

Corporate Update

HERANTIS

PHARMA

November 2021

Our mission is to break boundaries of standard therapeutic approaches. Our drug candidates aim to revolutionize the treatment of Parkinson's Disease and other Neurodegenerative diseases.

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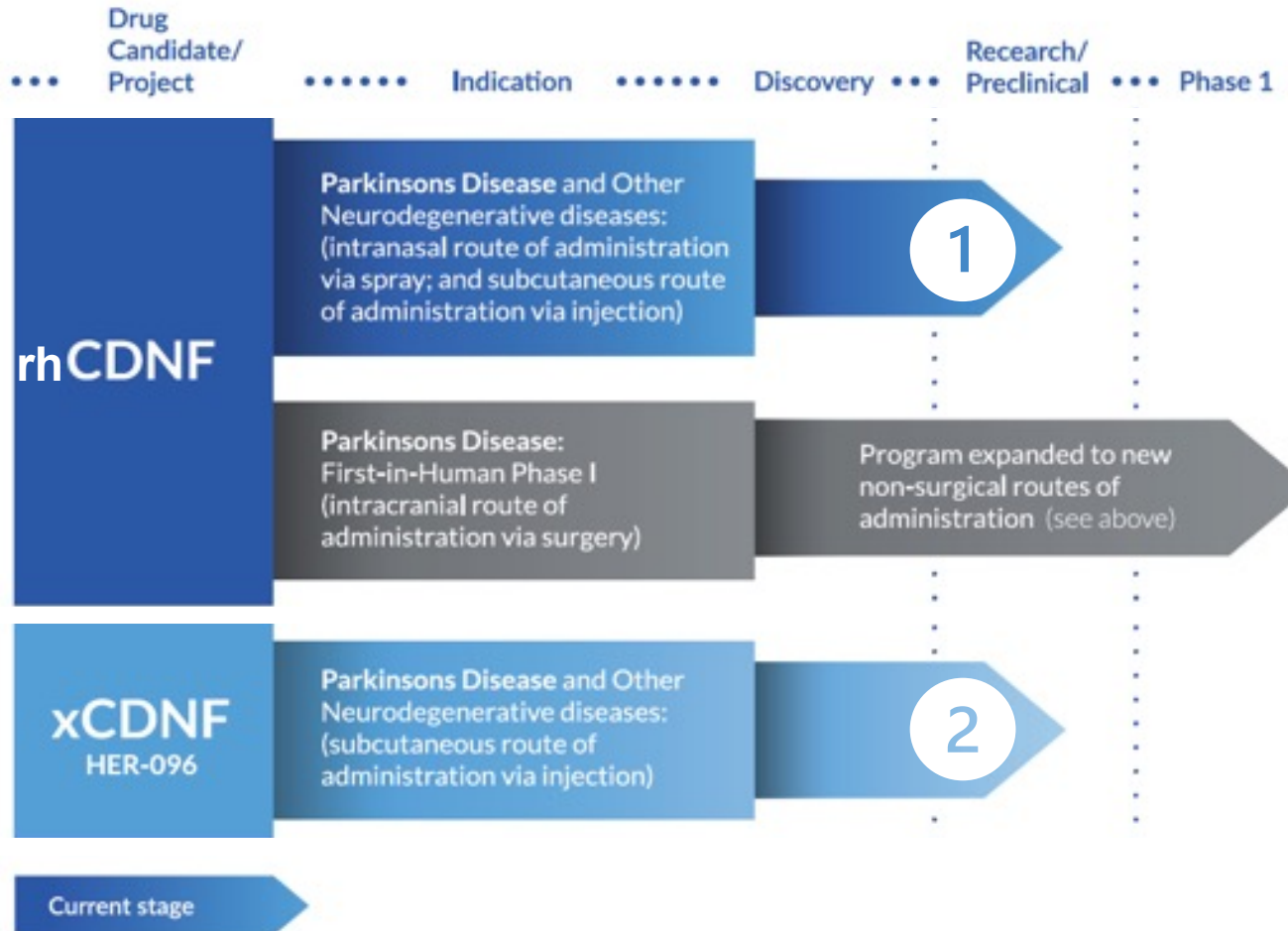
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Herantis Focused On Parkinsons And Other Neurodegenerative Diseases

