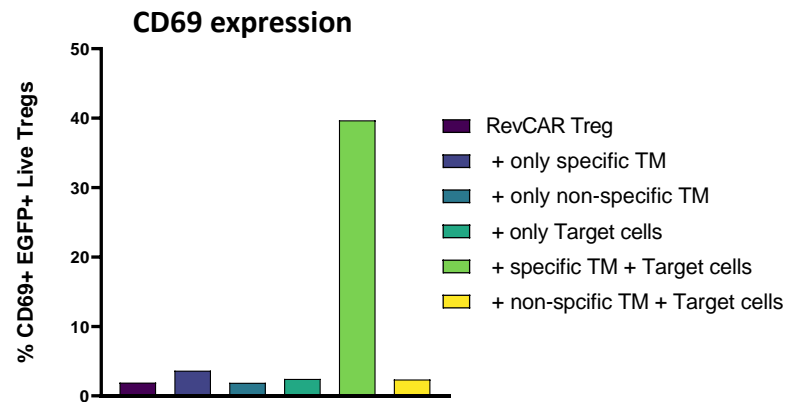
Fold expansion



High purity after expansion

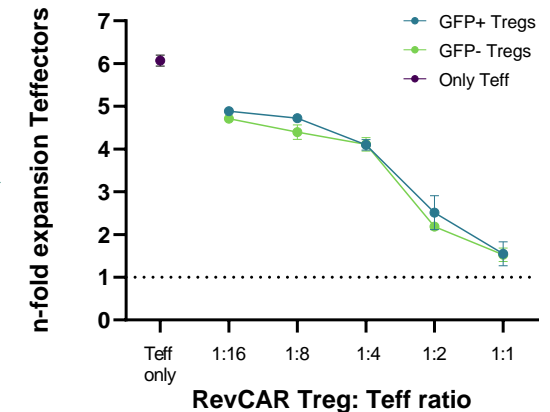
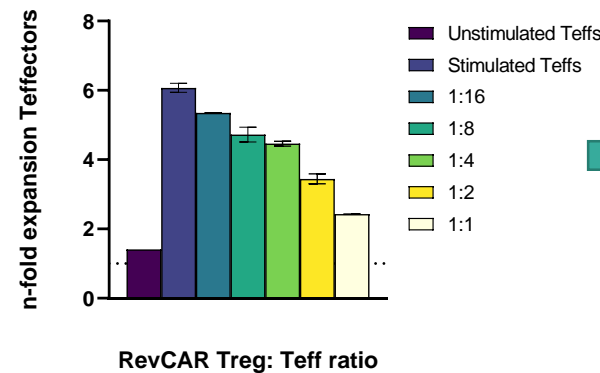


RevCAR Tregs are specifically activated



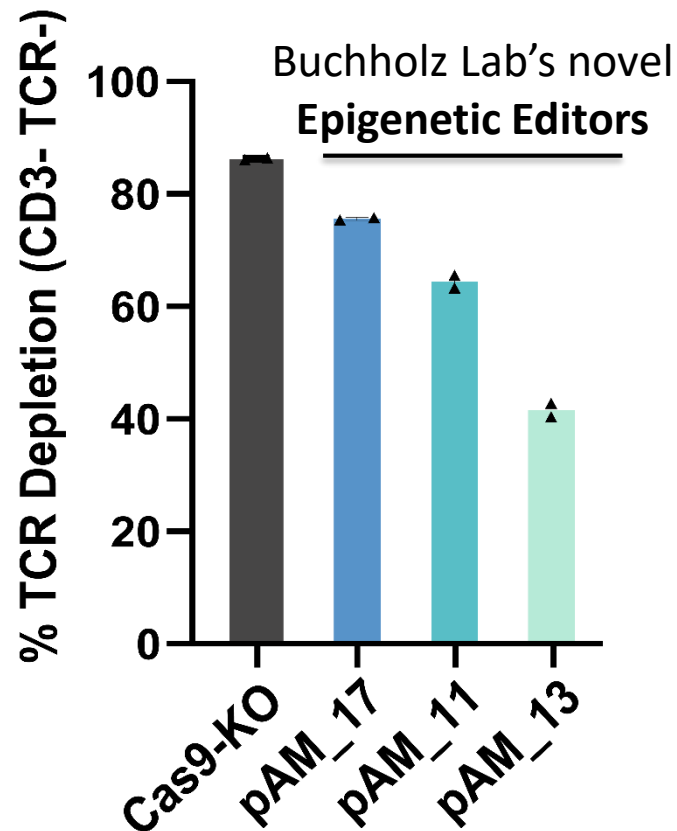
Retain suppressive function

96 hours eflour450 CD4+ CD25- Teffectors

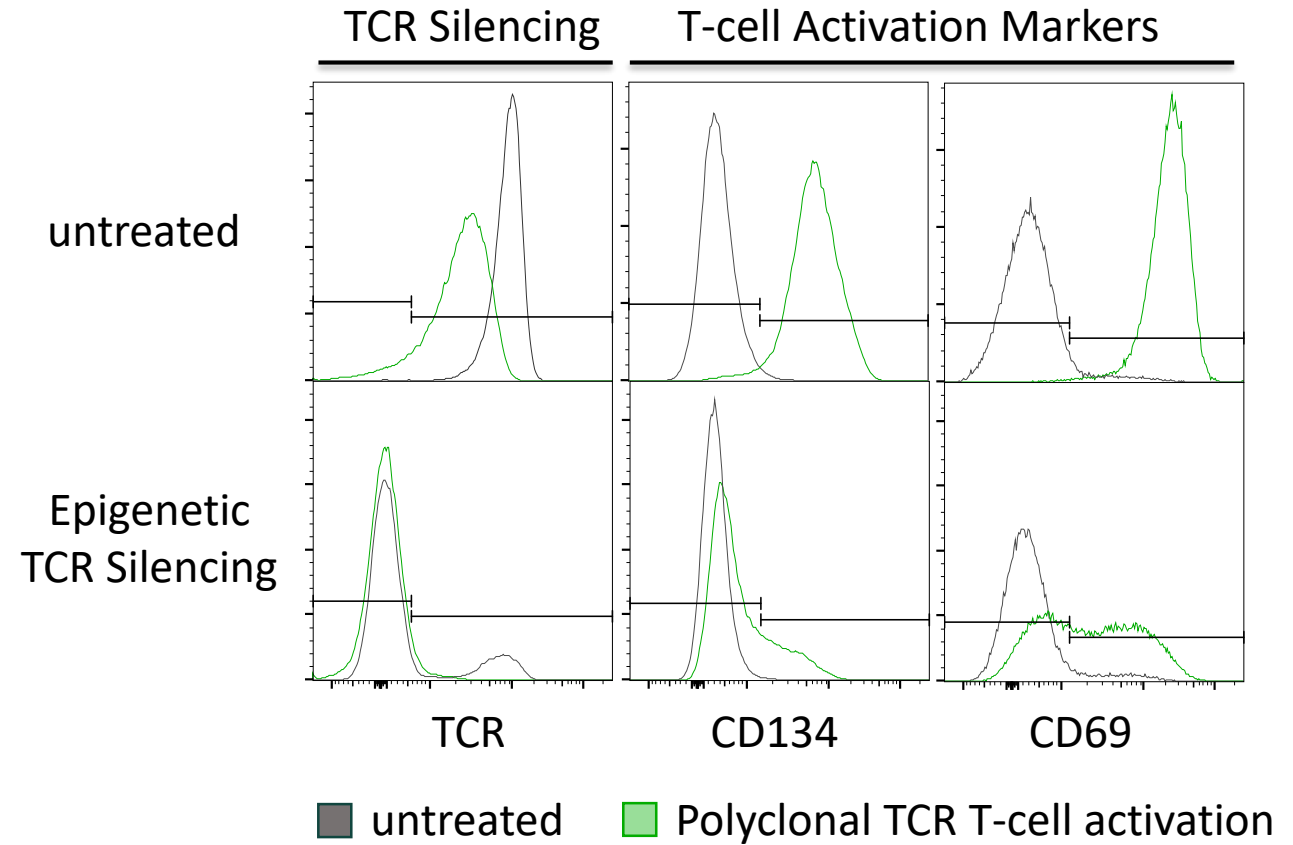




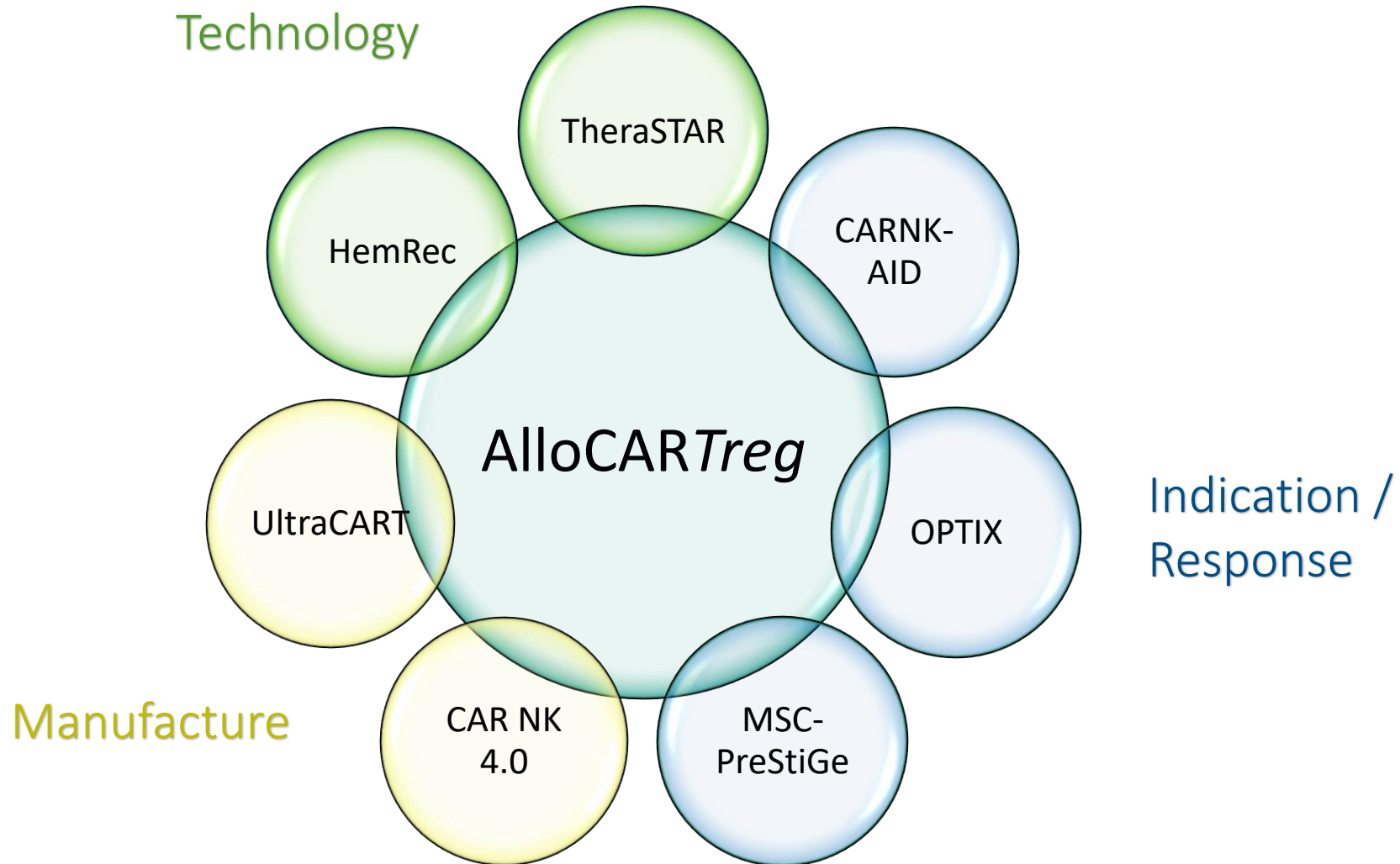
Epigenetic TCR Silencing



Phenotypic Analysis



AlloCAR_{Treg} – Synergies to other SC Projects




AlloCART_{reg} – Outlook


Short-term

- Optimizing antigen-specific functional assays
- Optimizing epigenetic TCR silencing, impact on phenotype and expansion potential

Medium-term

- Integration of epigenetic TCR silencing to the automated manufacturing process
- Upscaling of umbilical cord blood Treg manufacturing 

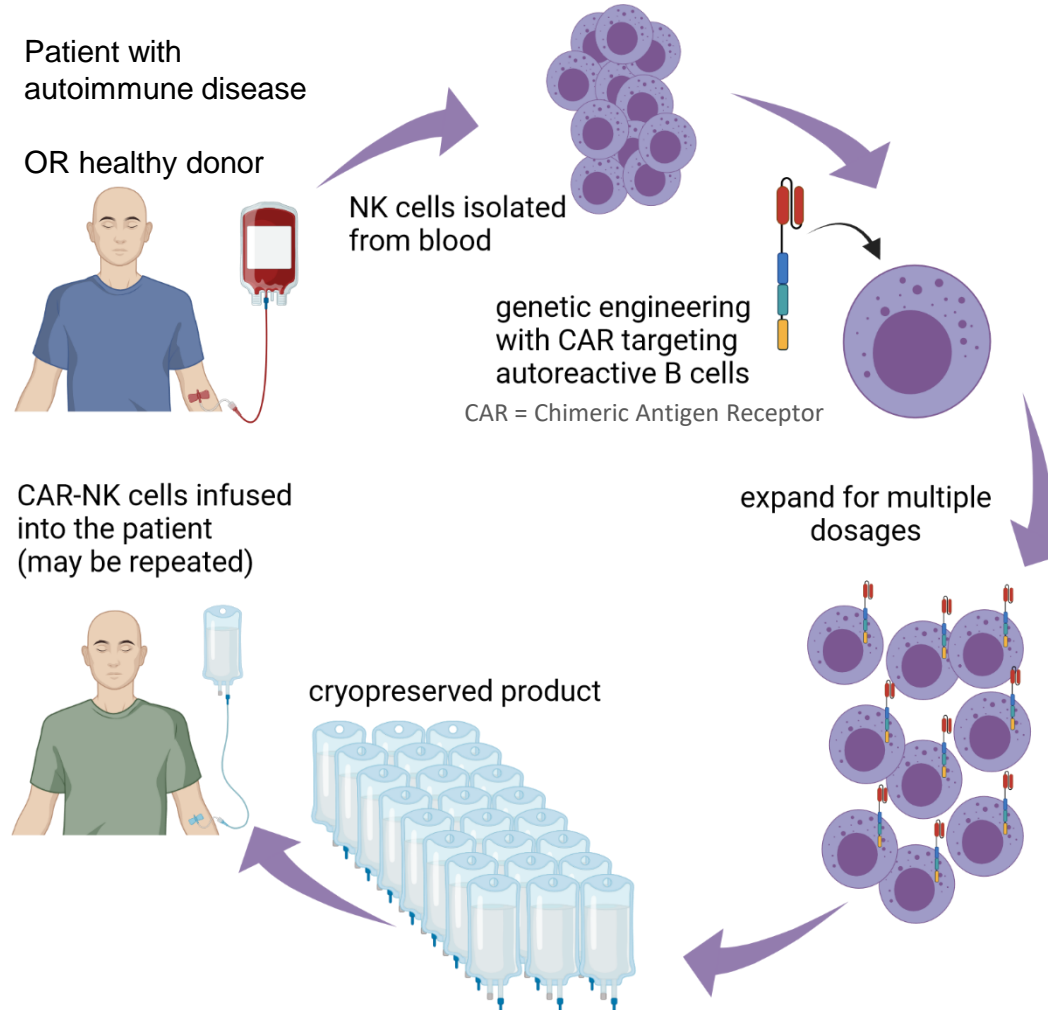
Long-term

- Novel targeting modules for autoimmune indications including dual targeting
- TCR excision with designer recombinases 

CAReNK-AID – Project Overview

CAR engineered NK cells for the targeting of severe AutoImmune Diseases

Torsten Tonn
(ETM, MF, TUD)



Ezio Bonifacio
(CRTD, TUD)

Achim Aigner
(MF, Uni Leipzig)

Achim Temme
(NCH-FOR, MF TUD)

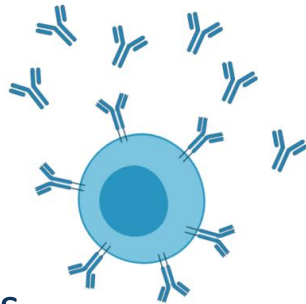
Stefan R. Bornstein
(MK III, MF TUD)

CAReNK-AID – Objectives

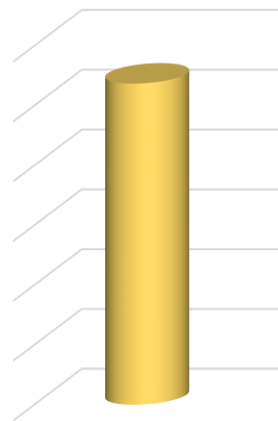
- >100 distinct autoimmune diseases identified
- estimated **10% of world population** is affected (~70 Mio Europe, 4-6 Mio Germany, 23 Mio USA,...)

