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The R&D Autobahn to Cures

Forward-looking statement

Information set forth in this presentation contains forward-looking statements, which involve a number of risks and uncertainties. The forward-looking statements contained herein represent the judgement of Evotec as of the date of this presentation. Such forward-looking statements are neither promises nor guarantees, but are subject to a variety of risks and uncertainties, many of which are beyond our control, and which could cause actual results to differ materially from those contemplated in these forward-looking statements. We expressly disclaim any obligation or undertaking to release publicly any updates or revisions to any such statements to reflect any change in our expectations or any change in events, conditions or circumstances on which any such statement is based.

Let’s talk about Evotec

Capital markets day 2020

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Integrated Drug Discovery

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Just – Evotec Biologics

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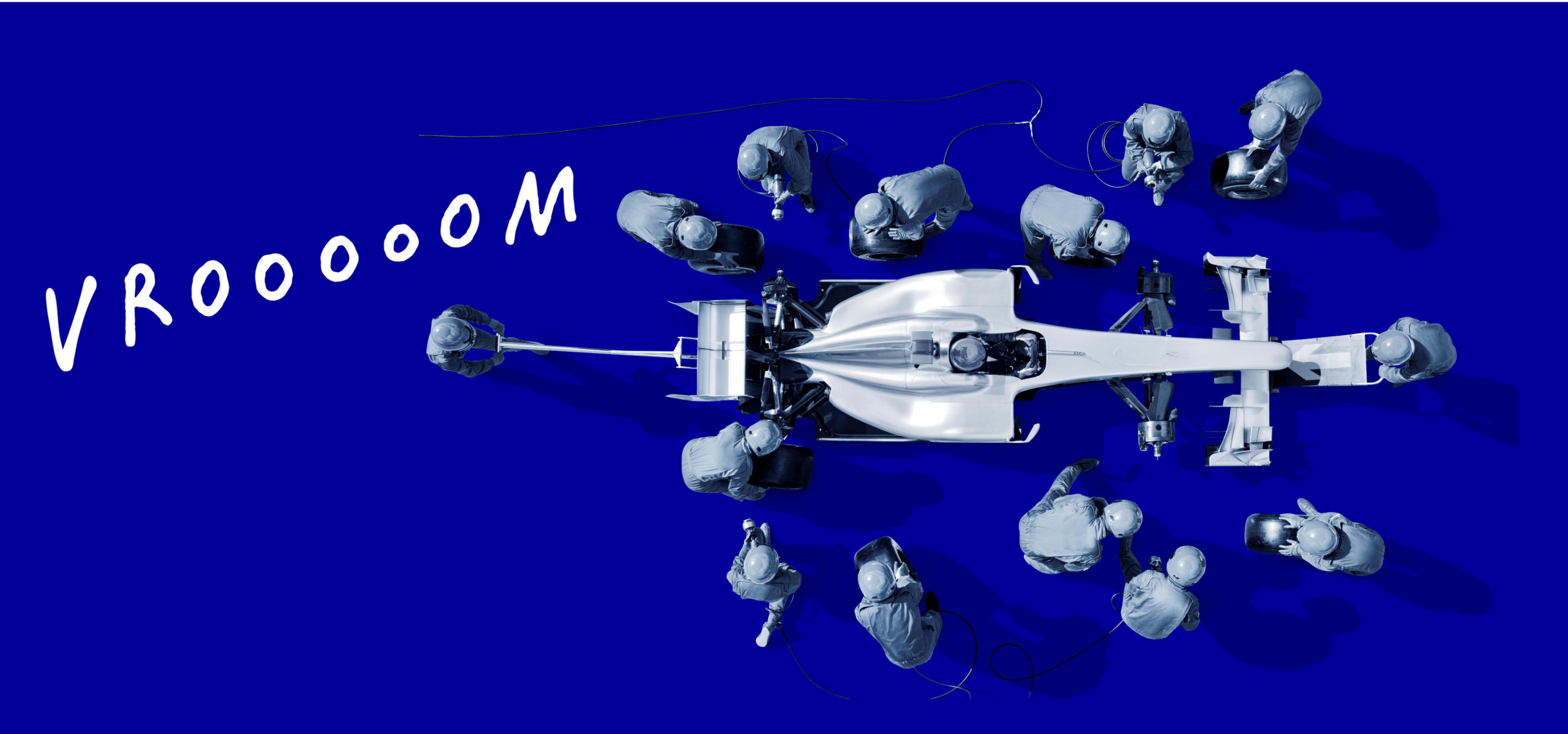
evotec



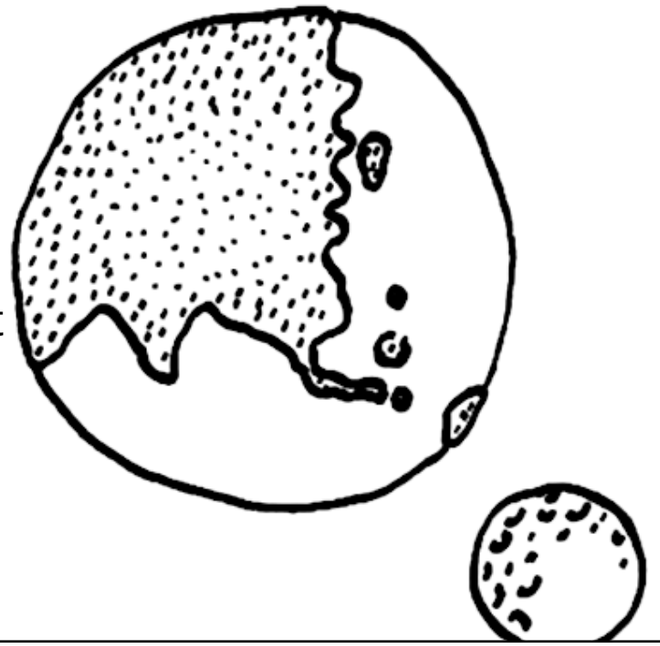
Agenda

The R&D Autobahn to Cures
Our business strategy

Data driven precision medicine
From patient to patient

Drug discovery, development & biologics
From machine learning to the factory of the future

“…just the beginning” …
of the shared economy of drug discovery & development



“R&D precision and efficiency is not just a skill, it is an attitude. We want to dramatically expand and accelerate access to better drugs.“

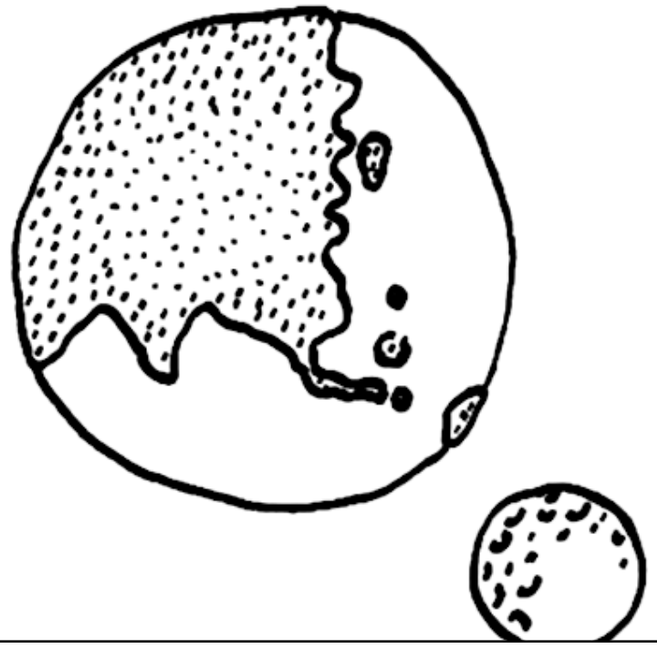
Werner Lanthaler

Agenda

Our business strategy

Co-owned assets

Pipeline evolution



… it is just the beginning

Our mission

Manfred Eigen
Nobel Prize 1967

We put drug discovery ideas and leading technologies across all modalities to action. We enable and accelerate the development of precision medicines together with our partners.

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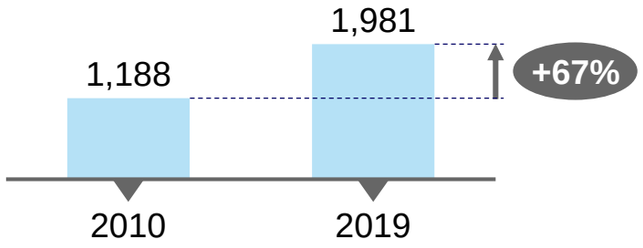
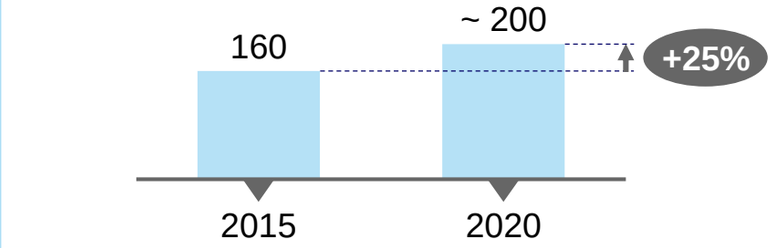
Industry dynamics suggest need for disruptive approach in R&D

R&D megatrends

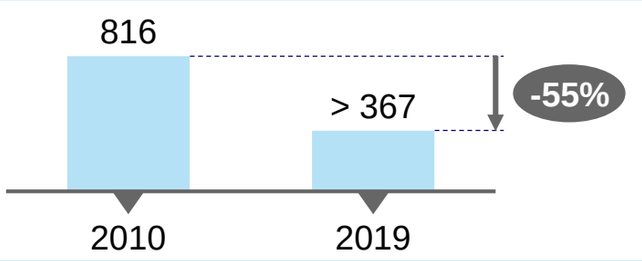
Development costs per asset
Cost per asset increased ~2/3rd since 2010, in US$ bn



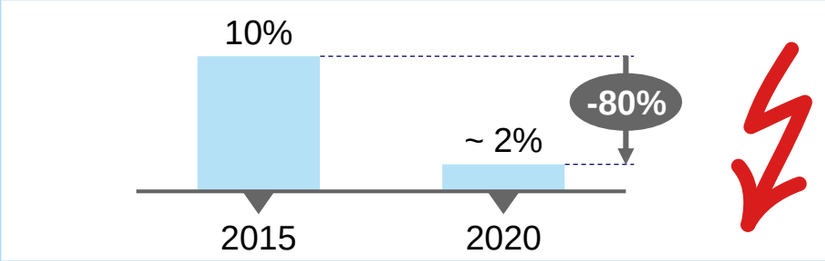
R&D budgets continue to grow
in US$ bn



Peak sales per drug
Average sales more than halved since 2010, in US$ bn



Commercial returns decrease
IRR



"The IRR turn around challenge" needs new business models

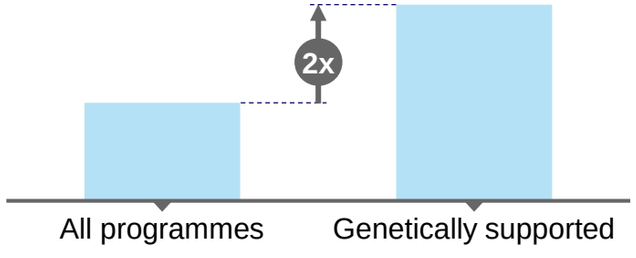
Source: Visiongain – Drug Discovery Outsourcing Market Forecast 2015-2025 and Evotec's estimates;

Our focus: More precision, higher efficiency, higher returns

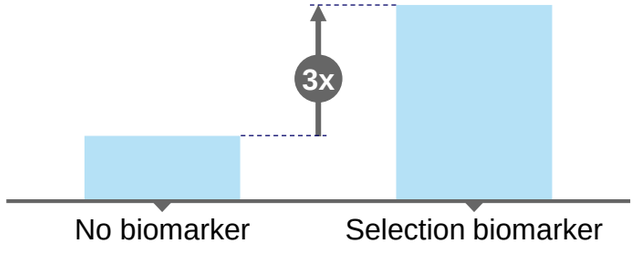
Data-driven precision medicine meets operational excellence

Precision

Human genetics supported targets[1)]
% success

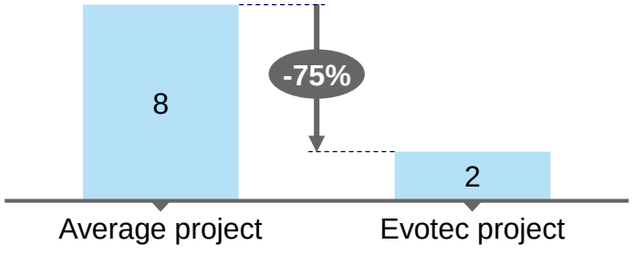


Biomarker based stratification[2)]

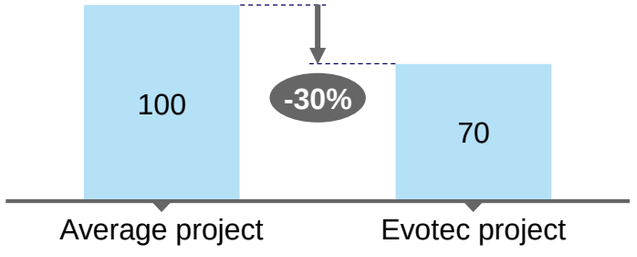


Efficiency

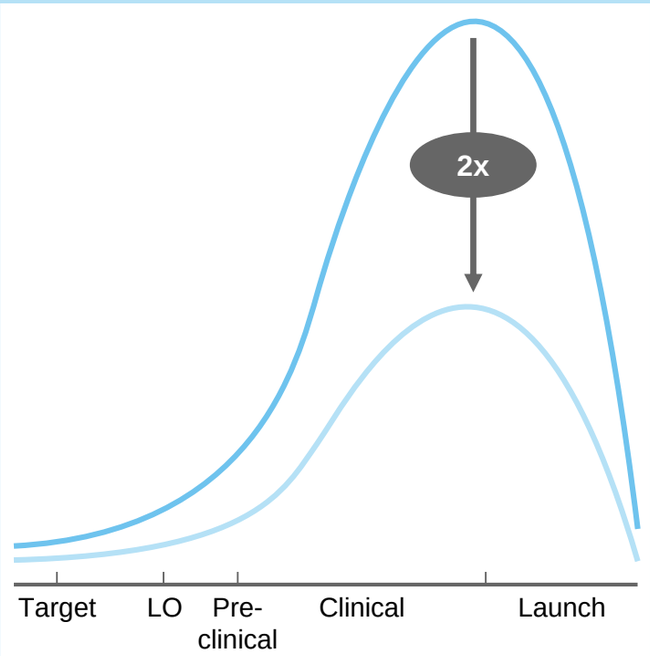
Average project evaluation time
in months before R&D decision[3)]



Average cost to safety[4)]
(FGLPD) in %



Capitalised cost per launch, in US$ bn[4)]

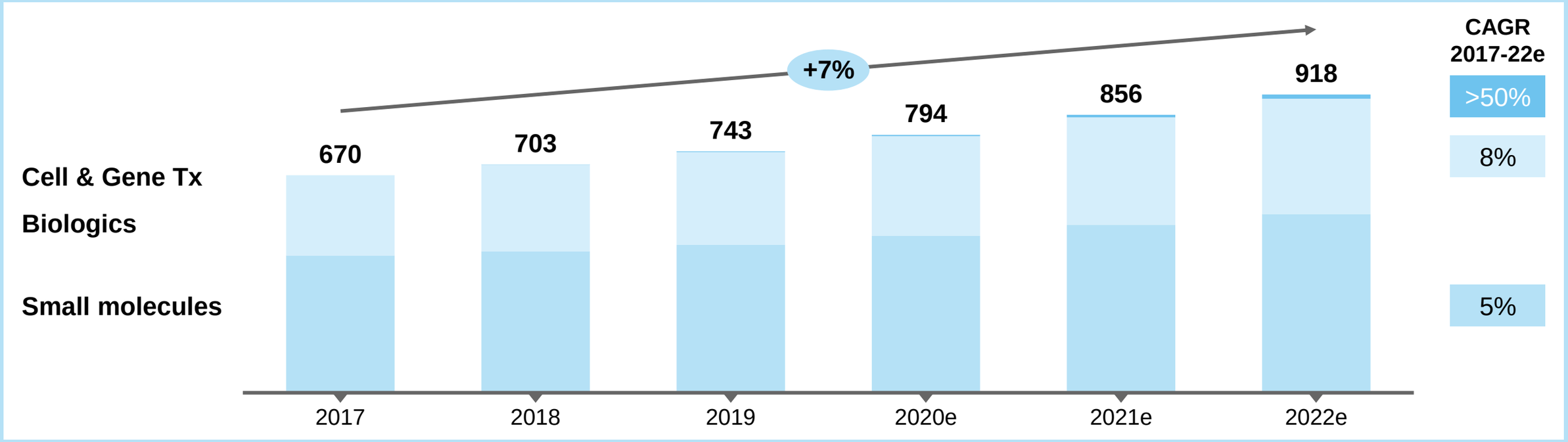


[1)] Margan, P. et al. Nature Rev Drug Discovery 2018 Mar 17 (3): 167-181
[2)] Evotec-Bayer report "Excelling Together for the Benefit of Women Suffering from Endometriosis
[3)] Deloitte Report Unlocking R&D Productivity, Measuring the Return from Pharmaceutical Innovation 2019
[4)] Evotec internal; Paul S.et al Nature Rev. Drug Discov. 9 203-214 (2010). McKinsey 2014 McKinsey one advantage to product launch (2014).
FGLPD= First good laboratory practice dose in safety assessment

Multimodality is reality

Small molecules, biologics & other modalities

Global pharmaceutical R&D market[1), 2)]
in US$ bn



[1)] Small molecules forecast from May 2017 and Biologics forecast from Dec 2017
[2)] Excluding sales not classified by EvaluatePharma
Source: EvaluatePharma; Evotec estimates

New technologies, more precision, higher speed and efficiency

Evotec – Sites & number of employees

Princeton, Seattle, Branford, Watertown
~350

Orth an der Donau
~30

Verona
~700

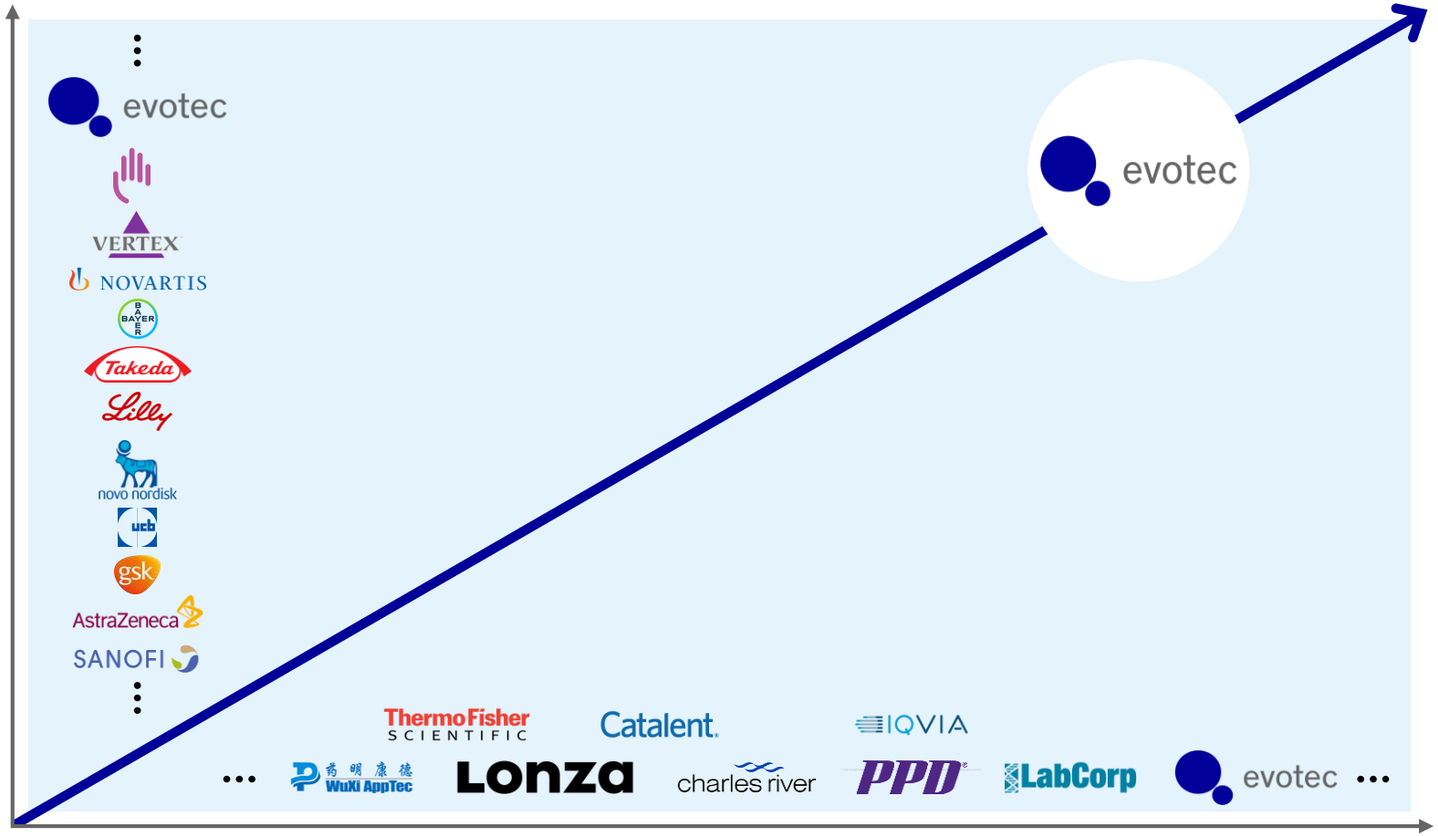
Hamburg (HQ), Goettingen (Manfred Eigen Campus) Cologne, Munich,
~830

Abingdon (Dorothy Crowfoot Hodgkin), Alderley Park
~820

Lyon, Toulouse (Campus Curie)
~750

Combining best of both worlds

Our unique business model



Partners share with us because of

- Unique IP & know-how
- Unique platforms
- Significant efficiency gains

Our strategy delivers significant growth and value potential

Development from ***2015 … to 2020 (e)***

Revenues
in € m

270%

128 ..... **470+**

Co-owned programmes

400%

20 ..... **100+**

Adjusted Group EBITDA
in € m

>1,000%

9 ..... **100+**

Co-owned companies & BRIDGES

>>1,000%

1 ..... **24**

Top-class employees

240%

1,000 ..... **3,400+**

Unpartnered R&D projects

250%

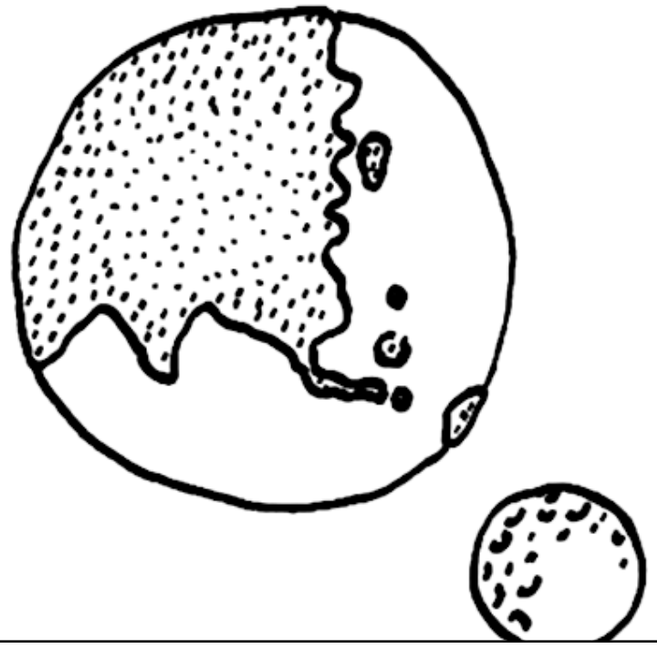
10 ..... **35**

Agenda

Our business strategy

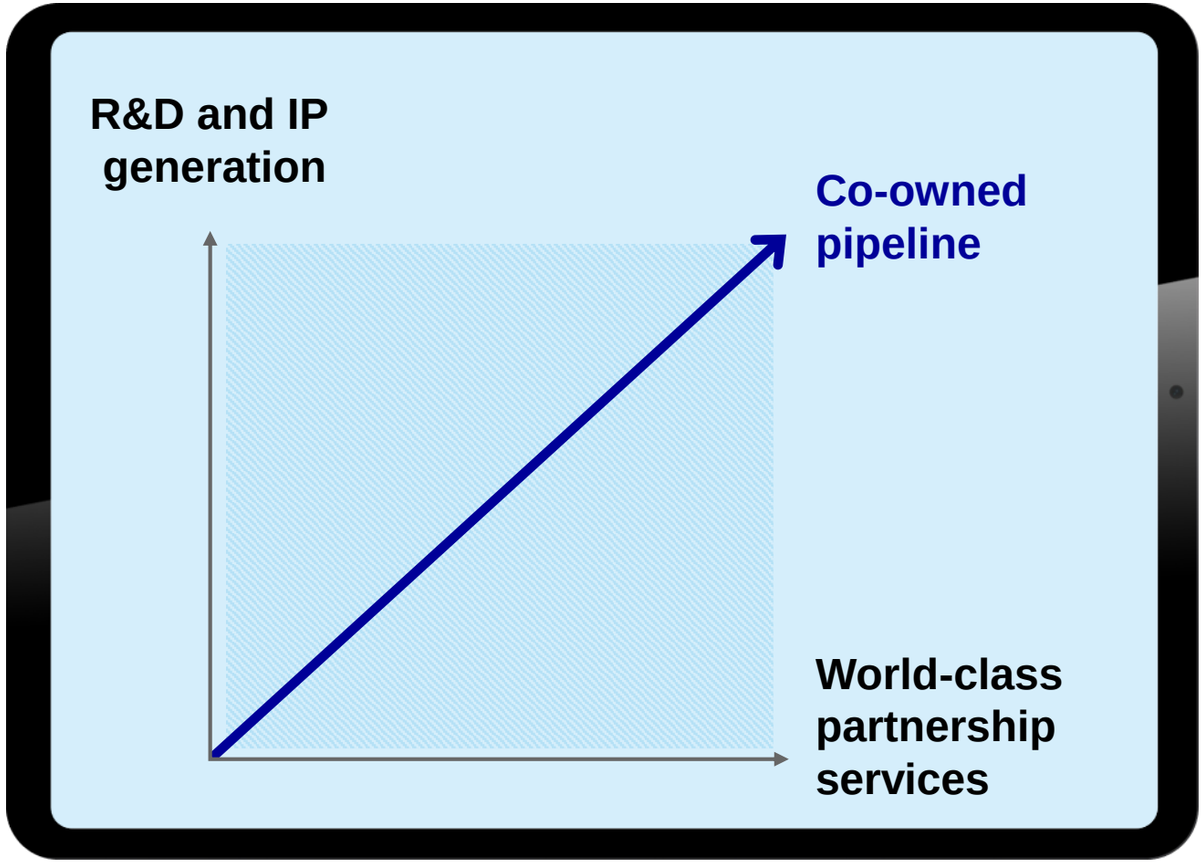
Co-owned pipeline & examples

Pipeline evolution



Power of novelty and precision opens path to co-ownership

Unique business model

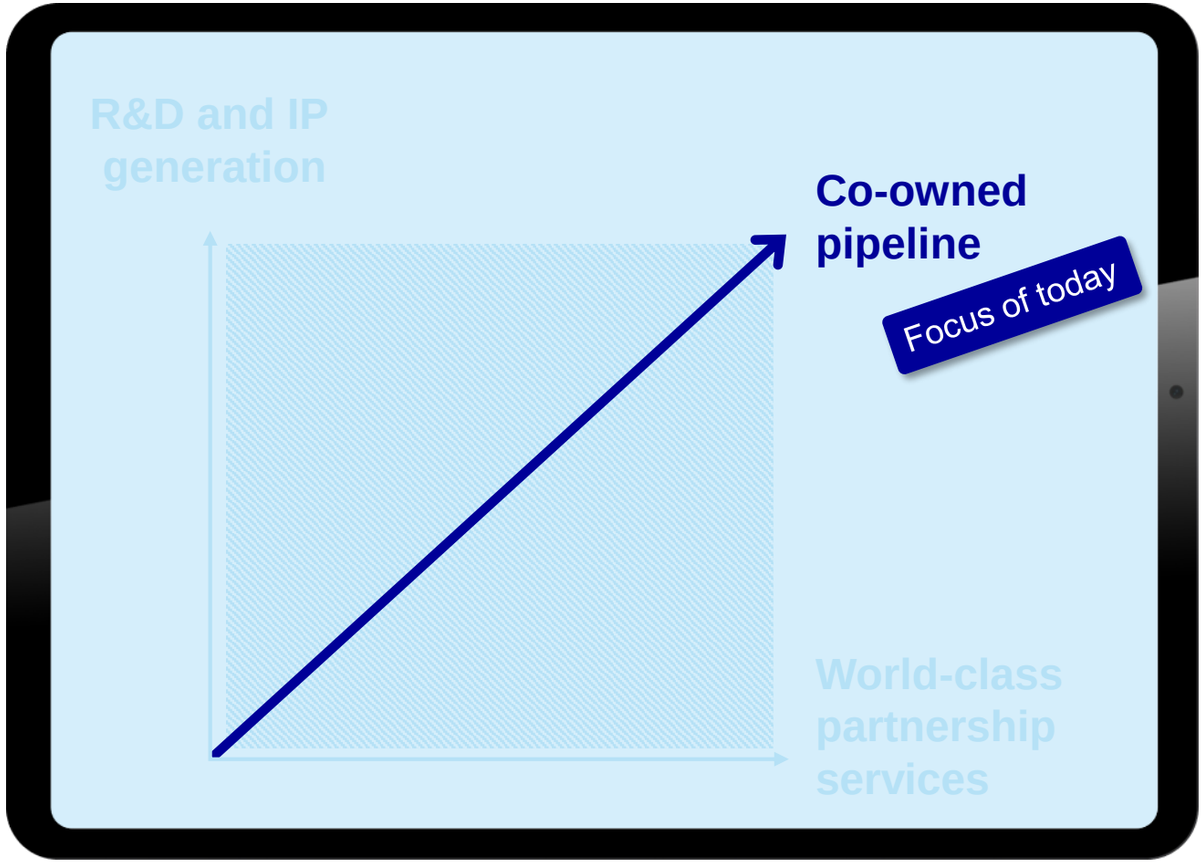


Sources for Co-ownership

1	EVT platforms
2	Indication driven target pipelines
3	BRIDGES, operational ventures, …

Co-owned pipeline has multiple starting points

Unique business model – Sources for “Co-ownership”