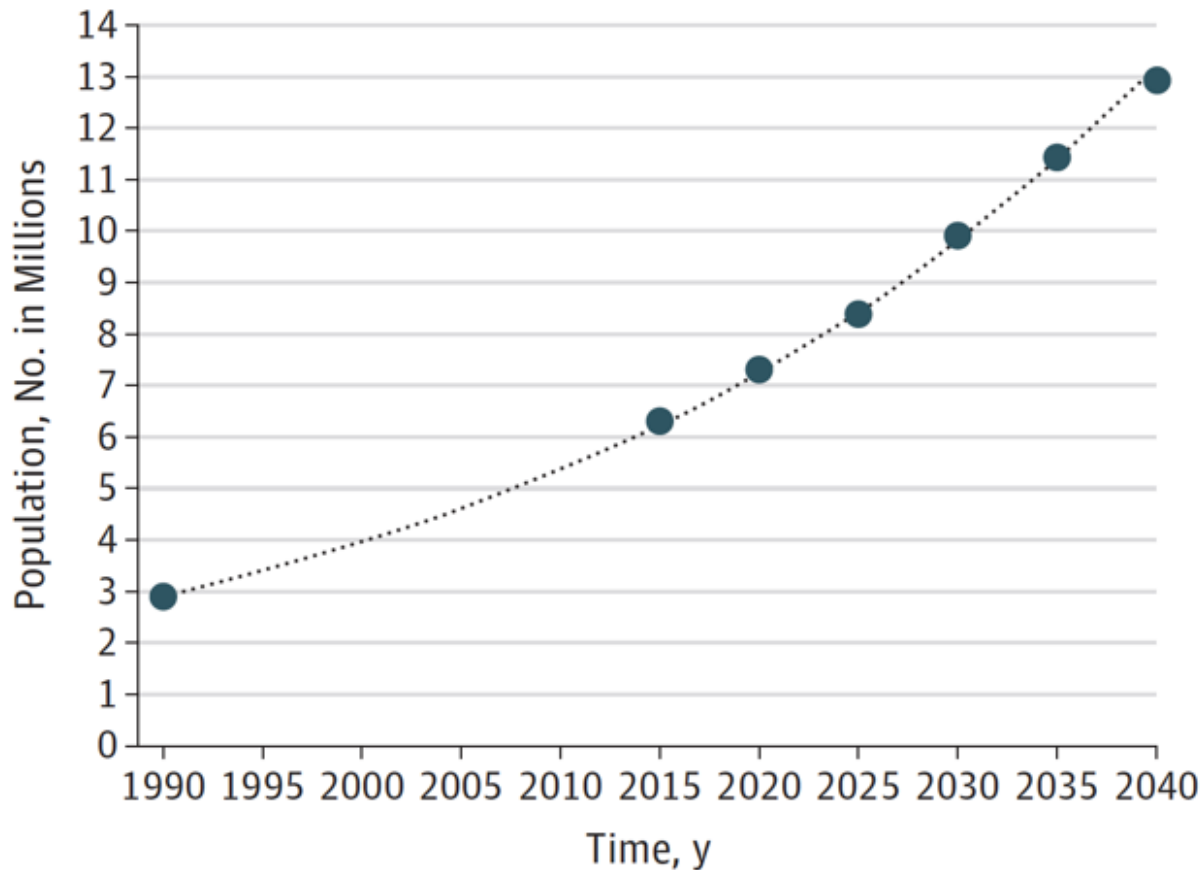


- **Headquartered Helsinki, listed Finland & Sweden**
 - IPO 2014 (Finland) 2019 (Sweden), €67m to date
- **Two programs:**
 - rhCDNF** a **ground-breaking biological** therapy.
Already used **safely** in human Phase I study via surgical intracranial administration; now being developed for follow on Phase I using intranasal route of admin
 - HER-096 (xCDNF)** **innovative and advanced small synthetic** chemical peptidomimetic version of the active parent rhCDNF protein. Combines i. the **compelling MoA** of rhCDNF protein and ii. ability to **cross blood brain barrier** after simple skin injection

CDNF = Cerebral Dopamine Neurotrophic Factor

Parkinson's Disease – Urgent Need For Disease Modifying Treatments

Figure. Estimated and Projected Number of Individuals With Parkinson Disease, 1990-2040