B cell-mediated:

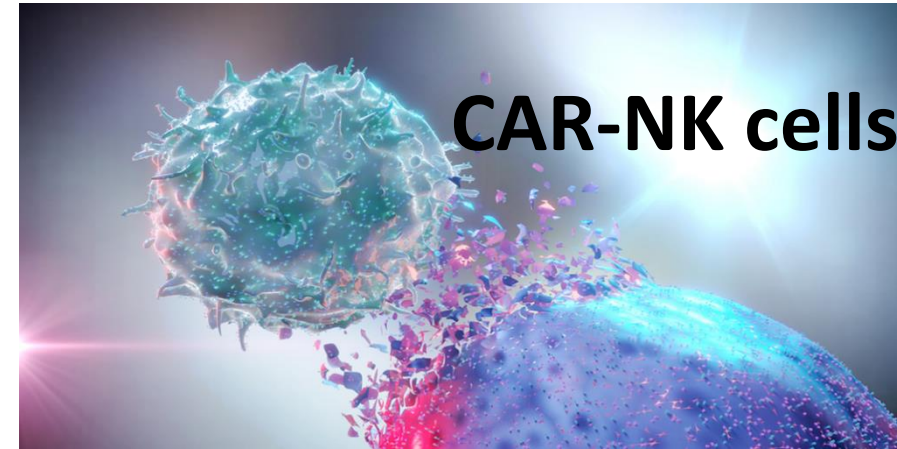
- SLE
- Multiple Sclerosis
- Myasthenia Gravis
- ... **3.4 Million patients Europe & USA**



\$ 3.4 Billion



1% \$ 100k



Safety

(no severe side effects vs. CAR T cells)



Cost effective

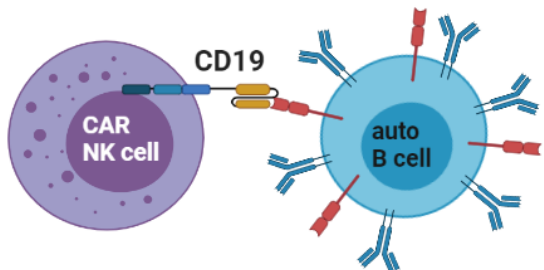
(1 product = multiple patients)



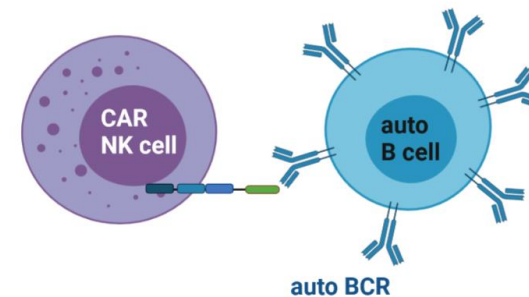
Fast transfer from cancer

CAReNK-AID – Results so far

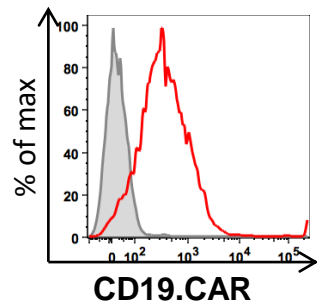
CAR-NK
anti-Pan B cells



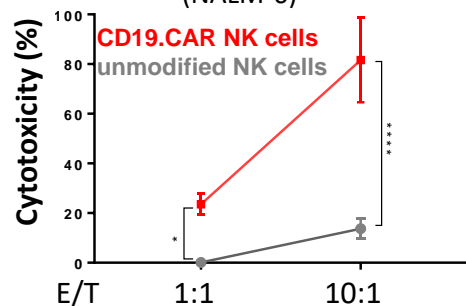
CAR-NK
anti-autoreactive BCR



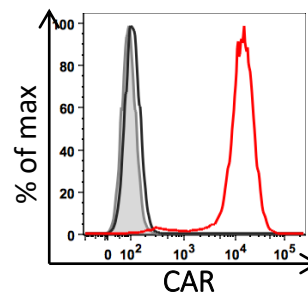
Blood-derived CAR-NK cells



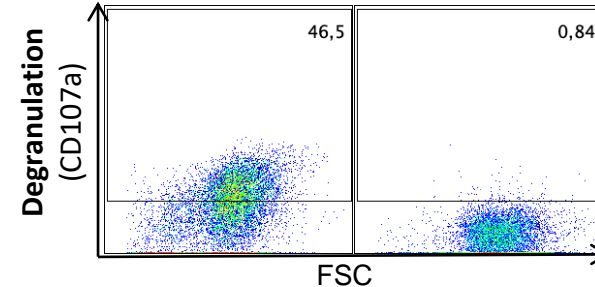
CD19-positive B cell line
(NALM-6)



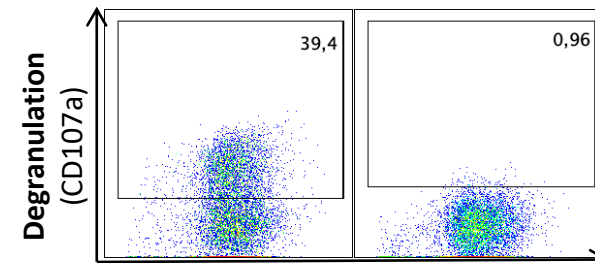
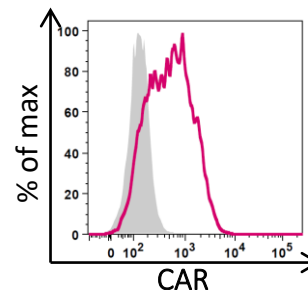
PV.CAR NK-92



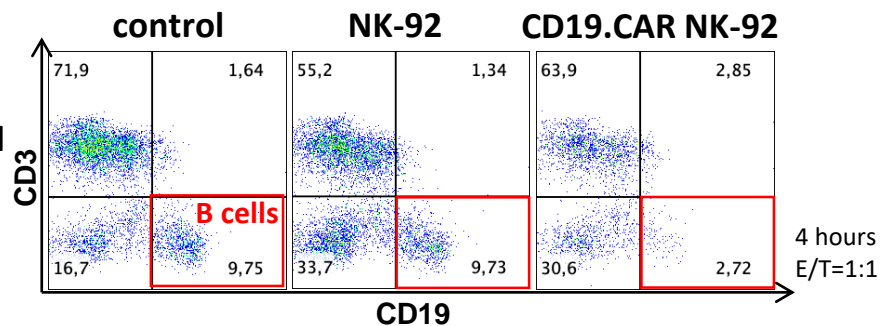
autoreactive
antibody



T1D.CAR NK-92

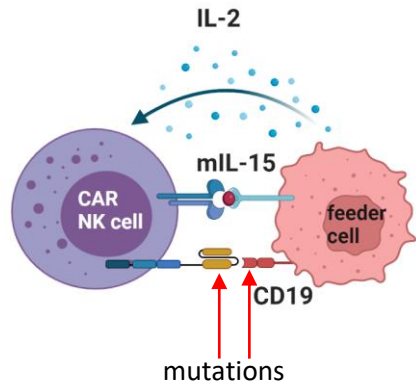


Peripheral
blood

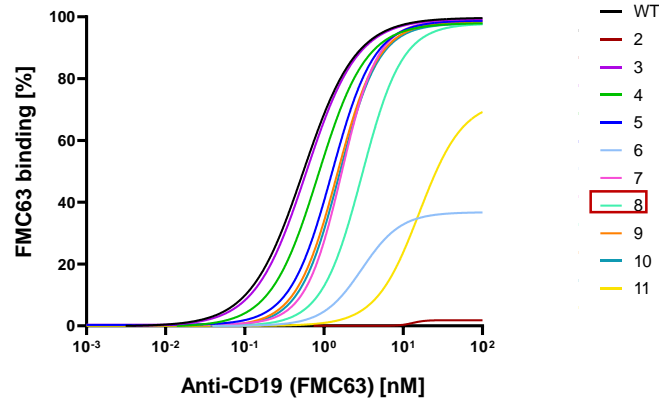


CAReNK-AID – Results so far

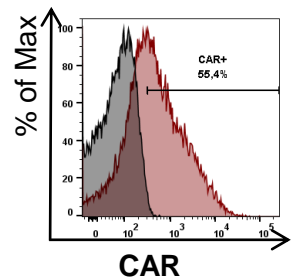
Feeder cells for specific CAR-NK cell expansion



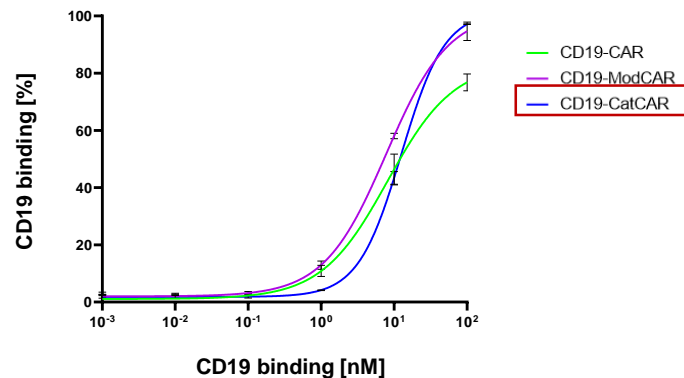
anti-CD19 binding to the PC3.CD19 feeder cells



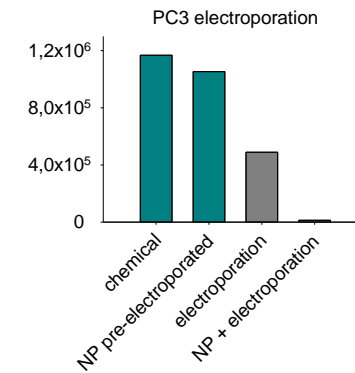
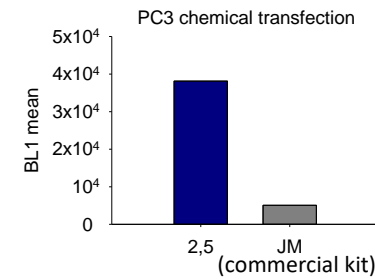
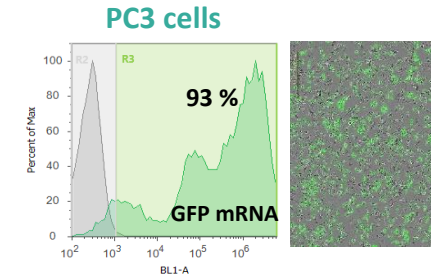
CD19.CAR NK cells



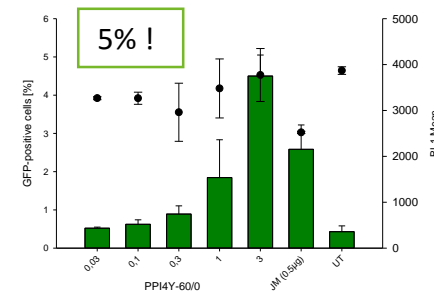
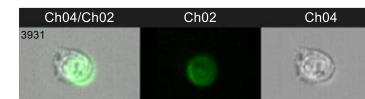
CD19 binding to mutated CD19.CAR NK cells



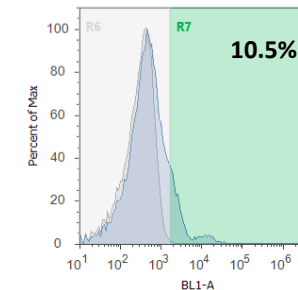
Virus-free NK cell transfection nanoparticles



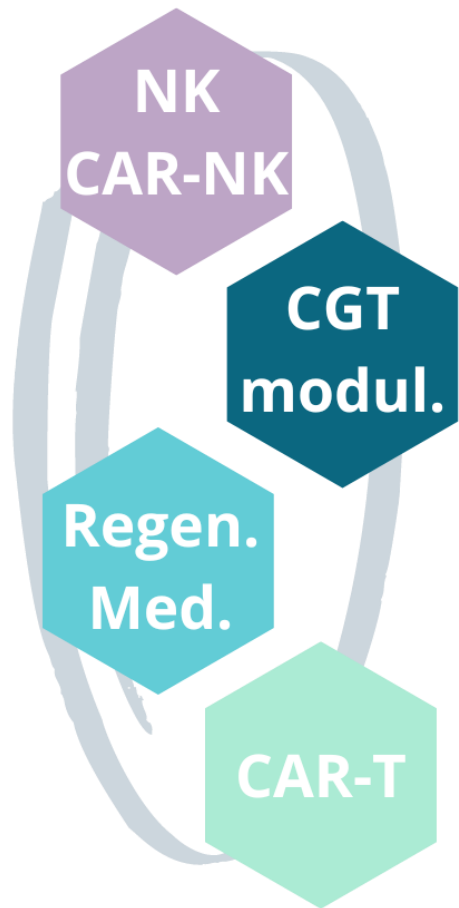
Primary NK cells



saRNA-GFP



CAR-NK-AID – Synergies to other SaxoCell Projects



CAR-NK 4.0	●	●	●	●
NK4Therapy	●			●
AlloCARtreg		●	●	●
UltraCAR		●	●	●
TheraSTAR		●	●	●
EPC-CAR			●	●
OPTIX				●
HemRec	●			●
ZellWund				●
xMax				●
MSC-PrestiGe				●