Sources for Co-ownership

1	**EVT platforms** e.g. iPSC, Protein degradation, PanOmics, PanHunter, HAL, High-value IDD
2	**Indication-driven target pipelines** e.g. P2X3, B1, A2a, …
3	**BRIDGES, operational ventures** e.g. Lab282, Exscientia, Topas, Breakpoint, …

Transactions are the beginning for risk-free value creation

Co-owned portfolio[1)] – Selected examples (in € m/ US$ m)

1 EVT Innovate platforms (*Examples*)

iPSC Neurodegeneration — 2017
UF: $ 45 m + $ 30 m
MS: up to $ 250 m / product
%: up to double digit

CKD Kidney diseases — 2018
UF: ND
MS: > € 150 m / product
%: Tiered royalties

Protein degradation oncology — 2018
UF: ND
MS: up to $ 250 m / product
%: up to double-digit

PCOS Womans´Health — 2019
UF: € 6.5 m
MS: > € 330 m
%: up to double-digit

Infectious Diseases — 2020
UF: € 60 m
MS: not applicable
%: not applicable

2 Indication driven target portfolios (*Examples*)

Multiple indications — 2011
UF: ND
MS: ND
%: Single digit

P2X3, B1, P2X4 Multiple indications — 2012
UF: € 12 m
MS: approx. € 580 m
%: up to double-digit

Solid Tumors — 2017
UF: US $ 65 m
MS: ND
%: up to double-digit

Multiple — 2017
UF: ND
MS: > € 150 m / product
%: up to double-digit

CKD — 2017
UF: ND
MS: > € 300 m
%: up to double-digit

3 BRIDGES, operational ventures, spin-offs, grants … (*Examples*)

DNA Repair Spin-off — 2009
Financing: € 30 m

Multiple indications — 2015
R&D loan: > € 75 m

Multiple indications — 2016
Financing: > € 15 m

JV: CKD — 2018
Financing: > € 25 m

Equitiy & JV — 2018
Financing: > $ 85 m

Upfronts
> € 200 m

Potential milestones
> € 7 bn

VC financing, R&D loans & grants
> € 200 m

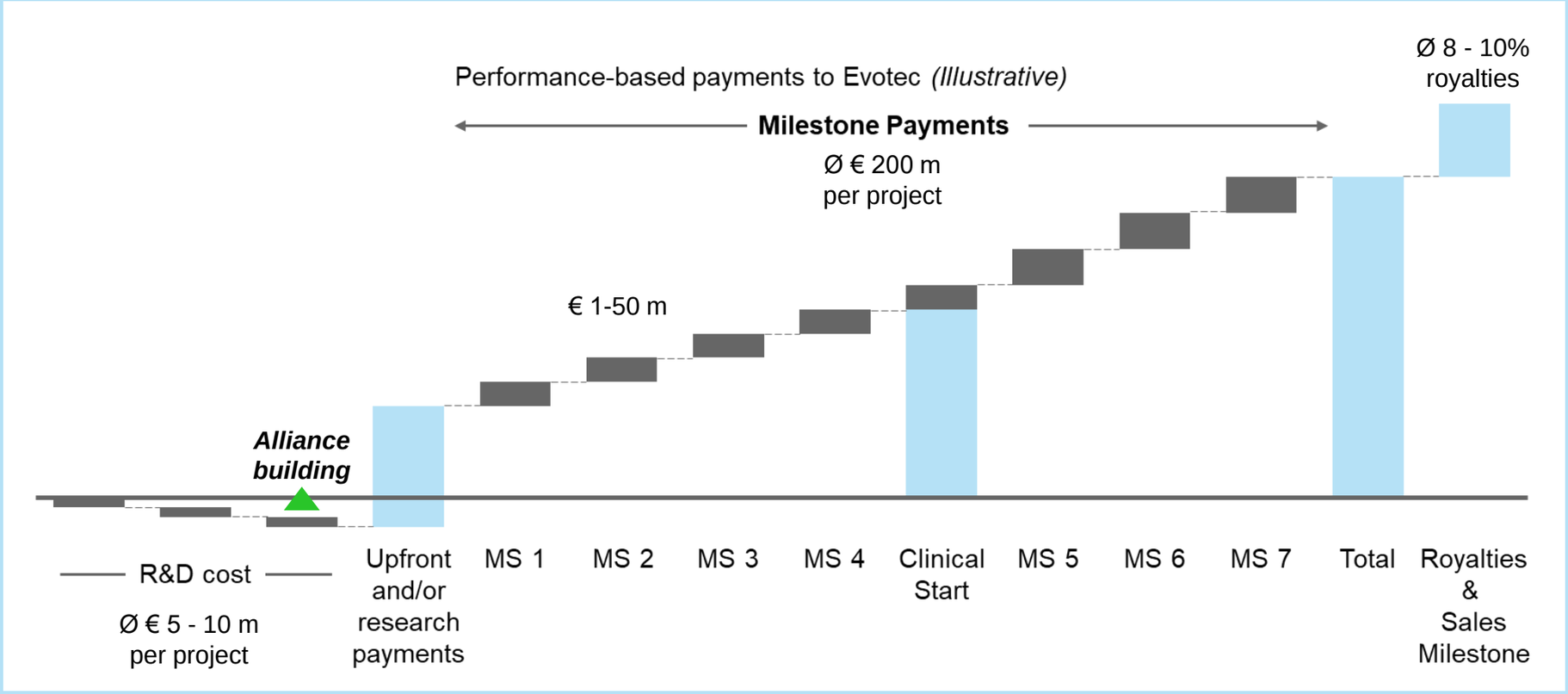
ø Royalties on more than 110 targets
8% (from 3 – 50%)

[1)] Since 2012 – Status 2020; ND (not disclosed)

We optimise long-term value generation

Co-owning “blueprint”

- “Free options” through alliance building
- Selected risk-shared alliances reduce upfront and research payments in exchange for milestones and royalties



Large portfolio across modalities moving towards market

Broad and diversified pipeline of assets

# of fully funded co-owned assets

EVT Innovate
118

Bridge projects
36

Others (e.g. operational ventures)
25

	Cell & gene therapy	Biologics	Small molecules
Discovery & Pre-clinical	>15	>20	>65
Clinical	0	1	15
Example	iPSC derived therapies	Chikungunya virus; HBV	P2X3

> 100 highly attractive co-owned individual assets

Partnership portfolio pre-clinical and clinical

	Molecule	Therapeutic Area/Indication	Partner	Discovery	Pre-clinical	Phase I	Phase II	Phase III
Clinical	EVT201	Insomnia (GABA-A)	京新药业					
	BAY-1817080	Chronic cough (P2X3)	Bayer					
	BAY-1817080	Overactive bladder	Bayer					
	BAY-1817080	Endometriosis	Bayer					
	CT7001	Oncology (CDK7)	Carrick therapeutics					
	CT7001	Oncology (CDK7)	Carrick therapeutics					
	EVT401	Immunology & Inflammation (P2X7)	康恩贝集团 CONBA GROUP					
	BAYxxx	Gynaecology	Bayer					
	BAYxxx	Multiple indications	Bayer					
	BAY2328065	Gynaecology	Bayer					
	BI 894416	Asthma (not disclosed)	Boehringer Ingelheim					
	BI 860585	Oncology (mTORC1/2)	Boehringer Ingelheim / XYNOMIC Pharma					
	TPM203	Pemphigus Vulgaris (not disclosed)	Topas Therapeutics					
	DSP-1181	Obessive-compulsive disorder (5-HT1A)	Exscientia					
	CNTX 6016	Pain (CB2)	Boehringer Ingelheim					
	EVT894	Chikungunya (Antibody)	NIH / SANOFI					
Pre-clinical	BAYxxx	Endometriosis (not disclosed)	Bayer					
	EVT801	Oncology (VEGFR3)	SANOFI					
	APN411	Oncology – Immunotherapy	SANOFI / APEIRON BIOLOGICS					
	EXS21546	Oncology (various programmes)	Exscientia					
	GLPGxxxx	Fibrosis (not disclosed)	Galapagos					
	BAYxxxx	Nephrology (not disclosed)	Bayer					
	QRB001	Metabolic – Diabetes (not disclosed)	QRbeta					
	BMSxxxx	Neurodegeneration (not disclosed)	Bristol Myers Squibb					
	EVT895	HBV	SANOFI					
	EVTxxxx	CNS, Metabolic, Pain …	**>10 further programmes**					

[1] Not disclosed

Note: Several projects have fallen back to Evotec, where Evotec does not intend to run further clinical trials unpartnered, e.g. EVT302, EVT101, SGM-1019

Follow-on discovery projects are progressing rapidly

Partnership research and discovery portfolio

	Molecule	Therapeutic Area/Indication	Partner	Discovery	Pre-clinical	Phase I	Phase II	Phase III
Discovery	Various ND[1)]	Nephrology	AstraZeneca					
	ND[1)]	Nephrology	VIFOR PHARMA					
	ND[1)]	PCOS	celmatix					
	INDY inhibitor	Metabolic						
	Various	Oncology	Bristol Myers Squibb					
	ND[1)]	Oncology	The Mark Foundation for Cancer Research					
	ND[1)]	Oncology – Colorectal cancer	indivumed					
	ND[1)]	Oncology – DNA damage response	BREAKPOINT THERAPEUTICS					
	ND[1)]	Novel antibiotics	HELMHOLTZ RESEARCH FOR GRAND CHALLENGES					
	ND[1)]	Novel antibiotics	GARDP					
	ND[1)]	Anti-bacterial	FORGE Therapeutics					
	Target*PicV*	Antiviral						
	Various	Anti-infectives	evotec **>5 programmes**					
	Various	All indications	LABS91 LAB031 LAB10x					
	ND[1)]	Dermatological diseases	almirall					
	ND[1)]	Facioscapulohumeral Dystrophy	facio therapies					
	Various	Immunology & Inflammation – Tissue fibrosis	Pfizer					
	Various	Fibrotic disease	Galapagos					
	Various ND[1)]	Immunology & Inflammation	ucb					
	ND[1)]	Inflammatory	Aeovian PHARMACEUTICALS					
	ND[1)]	Cancer	Immunitas					
	Various	Internal: Oncology, CNS, Metabolic, Pain & Inflammation	**>40 further programmes**					

[1)] Not disclosed

Pipeline will strongly gain visibility with no clinical costs for us

Overview of pipeline and selected upcoming events & internal champions

Selected expected upcoming pipeline events in the next 12 - 24 months

1. Phase IIb with Bayer in RCC (Eliapixant)
2. Phase II with Bayer in Overactive bladder (Eliapixant)
3. Phase II with Bayer in Endometriosis (Eliapixant)
4. Phase II initiation with BI in Oncology / Pain
5. Phase II with Bayer in Gynaecology (B1 antagonist)
6. Phase I initiation in Chikungunya virus
7. Phase I with BMS in CNS
8. Phase I with Exscientia in Oncology (A2a)
9. Phase I with Bayer in Gynaecology (P2X4)
10. Phase I with Sanofi in Immuno-oncology
11. Phase I in HBV Cure
12. Multiple co-owned equity companies will progress in clinic (e.g. Topas, Forge, Carrick, Fibrocor, QRbeta, …)

"Beta cell therapy is the most promising approach to cure diabetes."
"IPSCs have game changing potential, they fast forward many key questions for new drugs."

Andreas Scheel (Evotec) & Rainer Kuhn (Evotec)

"True innovation – an antibody to be used as both: targeted therapy, and prophylactic treatment"

Florian von Groote-Bidlingmaier (Evotec)

"Potent molecule with sustained activity to achieve HBV functional cure."

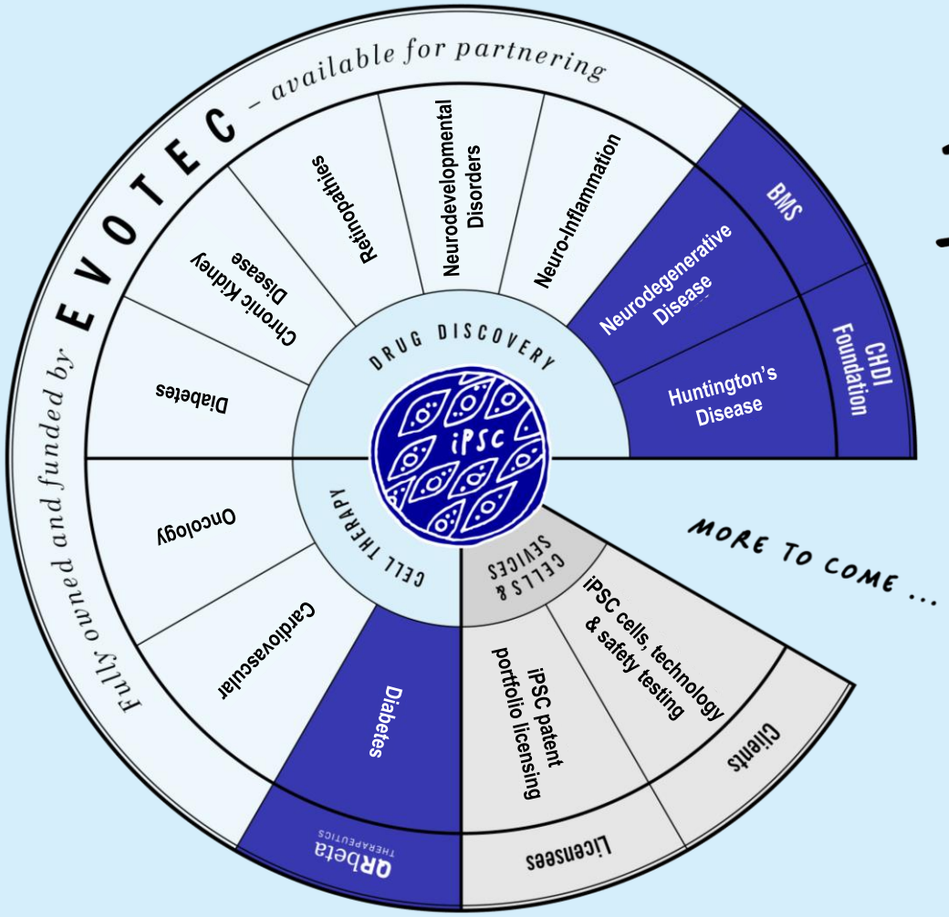
Antoine Alam (Evotec)

"P2X3 is a pipeline in a molecule. E.g. in refractory chronic cough with its selectivity and side effect profile."

Adam Davenport (Evotec)

Unparalleled iPSC platform delivers big portfolio of opportunities

iPSC platform

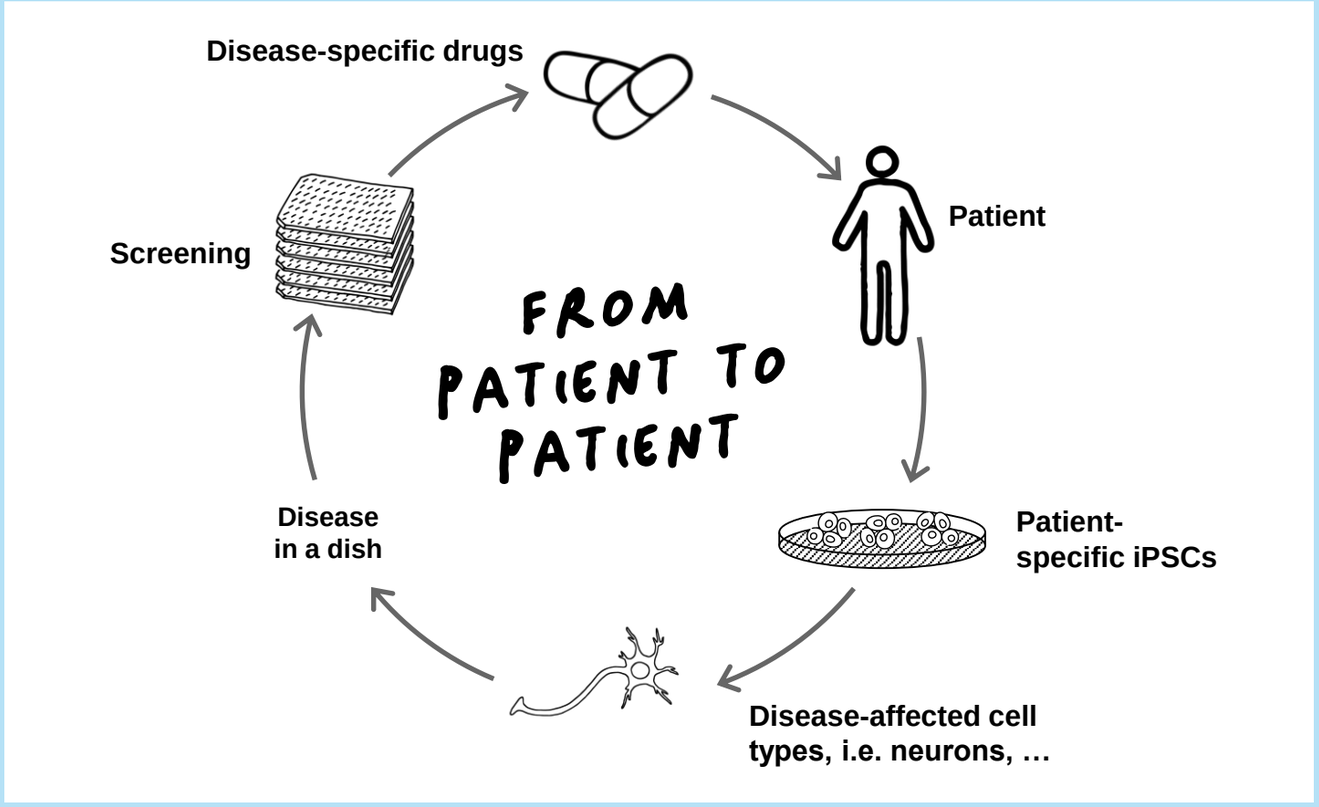


- Unique to select unbiased therapeutic modality for specific disease or target
- Perfect starting point for drug discovery and cell therapy – linked to technologies for disease understanding and modelling

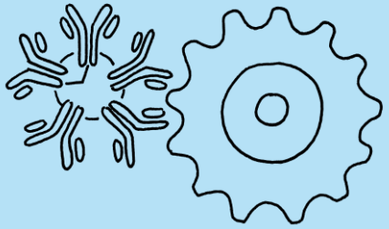
iPSC-derived therapies have game changing potential

Unparalleled fully integrated iPSC-based drug discovery platform

Disease relevance at the start



Cell therapy



Drug discovery

Strong portfolio emerging in CNS, IO, and metabolic diseases

Pipeline build-up to turn vision into reality in drug discovery & cell therapy

2021 (e)

Bristol Myers Squibb™	iM[1] – IO
Bristol Myers Squibb™	iCM[2] – CV
Bristol Myers Squibb™	iSat[3]
iPSC-MS	iPSC-Gaucher
iPSC-RD	QRbeta THERAPEUTICS
iNK – IO	QRbeta THERAPEUTICS
γδ iT – IO	
αβ iT – IO	

2022/23 (e)

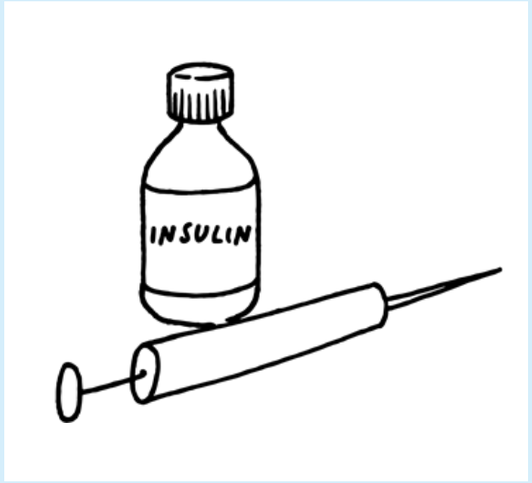
Bristol Myers Squibb™	iCM – CV	iPSC-MS
Bristol Myers Squibb™	iSat – muscle	iPSC-Psych
iNK – IO	iNK – fibrosis	Bristol Myers Squibb™
γδ iT – IO	iChon[4] – OA	Bristol Myers Squibb™
αβ iT – IO	iPSC-Gaucher	Bristol Myers Squibb™
iM – IO	QRbeta THERAPEUTICS	QRbeta THERAPEUTICS
iNKT – IO	iPSC-LSD	
iDend – IO	iPSC-ND	

Pre-clinical Clinical development

[1] Macrophages
[2] Cardiomyocytes
[3] Satellite cells muscle
[4] Chondrocytes

Paradigm shift for cure

Current insulin therapy *versus* beta cell therapy

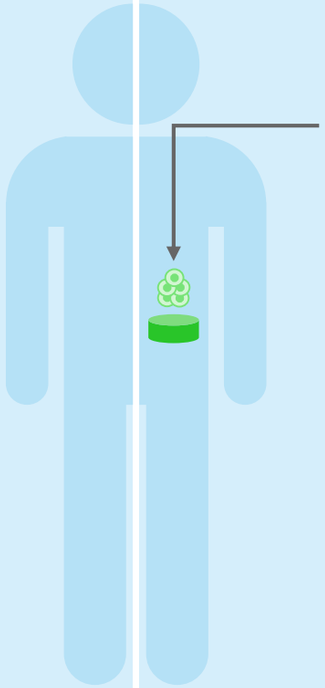


> 7% of population[1)2)];
> 20 US$ bn today – tremendous potential[3)4)]

Old paradigm

Insulin injections - do not address underlying cause of disease

- Therapy dominates daily life
- Glucose measurements
- Hypoglycemic episodes
- Kidney failure
- Blindness
- Stroke
- Amputation



New paradigm

Beta cell therapy

Beta cell implant or infusion

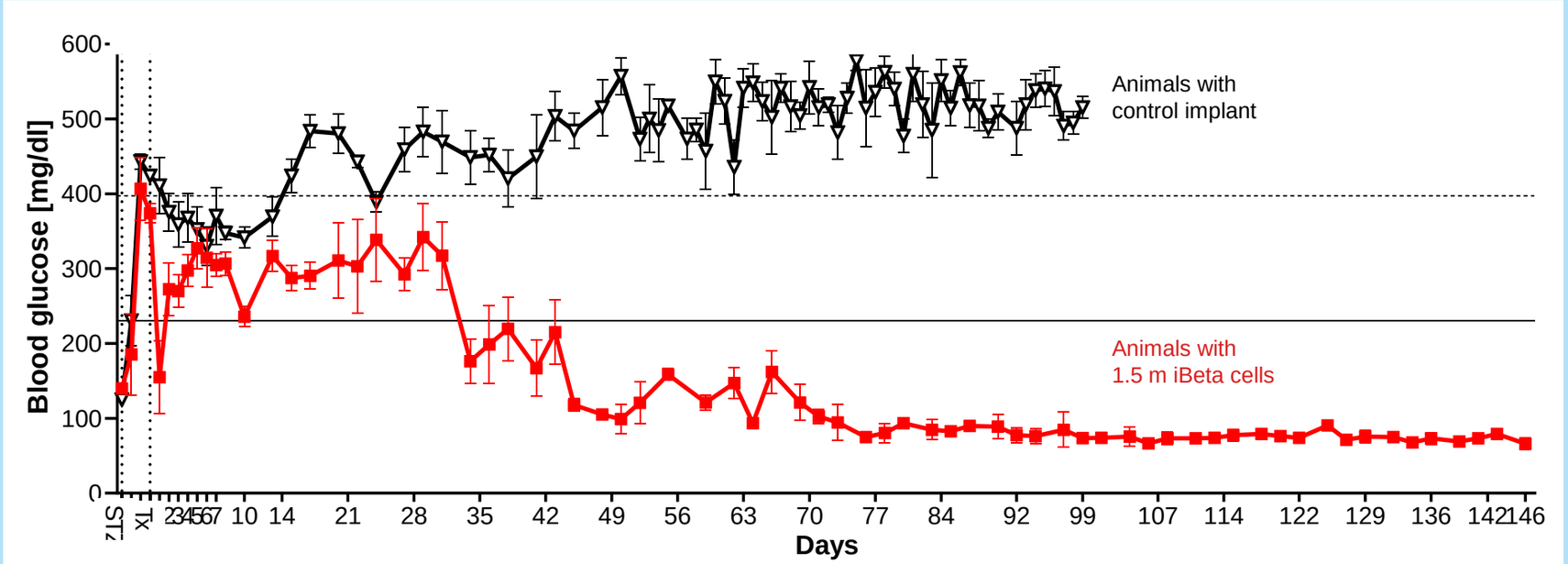
- Significant improvement in quality of life
- No blood glucose measurements
- No daily insulin injections
- No hypoglycemic episodes
- No diabetic complications – Nerve damage, kidney damage, blindness, …

[1)] Norris et al., Lancet Diabetes Endocrinol 2020; 226-38; Chatterjee et al., Lancet 2017; 389: 2239–51
[2)] Globaldata list more than 500 companies active in diabetes (count includes affiliates or large pharma companies)
[3)] Insulin and its analogues, with or without additional technical devices like pumps, closed loop systems, etc.
[4)] Global data, EU5, USA and Japan, patients 20 – 64 year old; Accumulated sales of top 10 Diabetes products in 2018

Durable normalisation of blood glucose levels

iPSC-derived islet-like clusters in diabetic animal PoC study

Random-fed blood glucose in diabetic mice implanted with GMP iPSC-derived beta cells[1)]



Late pre-clinical development; Phase I expected in 2021/22

- iPSC islet-like clusters deliver **long-lasting normoglycemia** at human glucose setpoint[2)]
- Significantly increased resistance to hypoxia and post-implantation stress relative to primary human islets[3)]
- GMP capabilities with unique know-how
- Direct efficacy comparison to standard treatments not feasible

[1)] Cells implanted in Theracyte non-oxygenated encapsulation devices subcutaneously in STZ-diabetic NOD-SCID mice

[2)] In this model, 4000 human donor islet IEQ are needed to establish normoglycemia (kidney capsule). Assuming a β-cell content of 35%, corresponding to 1.4 M β-cells (1000 total cells per IEQ, see https://pubmed.ncbi.nlm.nih.gov/24835624/)

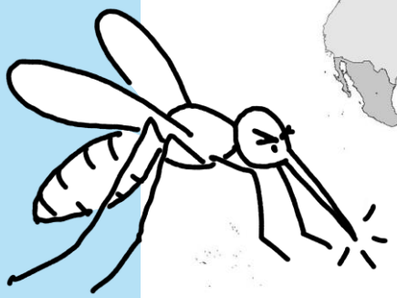
[3)] Evotec results, in agreement with Lee et al., 2009; https://pubmed.ncbi.nlm.nih.gov/19352116/, Shapiro et al.