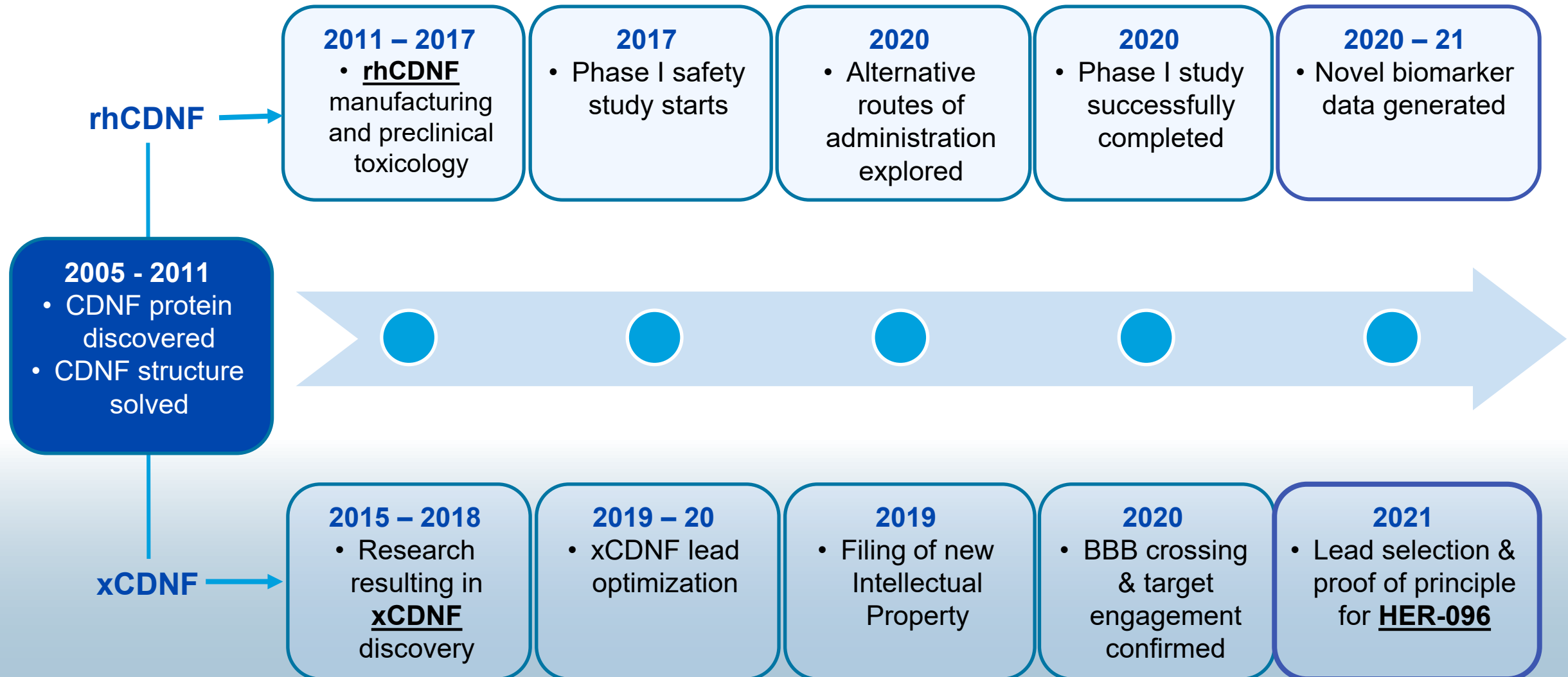


Viewpoint: E.Ray Dorsey, MD, Bastiaan Bloem, MD, PhD

¹ European Parkinson's Disease Association www.epda.eu.com

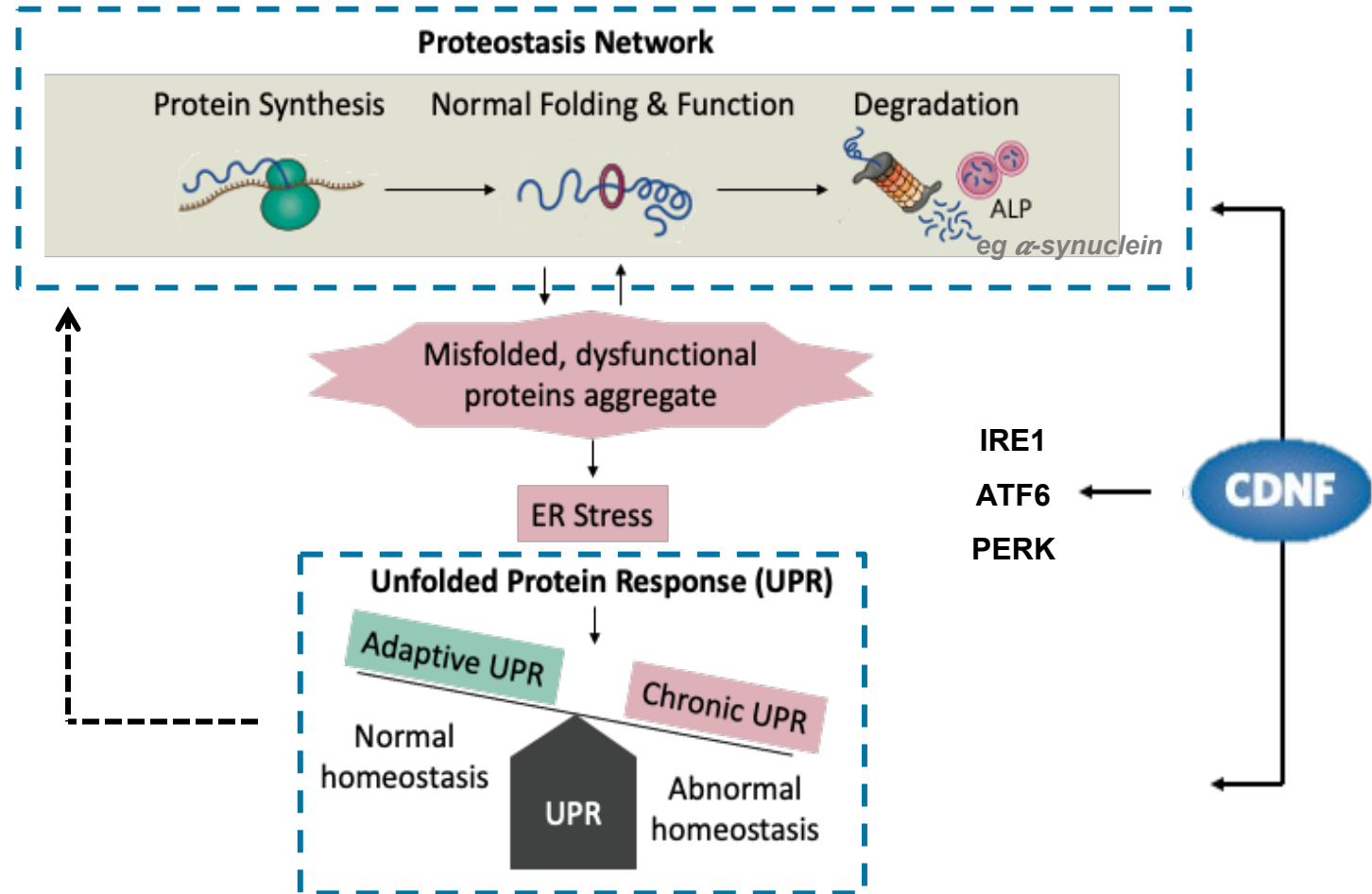
- Exploding incidence of Parkinson's worldwide ... of 'pandemic proportions'
 - combination of man-made and genetic factors
- Massive burden of disease for the world
 - > 10 million patients worldwide, costs €14bn annually EU alone, household costs €20,000/year/patient
- Current treatments wholly insufficient
 - symptomatic only, useful but no affect on disease
 - same mainstay of care, levodopa, since 1950's
- New & successful innovations desperately needed
 - lots of research and pharma investment into PD
 - Herantis rhCDNF and HER096 well positioned in the competitor space

More Than A Decade Of Innovation Coming to Fruition



rhCDNF and HER-096 Targets Core Pathology Of Parkinson's – Proteostasis & Unfolded Protein Response (UPR)

- Proteostasis regulates proteins in body and influences the fate of every protein from synthesis to degradation
- Its failure is implicated with the development of neurodegenerative diseases such as Parkinson's
- ***rhCDNF and HER-096 designed to restore proteostasis via modulation of unfolded protein response (UPR) pathway and promote functional recovery of stressed cells***



Nature BioPharma Dealmakers 2021, <https://www.nature.com/articles/d43747-021-00070-6>