Fraunhofer

IZI

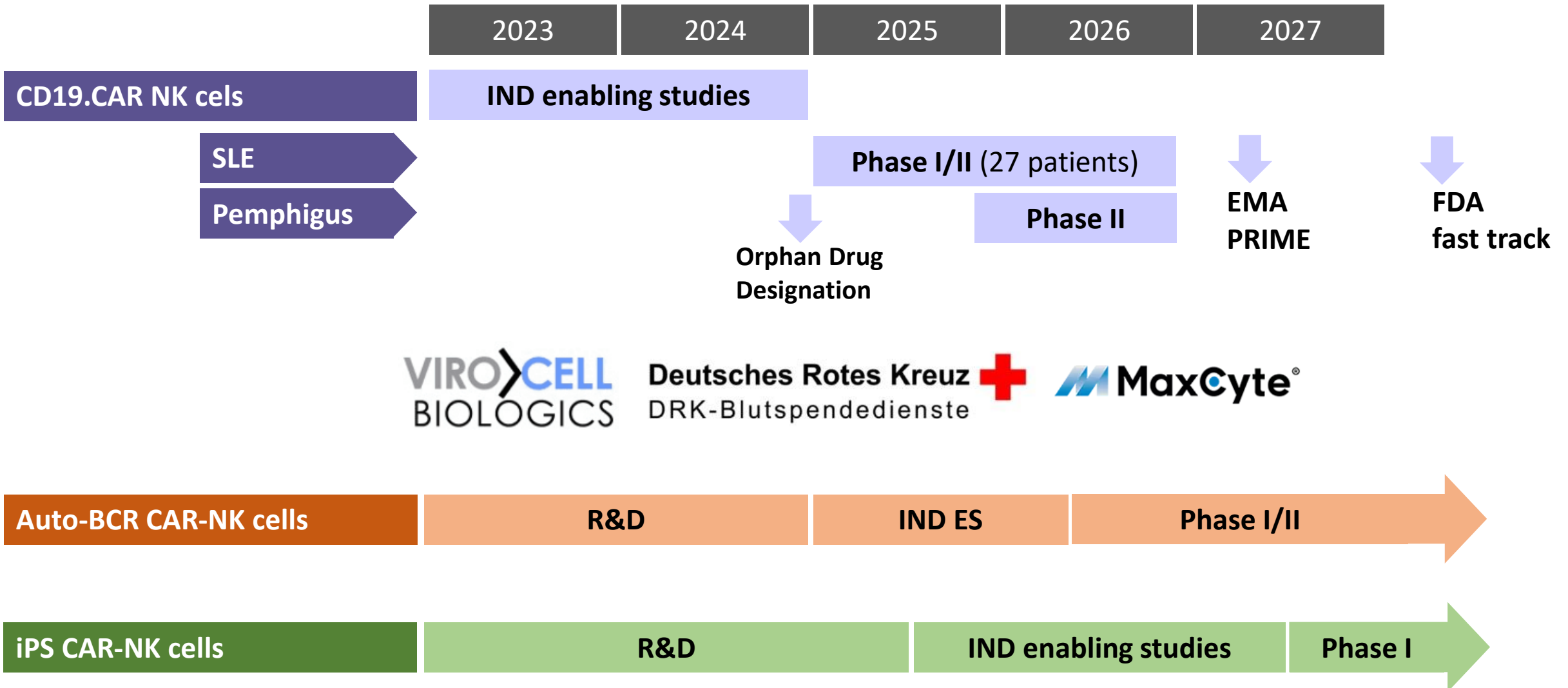
❖ SaxoCell Systems, Clinics, Omics

❖ Transgenic GMP cell products

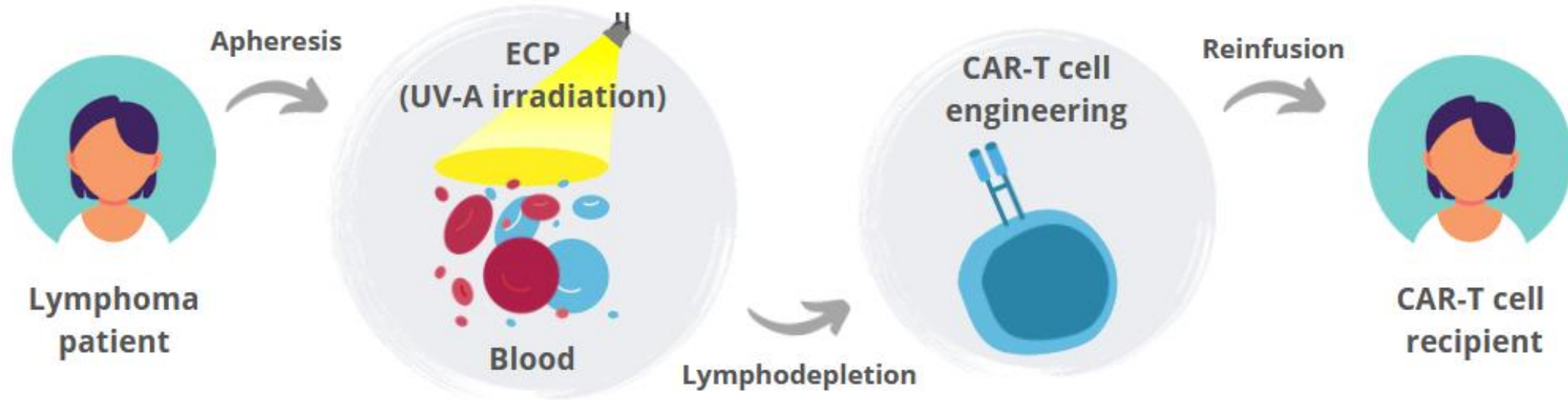
❖ (CAR) gene transfer

❖ NK cell expansion and production

CAReNK-AID – Outlook



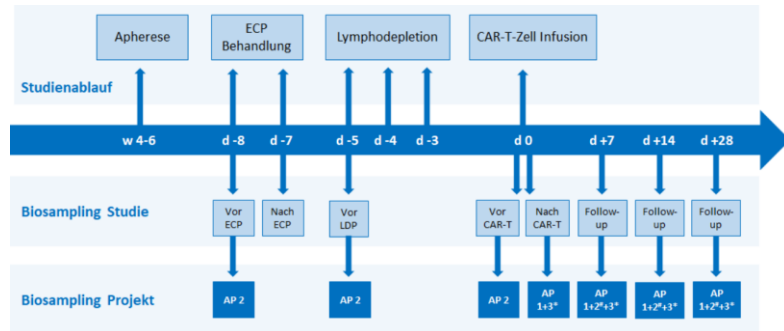
ECP-CAR – Project Overview



ECP-CAR – Objectives

original objectives:

-analysis of samples **PhotoCAR** trial



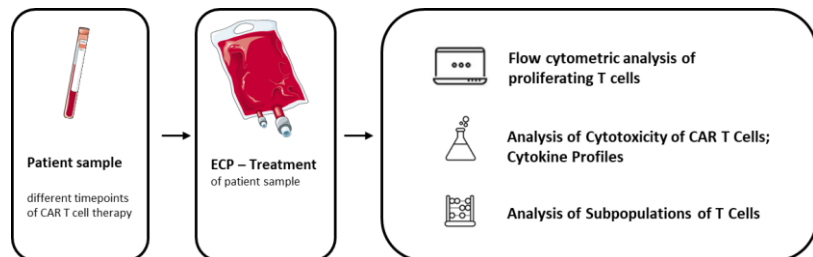
- patients CAR
- ECP induced
- dynamics of



PhotoCAR trial will not be performed (PEI concerns)
 - lack of data on the actual mode of action
 - impact on CAR T cell efficacy?

current objectives after project amendment:

-analysis of 15 ECP treated peripheral blood samples of lymphoma patients after treatment with CAR-T cells



- patients CAR T cells after ECP treatment
- evidence of apoptosis/reduced proliferation
- dynamics of cytotoxic effector functions and cytokine-profiles
- translational research regarding incorporation in current treatment concepts (management of inflammatory complications...)

CD19 CAR T-cell therapy and prophylactic anakinra in relapsed or refractory lymphoma: phase 2 trial interim results

Received: 26 February 2023

Accepted: 17 May 2023

Published online: 03 July 2023

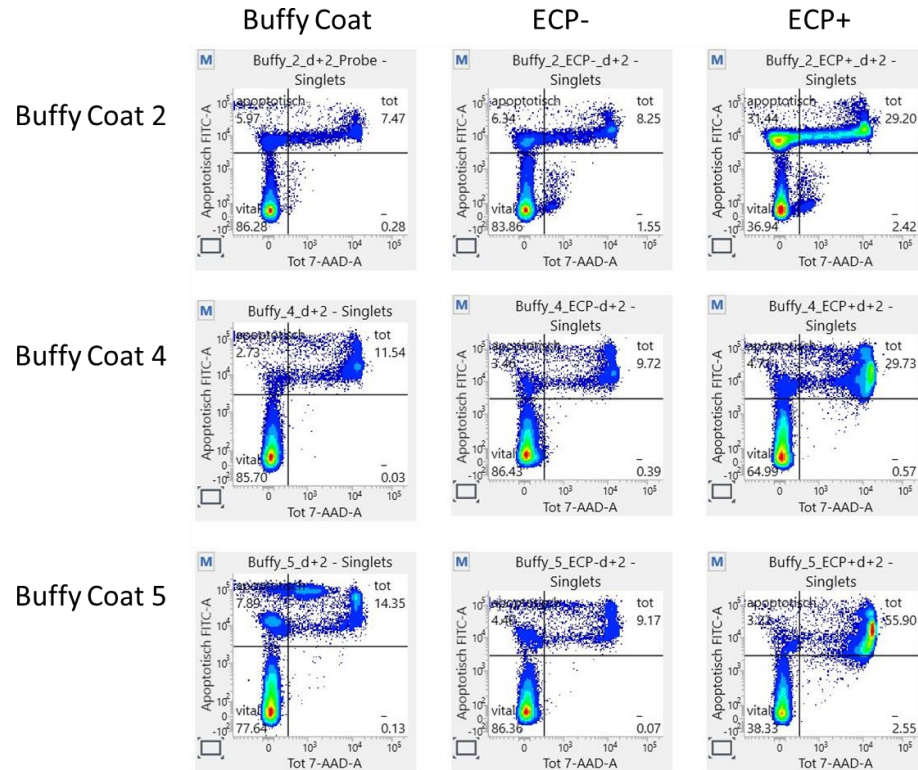
Check for updates

Jae H. Park^{1,2,3,15}, Karthik Nath^{1,15}, Sean M. Devlin⁴, Craig S. Sauter^{1,5,12}, M. Lia Palomba^{1,3,6}, Gunjan Shah^{1,3,7}, Parastoo Dahi^{1,3,7}, Richard J. Lin^{1,3,7}, Michael Scordo^{1,3,7}, Miguel-Angel Perales^{1,3,7}, Roni Shouval^{1,3,7}, Ana Alarcon Tomas^{7,13}, Elizabeth Cathcart¹, Elena Mead^{1,8}, Bianca Santomaso^{1,9}, Andrei Holodny¹⁰, Renier J. Brentjens^{1,5,14}, Isabelle Riviere^{5,11} & Michel Sadelain⁵

ECP-CAR – Results so far

Understanding the mechanism of action of ECP - validation of apoptosis using buffy coats:

Proliferation capacity of the T lymphocytes after ECP treatment:



BC2	ECP-	88,7 %
	ECP+	0.2 %
BC4	ECP-	90.9 %
	ECP+	32,4 %
BC5	ECP-	90,3 %
	ECP+	0 %

- 25% - 56% of cells exhibited apoptosis

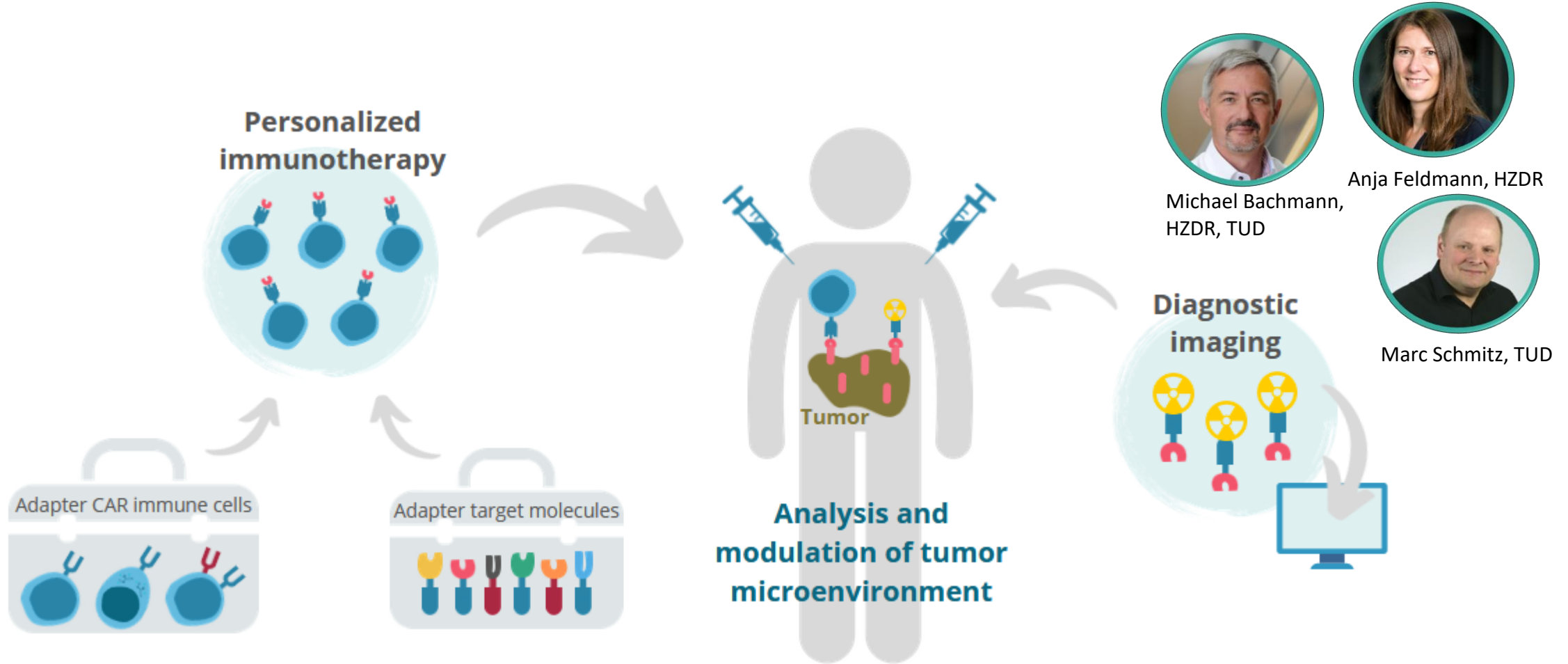
ECP-CAR – Synergies

- Understanding the role of ECP in immunomodulation prior to lymphodepletion therapy
- Incorporation of ECP in management of inflammatory complications of cellular therapies
- Synergies with current ECP indications as well as with expanding indications for treatment with CAR-T cells

Till September 2024: analysis of 15 ECP treated peripheral blood samples of lymphoma patients after treatment with CAR T cells (tisagen lecleucel, axicabtagene ciloleucel)

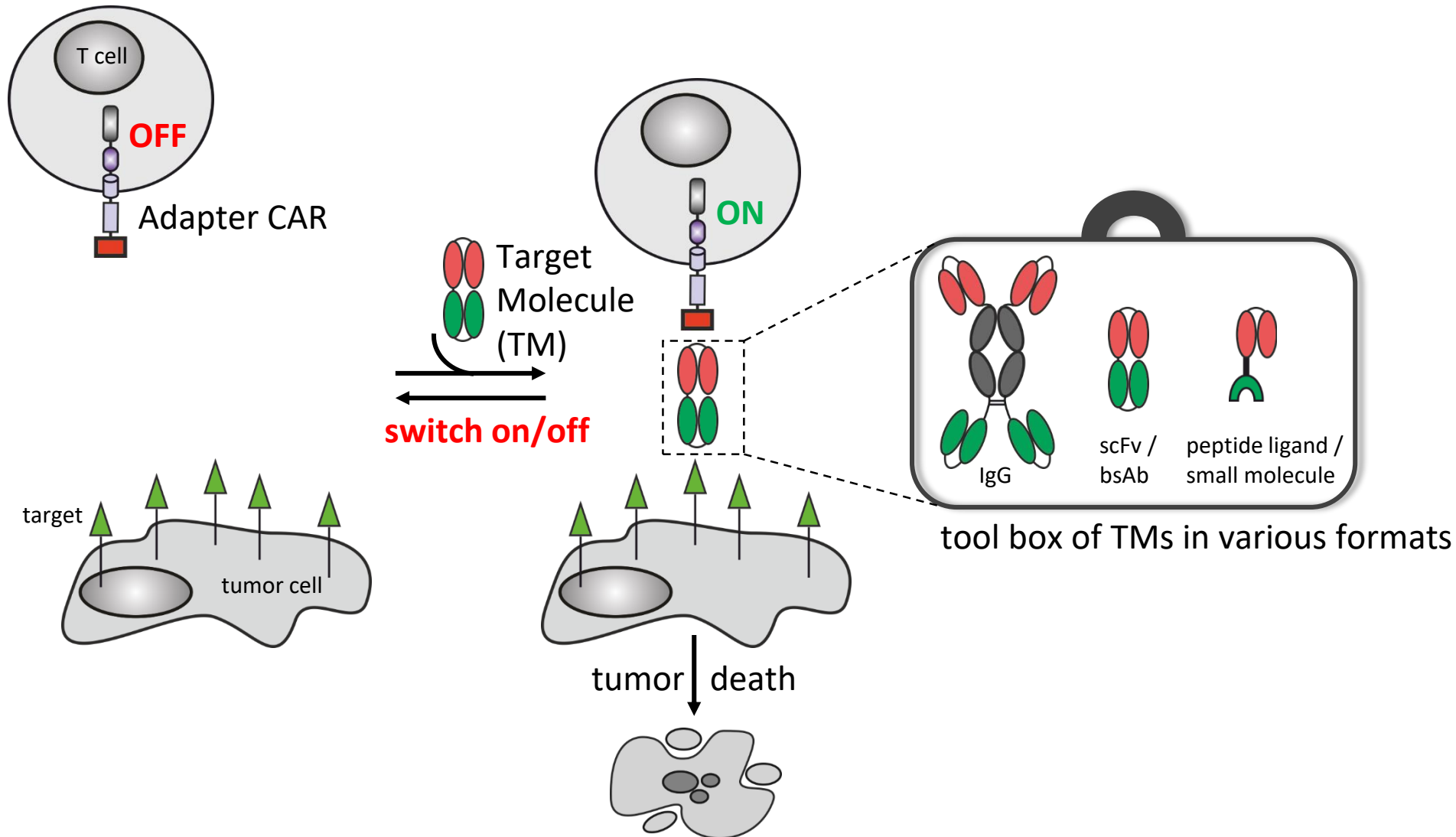
- Provide insights into the potential synergistic effects of immunomodulation by ECP and lymphodepletion
- Deepening the knowledge of the mechanism of action of ECP in CAR T cell therapy
- Defining the role of ECP-immunomodulation in the context of CAR T treatment
- Basis for further concepts of clinical trials