Infection with significant public health burden

EVT894 - **Chikungunya virus (CHIKV)**

> 1.3 bn people in endemic areas

- Mosquito-borne infection, most prevalent in tropical and subtropical regions with recent cases in Europe
- Often misdiagnosed due to unspecific symptoms
- Illness transitions to chronic arthritis like condition associated with high cost of disease management
- No effective therapies and approved vaccines; no rapid point of care test for diagnosis
- Chikungunya on **FDA priority review voucher list**



WHO designated neglected tropical disease

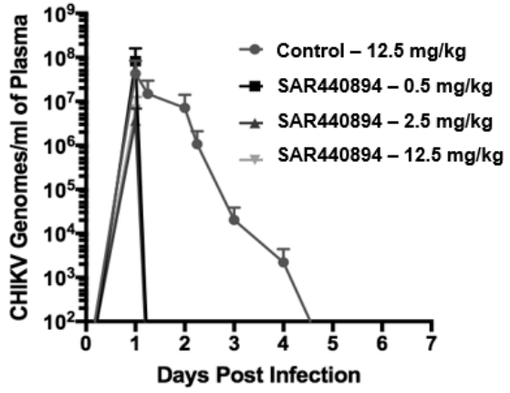
Chikungunya in the world

Strong data in various *in vivo* models lead to Phase I

EVT894: FIH study at Duke University initiated November 2020[1)]

Pre-clinical development

- Strong neutralising activity in mice and non human primates
- Data suggest long half-life



Phase I FIH study

- Single ascending IV doses of EVT894 (0.3, 1, 3, 10, 20 mg/kg)
- 8 subjects (6 active, 2 placebo) per cohort
- Projected duration 14 months, started Nov 2020

Very good synergy with Just – Evotec Biologics

Reference case for “Pandemic preparedness”

Phase I initiated

[1)] www.clinicaltrials.gov: NCT04441905; Sponsor: NIH Site: Duke Clinical Research Center

A novel biologic to cure HBV

EVT895: HBV infections are a major global health burden

>900,000 deaths in 2015

- HBV kills as many people world-wide as HIV

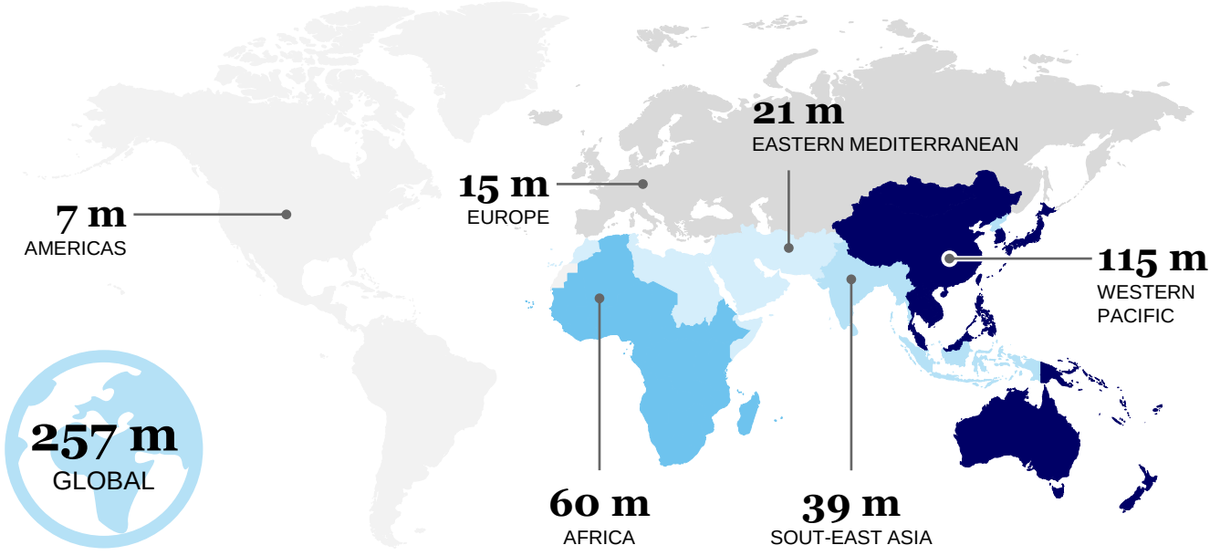
Current therapeutics have a low cure rate

- Some being poorly tolerated
- Though a safe and effective vaccine is available, it is not used in all countries
- It will be decades before impact is seen on global disease burden

HBV cure is WHO target for *2030 agenda for sustainable development*

Viral Hepatitis B in the world

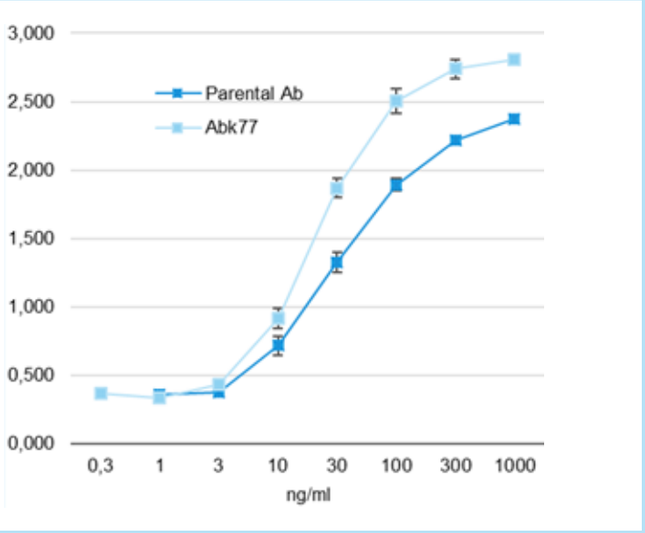
World Health Organization



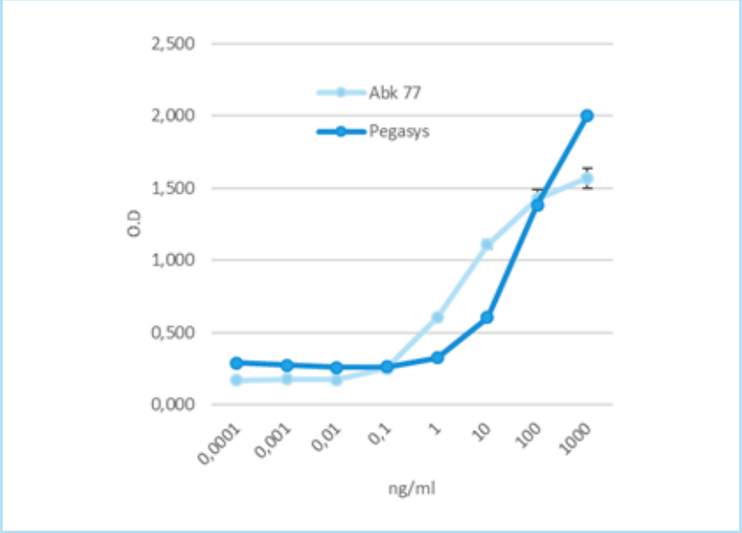
Stimulate interferon pathway and agonise CD40

EVT895: A potent biologics antiviral - Bifunctional molecule

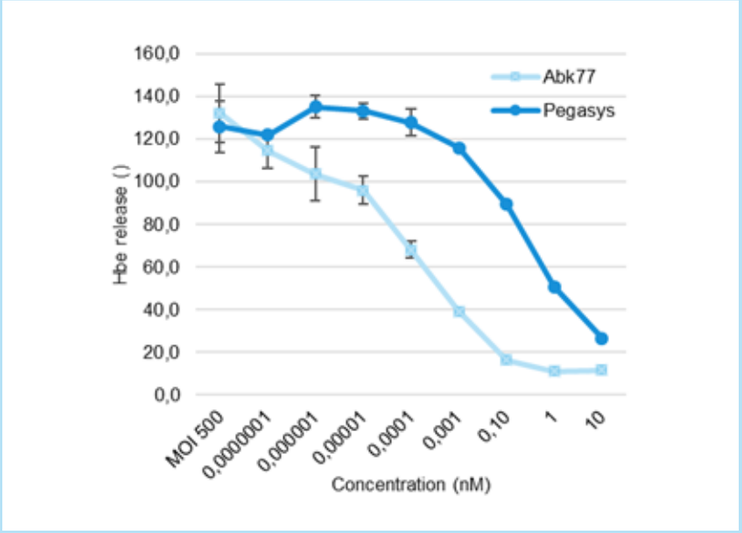
Interferon pathway stimulation compared to Pegasys



CD40 agonism compared to CD40 agonistic antibody



Hbe release: Comparison with Pegasys (donor 2)

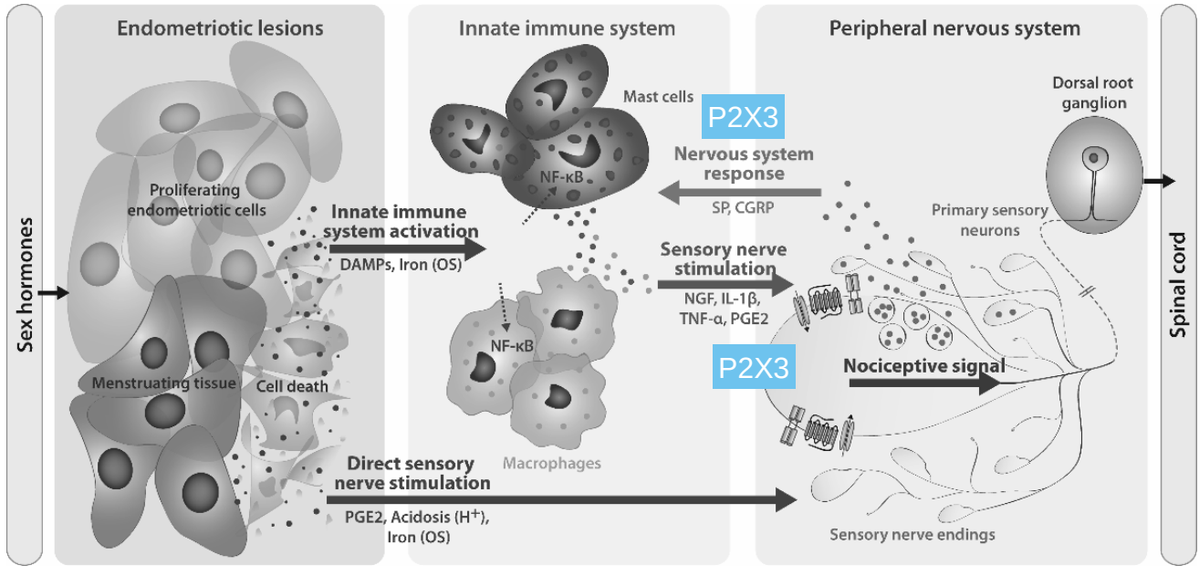


Late pre-clinical development; Phase I in 2021 (e)

Key target in nerve fiber hypersensitization

P2X3 antagonist – Eliapixant (BAY1817080)

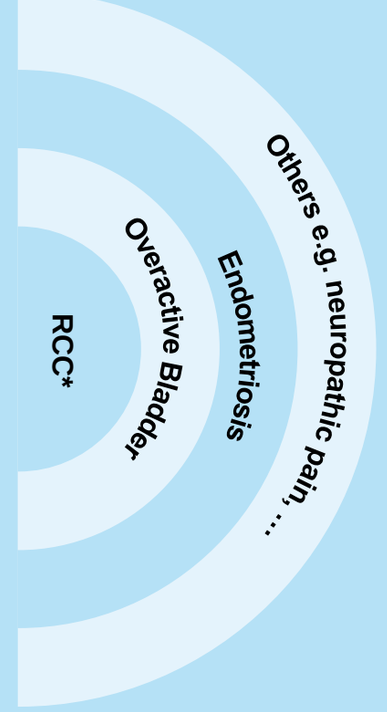
Expertise in inflammation / Women's health; market access



Derived from the strategic multi-target research alliance of Bayer and Evotec on endometriosis

Expertise in pain research, *in vivo*; ion channels

Multi-target potential



Infographic: Modified from Laux-Biehlmann et al, Trends Pharmacol Sci. 2015 May;36(5):270-6.

* RCC : Refractory Chronic Cough

High unmet medical need, no effective treatment

P2X3 antagonist – Eliapixant (BAY1817080) **Refractory Chronic Cough (RCC)**

~ 15 million RCC patients in US and EU

Disease

- RCC persists > 8 weeks; present despite guideline-based treatment
- Symptoms include dry irritable sensation in the throat. Symptoms not limited to coughing, may include globus, dyspnea, and dysphonia[1)]
- Cough refractory to treatment and/or unexplained

Standard of Care

- No effective treatment approved

[1)] Song WJ, Chang YS, Faruqi S, et al. (2016). Defining Chronic Cough: A Systematic Review of the Epidemiological Literature. Allergy Asthma Immunol Res. 2016 Mar. 8 (2):146-55.

Phase II data support best-in-class potential

P2X3 antagonist – Eliapixant (BAY1817080) **Refractory Chronic Cough (RCC)**

Safety

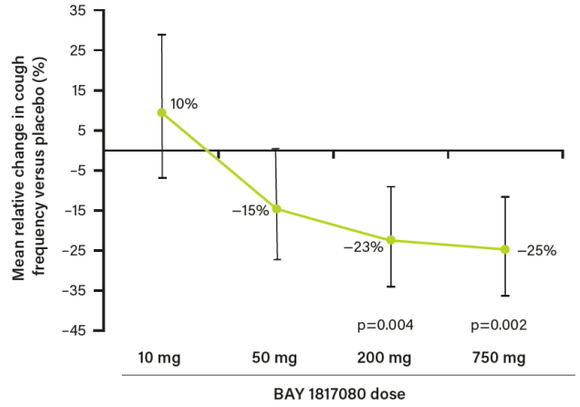
- Low rates of AEs including taste-related AEs
- All taste-related AEs mild and resolved after cessation of therapy

Efficacy

- Dose-dependent reduction in cough frequency over 24 hours (plateau for 200 mg and 750 mg)
- Daytime (awake) cough frequency similar to 24-hour frequency, showing a reduction of 36% versus baseline with 750 mg dose.
- Dose-dependent improvements in cough severity and LCQ

Cough frequency[1)]

Figure 2. Mean relative change in hourly cough frequency assessed over 24-hour periods versus placebo.



Vertical lines show 90% credible limits. Duration of treatment was 1 week with each dose of BAY 1817080.

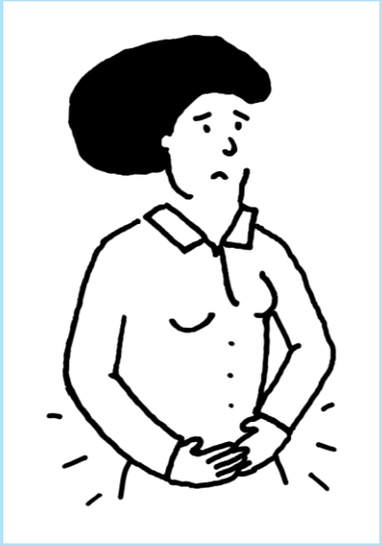
Status: Phase IIb initiated October 2020 – expected completion Q4/2021

[1)] Dose-dependent improvements in patients also seen in the Leicester Cough Questionnaire (LCQ)

Sources: https://conference.thoracic.org/ Poster presented on the ATS 2020 International Conference Virtual Platform

Two more large indications already on their way

P2X3 | Eliapixant (BAY1817080) – **Endometriosis // Overactive bladder (OAB)**



~8-10% of women in reproductive age

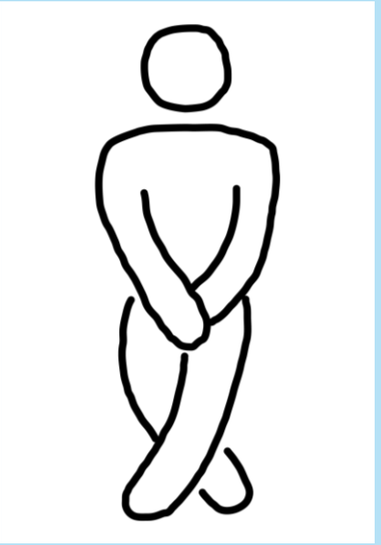
Endometriosis – No proper diagnosis

- Estrogen-dependent, chronic inflammatory disease caused by endometrial tissue outside the uterus
- ø age at first diagnosis 28 years
- Symptoms include dyspareunia, cyclic menstrual pain, chronic pelvic pain, subfertility

Current treatment options

- No safe & efficacious long-term treatment available
- No non-hormonal treatments available

Status: Phase II expected to be initiated shortly



~12% of adults worldwide

OAB- Growing topic with ageing population[1)2)3)]

- Urinary urgency, with or without urinary incontinence. Usually with urinary frequency and nocturia[4),5)]

Standard of Care

- First line: behavioral training
- Second line: medications e.g. anticholinergics
- Third line: e.g. onabotulinumtoxin

Status: Phase II initiated September 2020

Sources:
Ahn S et al. (2015). Pathophysiology and Immune Dysfunction in Endometriosis. Biomed Res Int. 2015;2015:795976
Alimi Y et al. (2018). The Clinical Anatomy of Endometriosis. A Review. Cureus. 2018 Sep; 10(9): e3361.
Wee-Stekly et al. (2015). Endometriosis: A review of the diagnosis and pain management. Gynecology and Minimally Invasive Therapy

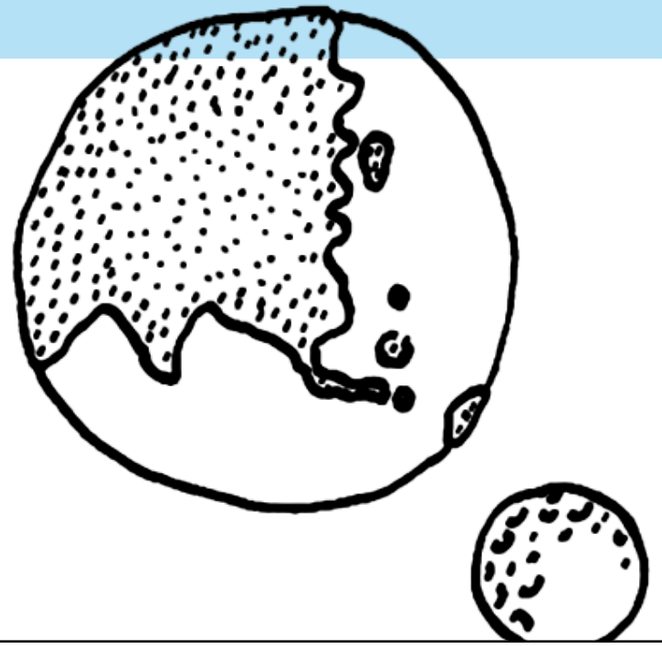
1) MedScape: https://emedicine.medscape.com/article/459340-guidelines (retrieved March 2020).
2) MedScape: https://emedicine.medscape.com/article/459340-overview#a1 (retrieved March 2020).
3) Mayoclinic: https://www.mayoclinic.org/diseases-conditions/overactive-bladder/symptoms-causes/syc-20355715 (retrieved March 2020).
4) Milsom I, Abrams P, Cardozo L, Roberts RG, Thüroff J, Wein AJ. How widespread are the symptoms of an overactive bladder and how are they managed
5) Irwin DE, Milsom I, Hunskaar S, et al. Population-based survey of urinary incontinence

Agenda

Our business strategy

Co-owned pipeline & examples

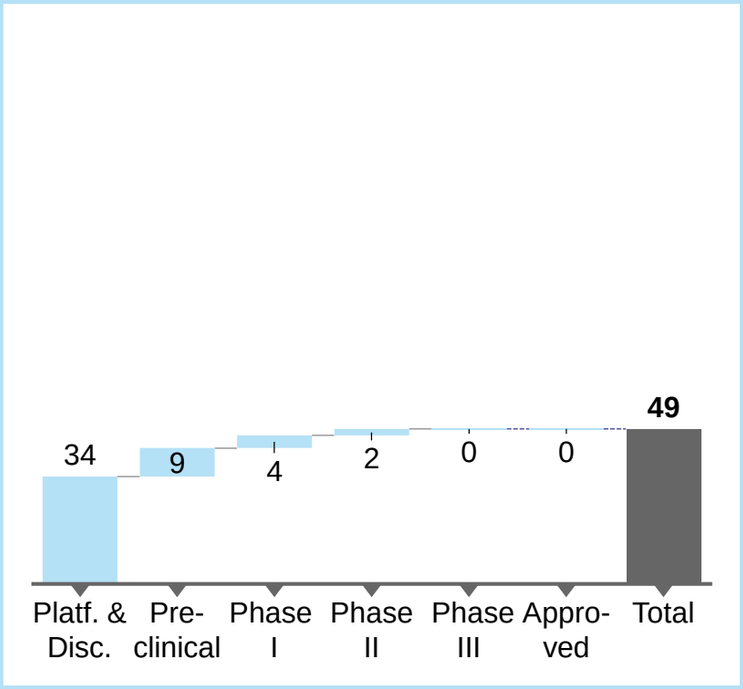
Pipeline evolution



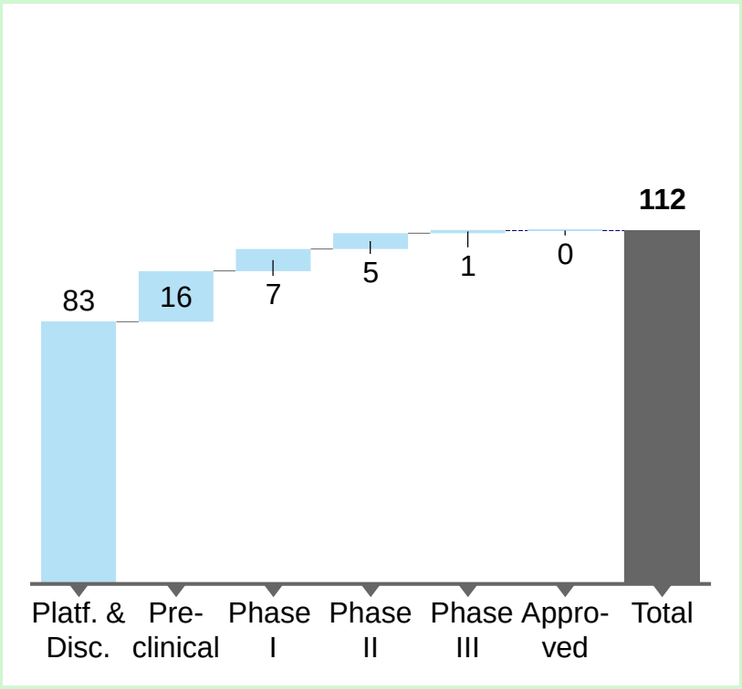
Building a massive co-owned clinical pipeline

EVT Innovate pipeline evolution 2015-2025 (e)