Biomarker Focus

CNS Drug Development is Shifting to Biomarker-driven Development Strategies

- Diseases take a long time to develop, so without biomarkers it can take years to see clinical results
 - Biomarkers provide a window into onset of disease, its progression, and response to therapy
 - Enables ***more rapid & efficient assessment of drug effect, that otherwise could take years***
 - Shortens development times, saves costs
- Recent conditional approval of Biogen's aducanumab in Alzheimer's bodes well for Herantis assets:
 - Biogen: Aducanumab first **disease-modifying drug** approved in Alzheimer's, **biomarkers** key for approval
 - Herantis: CDNF unique **disease-modifying drug** for Parkinson's, strong **biomarker** data generated to date
 - Biomarkers considered of equal importance to clinical observations, regulators starting to value the role of biomarkers and their assessment
- Compelling biomarker data generated in rhCDNF Phase I, and HER-096 development to date
 - Unique in Parkinson's research
 - Provides a strong foundation to build upon, and will be a key component of our programs moving forward

Why Biomarker Development has Become so Important in Drug Development?

- Mechanism-based, targeted therapies have successfully paved the way for precision medicine in oncology
- All therapeutic areas are transitioning to and leading pharma companies have already adopted biomarker-driven clinical trials models
 - McKinsey & Co recently estimated that 30-40% of novel drugs in the pharma pipeline are developed in conjunction with a biomarker
 - >99% of neurodegeneration trials have been unsuccessful to date
- Biomarker tests can compress drug development timelines, increase patient response rates and reduce development costs
- Clinical trial success rates are 3x higher when a biomarker strategy is implemented

Incorporation of Biomarkers to the Drug Development Process is Critical for Success

NO BIOMARKER STRATEGY

Biomarkers not co-developed with the therapeutic



Traditional patient selection methods compromise patient response rates



Increased risk of failing to meet clinical endpoints



8.4% clinical trial success rate*

BIOMARKER-LED

Biomarker assays developed to characterize disease models and monitor response to therapy



Stratified patient populations increase drug response rates



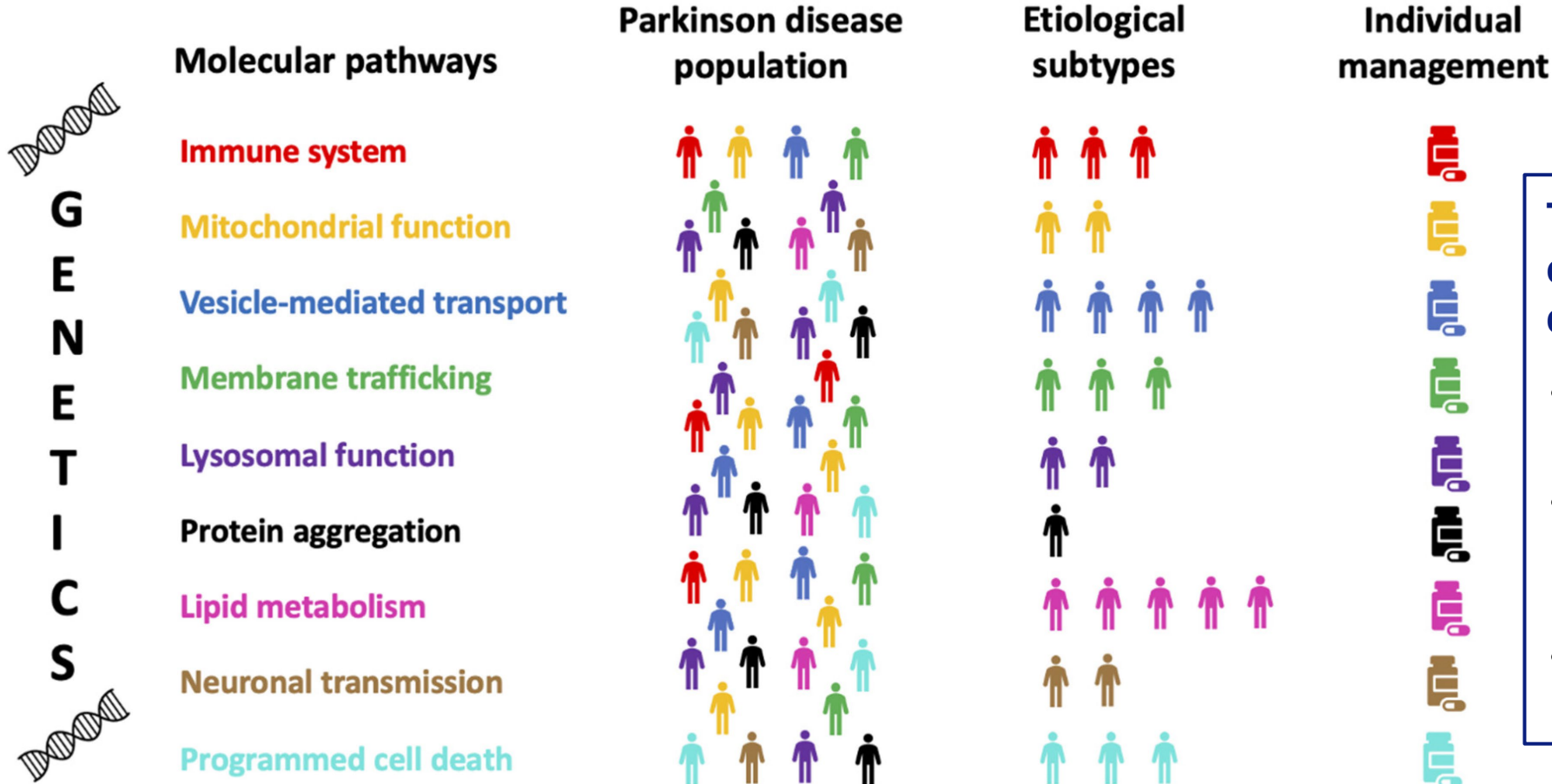
Rich treatment efficacy data generated, delivering deeper insights on the mechanism of action