TheraSTAR – Project Overview



TheraSTAR – Project Overview

switchable Adapter CAR platform

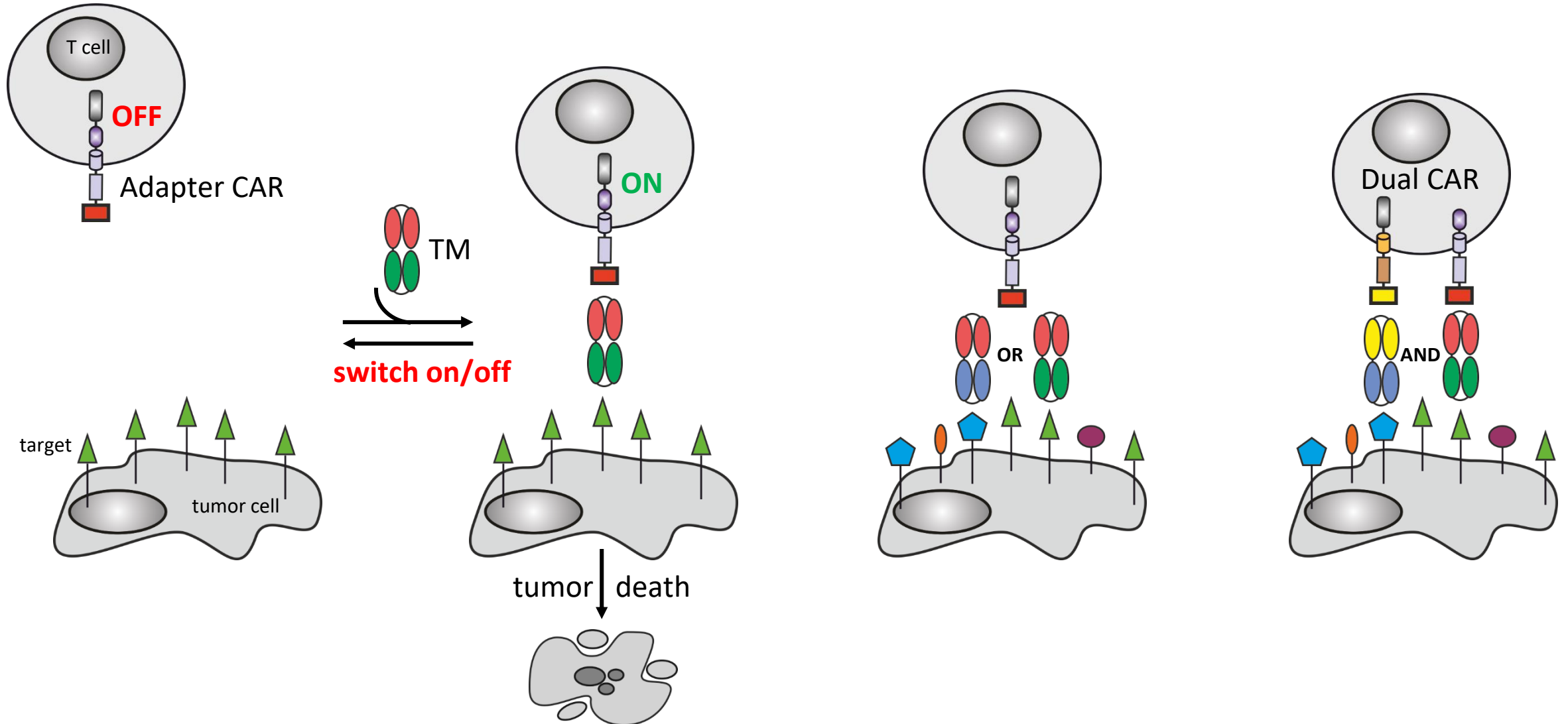


TheraSTAR – Project Overview

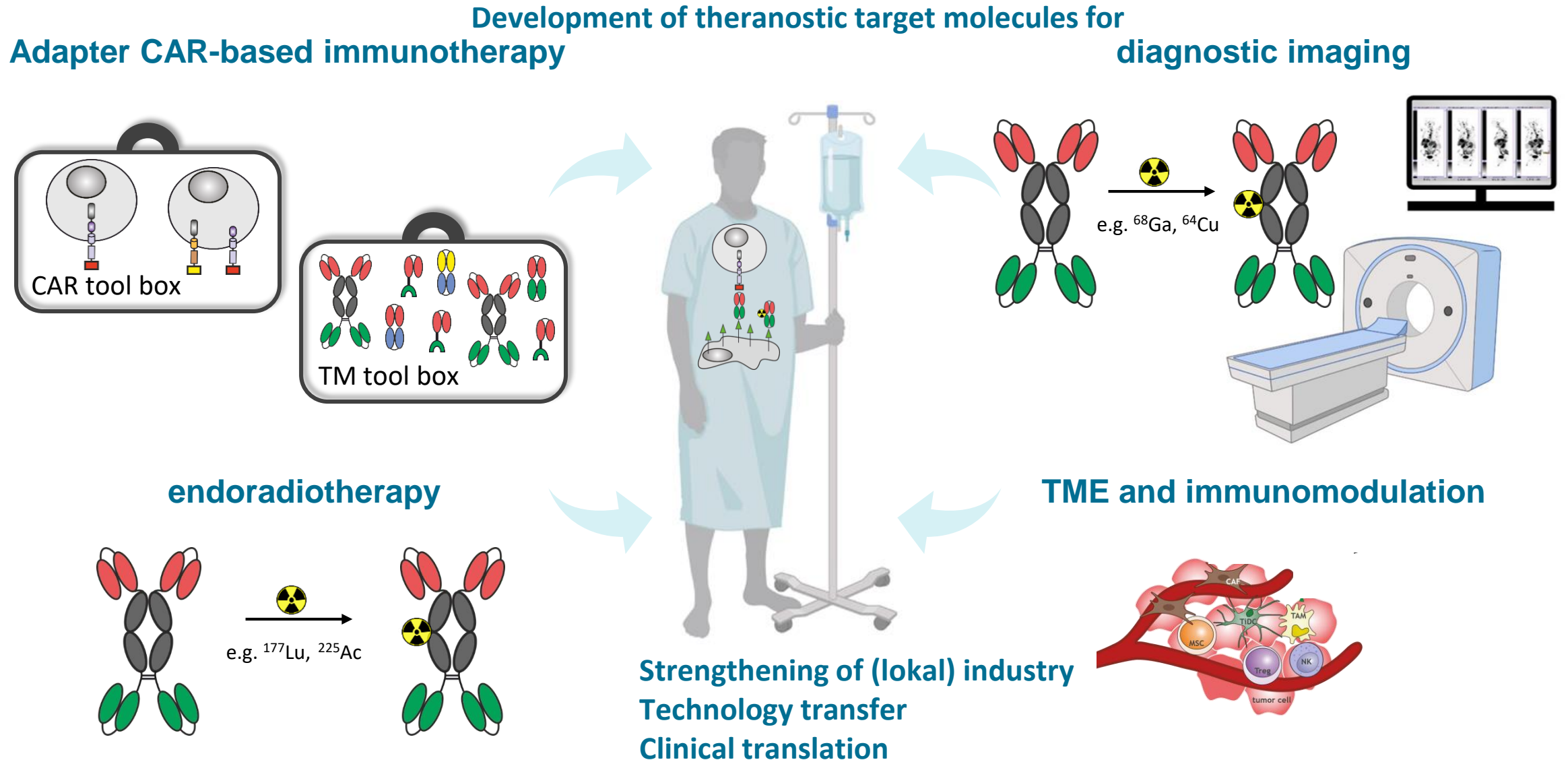
switchable Adapter CAR platform

flexible, multiple tumor targeting

precise tumor targeting

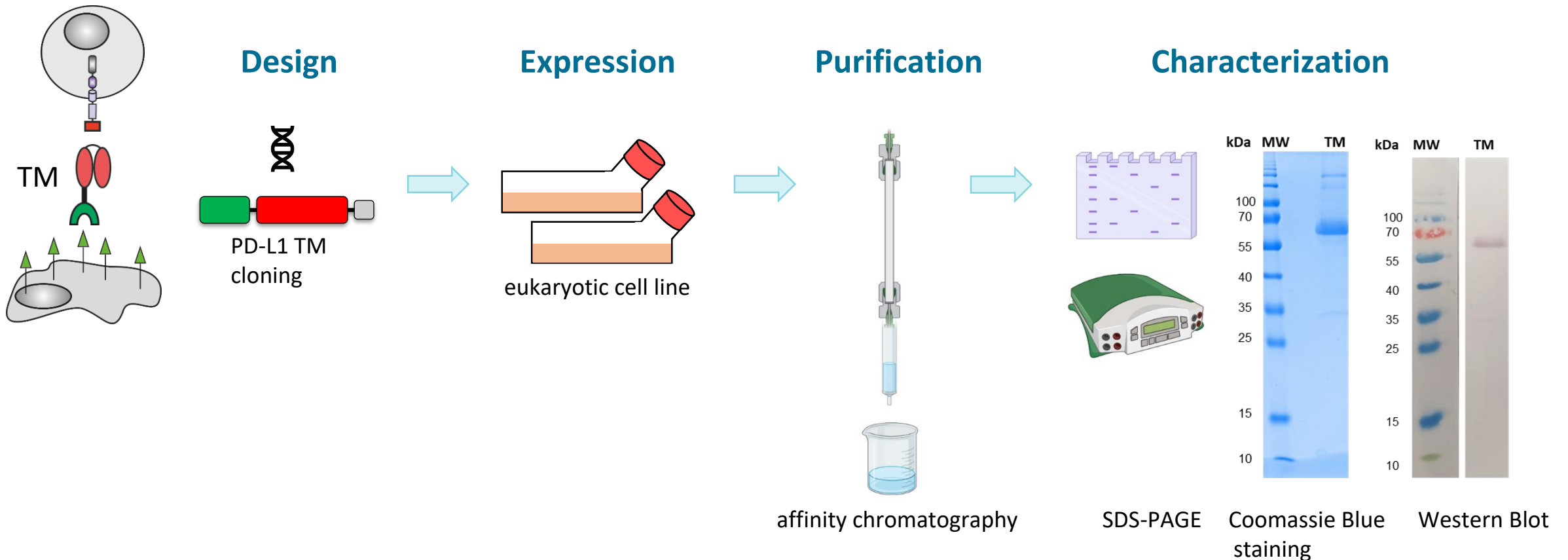


TheraSTAR – Objectives



TheraSTAR – Results so far

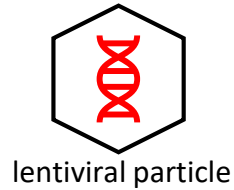
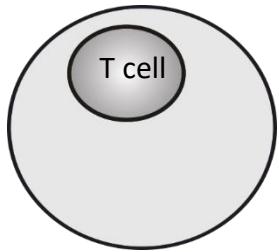
Development of novel Target Molecules (TMs) targeting immune checkpoint molecules (e.g. PD-L1)



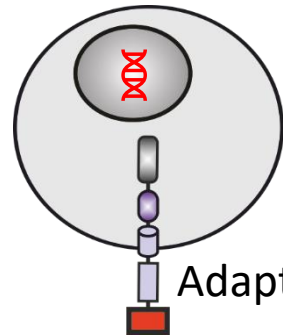
TheraSTAR – Results so far

Generation of Adapter CAR T cells

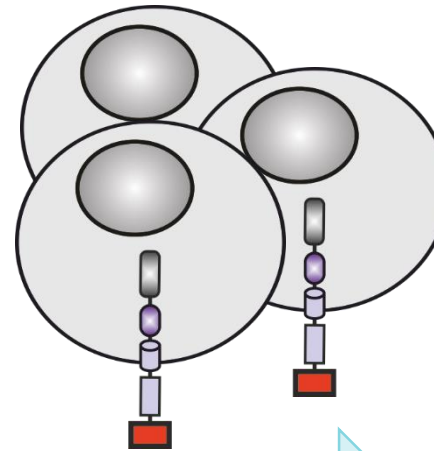
T cell isolation



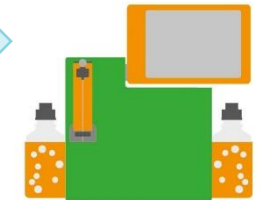
Genetical Modification



Expansion

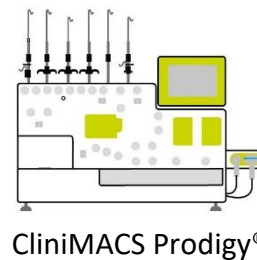
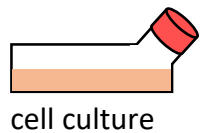


Characterization



Flow cytometry using
MACSQuant® Analyzer 10

manual or automated GMP-compliant large scale



TheraSTAR – Results so far



Eugenia Crespo

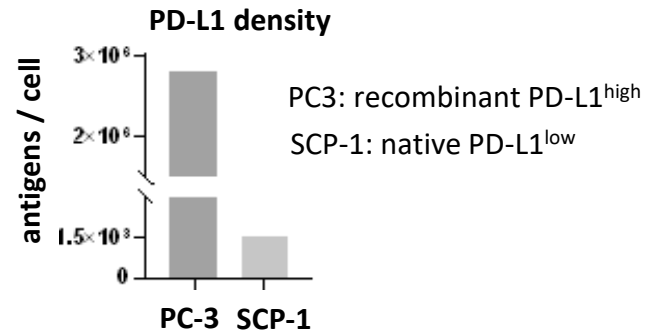
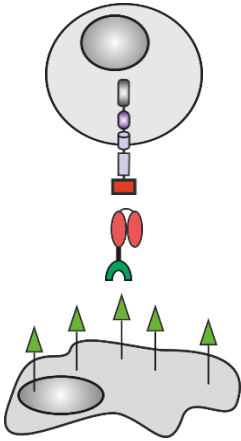


Liliana Loureiro

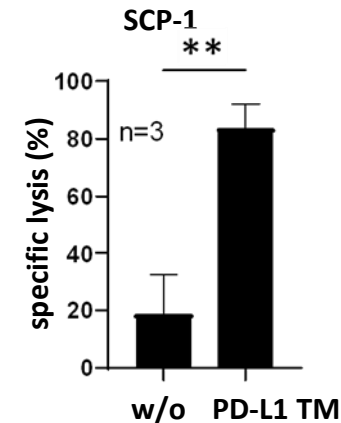
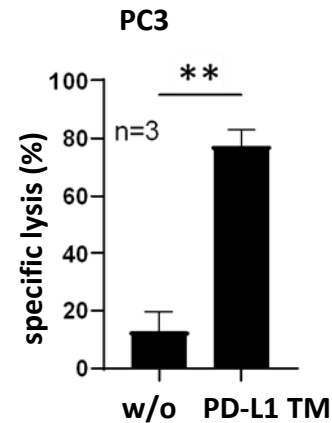


Therapeutic functionality of Adapter CAR platform in-vitro

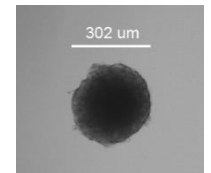
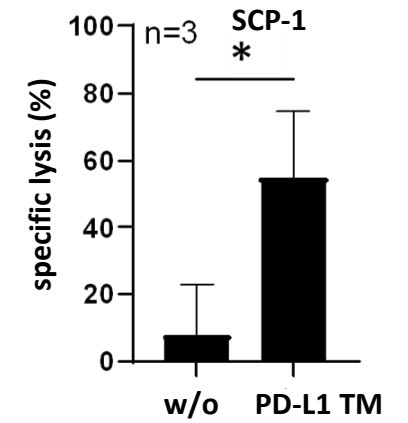
PD-L1⁺ target cell models



Killing of PD-L1⁺ monolayer target cells

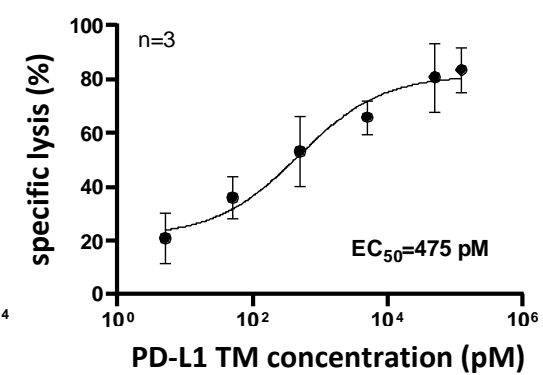
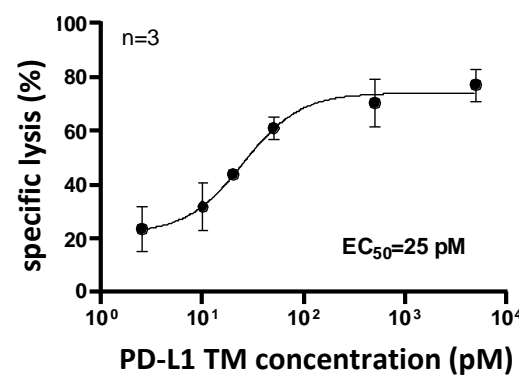
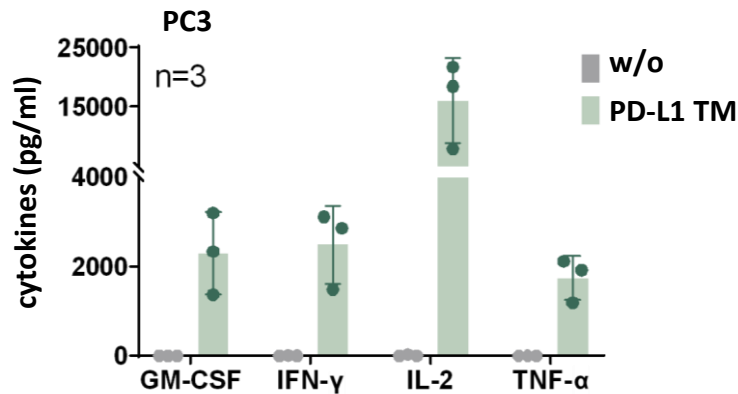