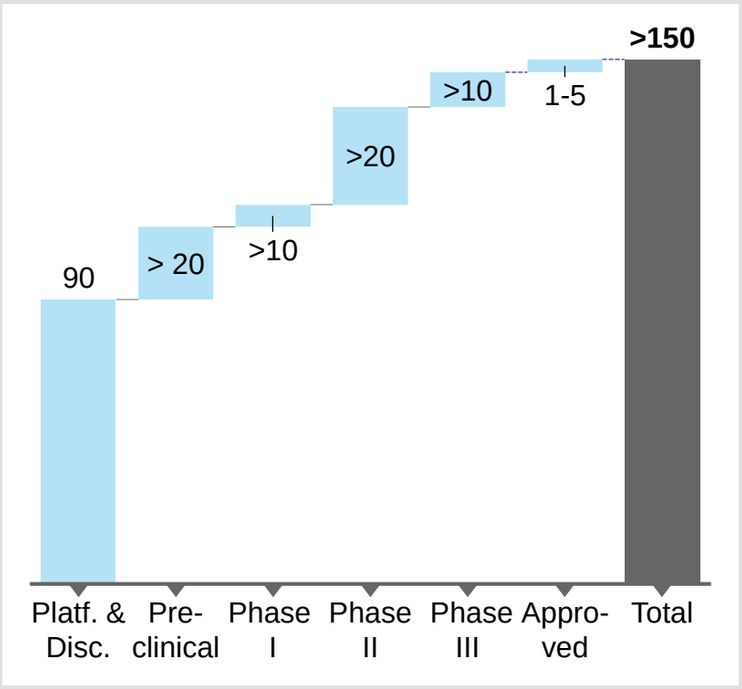
2015
# of projects



2020[1)]
# of projects



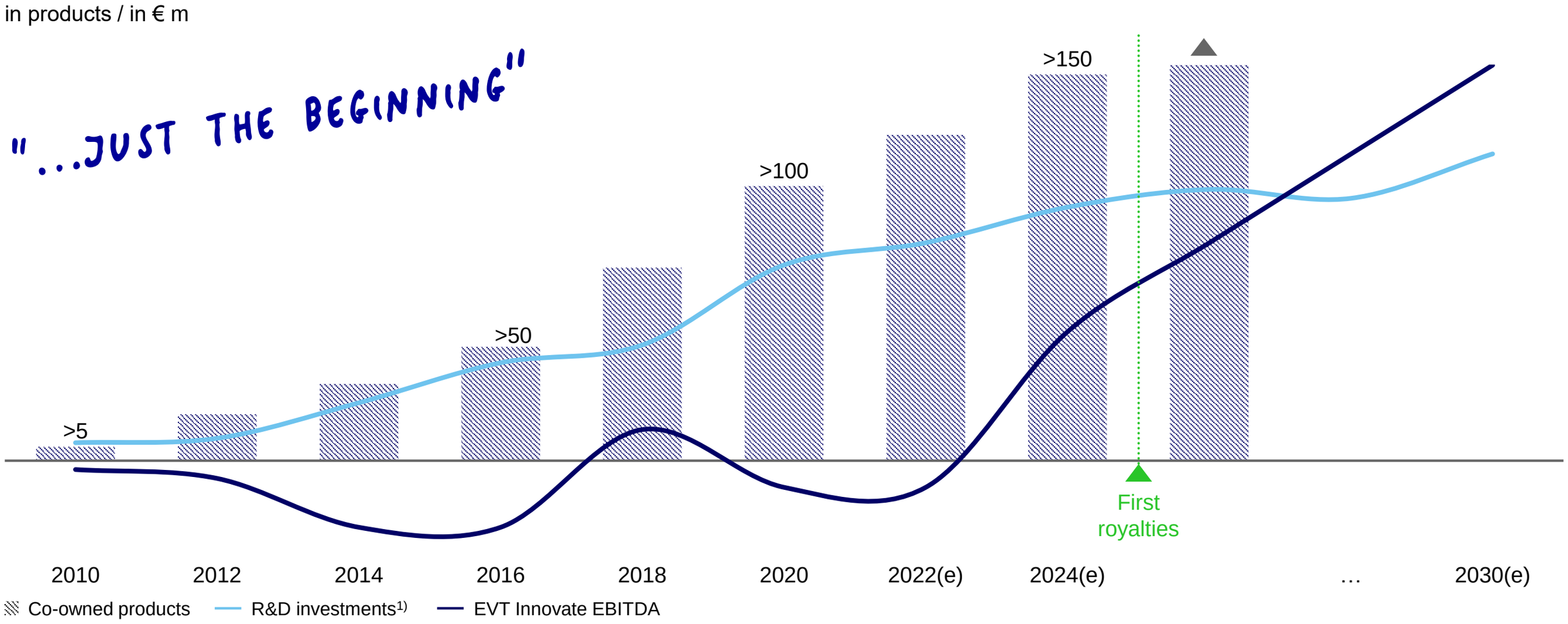
2025 (e)[2)]
# of projects



[1)] Does not include projects that were completely stopped, e.g. Diap277, EVT302
[2)] Not risk adjusted
[3)] Does not include EVT equity investments

Building co-owned product upside with limited financial risk

Co-ownership business model 2010-2025 (e)



1) without EVT Equity

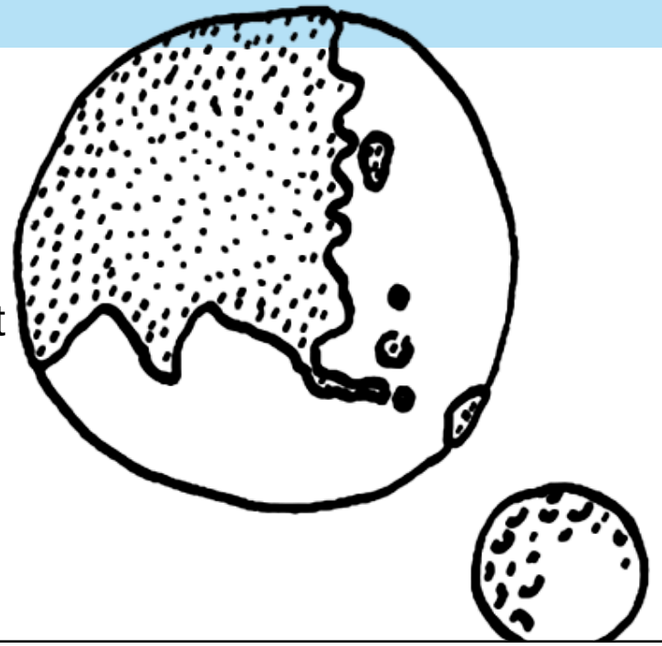
Agenda

The R&D Autobahn to Cures
Our business strategy

Data driven precision medicine
From patient to patient

Drug discovery, development & biologics
From machine learning to the factory of the future

“…just the beginning” …
of the shared economy of drug discovery & development



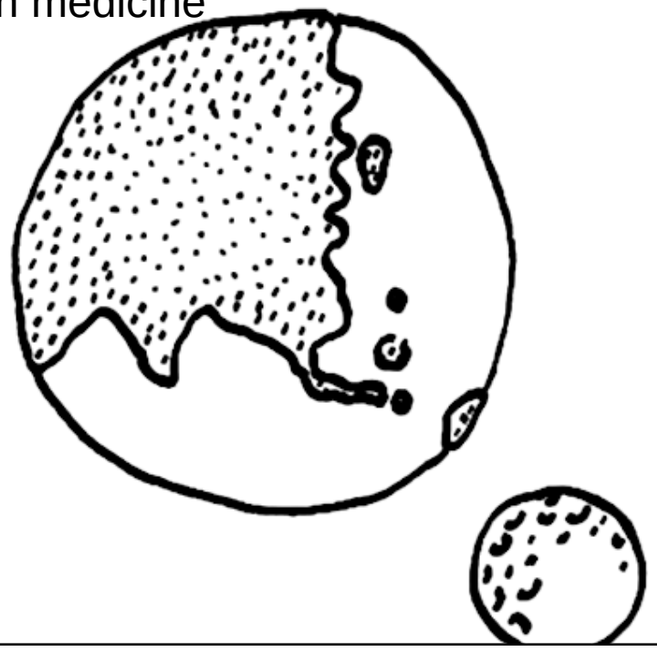
Agenda

Precision medicine requires a multi-omics approach

Evotec’s precision medicines platforms: Patient data bases – PanOmics – PanHunter

Molecular patient databases – the foundation of precision medicine

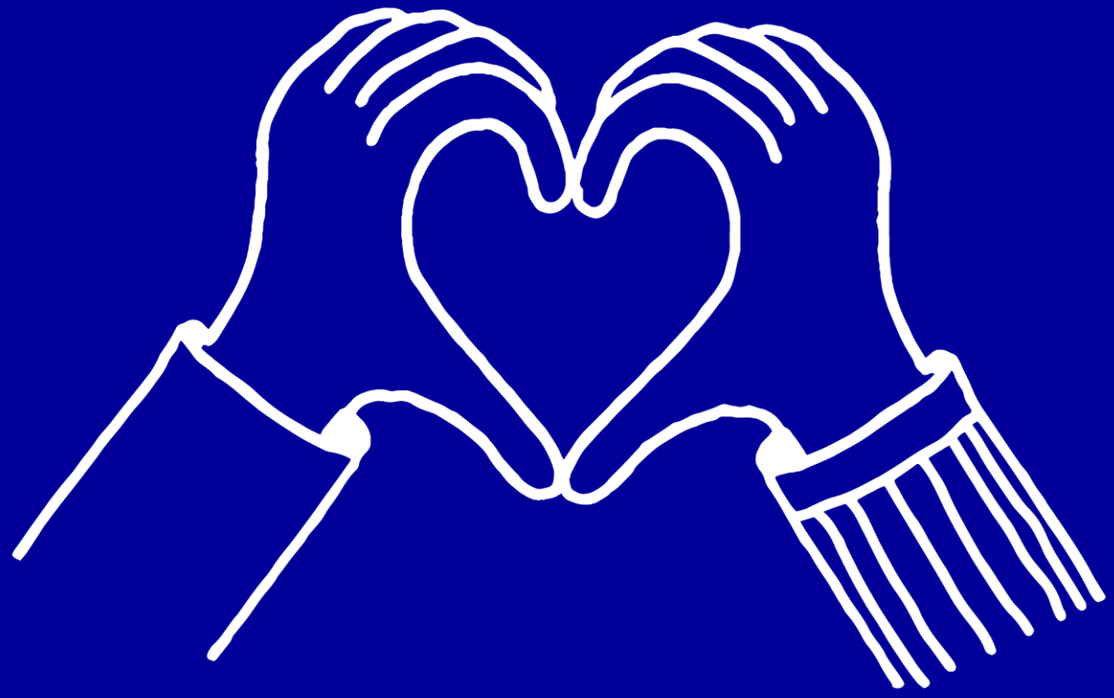
An emerging paradigm shift in drug discovery



evotec

From patient to patient

Integration of big “omics” data into drug discovery is driving precision medicine

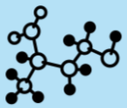


„We are living in a golden age of disruptive technologies. Applying these to drug discovery is highly exciting and rewarding.“

Cord Dohrmann

Precision medicine requires a multi-omics approach

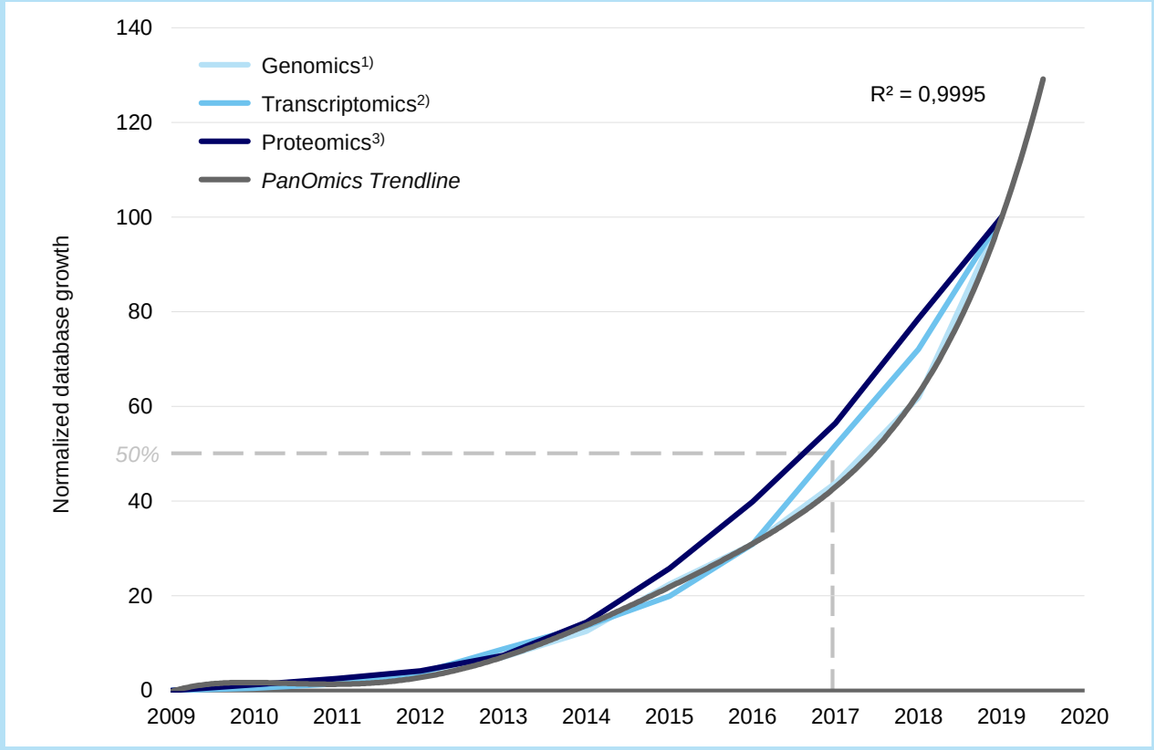
Molecular understanding of disease mechanisms enables precise interventions

	Robustness	Scalability	Cost efficiency	Biological insight
Genomics 	●	◑	◑	◑
Transcriptomics 	●	●	●	●
Proteomics 	●	◑	○	●
Metabolomics 	◑	○	○	◑
	Reproducibility • Day to day • Month to month • Year to year	Throughput • High • Medium • Low	Cost efficiency • High • Medium • Low	Molecular insights in • Cause of disease • Manifestation of disease • Organs, tissues, cells

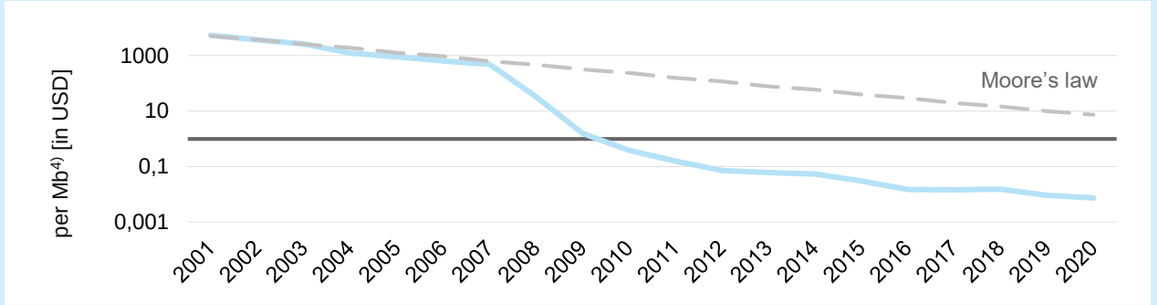
The acceleration of multi-omics data generation

Lower costs and AI/ML are key drivers of a coming Omics Tsunami

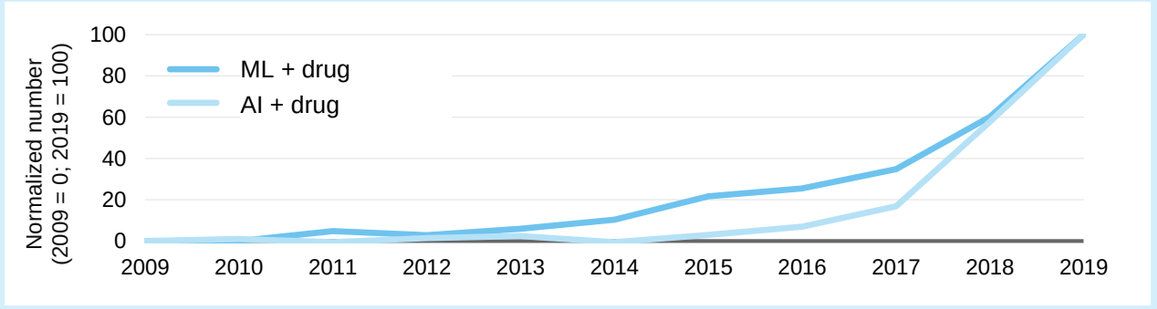
Omics data entered exponential growth phase



Sequencing costs dropped dramatically4)



AI/ML entering into exponential growth phase5)



1) NCBI – GenBank and WGS Statistics (https://www.ncbi.nlm.nih.gov/genbank/statistics/); 2) NCBI – Sequence Read Archive (SRA; https://www.ncbi.nlm.nih.gov/sra/docs/sragrowth/); 3) Perez-Riverol et al., The PRIDE database and related tools and resources in 2019 (doi.org/10.1093/nar/gky1106); 4) Wetterstrand KA. DNA Sequencing Costs: Data from the NHGRI Genome Sequencing Program (genome.gov/sequencingcostsdata); 5) Web of Science (http://www.webofknowledge.com)

Precision medicine is our focus

Patient databases & disease models combined with PanOmics & PanHunter

Molecular patient databases

- Re-defining health and disease
- Defining molecular disease profiles

Patient (iPSC) - derived disease models

- Focus on disease relevance throughout the process
- Screening / H2L / LO …

Molecular profiles turned biomarkers

- More precise measure of efficacy and safety
- Differentiation from SOC

Genomics – Transcriptomics – Proteomics – Metabolomics
Industrialised data generation

PanOmics
Data generation

Data science – Machine learning / Artificial intelligence – Bioinformatics
AI/ML driven data analytics

PanHunter
Data analytics

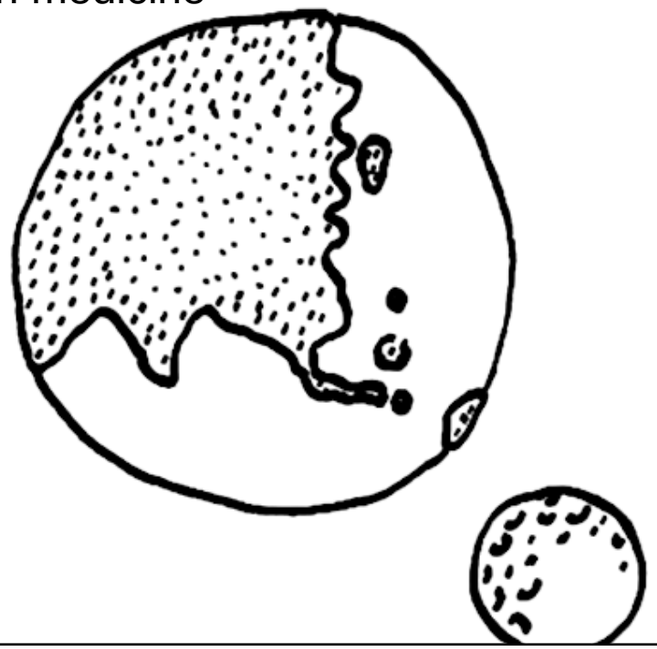
Agenda

Precision medicine requires a multi-omics approach

Evotec’s precision medicines platforms: Patient data bases – PanOmics – PanHunter

Molecular patient databases – the foundation of precision medicine

An emerging paradigm shift in drug discovery



PanOmics & PanHunter accelerate precision medicine

Efficient data generation combined with superior data analysis

PanOmics
Data generation

PanHunter
Data analytics

Genomics	Commodity processes
Transcriptomics	**Proprietary RNA-Seq processes deliver unprecedented throughput and depth**
Proteomics	**Proprietary proteomics processes deliver unprecedented coverage and sensitivity**
Metabolomics	Commodity processes

Proprietary multi-omics data analysis platform

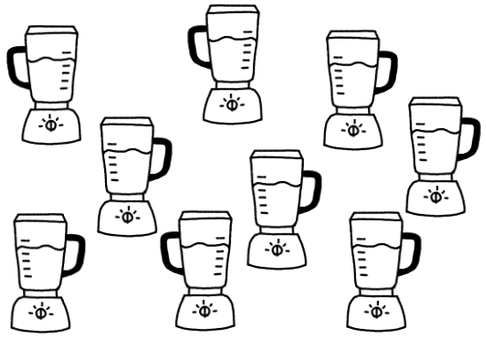
- Integrates bioinformatics and data science for proprietary and public domain data
- Incorporates purpose-built machine learning and artificial intelligence

High-throughput transcriptomics is game changing

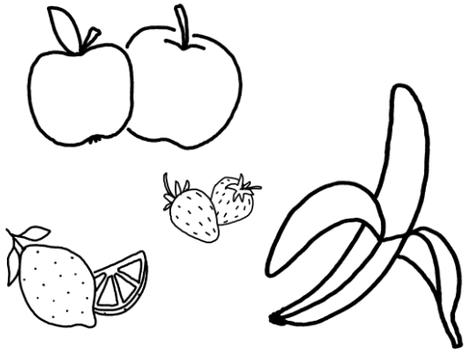
Transcriptomics ≠ Transcriptomics

Bulk RNA-Seq

High-throughput RNA-Seq



Single cell RNA-Seq



Spatial RNA-Seq

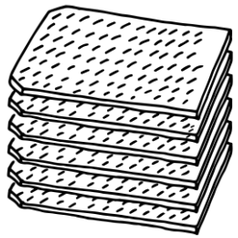
High-throughput RNA-Seq enables

- Building of molecular database to re-define health and disease
- Unbiased drug screening / profiling at screening, hit to lead and lead optimization
- Transparent animal models with unbiased universal read-out

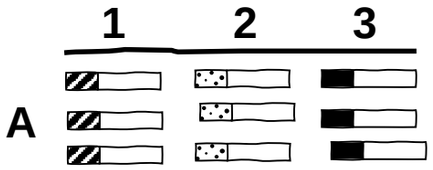
ScreenSeq™ is scalable to >100,000 samples

Evotec's automated 384-well transcriptomics platform

Set of 384 well plates

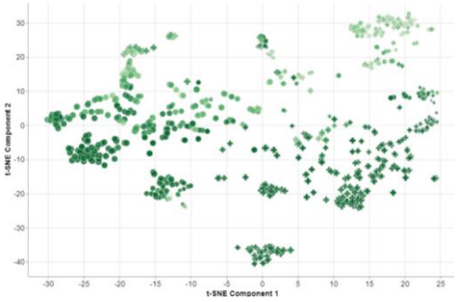


Cell lysis and well-specific barcoding



Library preparation & sequencing

Bioinformatics analysis



Precise gene expression quantification at unsurpassed depth

- Detection limit at @15,000 genes per sample

Protocols work for wide range of samples

- Primary human cells, tissues, cell lines, 3D microtissues

Automated high-throughput process

- For high-throughput compound screening

ScreenSeq™ platform is industry leading

Benchmarking against the leading high-throughput transcriptomics platforms

	Competitor 1	Competitor 2	Competitor 3	Competitor 4	ScreenSeq™
Format	96 well	384 well	384 well	96 well	384 well
Input material					
Gene-targeted option					
Throughput					
Data analysis					
Data quality					
Cost efficiency					

ScreenPep™ - Proteomics with unprecedented performance

Deep proteomics at industrial scale

Mass spectrometry at industrial scale
- High-end mass spectrometers embedded in proprietary work flows
- Throughput: >100,000 samples per year

World-leading proteomics technology and performance
- Exceptional proteome coverage: Up to 10,000 proteins
- Highest reproducibility

Driven by proprietary processes and workflows
- Fully automated sample preparation processes
- Highly optimised, single-shot mass spectrometry
- Dedicated bioinformatics pipeline and IT infrastructure

First partner: Bristol Myers Squibb™

Biological samples
- *In vivo* (patients)
- *In vitro* (compounds)

→ **Automated sample preparation** → **Deep proteome single-shot MS analysis** → **Dedicated bioinformatics pipeline** → **Activity profiles**
Targets
Biomarker

Evotec's ScreenPep™ platform is industry leading

High-Throughput Proteomics and Integrated Proteomics

		Competitor 1	Competitor 2	Competitor 3	Competitor 4	ScreenPep™
HT-Proteomics	Throughput	◑	◑	◔	◑	●
	Coverage	◑	◔	◔	◑	●
	Accuracy	◑	◑	◑	◑	●
Integrated proteomics	PTMs	◑	◔	○	◑	●
	Target Deconvolution	◔	○	◔	◑	●
Data analysis / Machine learning		◑	◑	◔	◔	●

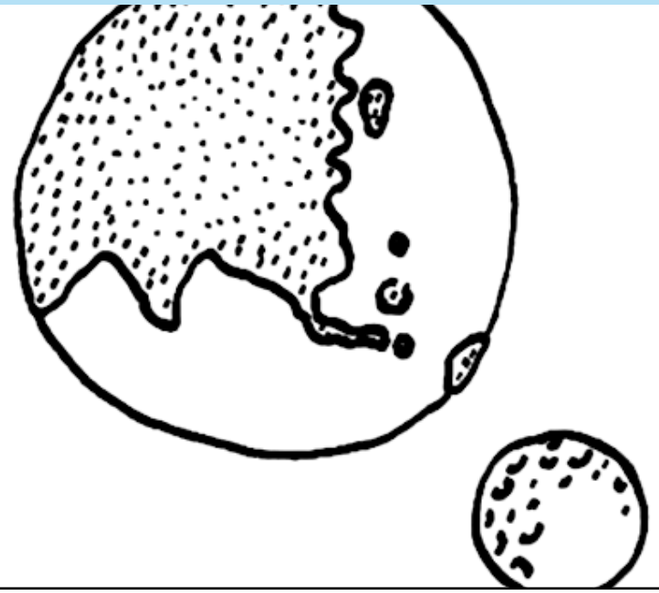
Agenda

Precision medicine requires a multi-omics approach

Evotec’s precision medicines platforms: Patient data bases – PanOmics – PanHunter

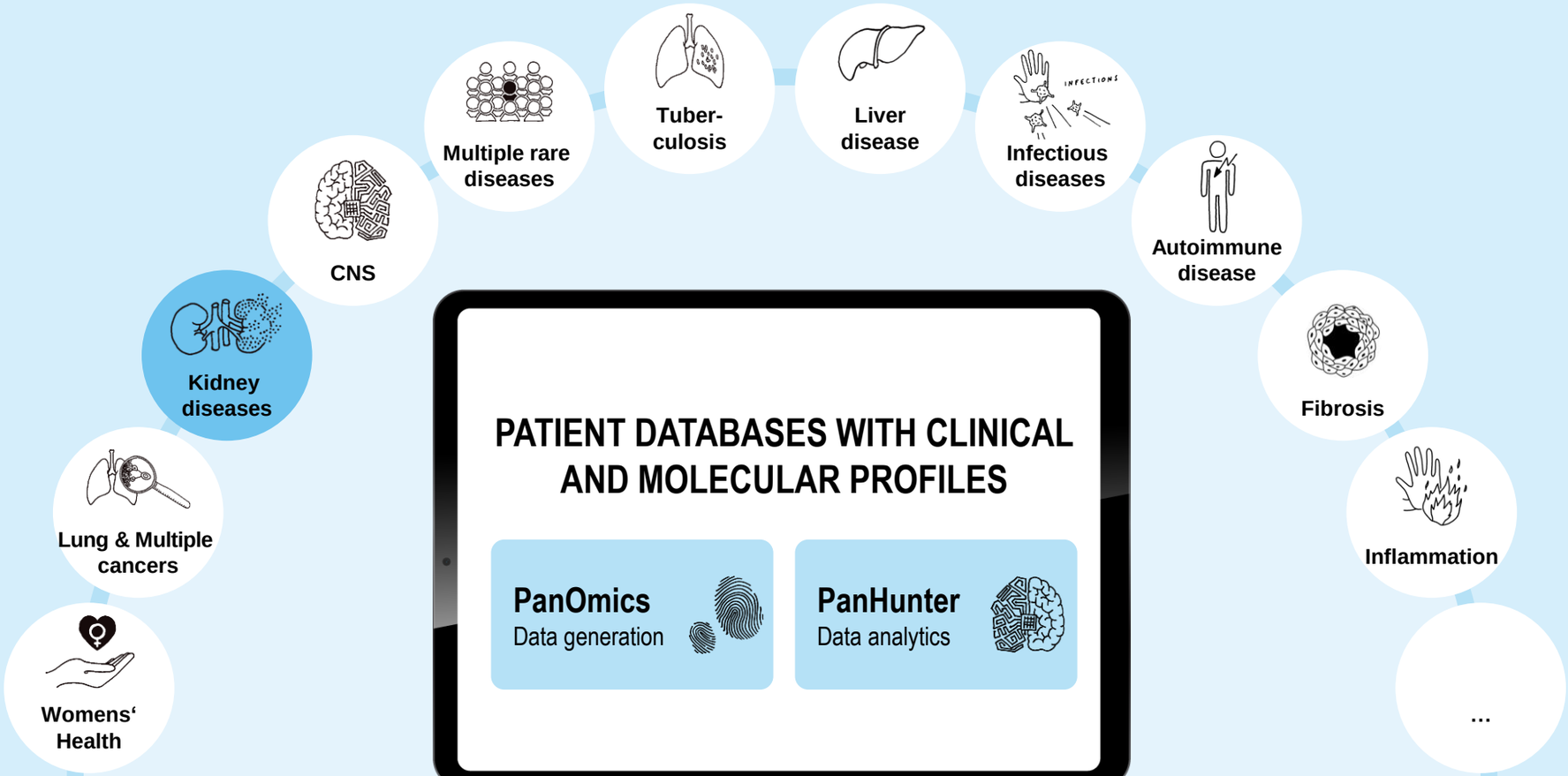
Molecular patient databases – the foundation of precision medicine

An emerging paradigm shift in drug discovery



The foundation of precision medicine

Molecular patient data bases are re-defining health and disease



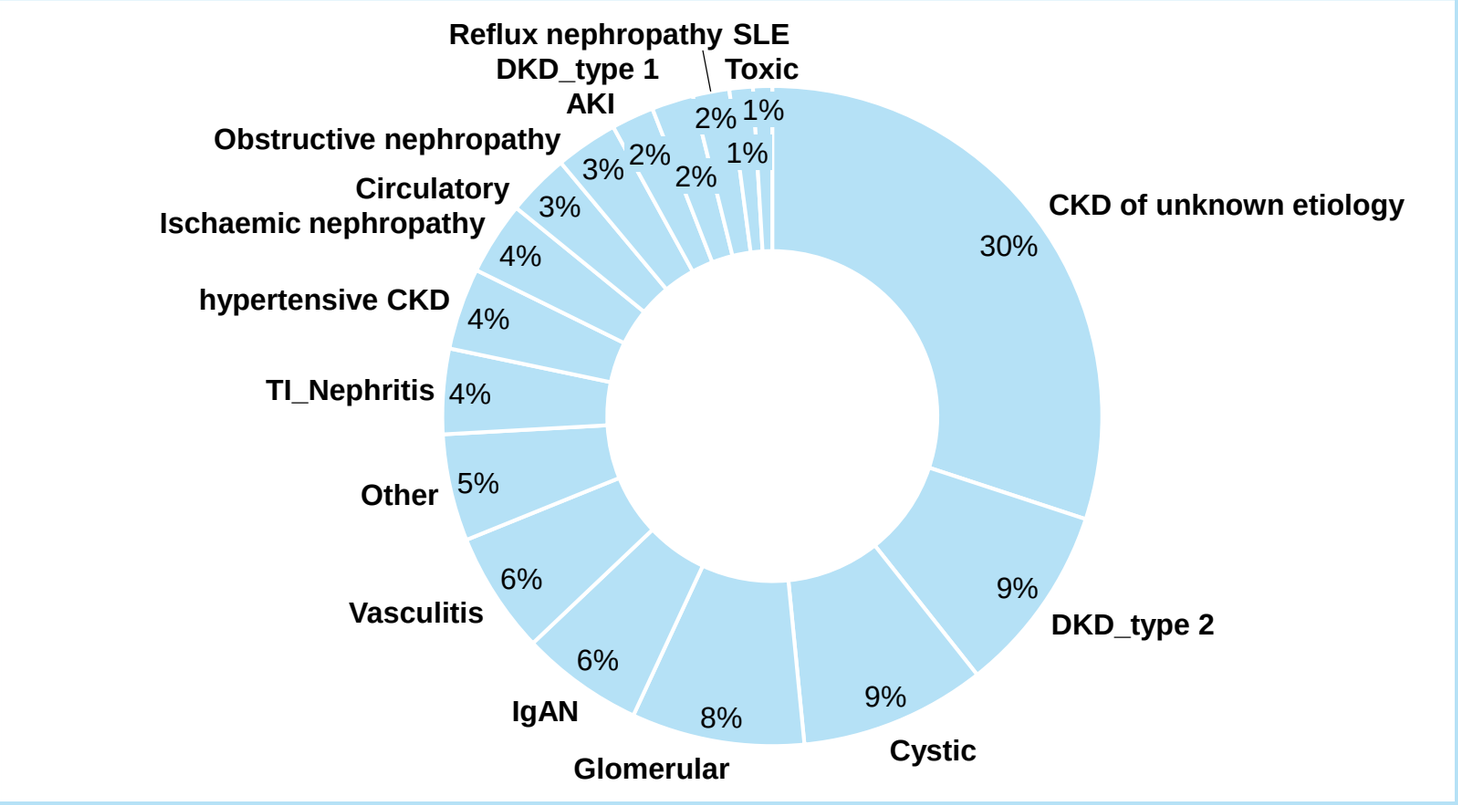
PanOmics: Genomics, Transcriptomics, Proteomics and Metabolomics
PanHunter: Bioinformatics, AI/ML

Kidney diseases are very diverse and not well defined

More precise definitions and disease models are needed

Broad spectrum of kidney diseases

- Major category is chronic kidney diseases of unknown etiology
- Category “Glomerular” includes
  - Idiopathic membrane nephropathy
  - Focal segmental glomerulare sclerosis
  - Alport syndrome
  - Fabry disease
  - …
- Even is the cause is known, treatment is not always clear



Source: ttps://www.nurturebiobank.org/dynamic-data-ckd/

Worldwide largest PanOmics approach to CKD

> 10.000 patients in Chronic Kidney Disease and growing

Cohort		Patients	Biopsies	Other Samples	Comment	EVT Data Exclusivity
CKD	NURTURE National Unified Renal Translational Research Enterprise	3000	450	Blood, serum, urine	Baseline recruitment completed; 1 year follow up ongoing	7 years
NS	NURTURE National Unified Renal Translational Research Enterprise	800	450	Blood, serum, urine	Recruitment 65% completed	7 years
CKD	Salford Royal NHS Foundation Trust	2500	200	DNA, serum	Cohort completed	5 years
Healthy donors	QUOD Quality in Organ Donation	1000	1000	n/a	Kidney & donor-matched liver and heart tissues	5 – 7 years
Healthy donors	Not disclosed	200	100+	Biopsies, glomeruli, blood, serum, urine	Scalable; 100 HD samples in Q3 2020	5 years
CKD	Not disclosed	3000	500 +	Blood	Blood: baseline & 6-years follow up option for further follow up samples	TBD
NS	Not disclosed	100-200	tbd	Blood, serum, urine	Remission vs relapse	TBD

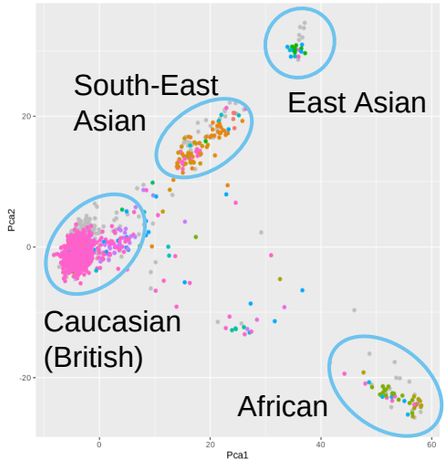
https://www.nurturebiobank.org/; NURTuRE: National Unified Renal Translational Research Enterprise; https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/salford-kidney-study/; SKS: Salford Kidney Study (CRISIS); HD: Healthy Donor; NS: Nephrotic Syndrome; QUOD: https://quod.org.uk/

PanOmics strategy is delivering on multiple fronts

Genomics, transcriptomics, proteomics

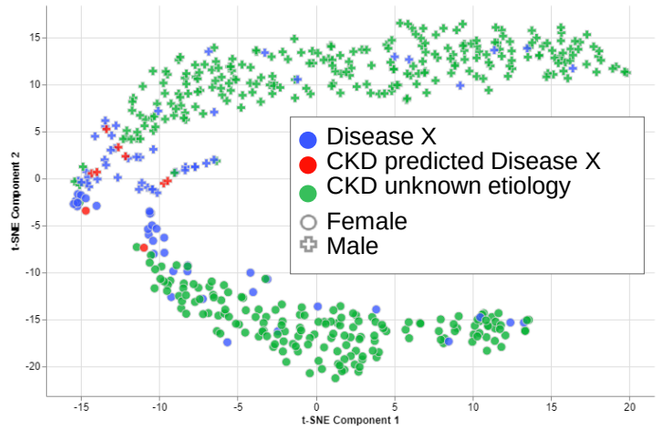
Genomics - SNP analysis

- Stratification of patients according to genetic background / ethnicity



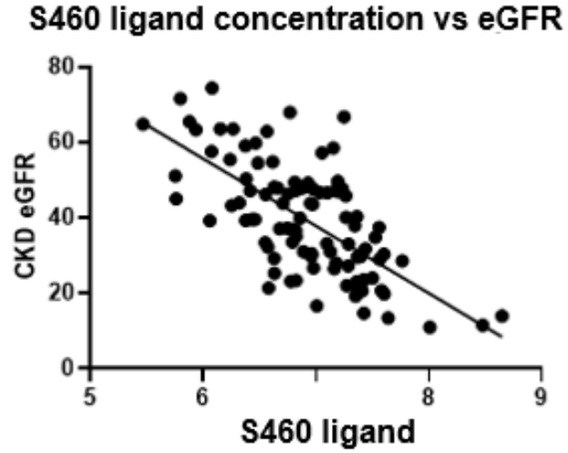
Transcriptomics - blood

- Molecular patient diagnostics / patient stratification



Proteomics - blood

- Correlation of target expression with kidney function



Molecular patient databases translate to high value partnerships

Partnerships deliver significant cash flow and upside

Start: **2016**

- Strong pipeline
- Financials
  - UF payment: ND
  - Research funding
  - MS of > € 300 m
  - Tiered royalties

Start: **2019**

- Multiple projects
- Financials
  - Funding of € 25 m
- Evotec owns 50% of NephThera

Start: **2020**

- Pipeline building initiated
- Financials
  - UF payment: ND
  - Research funding
  - MS of > € 150 m / per product
  - Tiered royalties

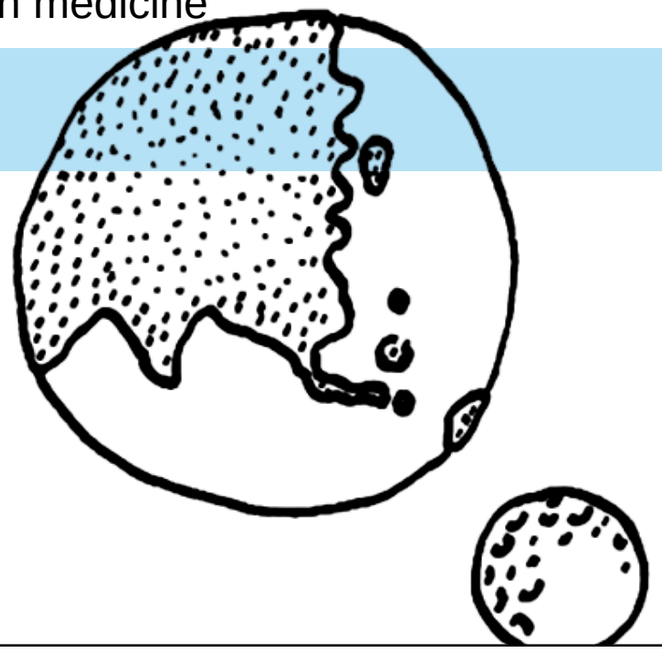
Agenda

Precision medicine requires a multi-omics approach

Evotec’s precision medicines platforms: Patient data bases – PanOmics – PanHunter

Molecular patient databases – the foundation of precision medicine

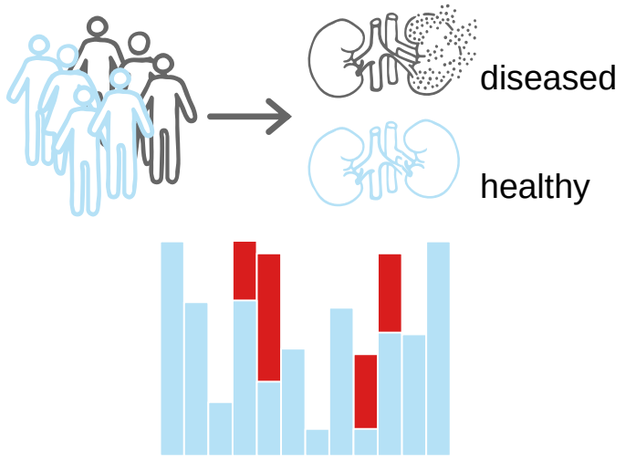
An emerging paradigm shift in drug discovery



Reverting molecular disease phenotypes towards healthy state

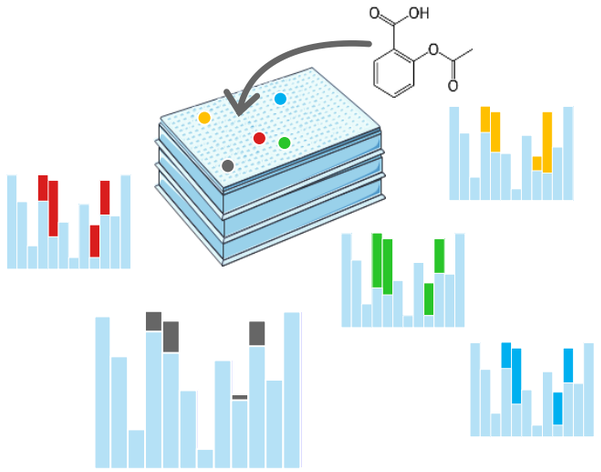
Reversal of molecular disease phenotypes ensures disease relevance

Disease signatures



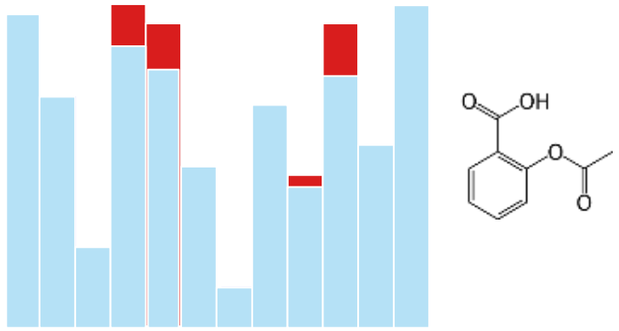
- Identifying molecular disease signatures
- Signatures capture more complete picture disease

Hit selection



- HTS using molecular disease signatures
- Hit selection according most disease relevant profile

Effective drugs normalise disease signatures



- Reverting molecular disease signatures
- Ensures disease relevance in key cell types

Unbiased identification of disease relevant drug candidates

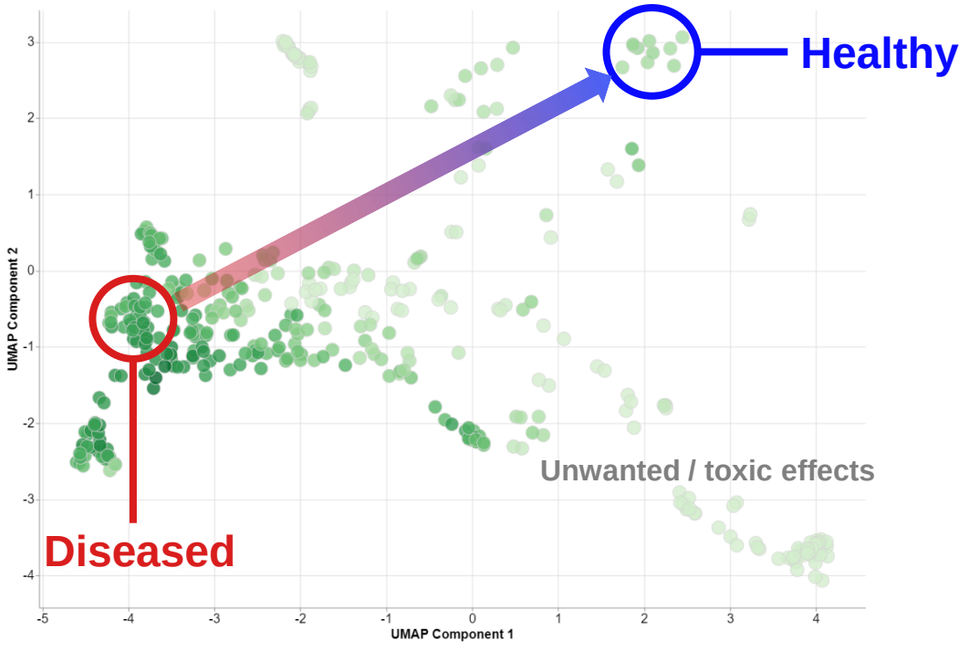
Screening to revert molecular patient profiles to the healthy state

PanOmics

Data generation

- Patient-derived *in vitro* disease model
- High-throughput screen
- Transcriptome analysis in 384 well format

Transcriptome profiles induced by individual compounds in patient-derived cellular disease model



PanHunter

Data analytics

- Identifies most suitable chemical hits
- Focus on reversal of molecular disease phenotype
- Weed out unwanted mechanisms

90% of all drugs fail in late stages of clinical development

Drug induced liver injury (DILI) is a major contributor for drug failure

- The liver is the most frequent site of adverse drug reactions
  - 18% of marketed drug withdrawals are due to DILI alone
- Animal models predict only approximately 50% of the human DILI events
  - More predictive models are urgently needed
- Primary human liver cultures combined with transcriptomics and AI/ML supported analysis
  - Opportunity to transform DILI prediction

90%

of drugs fail in late clinical development

US$ 2.6 billion

and 15 years to develop a drug

18%

drug withdrawals from the market caused by DILI

only 50%

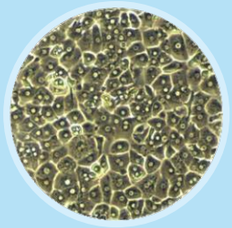
DILI picked up in animal studies

Superior DILI prediction based on PanOmics & PanHunter

Gold standard High-content imaging vs. Transcriptomics (PanOmics) & AI (PanHunter)

Current gold standard HCI based DILI platform[1)]

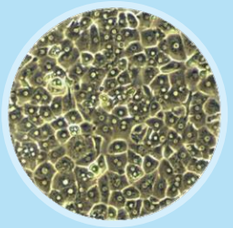
- Primary human hepatocytes
- Seven (7) read-outs
  – High-content imaging



Accuracy of DILI prediction: 70%

Evotec's new DILI prediction platform[1)]

- Primary human hepatocytes
- One (1) read-out
  – Transcriptomics



PanOmics
Data generation

&

PanHunter
Data analytics

Accuracy of DILI prediction: 82%

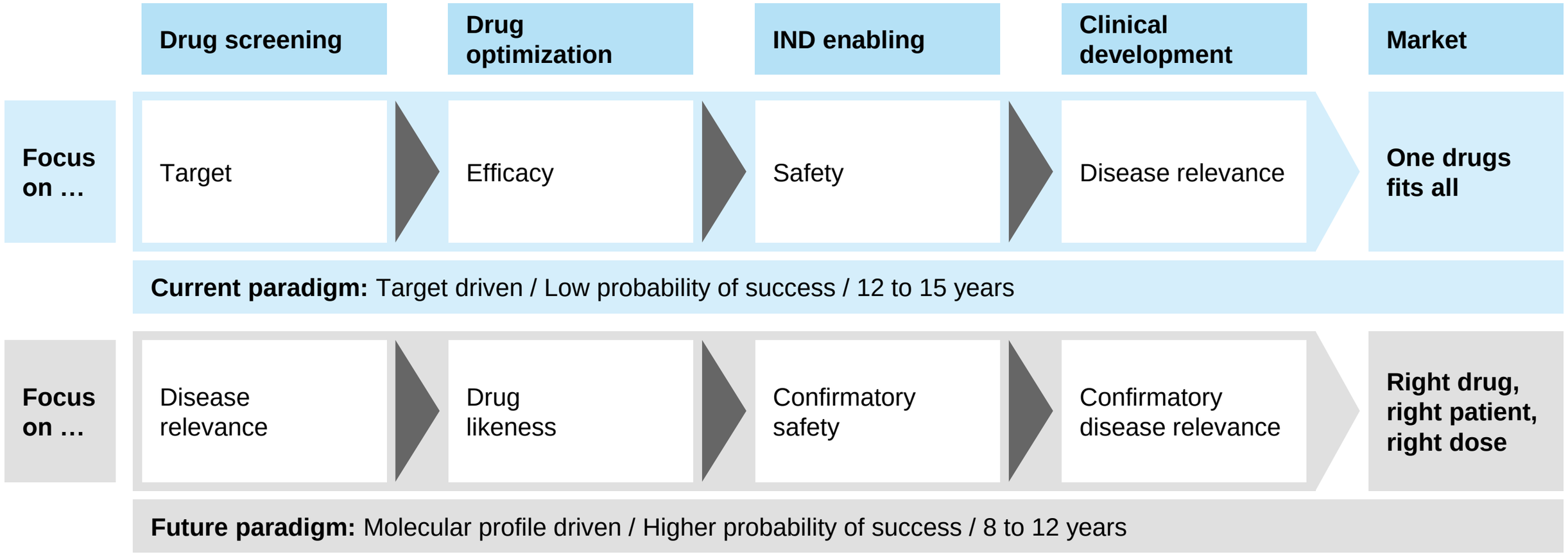
&

Insights into mechanism of tox

Prediction are based on 2D Primary Human Hepatocyte assay with 128 reference compounds tested (largest reference compound data base reported)

Molecular disease profiles are driving a paradigm shift

Disease relevance is paramount: 54% of phase 3 trials fail due to inadequate efficacy[1]

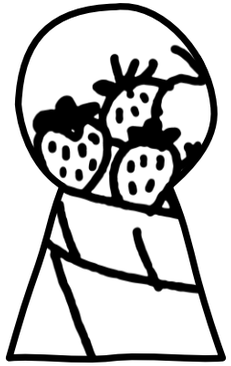


[1] Fogel DB. Factors associated with clinical trials that fail and opportunities for improving the likelihood of success: A review. Contemp Clin Trials Commun. 2018;11:156-164. Published 2018 Aug 7. doi:10.1016/j.conctc.2018.08.001.

Looking at the whole picture with unbiased molecular profiles

Too much target focus is limiting

Target driven drug discovery



Molecular profile driven drug discovery

evotec

Quantum leap in Drug Discovery, Development & Biologics

Operational excellence, from Machine Learning to the Factory of the future in all modalities

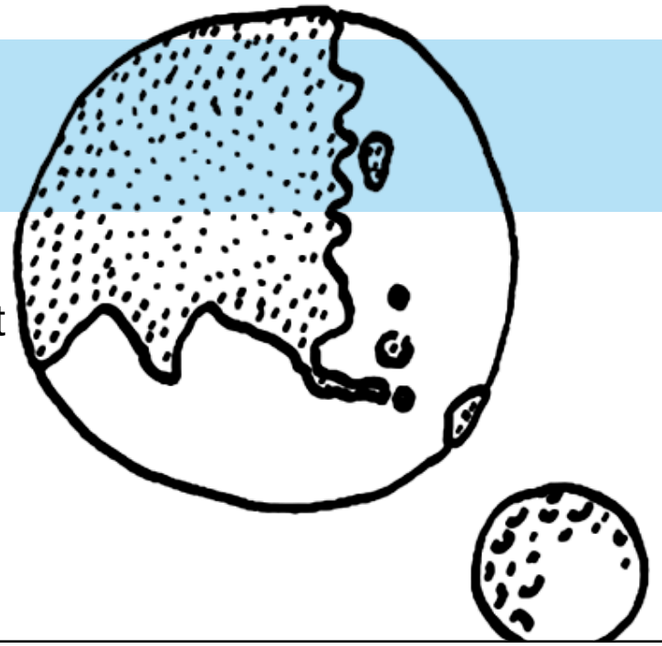
Agenda

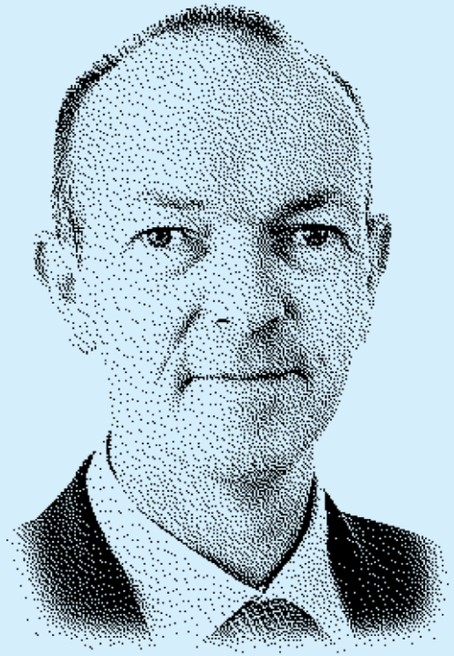
The R&D Autobahn to Cures
Our business strategy

Data driven precision medicine
From patient to patient

Drug discovery, development & biologics
From machine learning to the factory of the future

“…just the beginning” …
of the shared economy of drug discovery & development





“More efficient and effective drug discovery and development is a global necessity. Applying machine learning is the natural evolution beyond operational excellence“

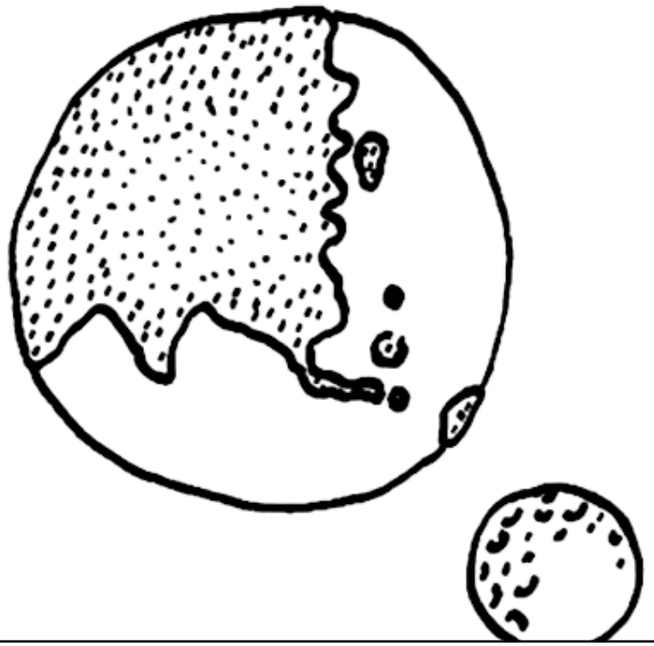
Craig Johnstone

Agenda

Next generation drug discovery & development

AI & ML in small molecules

Biologics



R&D Autobahn creates quantum leap for partners and patients

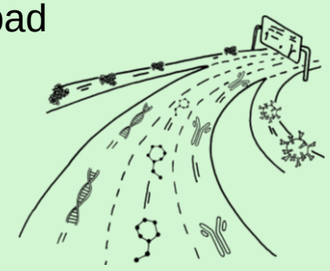
Creating the future with long and consistent vision

Opening of R&D Autobahn 2015-2018

- M&A to enhance capabilities and capacity
- Talent acquisition
- Cycle time, process excellence and quality enhancements