Killing of PD-L1⁺ spheroids



AREA 4 – CGT

Cytokine release from Adapter CAR T cells



TheraSTAR – Results so far



Luise Rupp

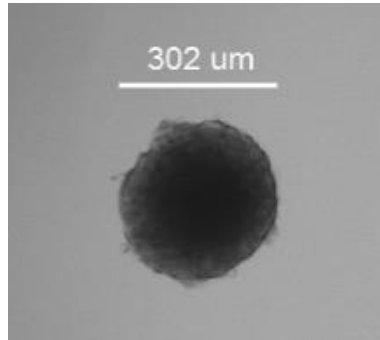


Antonia Stammberger

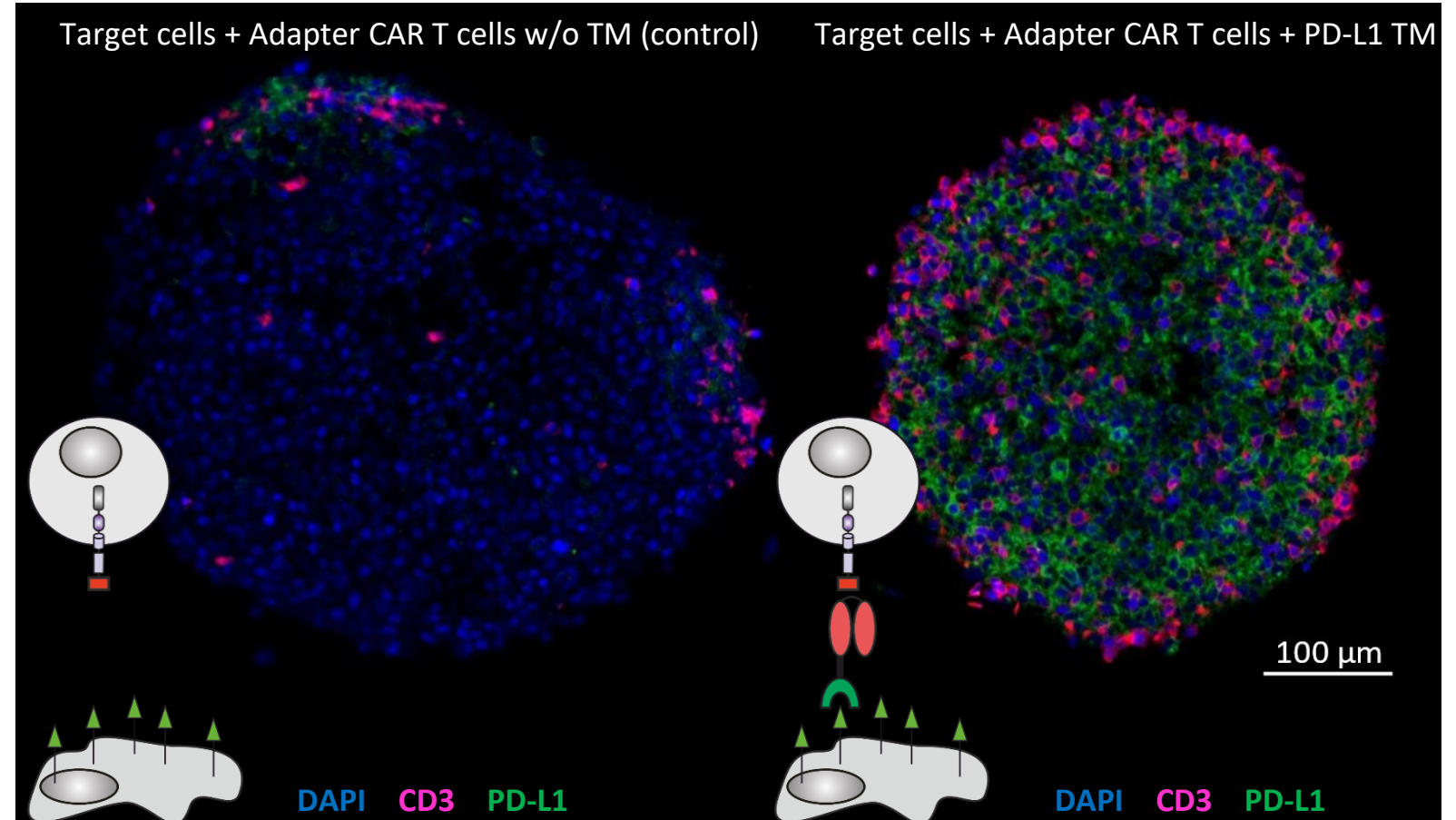


Infiltration of Adapter CAR T cells in PD-L1⁺ spheroids, TME analysis and modulation

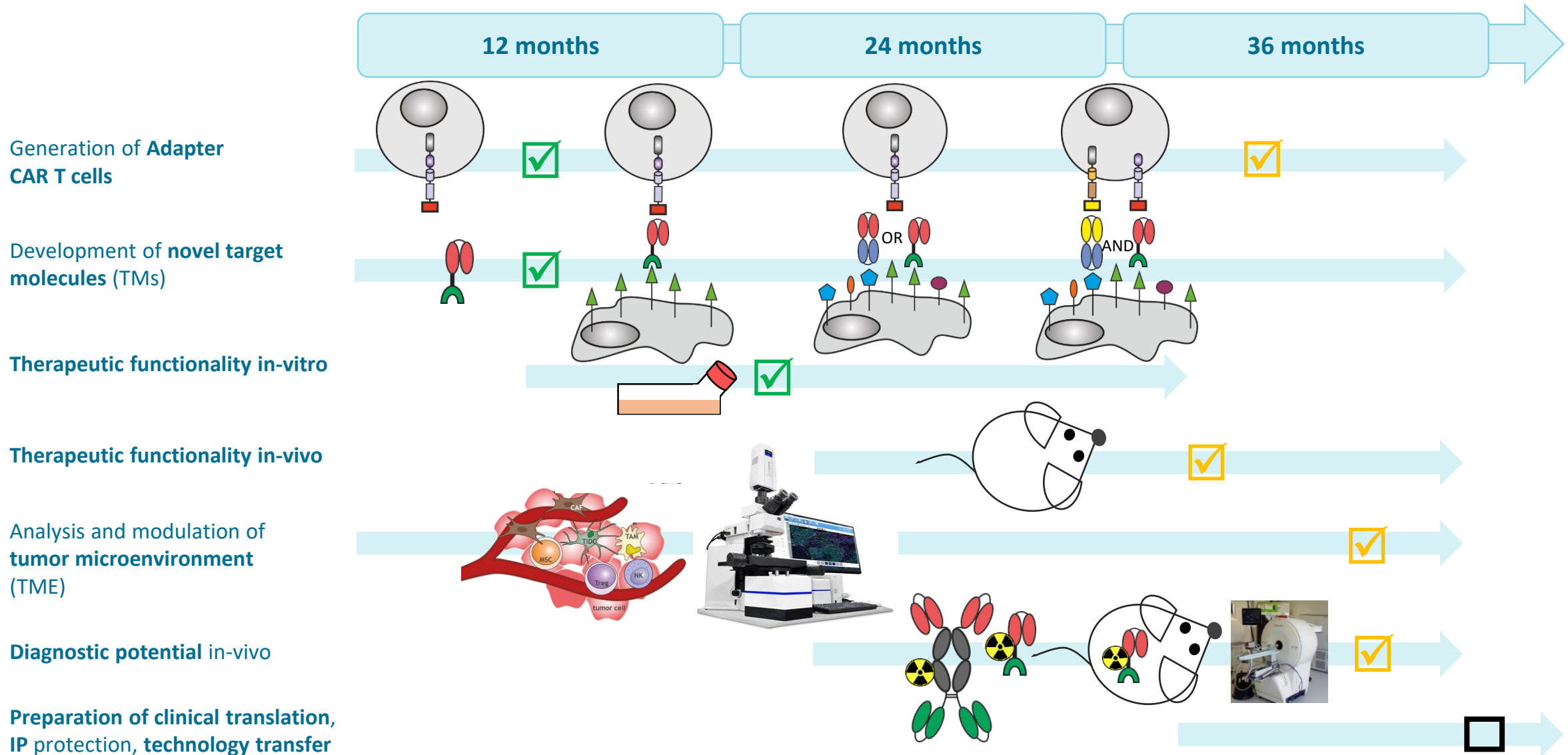
spheroid formation



Vectra automated quantitative immunofluorescence imaging system

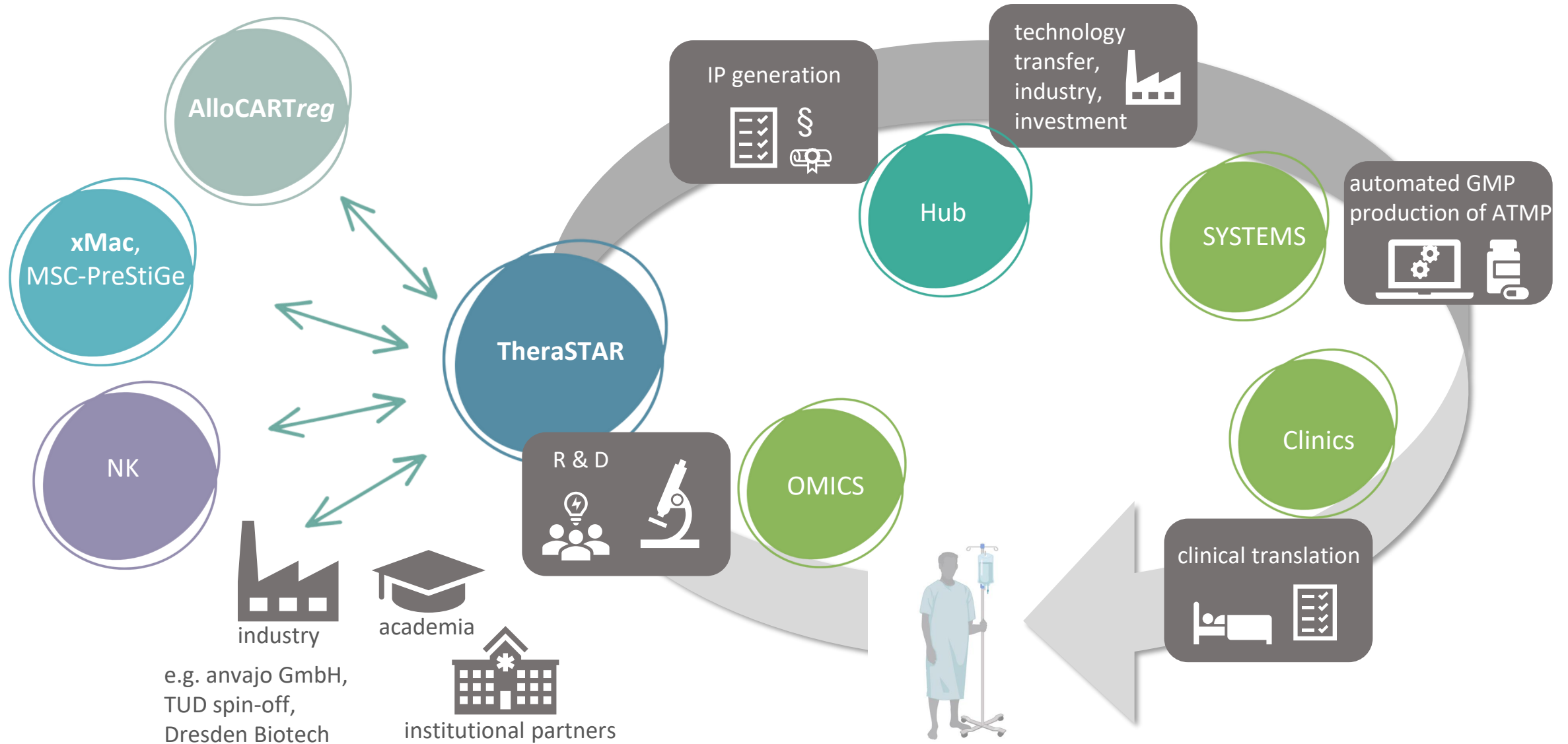


TheraSTAR – Results and Outlook

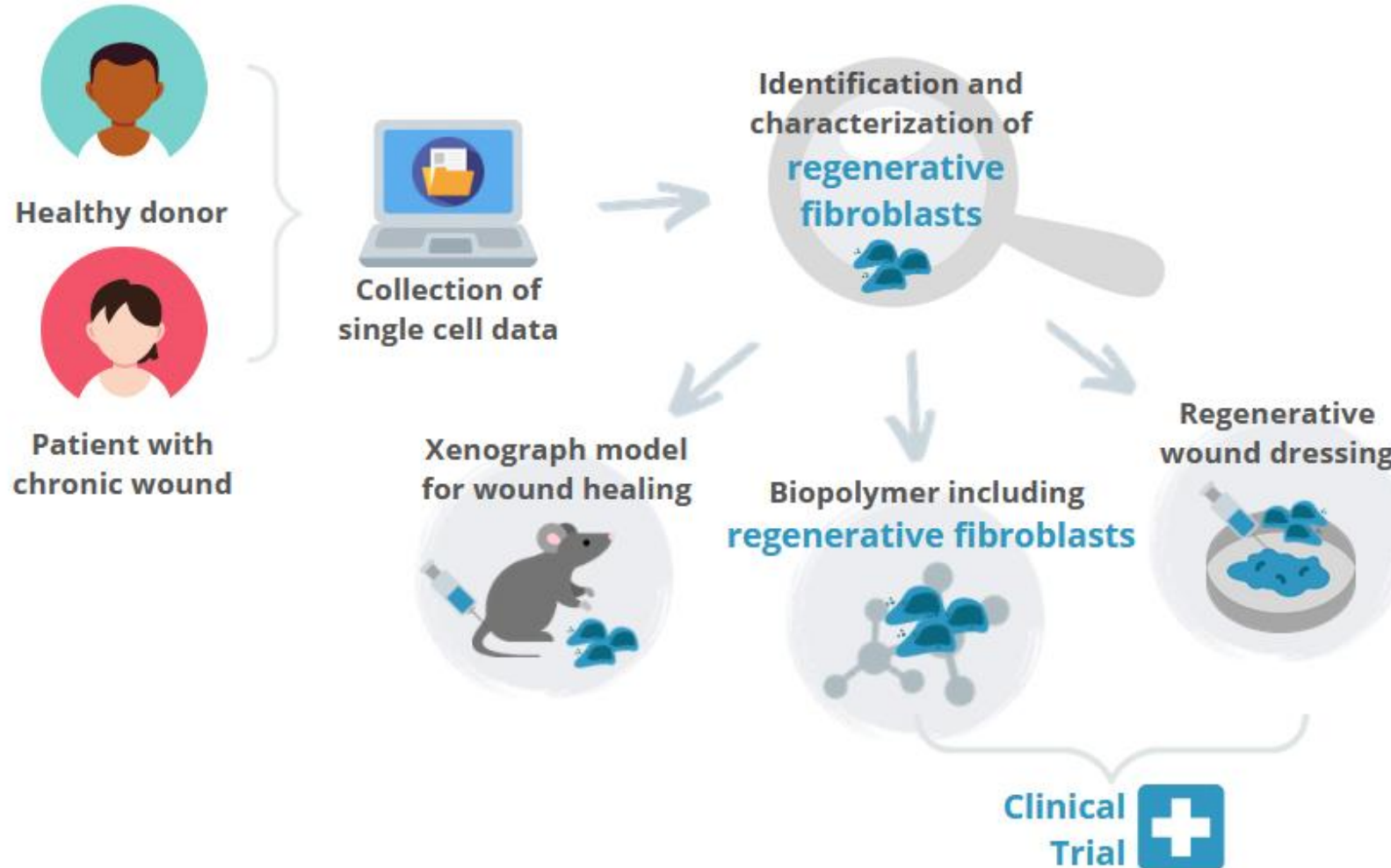


AREA 4 – CGT

TheraSTAR – Synergies and Outlook

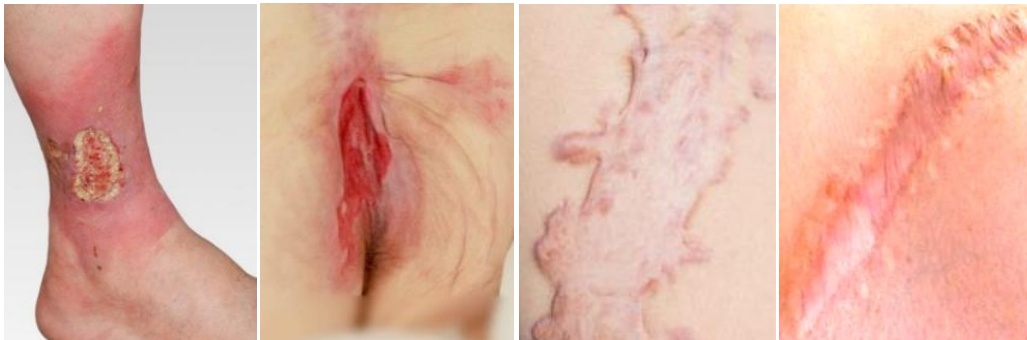


ZellTWund – Project Overview



Innovative cell therapy to promote skin regeneration

Wound healing disorders



Incidence chronic wounds in Germany¹:

2018
0,24%



Prevalence chronic wounds in Germany²:

2012- 2018
7.8%

Aging population

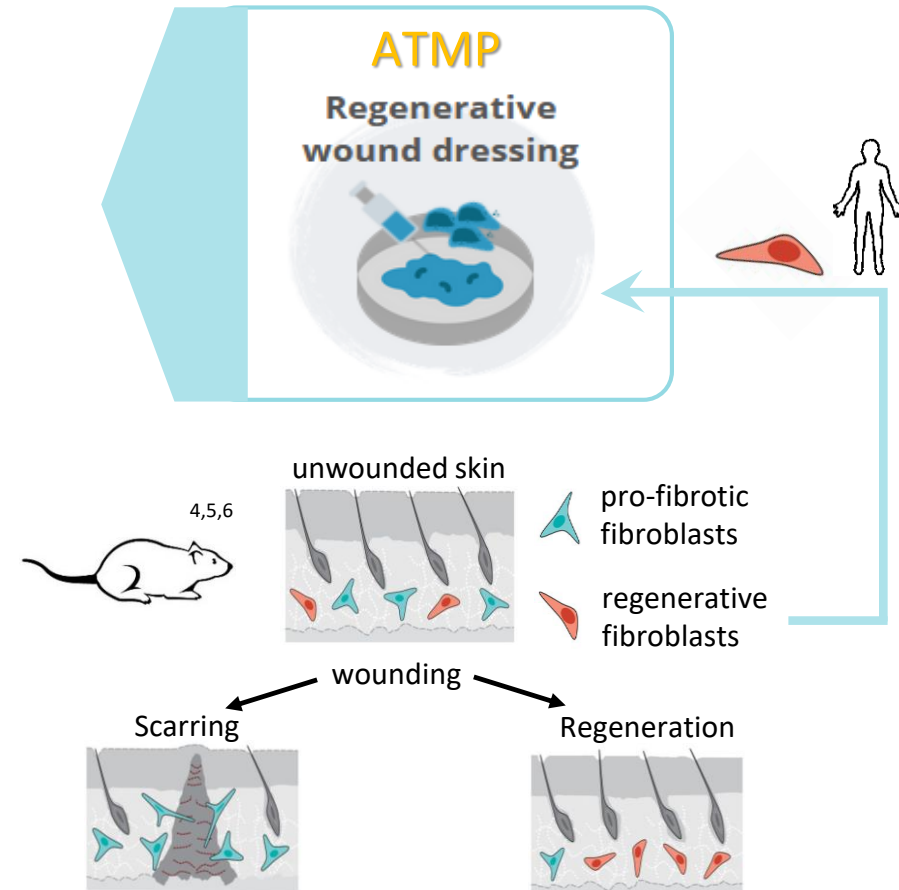
/

Comorbidities



Direct treatment costs³ : 9000 € / patient / year

Insufficient therapeutic success



¹ Heyer et al., *WoundRepairRegen*, 2016

² Raeder et al., *Int wound J.*, 2020

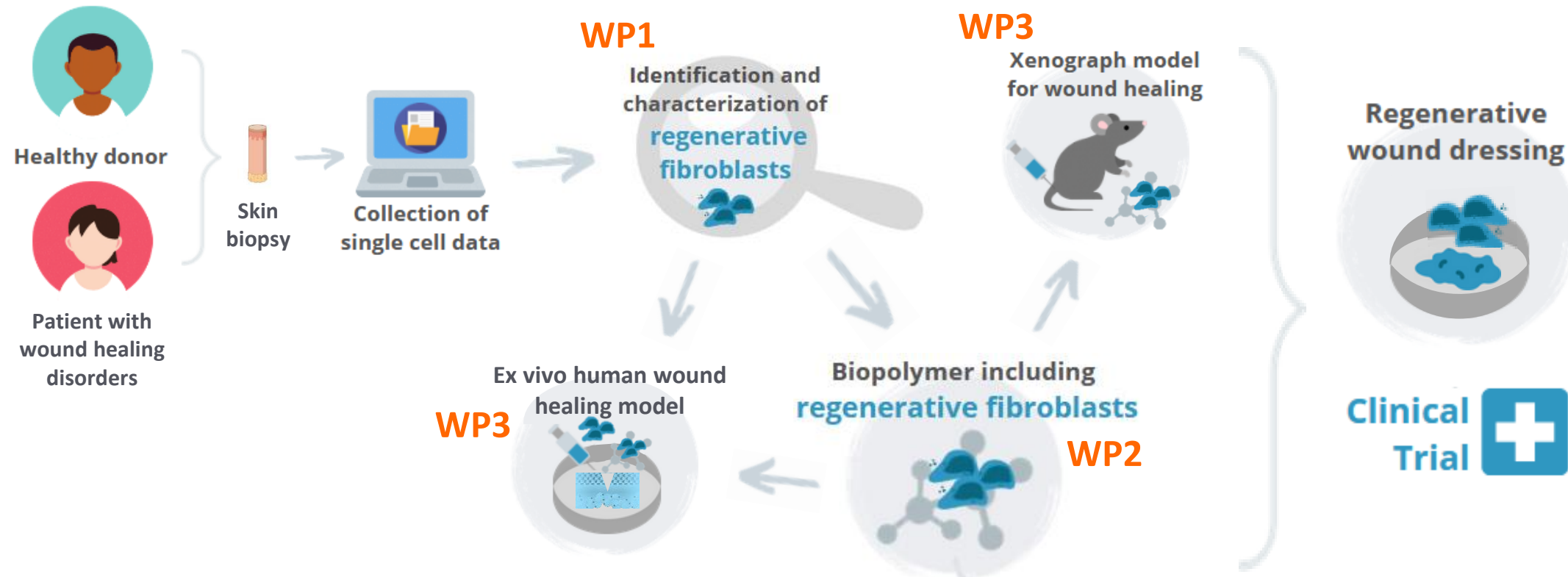
³ Augustin et al.; *IntWoundJ*, 2014

⁴ Shamik et al., *Science*, 2021

⁴⁵Rinkevich et al., *Science*, 2015

⁶ Correa-Gallegos et al., *Nature*, 2019

ZellTWund – Project Plan

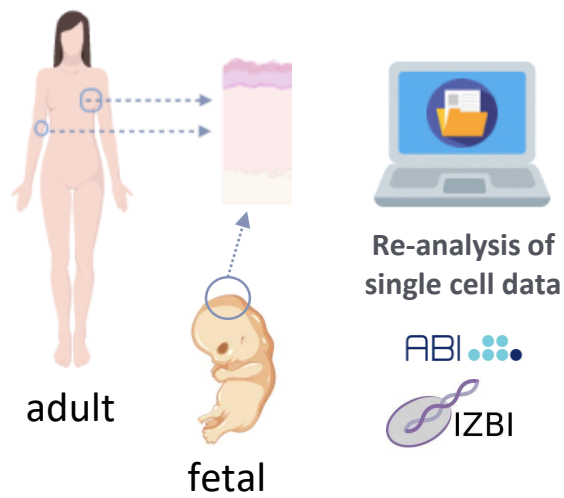


WP1: Identification and characterization of human pro-regenerative fibroblast populations

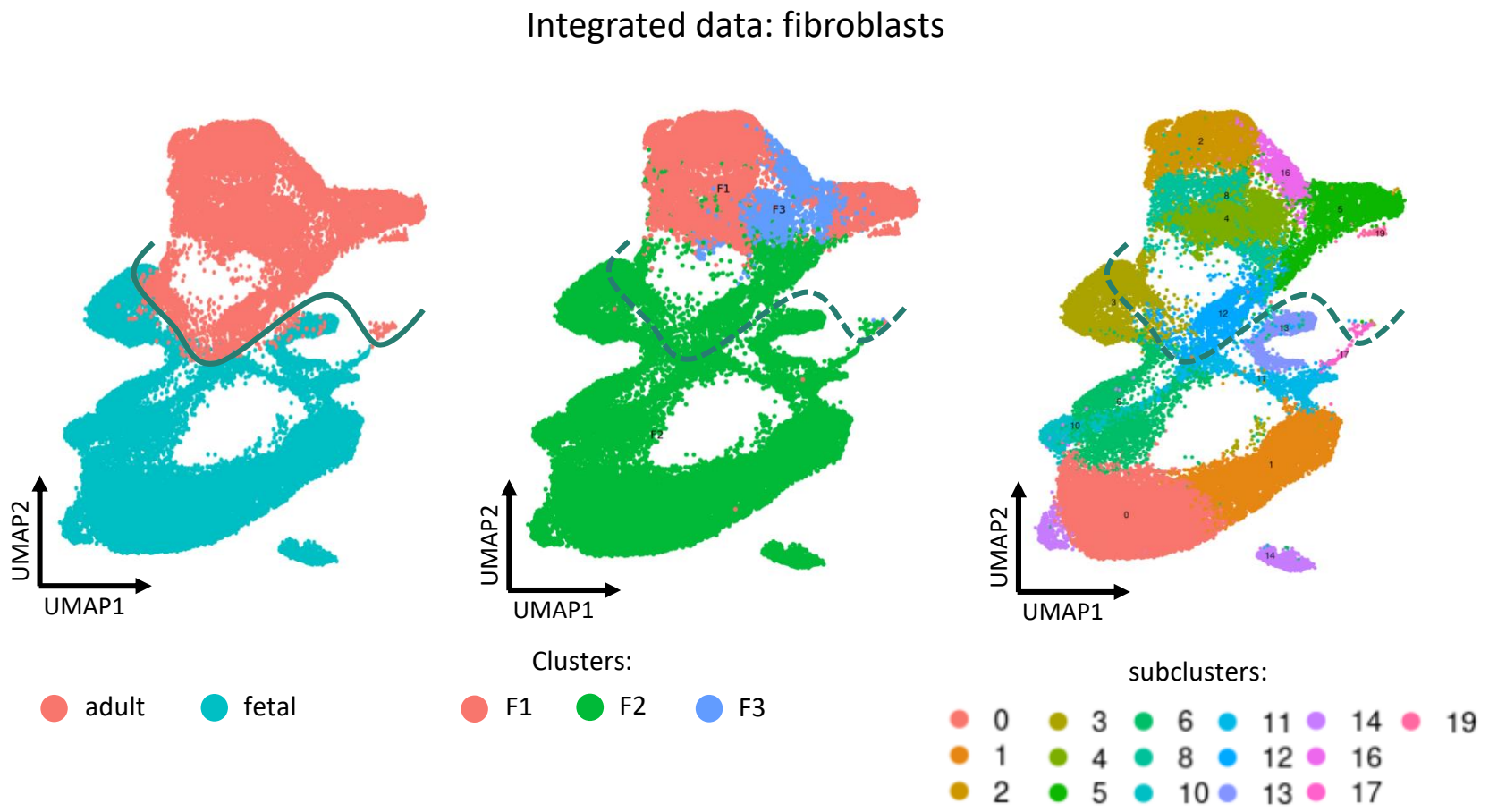
WP2: Development of a transplantable wound dressing

WP3: Establishment of preclinical wound healing models

Defining of human fibroblast subtypes

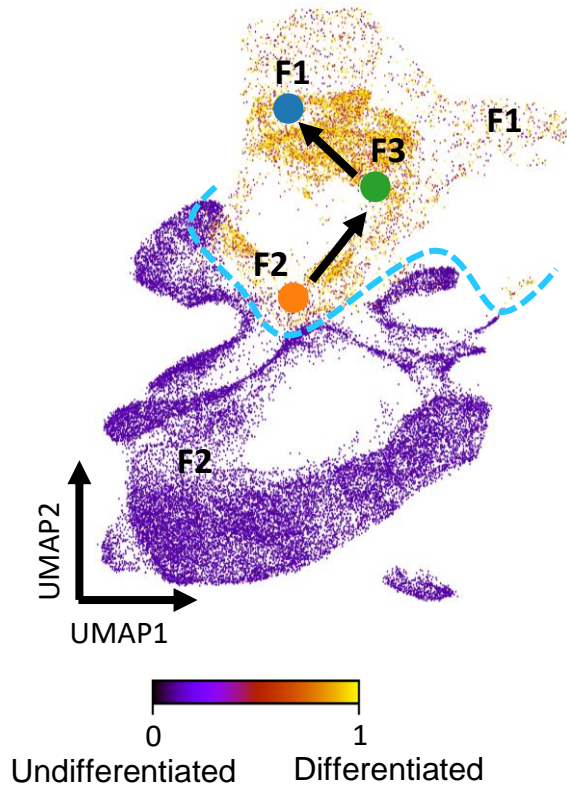


2022 Gur et al., Cell
2021 Reynolds et al., Science

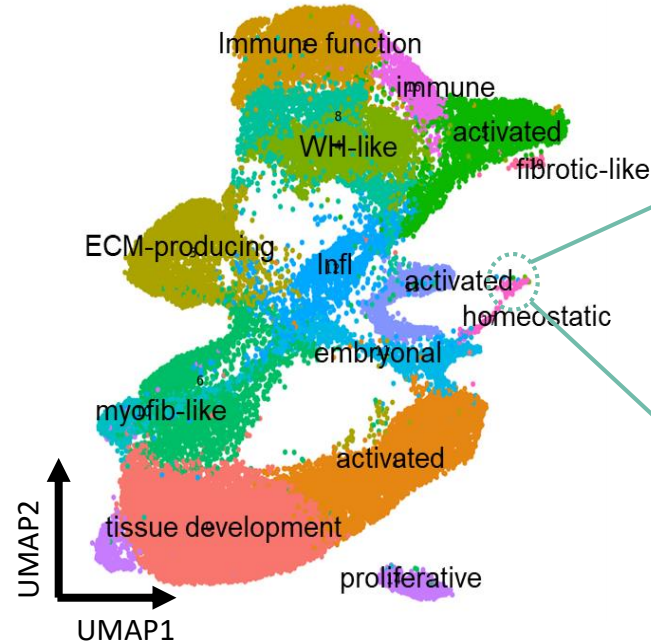


Defining of pro-regenerative human fibroblast subtypes

Integrated: Velocity pseudotime



Clusters' annotation



Subcluster 17

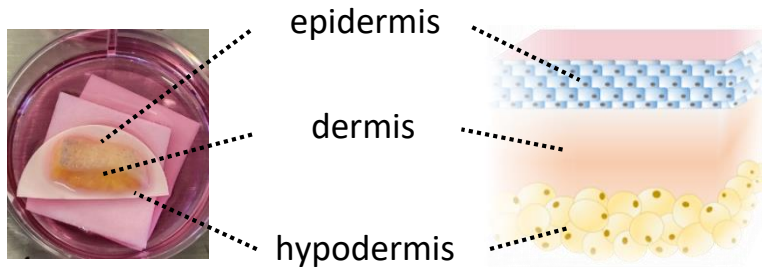
Top pro-regenerative genes:

- *IGFBP6*
- *IGFBP7*
- *CD63 (surface marker)*
- *NGFR (surface marker)*
- *CD200 (surface marker)*

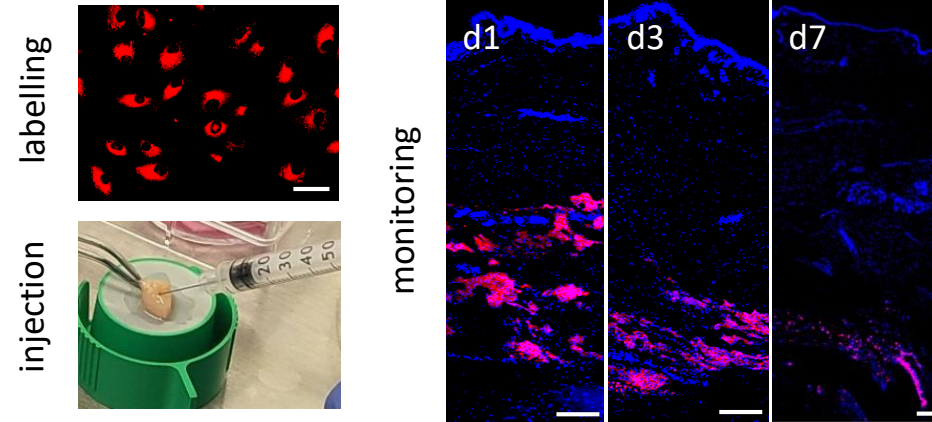
AREA 3 – ATMPS

Disclaimer: confidential data

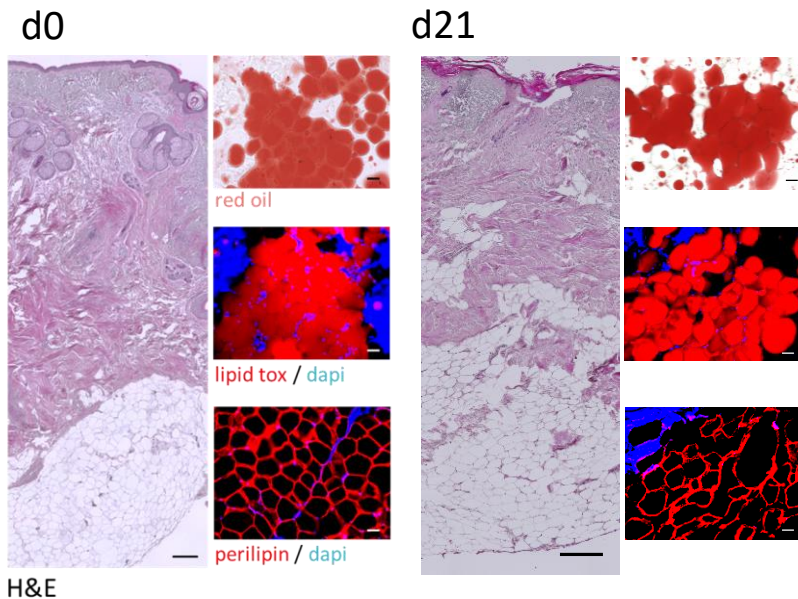
Preclinical model: Ex vivo human skin model