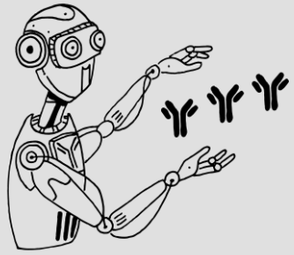
Current & near-future state 2018-2023

- Combination of multi-modality expertise, experience, technologies, slick processes
- Application of AI/ML to high-impact problems
- Integration in benchmark-busting performance and unique discovery launch-pad



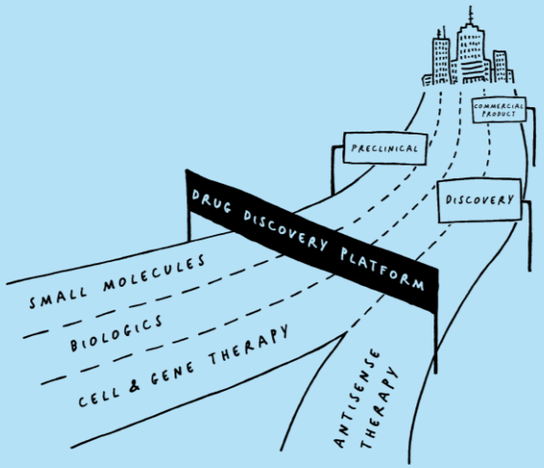
Medicines of the Future 2023-2030

- Integration and exploitation of data surface on R&D Autobahn for even better holistic prediction
- Massive reduction in costs and time in inventive, iterative discovery phases
- Quantum leap to novel medicines



Growth driven by multi-modality, integration and data surface

Key growth drivers for high-impact and high-value business



Capabilities and expertise creates multi-modality R&D Autobahn for growth

- Biologics technology disruption
- “Small molecules” extension to difficult targets
- Gene therapy; iPSCs and scalable cell therapy

Integration drives differentiation and high value

- Knowledge, experience and know-how creates success loop in discovery and development (> 90% return rate of partners)
- Integrated working creates quality, speed, performance and inventive steps

Combination of experimental data and AI/ML surface is cutting edge

- Creating *and* exploiting data in optimised infrastructure holds huge potential
  POC examples: HAL, leading with AI/ML in molecular design and predictive ADMET
- Laying “data surface” onto R&D Autobahn further drives competitive advantage

More efficient to high value value inflection points

Key advantages to consistently deliver outstanding performance

Integration across value chain

- Problem-solving and inventive step creation through Integrated drug discovery & drug development
- Smooth and efficient transitions within end to end process

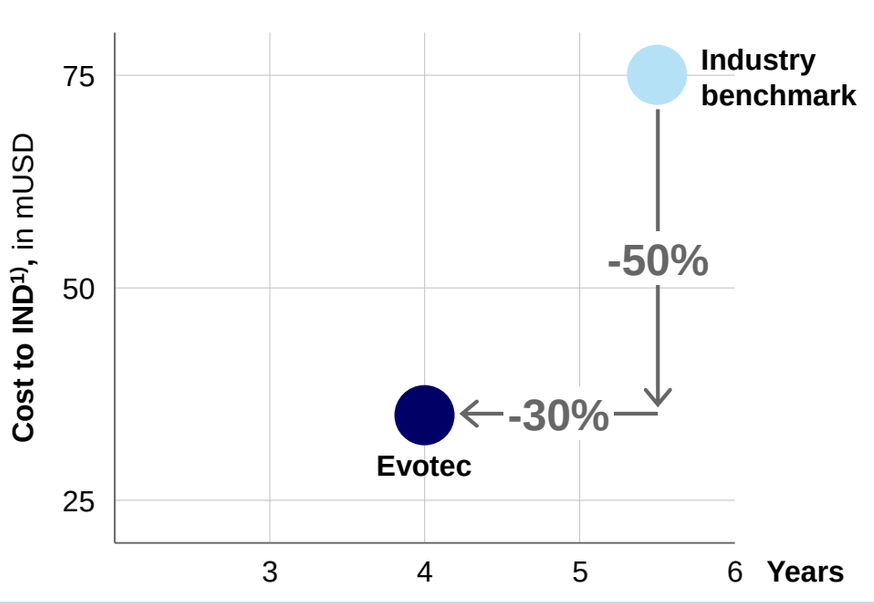
Flexible R&D Autobahn access

- Capital elasticity driven resourcing
- High speed execution on multimodality platforms

Top-class scientific leaders, teams & Demonstrable know-how

Overseeing, driving and piloting projects and portfolios across therapeutic areas (Disease models, design, breakthrough biology, formulation, …)

Benchmark-busting performance



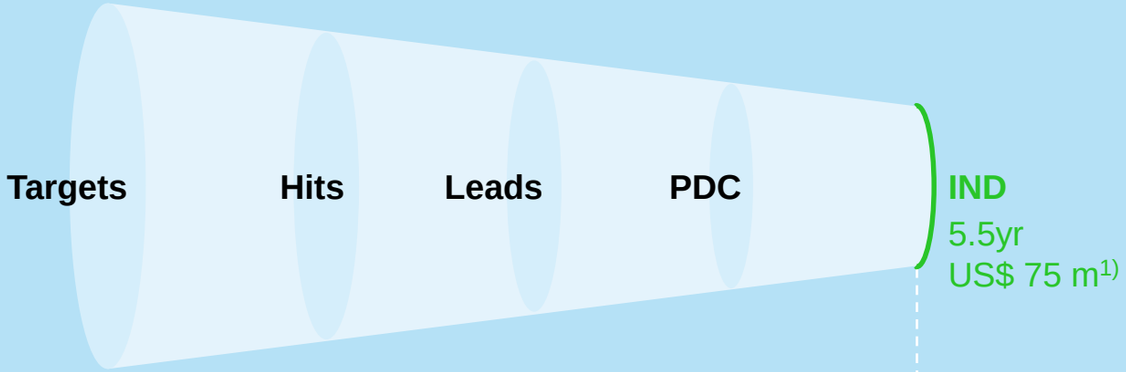
Faster & more efficient to IND inflection → 30% reductions in time, 50% reductions in cost

[1] including attrition

Significantly faster and more efficient on R&D continuum

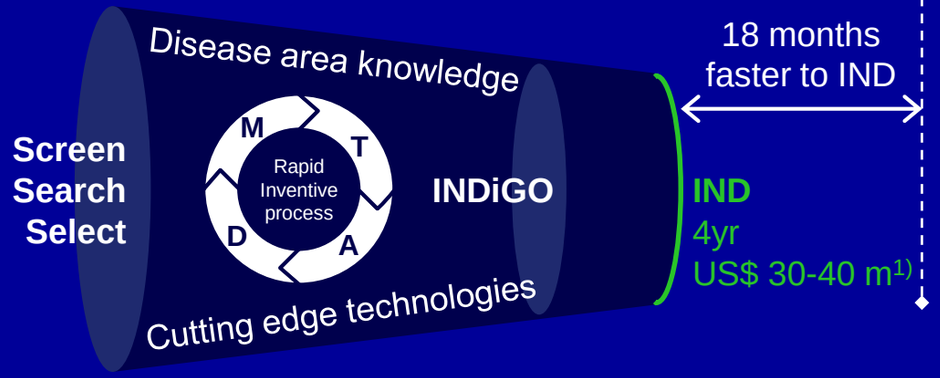
Key performance Indicators

Industry



- Benchmarks for speed not improving in last 10 years
- Attrition getting even worse – more complex targets/biology?
- Costs rising

Evotec



- Integrated processes create speed and early prioritization in cascades
- Expertise solves problems, creates inventive step and solutions
- Costs and time go down *“Innovation efficiency”*

1) including attrition ; DMTA = Design make test analyse

R&D Autobahn creates much better exit points for our partners

Selected examples of impact and value inflection

IDD in Autoimmunity *Initiated 2014* Acquired by BMS[1)]	**IDD in Fibrosis** *Initiated 2017* Partnered with Galapagos 2019[2)]	**IDD & INDiGO in Rare & Age Related** *Initiated 2017* *PDC Milestone 2018[3)]*	**IDD & DEV in Infectious Dis.** *Initiated 2016* Partnership with Roche 2020[4)]
IDD in Oncology *Initiated 2016* *Acquired by GSK [5)]*	**IDD in CNS** *Initiated in 2019* Acquired by Lilly[6)]	**IDD in Respiratory** *Initiated in 2018* Project acquired by Roche[7)]	**Multiple others in stealth mode …** Pain, Oncology, ID, Metabolic, etc.

”With Padlock, we decided to do something different – and signed up for a single, large collaboration with Evotec, where they would cover all of our research. They were essentially our entire discovery execution team. It’s obviously worked well … It also simplified the operating model enormously.

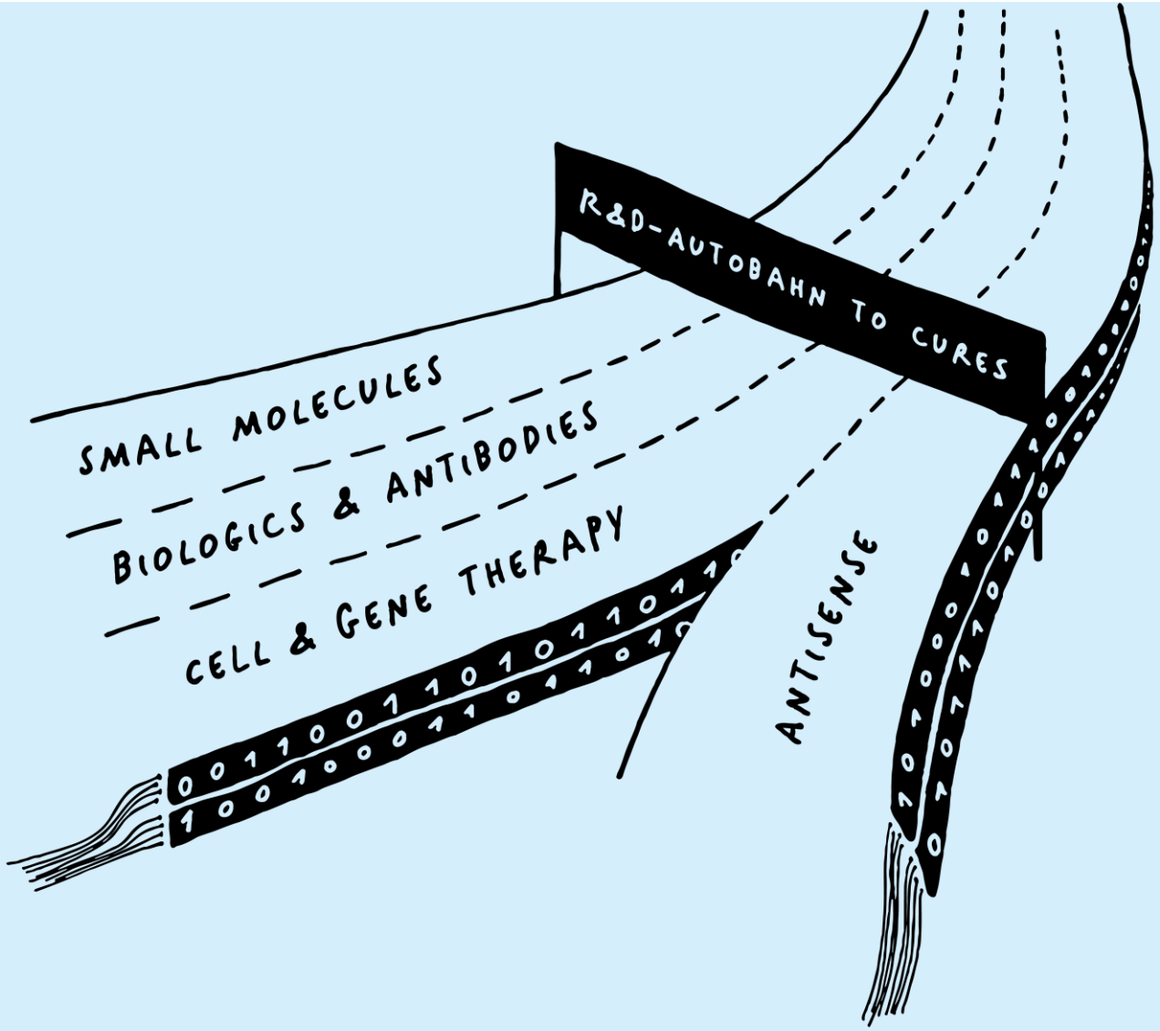
Bruce Booth, Partner Atlas Ventures

“We are extremely glad about the fast progress of our programme which has been made possible by Evotec’s expertise and technical excellence. The successful identification and de-risking of our lead clinical candidate was instrumental in the closing of our Series A financing.

Stelios T. Tzannis, PhD, President & CEO of Aeovian

1) https://lifescivc.com/2016/03/bms-secures-keys-padlock/
2) https://www.evotec.com/en/innovate/spin-offs-and-other-holdings/fibrocor-therapeutics
3) https://www.evotec.com/en/invest/news--announcements/press-releases/p/evotec-reaches-milestone-in-integrated-drug-discovery-and-development-partnership-with-aeovian-5851
4) https://forgetherapeutics.com/forge-enters-into-collaboration-with-roche-to-develop-novel-sntibiotic-to-treat-lung-infections/
5) https://www.gsk.com/en-gb/media/press-releases/gsk-completes-acquisition-of-tesaro-an-oncology-focused-biopharmaceutical-company/
6) https://www.bloomberg.com/press-releases/2020-10-15/lilly-announces-agreement-to-acquire-disarm-therapeutics
7) https://enterprisetherapeutics.com/enterprise-therapeutics-first-in-class-tmem16a-potentiator-program-for-treatment-of-cystic-fibrosis-and-other-respiratory-diseases-acquired-by-roche/

Integrating it all for higher productivity

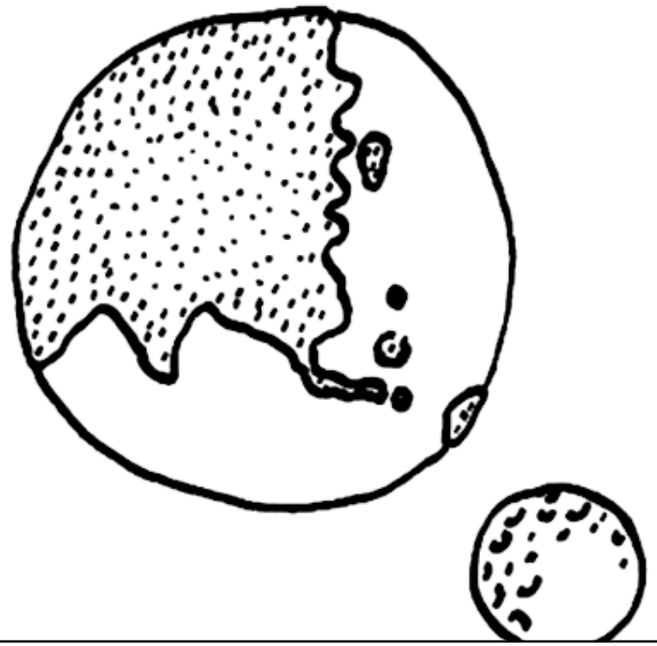


Agenda

Next generation drug discovery & development

AI & ML in small molecules

Biologics



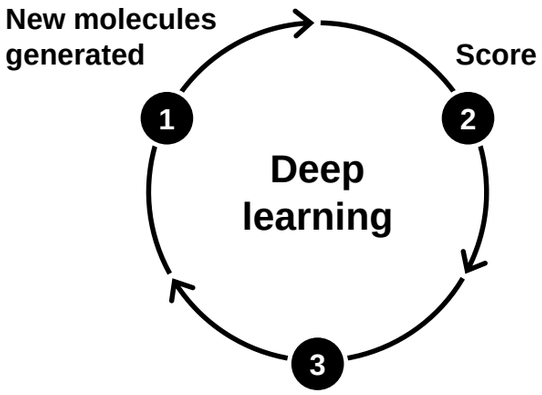
“My passion is putting our inventions in patients“

Karen Lackey

Small molecule computational drug discovery & development

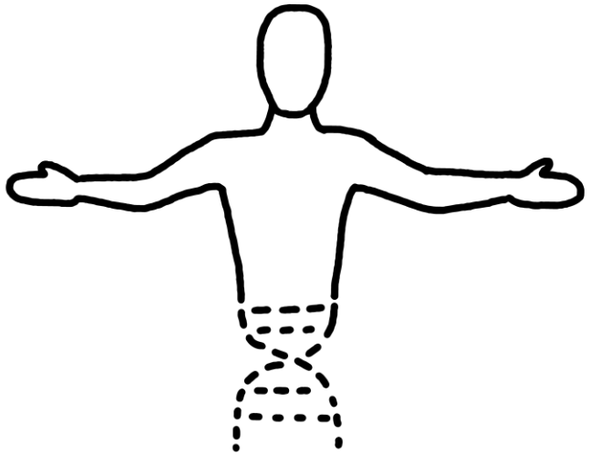
Overview

Current capabilities: Strengths in full value chain



Multi-objective optimisation
Policy gradient reinforces to deliver optimal solution

Growing in deep learning & knowledge building



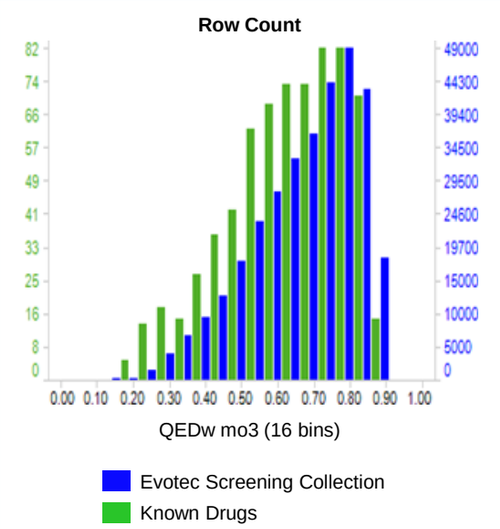
Future state in applications of knowledge built

Balancing speed, cost & probability of technical success

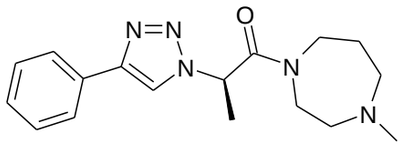
Early Hit ID: Extensive capabilities in small molecules

Less data available: HTS → **More data available: Virtual Screening**

Ongoing investment in screening collection

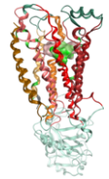


- **Highest quality chemical start points**
- **Best value**

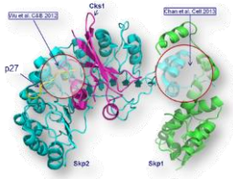


Desirable feature	Molecular term	Value
QED	Composite property	0.91
3 D shape	–	chiral
LipE	clogD	1.1
LE	MW	314

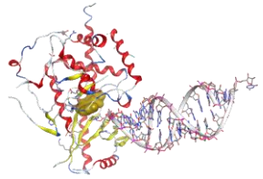
GPCR homology model directed screen



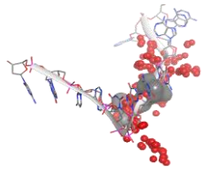
Protein//Protein inter-action SBDD/LBDD screens[1)]



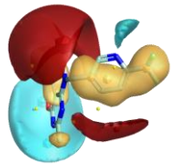
Protein//RNA transferase SBDD/LBDD screens



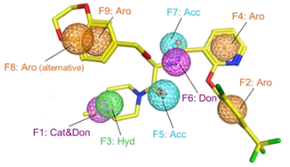
Protein//DNA endonuclease SBDD/LBDD screens



Field Pharmacophore guided LBDD



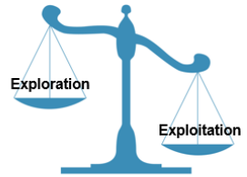
Pharmacophore guided LBDD excluded volumes



Optimising features with Evotec's molecular design apps

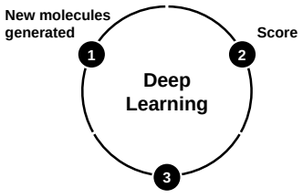
Fit-for-Purpose application of tools to drive project success

1. Bayesian optimisation

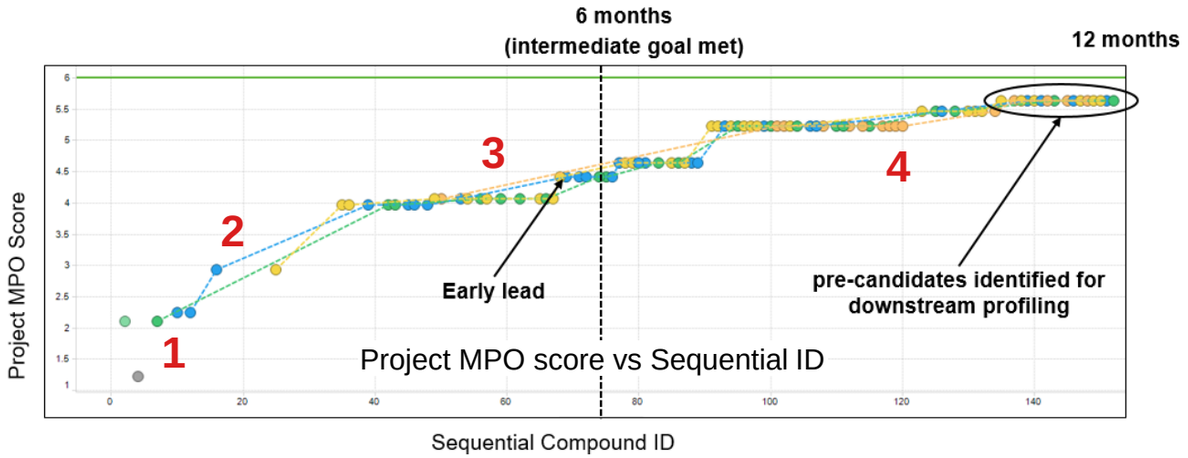


What molecule provides maximum information to the model?

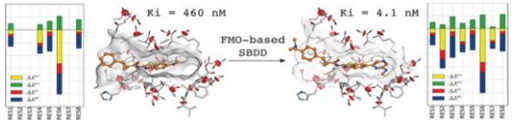
2. Generative design



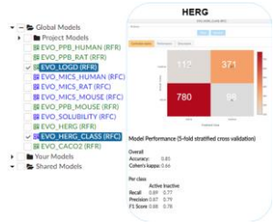
Multi-objective optimization
Policy gradient reinforces to deliver optimal solution



3. Quantum mechanics



4. Machine learning DMPK



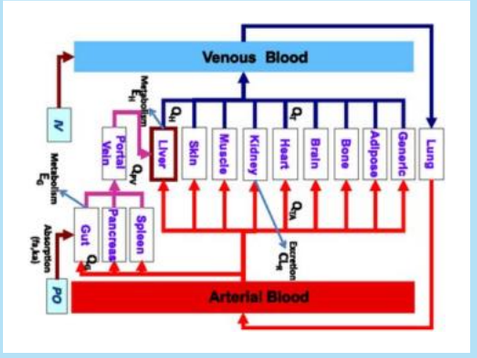
A pre-clinical drug candidate in 12 months and < 150 compounds

Improve quality and reduce costs to accelerate to INDs

Development readiness: discovery to development continuum

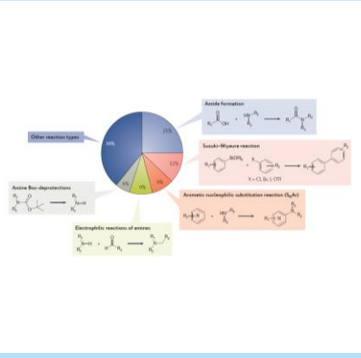
Human PK and dose prediction

- Multispecies prediction
- Target tissue concentration
- Continuum of predictions to optimise human PK during discovery process



Building development into Dx chemistry

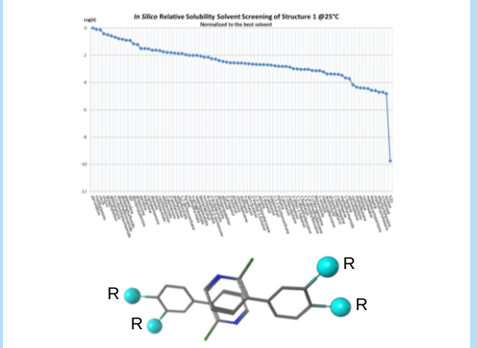
- >13,808 development transformations in a Dx reactions database
- Right First Time approach = no reengineering of process route for development



Predictive sciences drive faster and higher quality IND

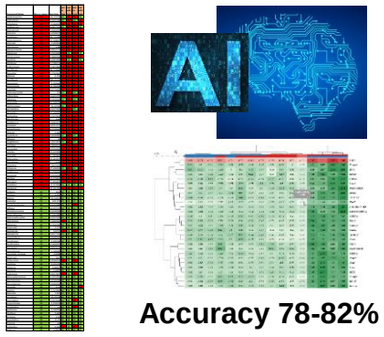
Predicting solid state

- Design for solubility, polymorphism screening & crystallisation processes
- Batch physical purity & crystal structure determination



Drug-induced liver injury

- Library of toxicology profiles
- Integrated AI and machine learning to enhance predictive power
- Unrivalled mechanistic insight

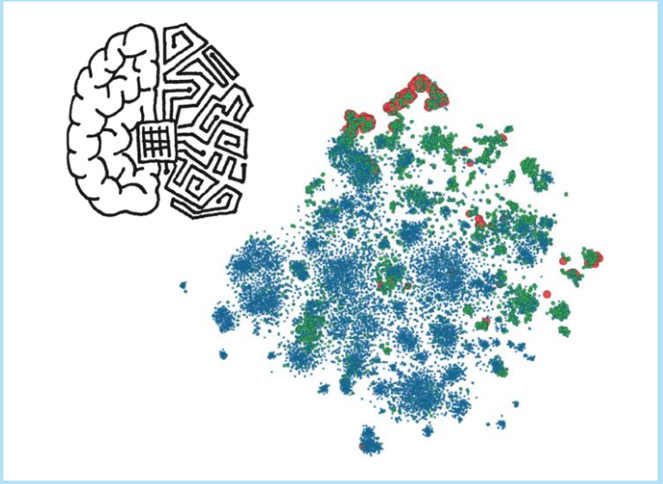


Accuracy 78-82%

Biomarkers link all discovery and development work to patients

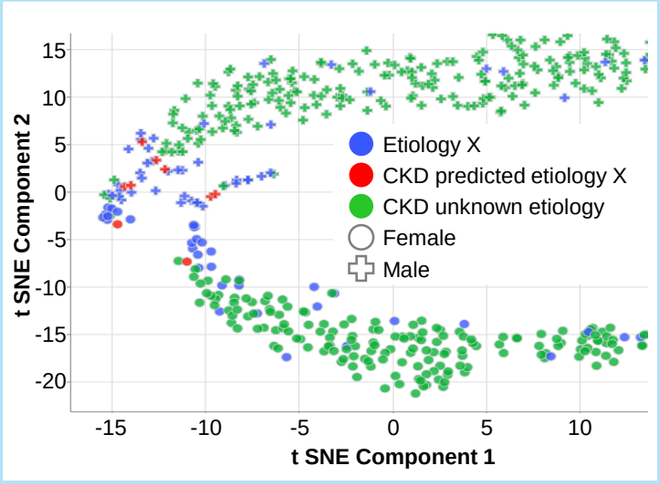
Integration of AI approaches to increase success in translation of pre-clinical discovery

Biomarker identification



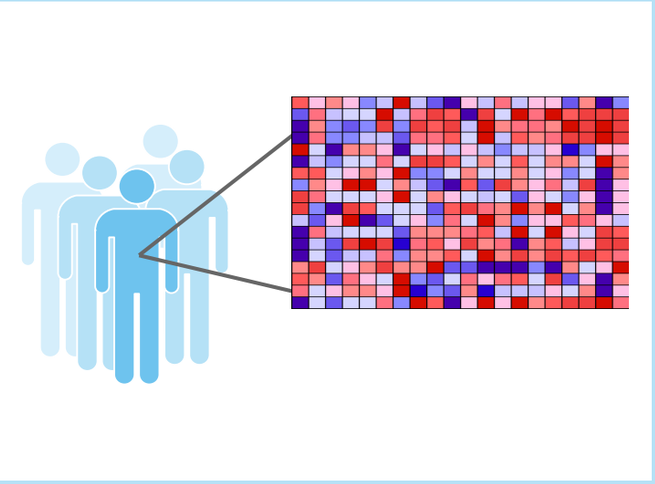
- Big Data analysis platform
- In-house quality data sets
- Data curation

Biomarker validation & optimisation



- Hypothesis testing and cross-validation on new cohorts
- Multi-variate signatures

Translation of biomarkers & companion diagnostics



- Integration of clinical results
- Retroactive refinement of predictivity and safety

GCP = Good Clinical Practice

Training algorithms with high quality well-curated data

Medium term objective: Dramatically improved designs through prediction

Data collection | Data curation and prediction | Connected prediction, end-to-end | Comprehensive cartography

Unstructured data

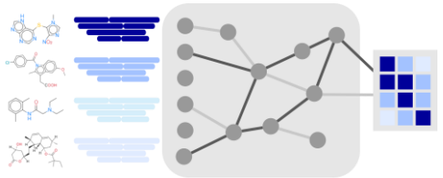
Public data

Commercial data

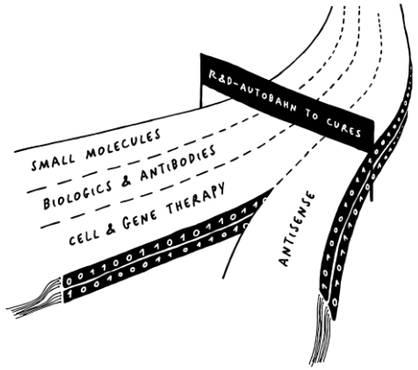
New and pro-prietary data

Machine learning models

Deep learning

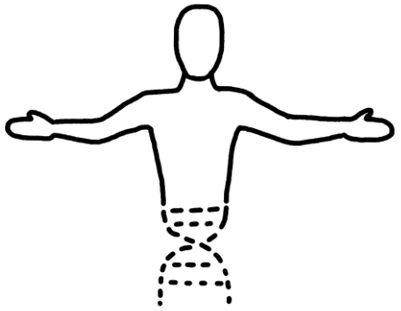


Evotec data surface



Connect molecular disease and molecular interventions

Knowledge graph

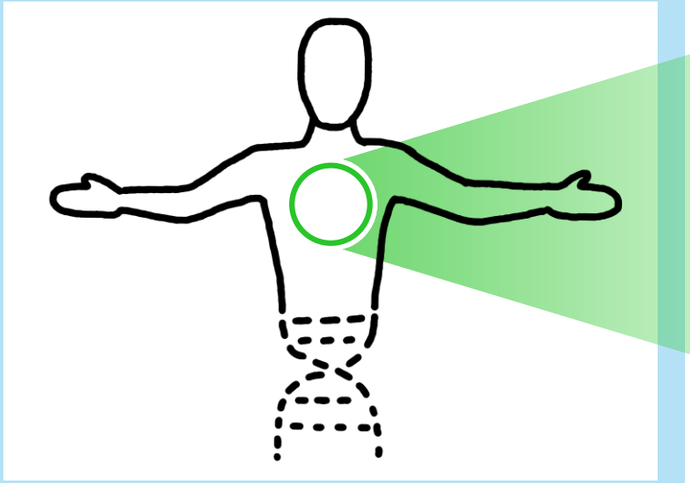


Experiment

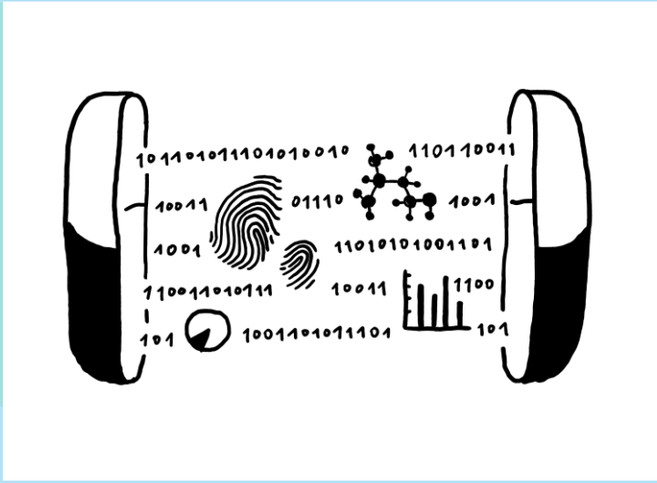
Future state: Quantum leap in exploitation of knowledge in all domains to invent and produce medicines of the future

Schematic representation of future state medicines discovery and development

Biomarker identification

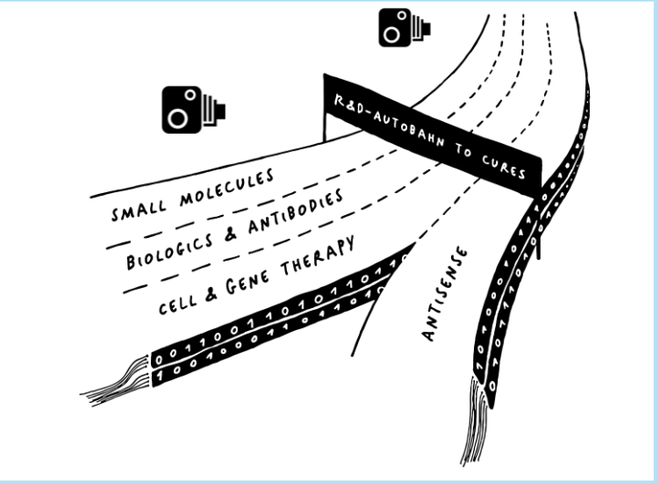


Redefined diseases at molecular level



Optimal phenotypic, drug-like and developable properties at point of molecular invention

Translation of biomarkers & companion diagnostics



From invention to patients on digital, frictionless surface on the multi-modality Autobahn

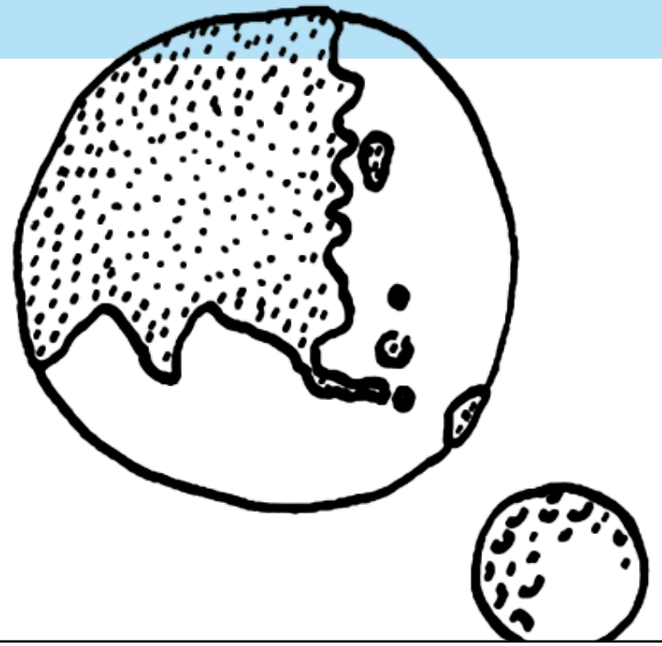
Uncovering disease-disease relationships through the incomplete interactome. DOI: 10.1126/science.1257601

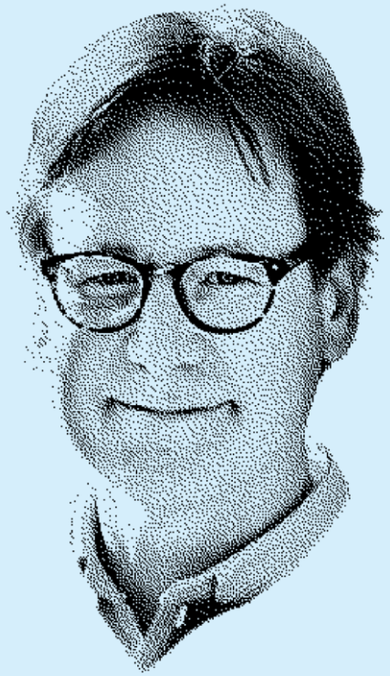
Agenda

Next generation drug discovery & development

AI & ML in small molecules

Biologics



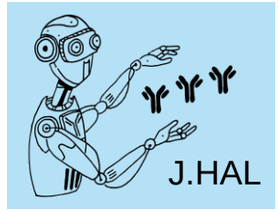


“We’re using our deep understanding of data science to deliver critical industry solutions and drive global access to important biotherapeutics”

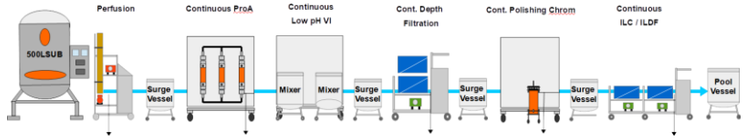
Jim Thomas

Common data platform coupled to powerful data science

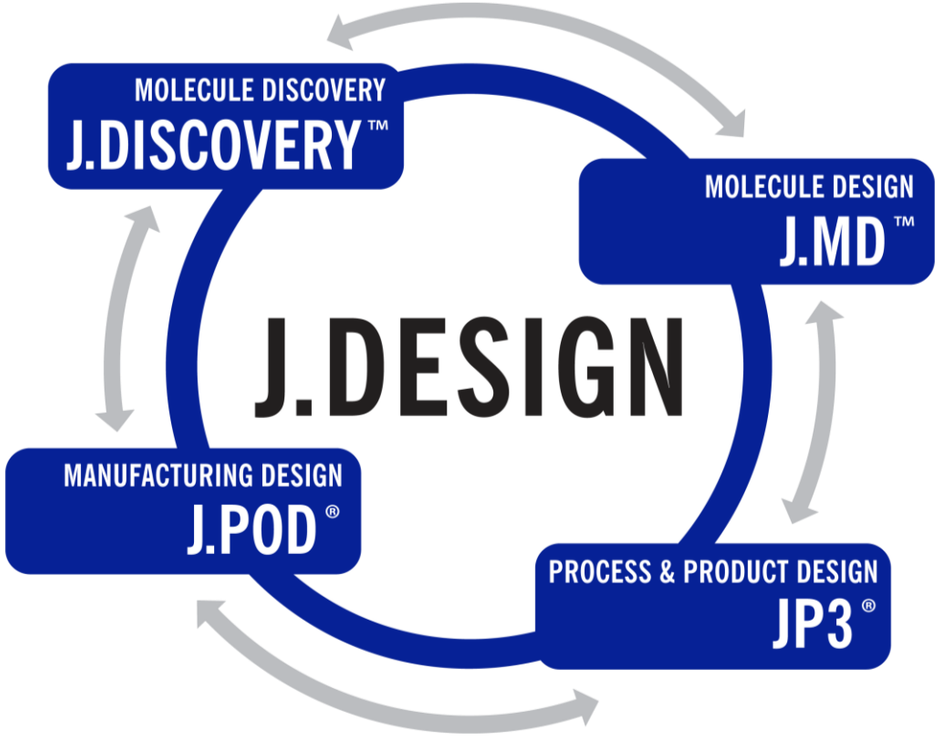
Integrating molecular, process and manufacturing design delivers excellence

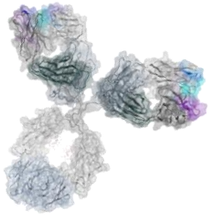


AI generated and *in vivo* discovery

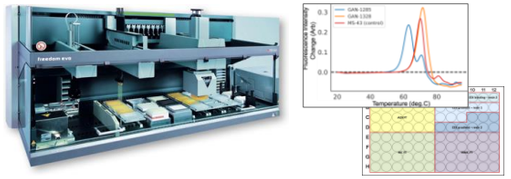


End to end continuous processing (E2E)

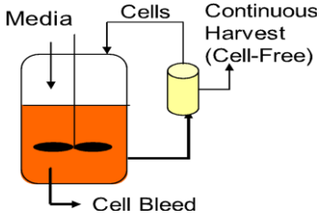




Abacus optimisation to fit PD



Robotic High-throughput PD

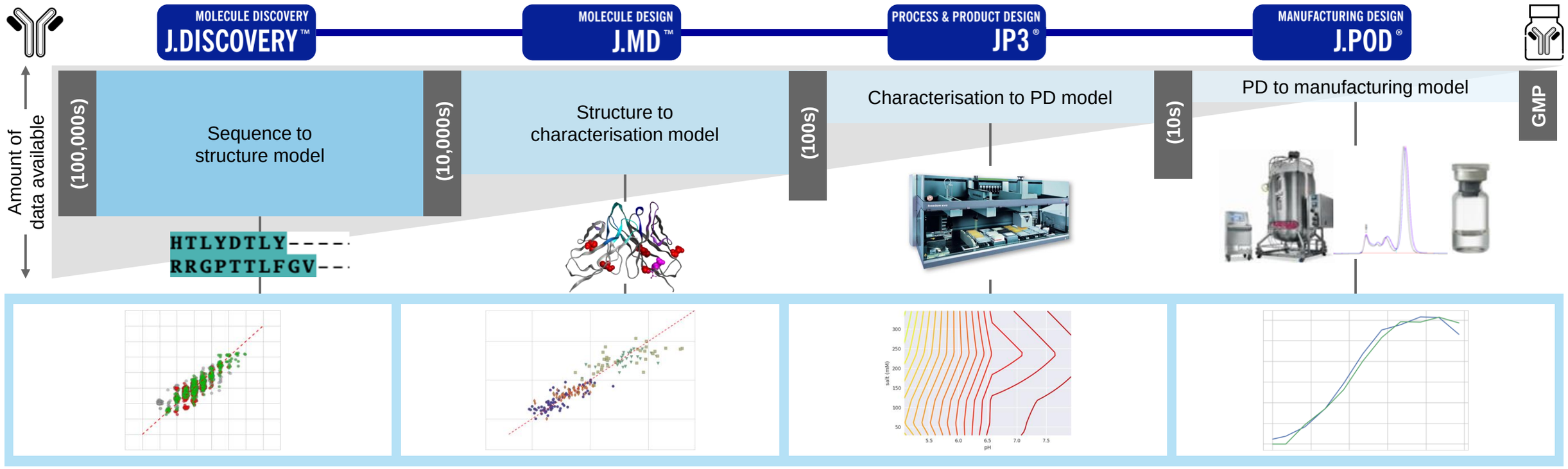


Dynamic predictive process control

Machine learning (ML) and Artificial intelligence (AI) are maturing our integrated biologics platform (J.DESIGN)

Data are captured and archived using common data platform, ML tools accelerate learning

Platform overview



Intense learning is focused on the most abundant, least expensive data – DNA sequence

Generative Adversarial Networks (GANs) to create faces *in silico*

Go to www.thispersondoesnotexist.com to find out more

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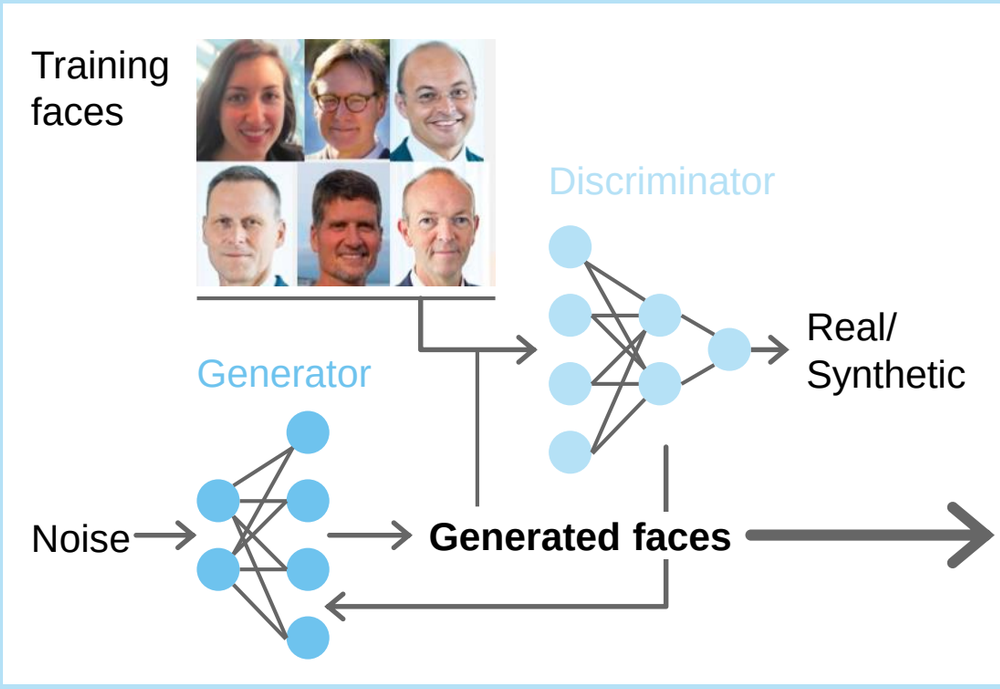
Example

- **Discriminator** neural network is lightly trained on human faces
- **Generator** creates images that sometimes fools the **Discriminator,** and learns from this experience
- **Discriminator** is trained with more real human faces, forcing the **Generator** to improve
- Eventually **Generator** can fool a human



GAN technology to create human-like antibodies

100,000s of natural human antibody sequences in the public domain serve as the training set

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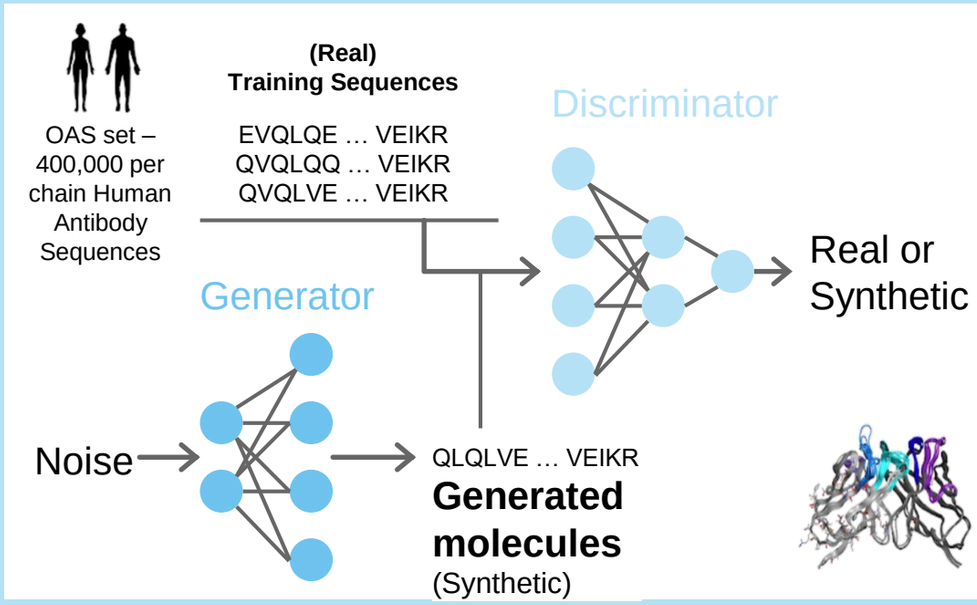
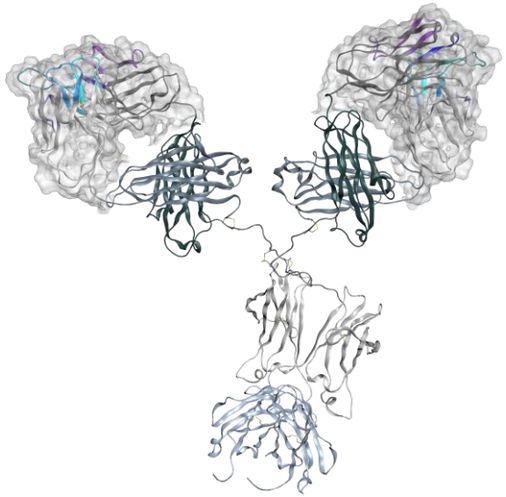
Example

- **Discriminator** neural network is lightly trained on normal human antibodies
- **Generator** creates antibody structures that sometimes fool the **Discriminator,** and learns from this experience
- **Discriminator** is trained with more real human antibodies, forcing the **Generator** to improve
- Eventually **Generator** produces a diverse library of antibodies indistinguishable for human antibodies



Human-like antibody



We can use GAN technology to create human-like antibodies – indistinguishable from normal human antibodies

Billions of human-like antibodies created to screen for activity

Transfer learning can bias libraries toward antibodies with superior qualities

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Example

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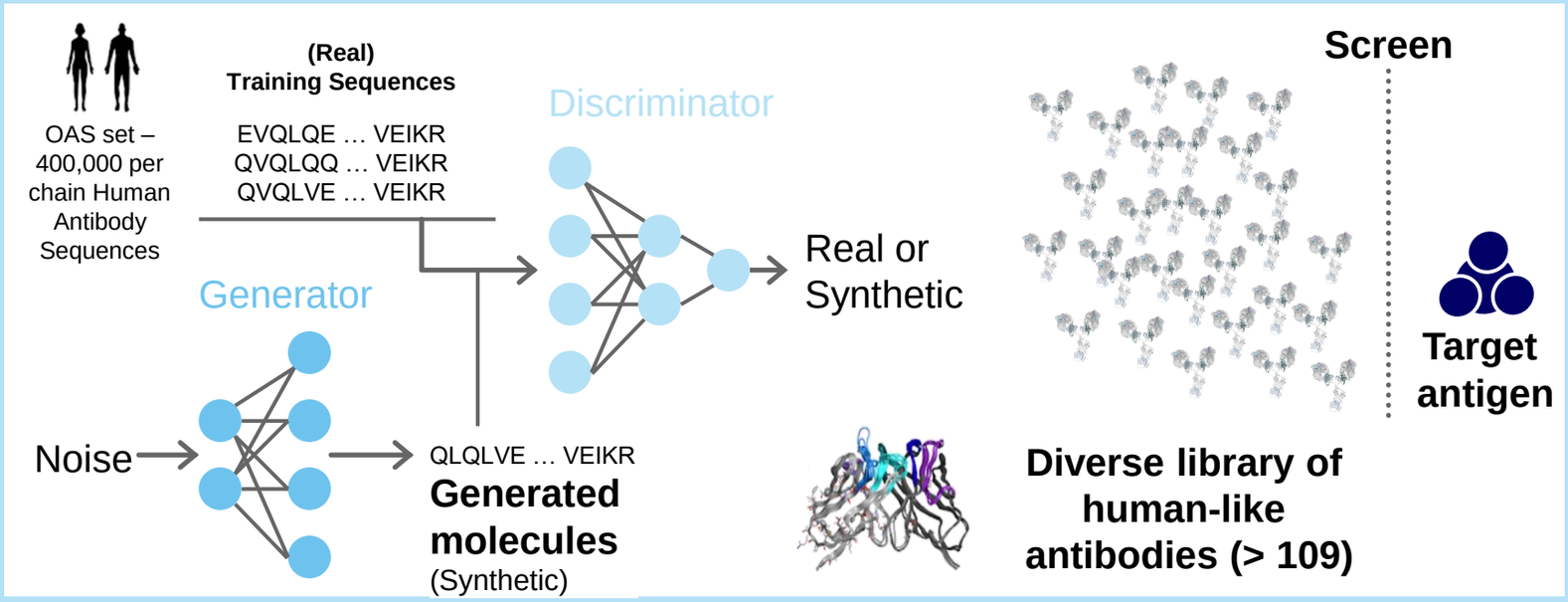

Libraries containing billions of human-like antibodies are being created to screen for therapeutic activity

Partner or client antibodies from animals or people are improved for manufacturing and formulation

Abacus – an *in silico* computational toolset of ML algorithms

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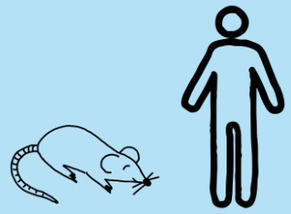
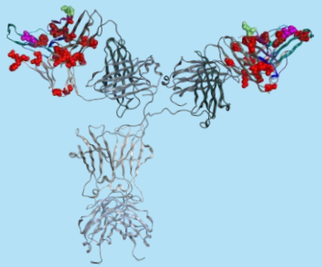
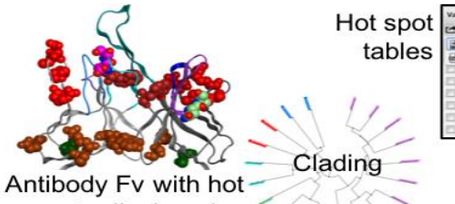




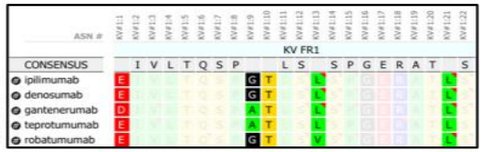
Abacus



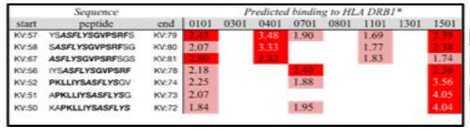
Hot spot tables

Clading

Structure-based alignments



Germline Switching



ML Immunogenicity Predictor

Germline Analysis

Molecules optimised for

- Expression in cells
- Purification
- Formulation
- Long-term stability

Molecular optimisation builds in quality

Dramatic improvement in low pH aggregation achieved through optimised molecular design with Abacus