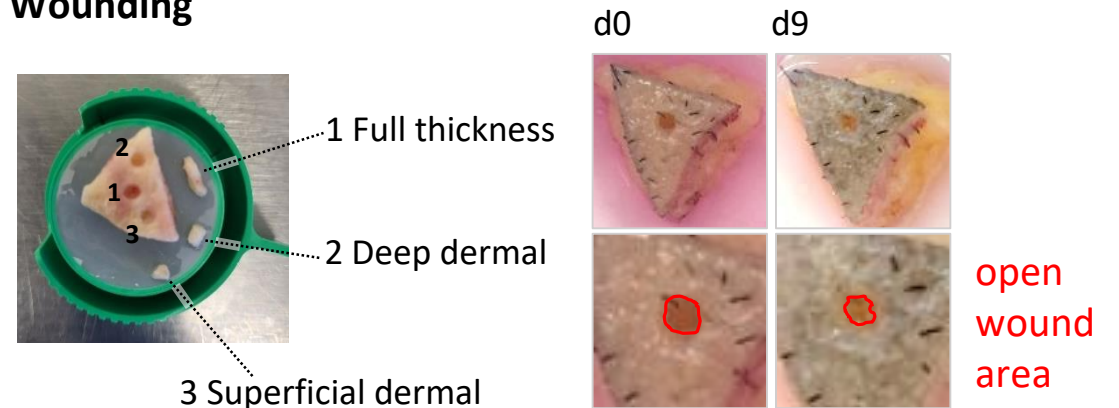
Fibroblast injection and tracing



Long-term culture

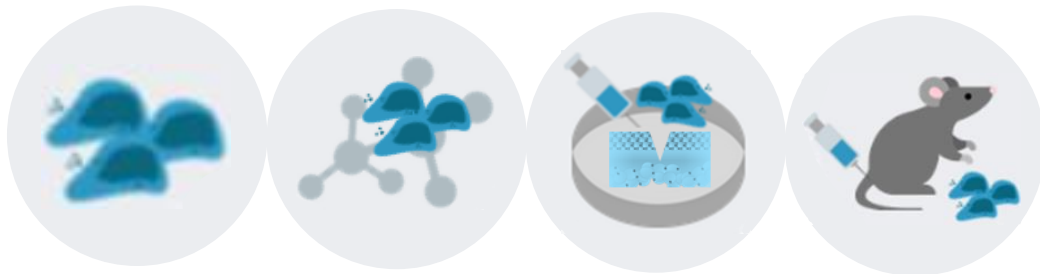


Wounding



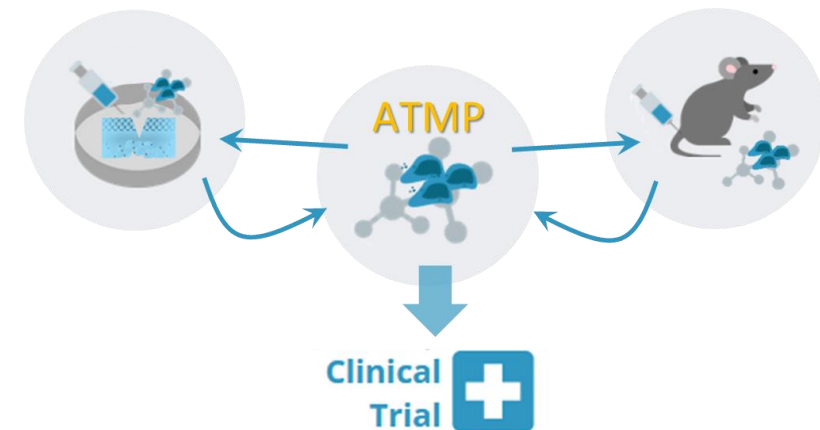
Current funding period

- Isolation, expansion, and functional characterization of regenerative fibroblasts
- Incorporation in transplantable wound dressing
- Testing in preclinical models
- Review under revision (*Nature Cell Biology*)



Future funding period

- Design of regenerative wound dressing (ATMP)
- Testing of ATMP in preclinical models
- Optimization of ATMP
- Clinical trial



ZellTWund-Team



Marta Torregrossa



Ravinder Kandi



Sandra Franz



Jan C. Simon



Yuval Rinkevich

Collaborations



Susie Avagyan
Arpi Grigoryan
Melina Tamazyan

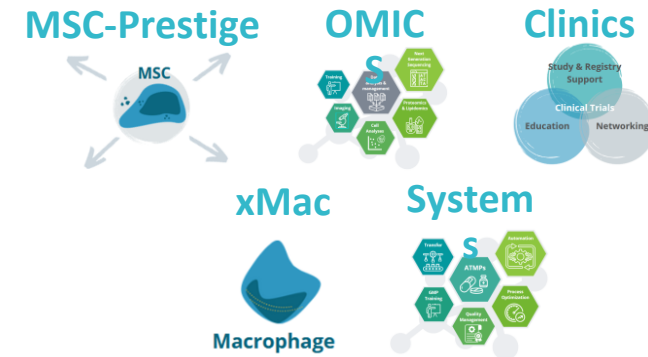


Hans Binder
Maria Schmidt



Julia Zarnowski
Sonja Grunewald
Rima Nuwayhid

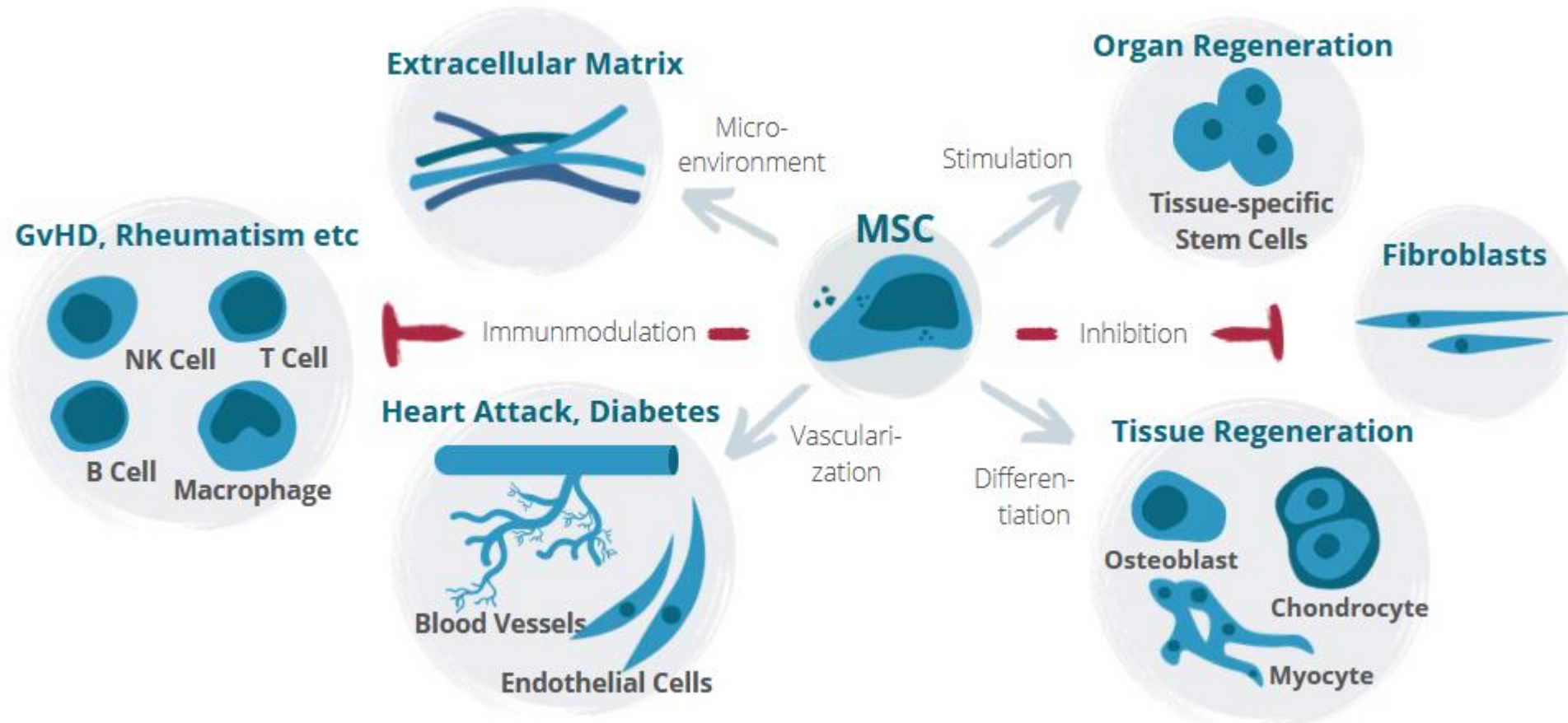
Synergies



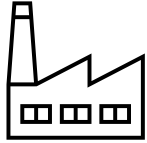
Industry



MSC-Prestige – Project Overview



MSC-Prestige – Objectives



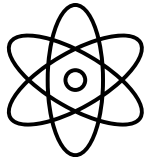
✓ **industrial**

- ✓ establish an **industrial pharmaceutical MSC Cell Manufacturing**



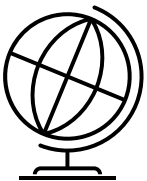
✓ **clinical**

- ✓ produce **Investigational Medicinal Products** (Prüfpräparate)
- ✓ prepare a Phase I/II Trial



✓ **scientific**

- ✓ further characterization
 - > active profile of the drug substance
 - > immune profile of patients



✓ **international**

- ✓ set up a base in North America

MSC-Prestige – Results so far

✓ intensive cooperation



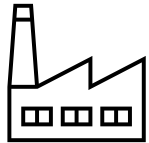
✓ Academic/Clinical Partner



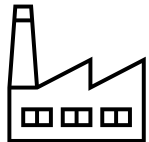
Universitätsklinikum
Carl Gustav Carus
DIE DRESDNER.



Prof. Rüdiger, Prof. Bornhäuser



✓ Industrial Partner



✓ Industrial Partner (associated)



MSC-Prestige – Results so far

✓ on schedule, objectives will be achieved

WP 1

✓ **Industrial Process Transfer from CRTD/TUD to DKMS ongoing**

WP 2

- ✓ specification and SOPs
- ✓ investments at associated Industrial partner

see next slides –
Simone Sonnenberg
DKMS

WP 3

✓ **Accompanying scientific research in progress**

- ✓ characterization drug substance, immune profiles

next meeting

WP 4

✓ **Spin-off of a subsidiary in preparation**

- ✓ will be in Canada, province of Ontario

MSC-Prestige – focus: DKMS facility



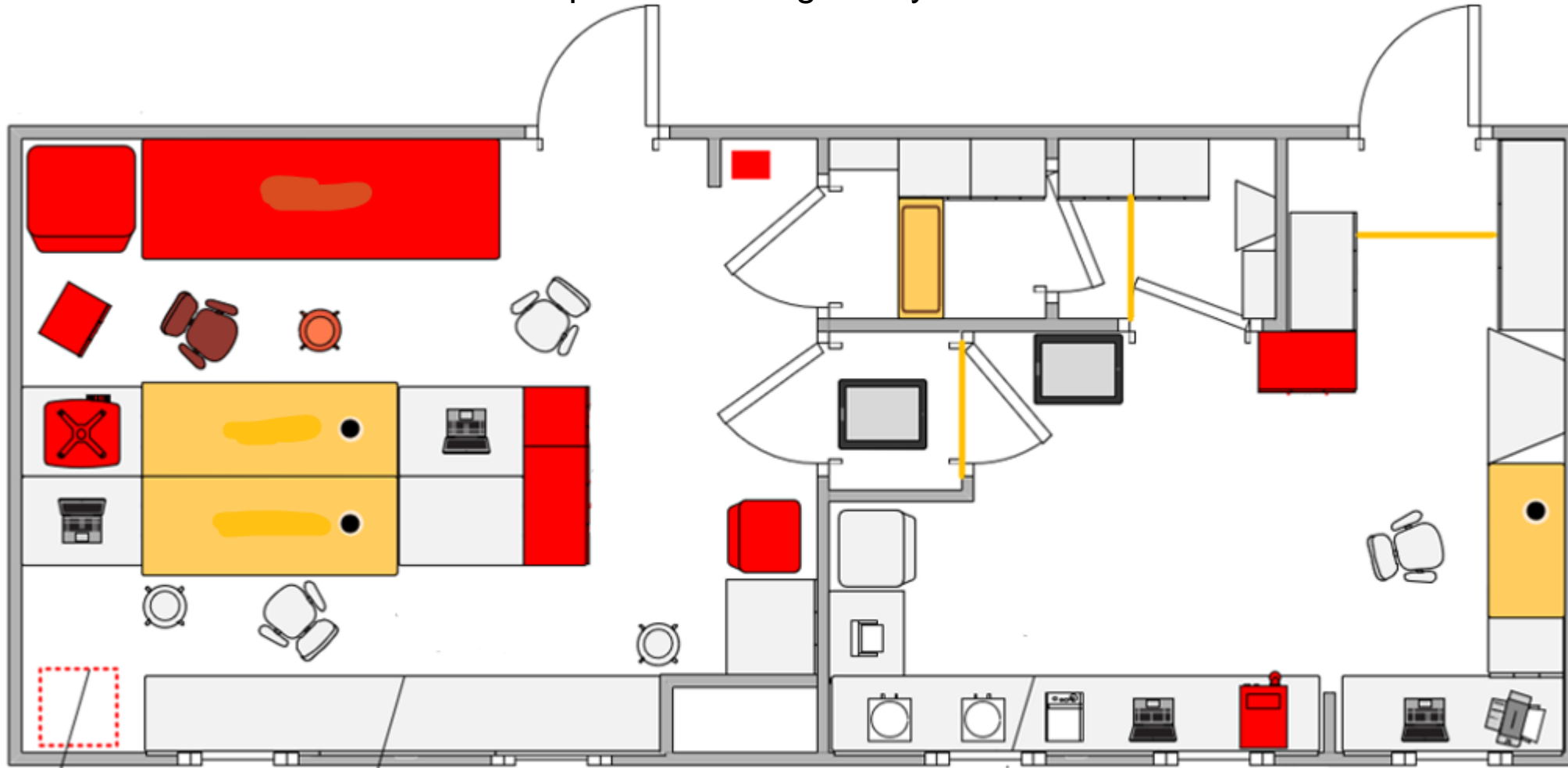
DKMS Stem Cell Bank:

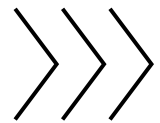
- Banking of allogeneic haematopoietic stem cell transplants
- Quality control
- Cryopreservation and storage
- cGMP manufacturing of cell-based therapeutics (process development, production, testing)

=> associated industrial partner für MSC-Prestige

MSC-Prestige – result: GMP investments

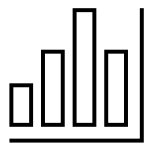
- GMP investments done
- Process transfer induces comprehensive regulatory tasks





✓ **Systems**

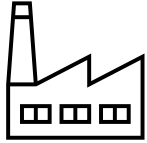
- ✓ MSC-Prestige is an initial use case for Systems



✓ **Omics**

- ✓ a 1st work package (sequencing) to be initiated (end of 2023)

MSC-Prestige – Outlook Phase I



✓ industrial infrastructure

- ✓ DKMS is an **industrial partner** for **MSC Manufacturing**



✓ clinical impact

- ✓ an **ATMP-Therapy** is in clinical testing



✓ unique 1st product

- ✓ **Desacell®** is a MSC drug substance for an allogeneic, off-the-shelf, ready-to-use cellular **drug product** at **reasonable costs**



✓ international impact

- ✓ **Transatlantic** long-term cooperation is prepared

MSC-Prestige – Outlook Phase II



⇒ Goal Phase II

Development of the MSC drug substance Desacell into a **product platform** for different drug products **for further international clinical studies**

➤ **Vision: World leading MSC-drugs for international trials**

- **Targeted Therapies**
- **Product Diversification**
- **Internationalization**

✓ **Programme Phase II: proposed**

✓ **industrial contribution: confirmed**

MSC-Prestige – Backup Phase II



⇒ Programme Phase II

- **Use clinical data** from the SaxoCell MSC-product Desacell
- Develop a more **targeted therapy** concept based on the clinical data
- Further **diverse the MSC-drug substance platform** using further cell characterization criteria
- Develop **internationalization concept** (develop the “Last Mile” = the international “bedside-value chain” to the patient)
- Develop **regulatory modules** for the future marketing authorisation

Break out session: Preclinic /Animal models

Discussion L: Marta

- points to address in projects
- Bürokratie \nearrow in other labs companies
 - collection of available models
 - SaxoCell clinics advice for preclinical approaches (data package)
 \rightarrow PEI
 - standard protocols, exchange of experiences
 - Seminar series on what did not work / but also worked 😊
 - sharing of technical expertise
 - preclinical platform
 - alternatives to animal models (organoids, iPS)
 \rightarrow seminars
 - collaboration with partners / carriers / Dicos

Pre-clinical/Animal models

- Question: Are our mouse model really useful for CAR-T experiments?
 \rightarrow other pre-clinical models could be more helpful?!
- No standard models and protocols exist \rightarrow current learning process (also for regulatory authorities)
- good documentation during pre-clinics to verify your data for e.g. PEI \rightarrow clinical studies
 \rightarrow quality of documentation!
(helpful tool \rightarrow ELN?! \rightarrow money?!)