Sequence optimisation improves manufacturability and yield

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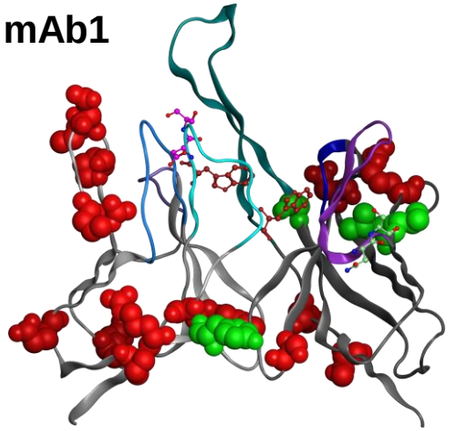
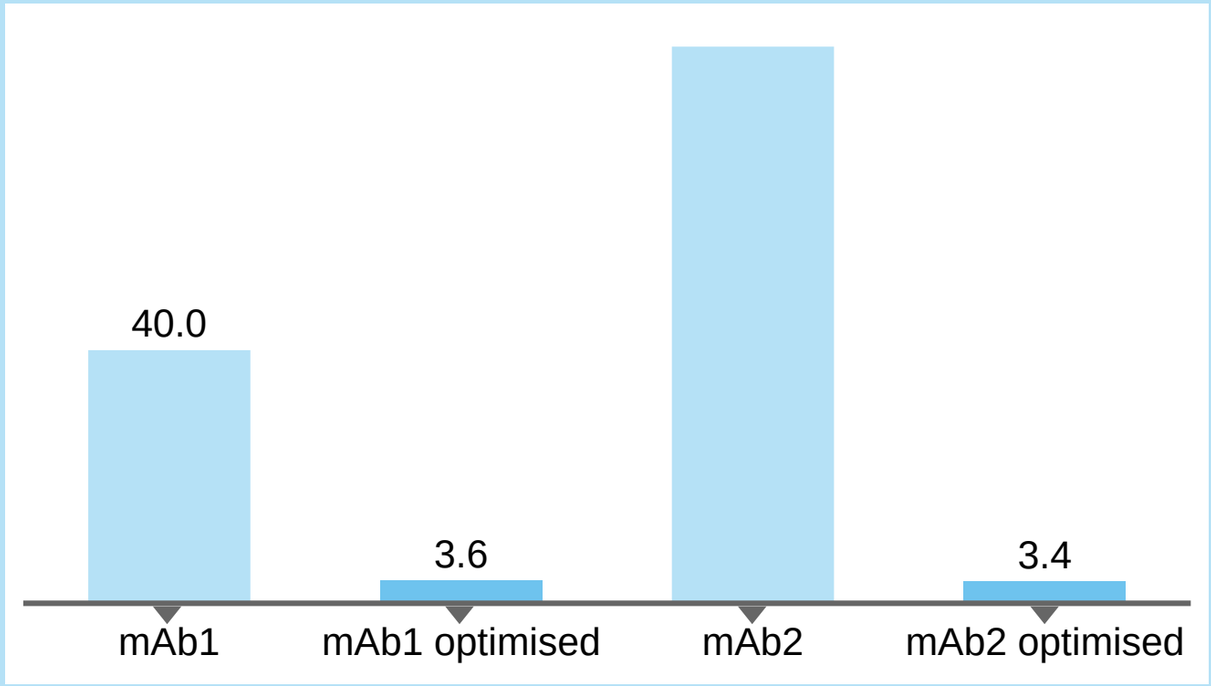
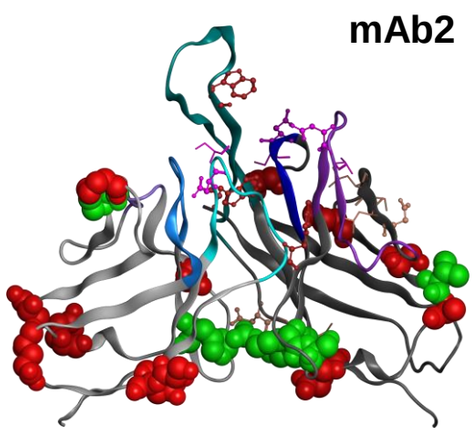
mAb1



mAb1 variant aggregate reduction and yield improved by 60% by resistance to low pH (3.3) aggregation



mAb2



mAb2 variant aggregate reduction and yield improved by 700% by resistance to low pH (3.3) aggregation

Kerwin et al. 2019 J Pharm Sci (In Press)

Propriety reagents and methods, coupled to robotics and ML can rapidly move client or partner molecules into the clinic

Highly efficient process & product design delivers high quality, low cost therapeutics

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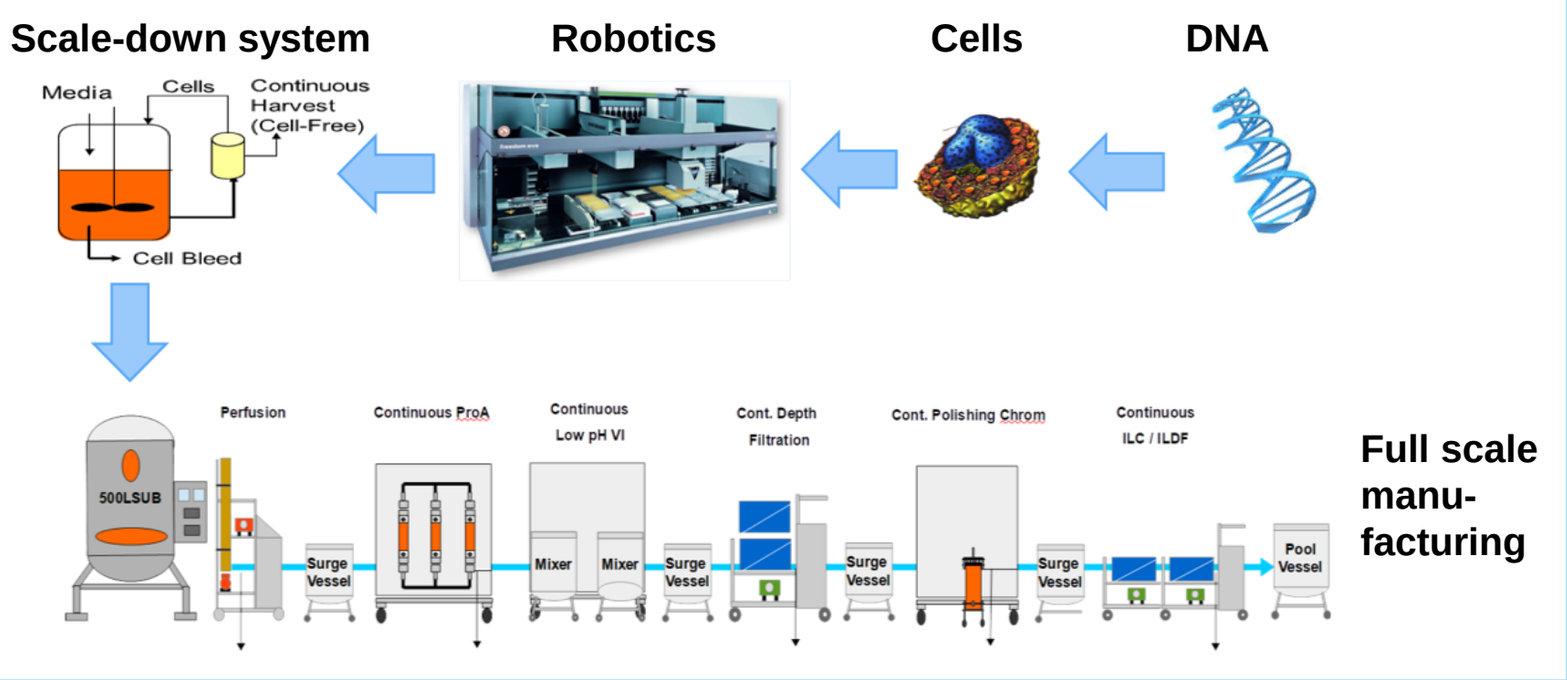
- Powerful expression vectors
- Optimised cell hosts
- Custom media tuned for productivity
- High density perfused culture conditions
- Connected downstream processing
- High resolution analytical methods
- Highly stable formulation conditions
- Current process yields are generally 2 - 4 grams per reactor/L per day



Production processes are small and fit into modular clean rooms that can be reconfigured for flexibility

J.POD® facility design reduces scale-up risk by scaling out, not up

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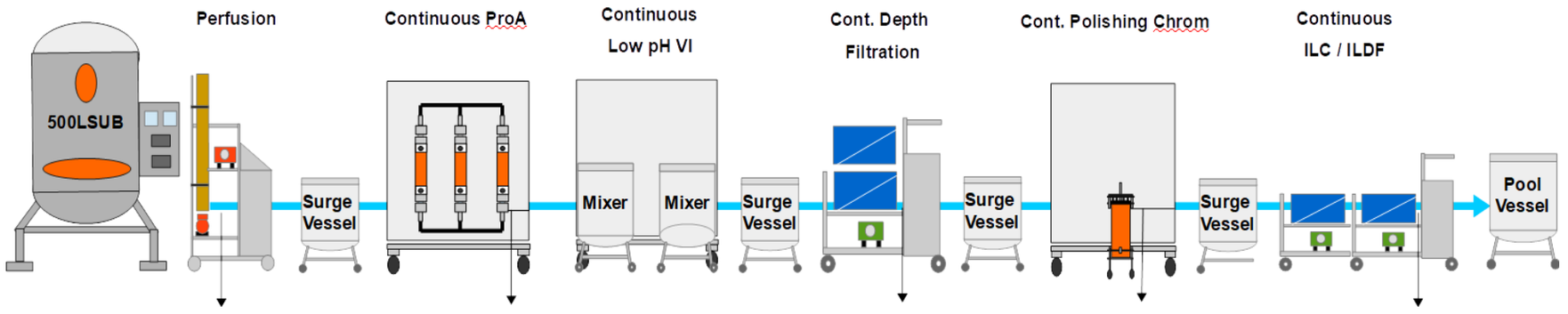
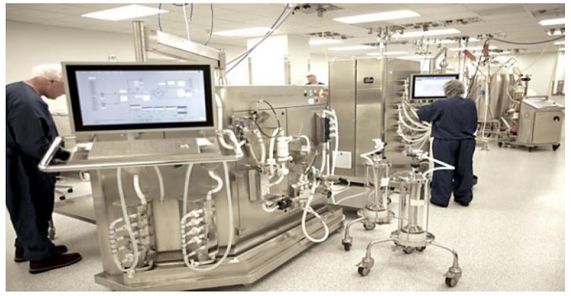
Intensified processing





Production from a few kilograms to metric tons in the same facility

J.POD facilities are ready for precision medicine while delivering capacity for high demand biologics for a variety of partners

The future is smaller, modular, flexible and highly automated

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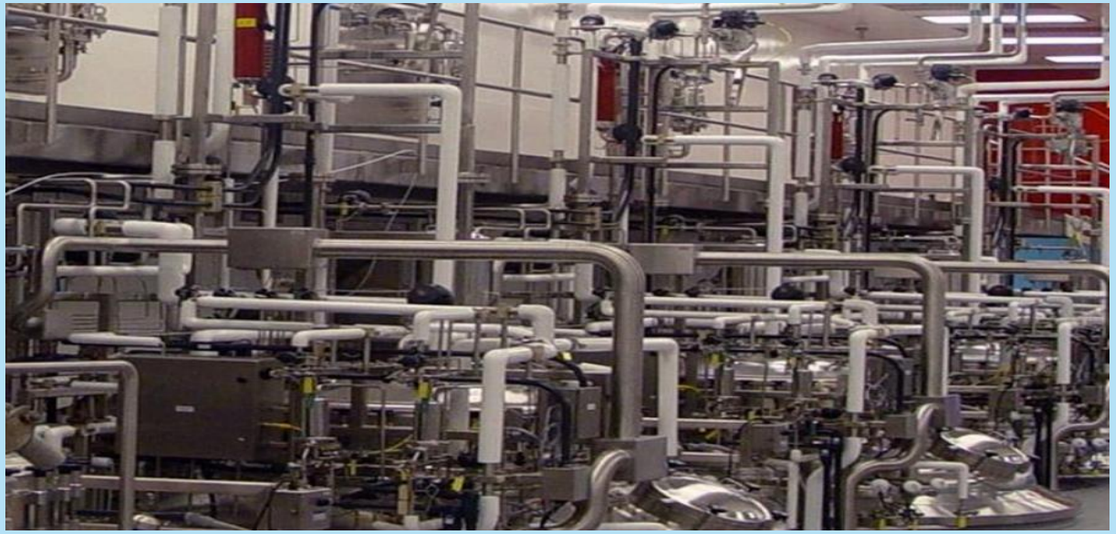
Conventional manufacturing plant



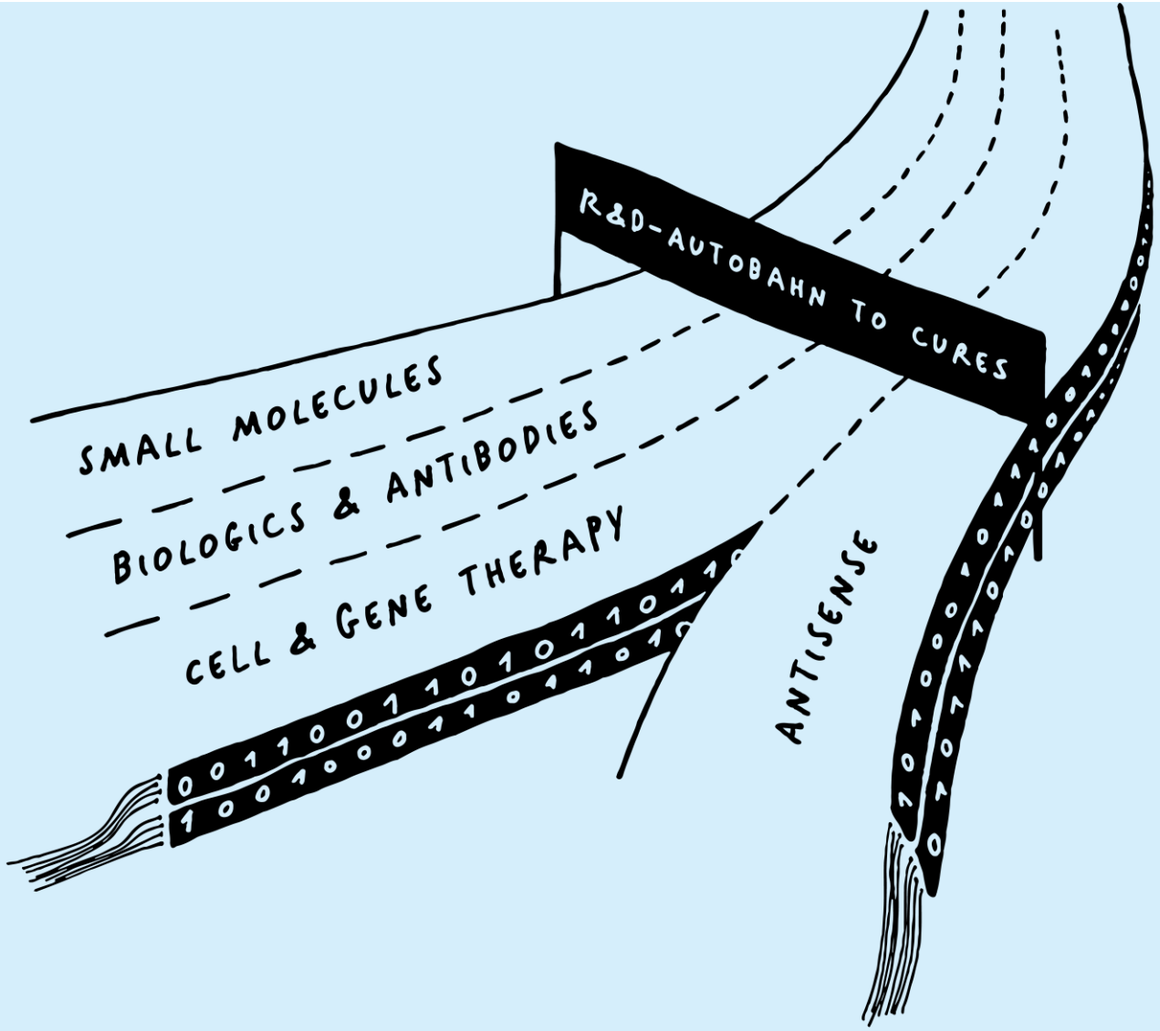
VS

J.POD® manufacturing network

Complexity managed at the process and not the plant level

Evotec is creating a multi-modality digital Autobahn for delivering critical industry solutions to partners and clients

Using the power of data science to deliver enhanced speed, lower cost and predictive efficacy



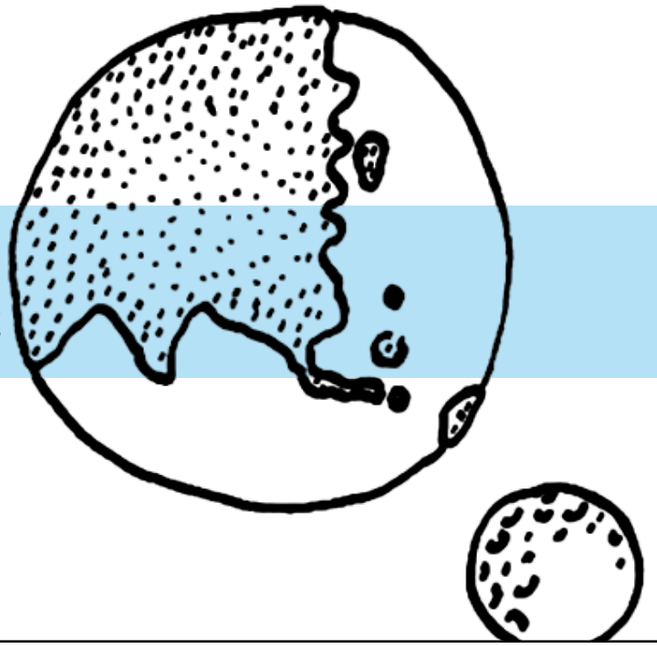
Agenda

The R&D Autobahn to Cures
Our business strategy

Data driven precision medicine
From patient to patient

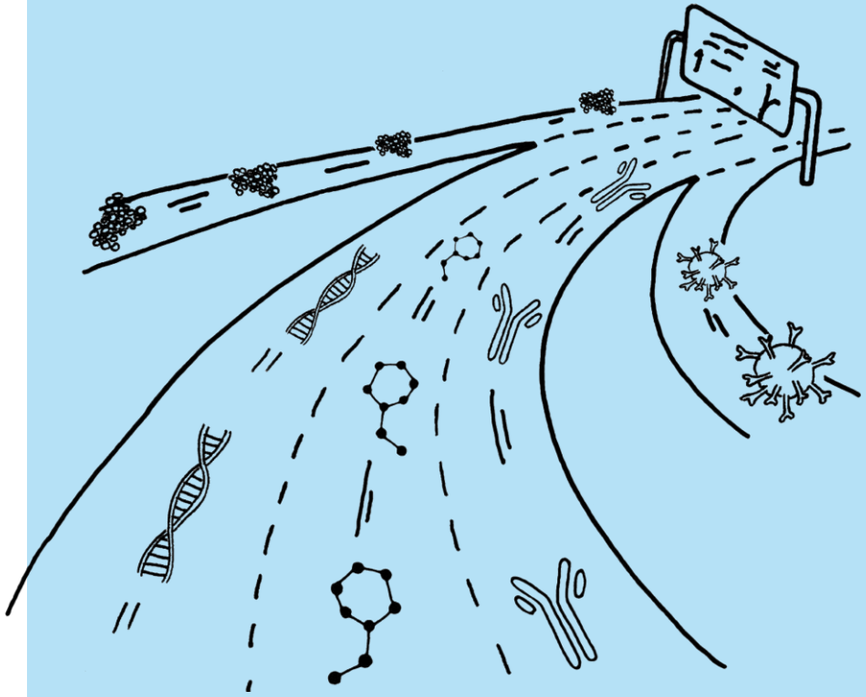
Drug discovery, development & biologics
From machine learning to the factory of the future

“…just the beginning” …
of the shared economy of drug discovery & development



The shared economy in discovery & development

Summary



Precision Medicine is paramount

- Disease relevance from the beginning will redefine “drug hunting” process
- Novel targets will only be progressed if disease relevance is visible in early stages of discovery, or latest early clinical evaluation

ML & AI will increase R&D IRR

- Unbiased application of right tools and modalities to novel biology will make drug discovery much more data driven and cost effective
- Access to all patients has to be core consideration from start

Creating co-owned pipeline is unique strategy that holds massive value

- Reducing cost of capital via efficient service and sharing partnering processes is helping all parties, and most importantly patients

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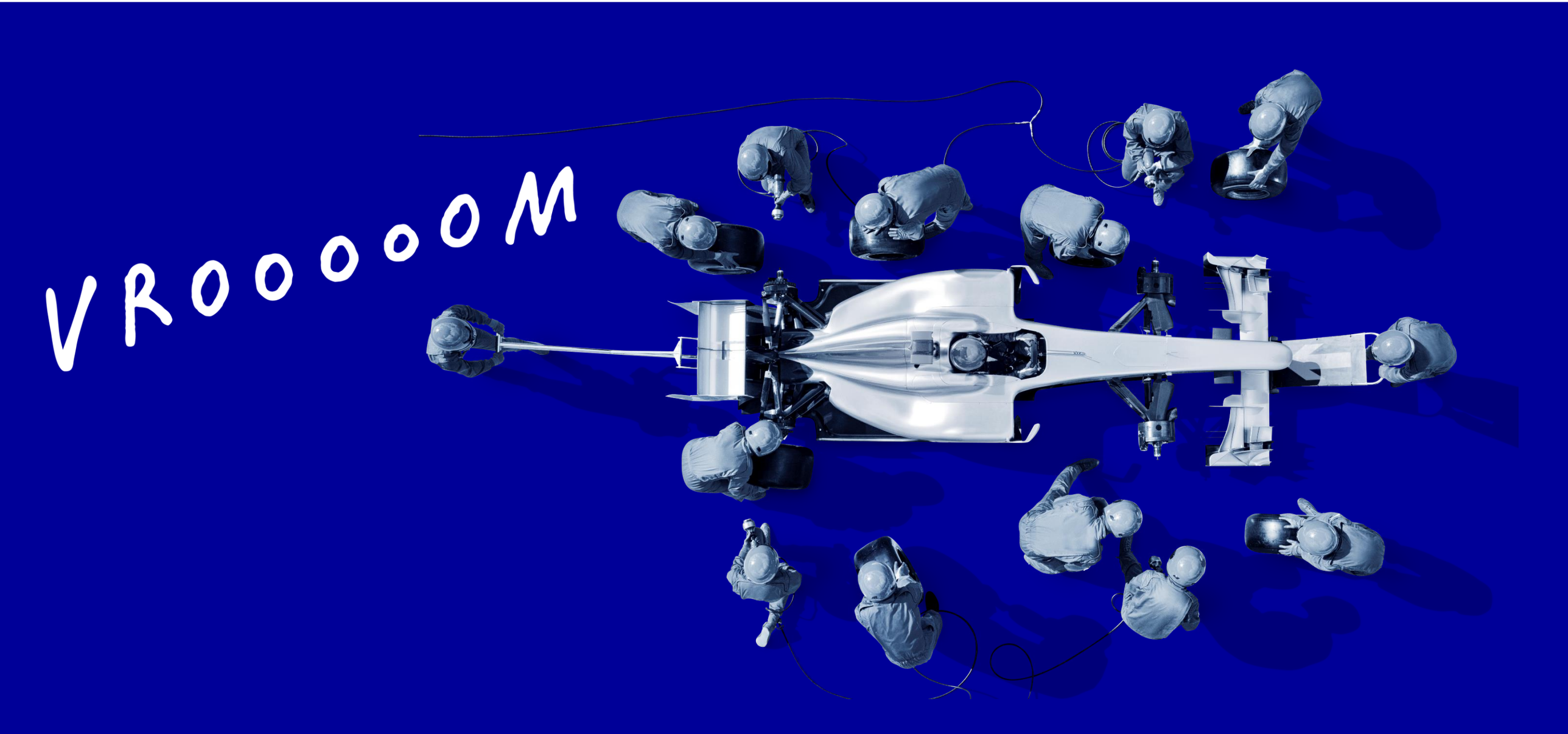

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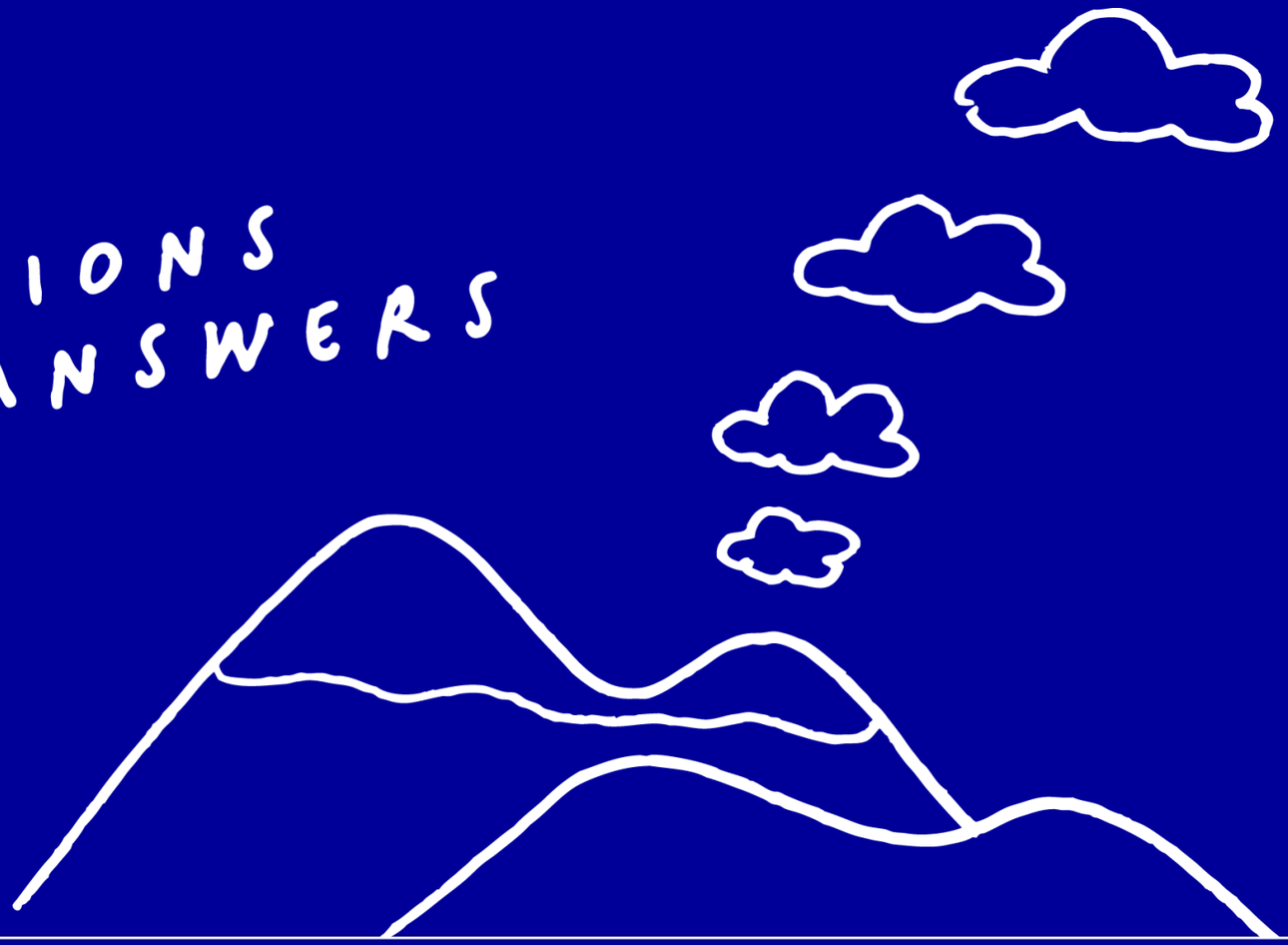
#RESEARCHNEVERSTOPS

QUESTIONS AND ANSWERS



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Many thanks for your participation!