Reporter:
Sandra Franz & Ulrike Weirauch



Break out session: AI / GMP Support / Automation



AI group 1/p2

- for QC
- AI for easier handling

Problem → How to get enough data for different models?

Auto → Which therapy is the best? → digital twin

Workshop to:

Collect ^{experience about} ~~best~~ manufacturers, machines, protocols, practices, cell type (genotypes), costs

GMP → after expensive try-error

AI group 1/p1

Upscaling

→ List

Auto

Macrophages expansion

- Important: = upscaling
- = 1 process
- also working for difficult GEs
- combination of diff. manufacturers

GMP

Anke - QC

Prodegy (Miltom) →

- Simulations
- Modules → flexible
- upscaling → decision for system

Alternatives:

- Advant
- (Proreactor and more)
- looking for

Cocoon?

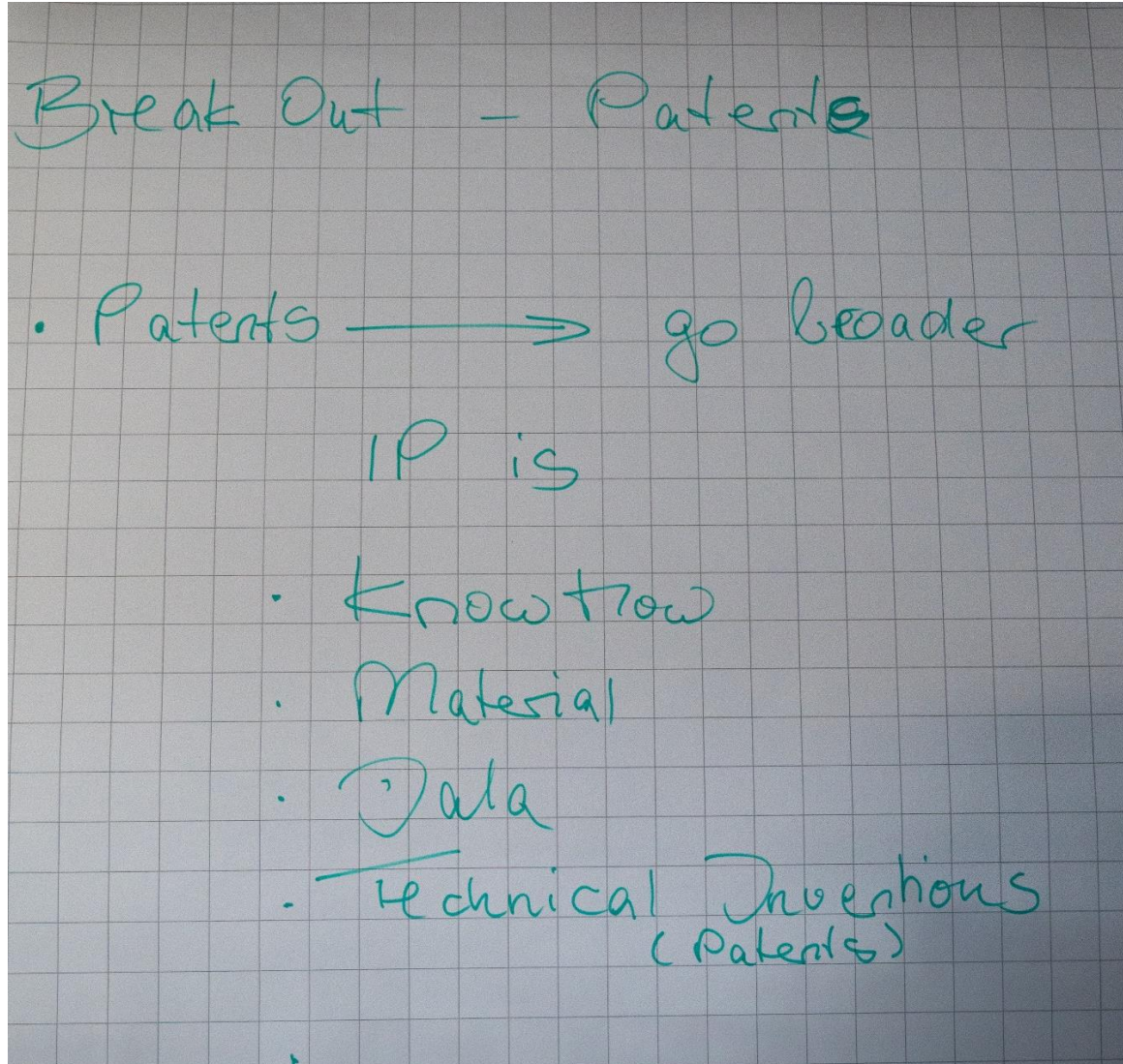
BREAK OUT SESSION
AI / GMP Support / Automation

Room München
Maren Henneker, Ira Ilgen

Reporter: Alexander Scholz



Break out session: Patents



Reporter:
Dorit Teichmann

Break out session: Clusterdevelopment

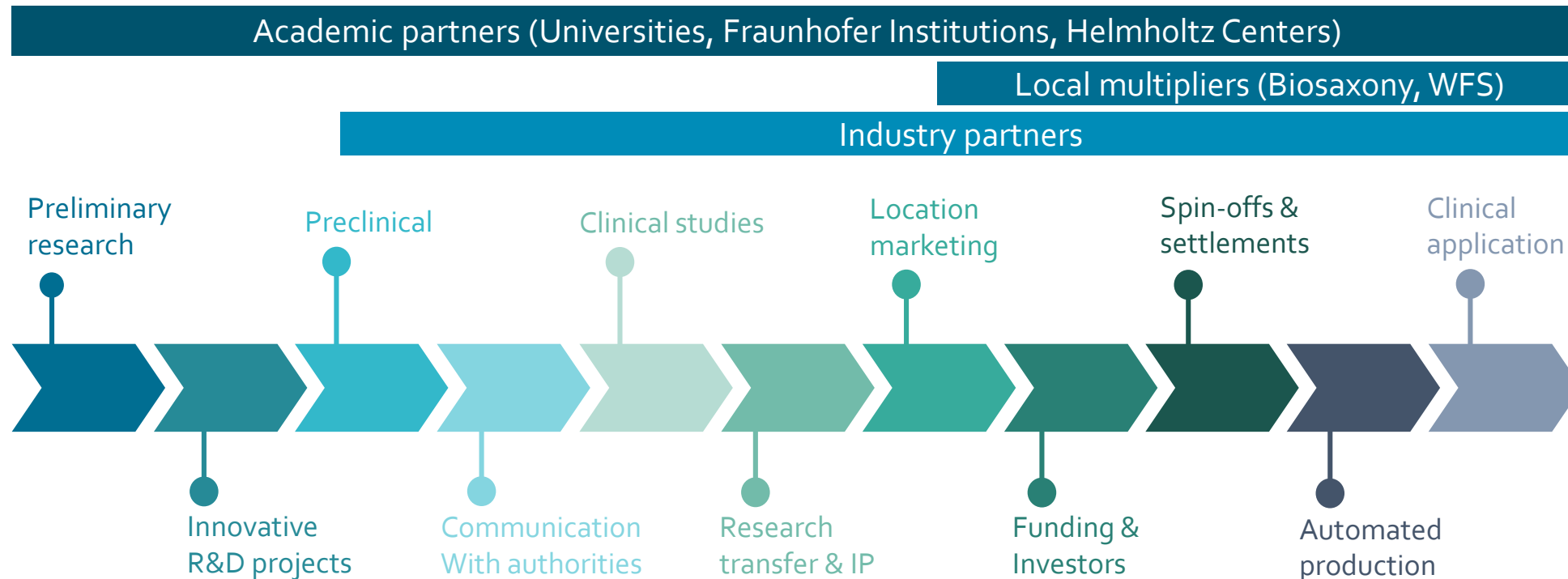
Reporter: Stefanie Binder



Clusters4future transfer spirit

A strong cluster is more than the sum of its individual players

- pursuing regional development approach
- network of local and supra-regional partners
- establishing the complete value chains in Saxony

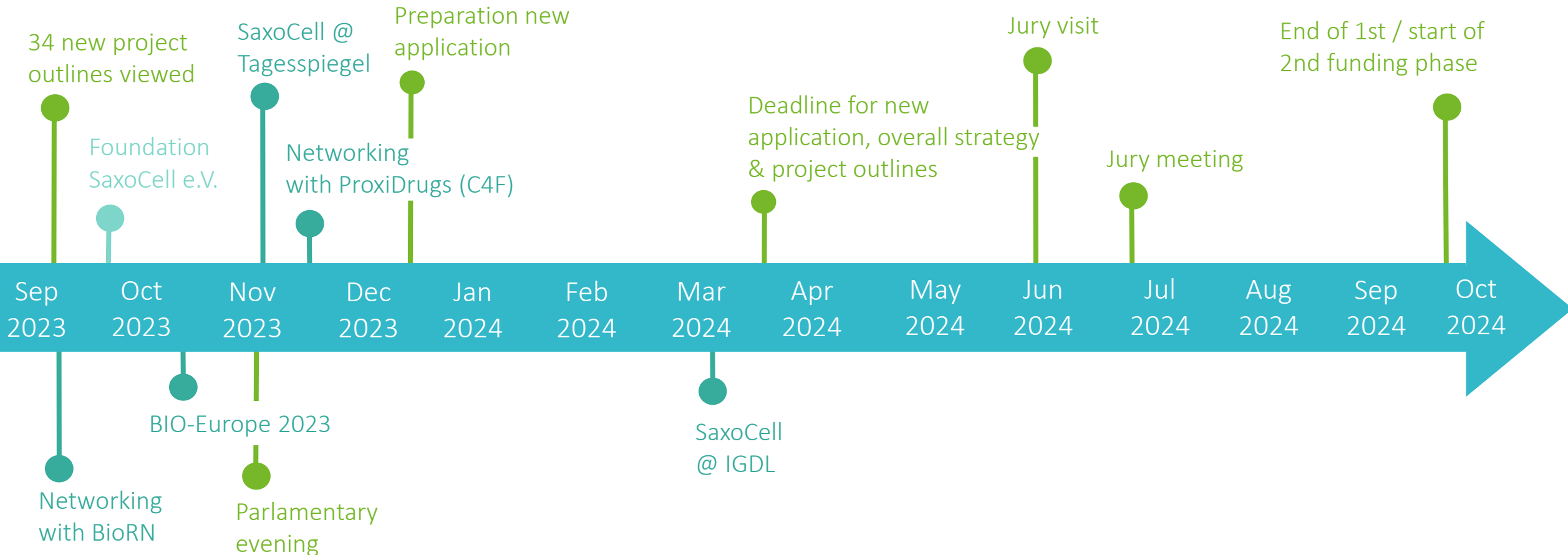


Outlook

Transfer

Conferences / Meetings

Cluster-internal



Project outlines for 2nd funding phase

- 34 outlines were submitted
- First categorization was made by the speakers
 - ✓ with concrete **industry contribution** and innovative
 - ✓ with little to **no industry** contribution but innovative
 - ✓ new professorships or **start up projects** and interesting technologies



Discussion between PIs and speakers will begin in the next few days

Connect, Innovate, Heal - Together into the future of therapy

SaxoCell e.V. is to involve (new) partners and strengthen our network

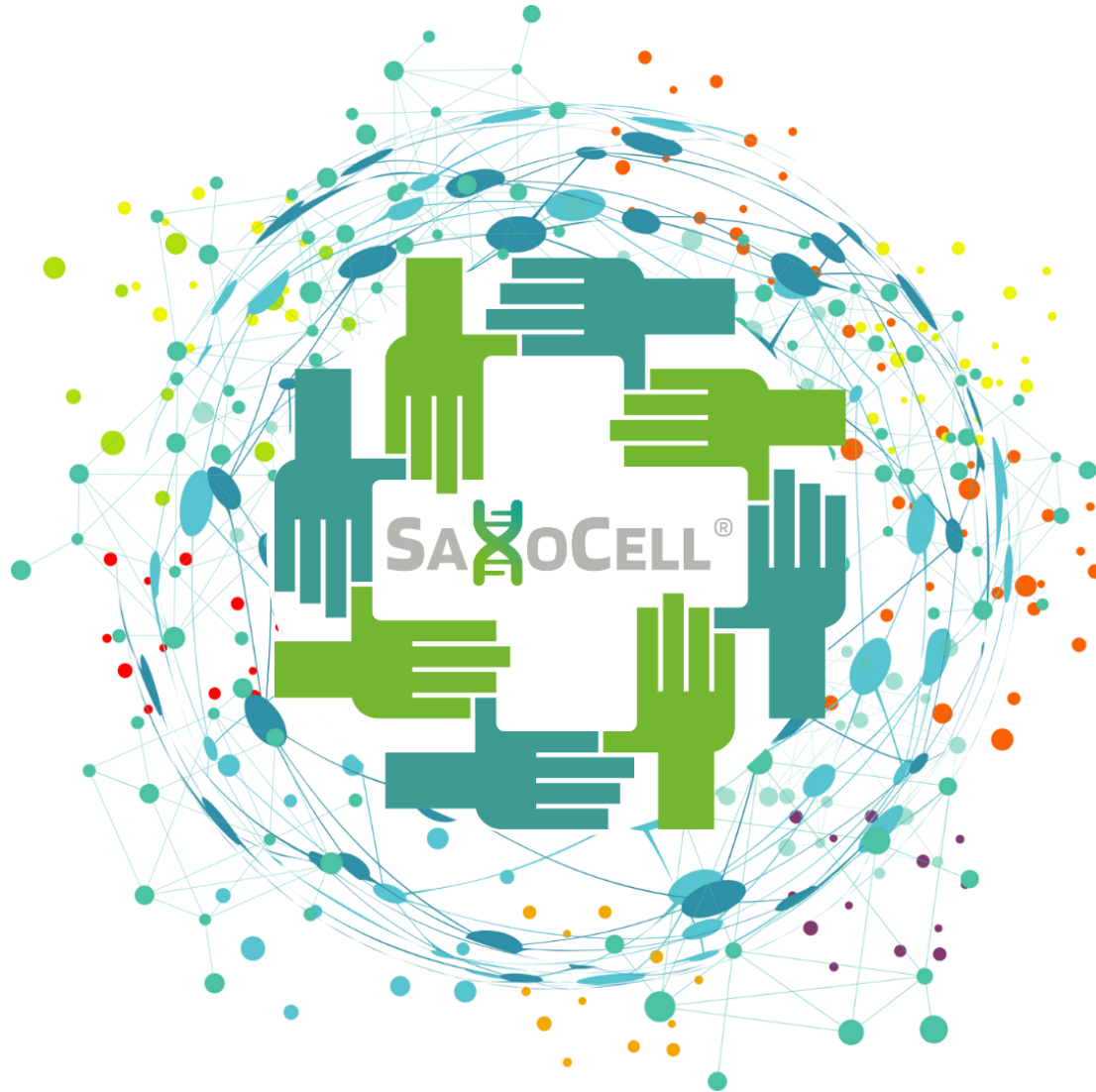
Current status of SaxoCell e.V.

- By-Laws approved by TUD, Uni Leipzig & Fraunhofer IZI
- Founding on September 12, 2023
- Will be open to SaxoCell partners and non-partners
- Attract finances for gene and cell therapy
- Increases flexibility and response to needs



So stay tuned...

Thank you...



...for being part of our sustainably
growing network ♥

Day 2: Tuesday 12.9.23, Biocity



Thank you for your participation!

It was nice seeing you!

You can fill out the survey about the meeting here