25.9% clinical trial success rate*

* Anon, 2016. Biomarker tests for molecularly targeted therapies.

Parkinson's Disease is a Heterogenous Disease with Multiple Etiological Subtypes



Types of biomarkers used in clinical development of disease-modifying therapies

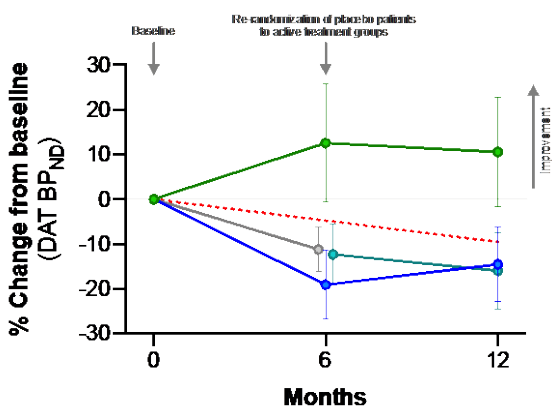
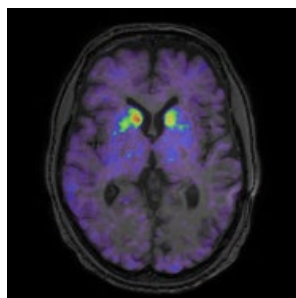
- Biomarker-driven phenotyping for targeted clinical trials
- Pharmacodynamic biomarkers for measuring treatment response
- Prognostic biomarkers to follow disease progression in trials

Reed et al. J. Pers. Med. 11(3): 169, 2021

Three Biomarker Modalities Explored in CDNF Phase 1 Study

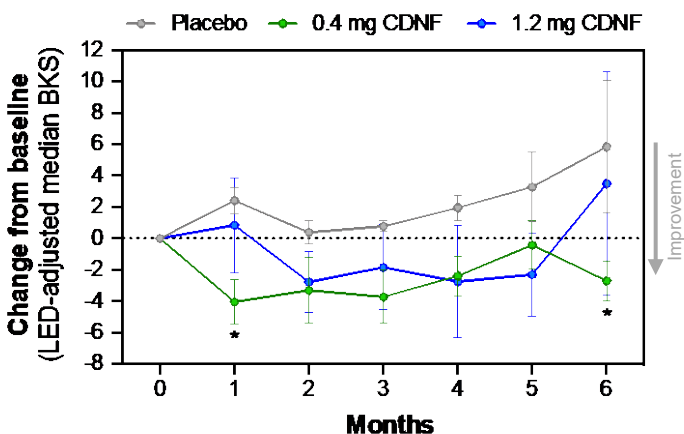
Brain imaging biomarker:

Dopamine transporter
PET imaging



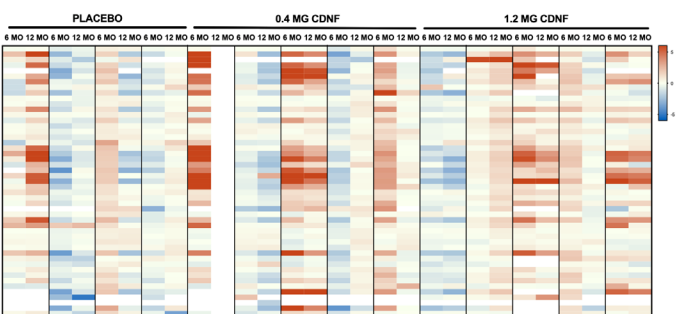
Digital biomarker:

Parkinson's
KinetiGraph (PKG)

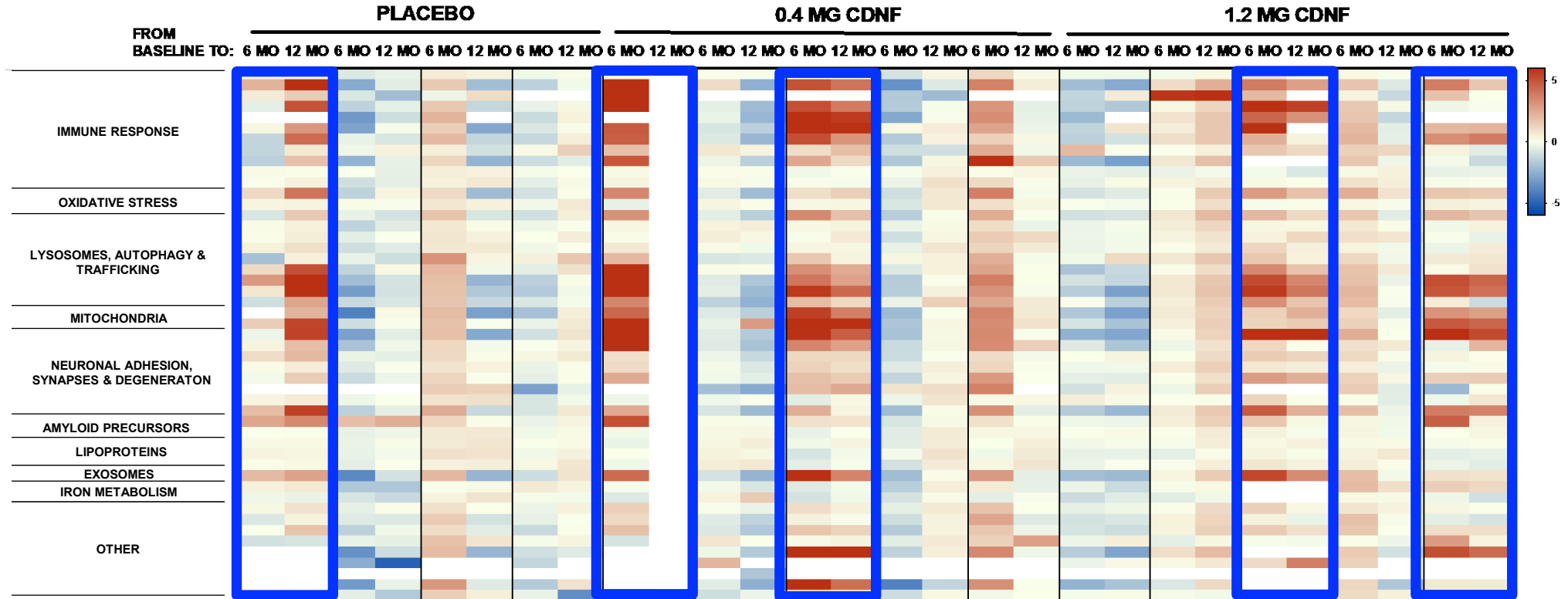


Fluid-based biomarkers:

CSF biomarker
discovery study



Biomarker Discovery Data: Targeted Cerebrospinal Proteomics Study Revealed a Biomarker Fingerprint in PD Patients Receiving rhCDNF



- 20 cerebrospinal fluid markers identified in a subgroup of CDNF-treated patients with moderately advanced Parkinson's disease

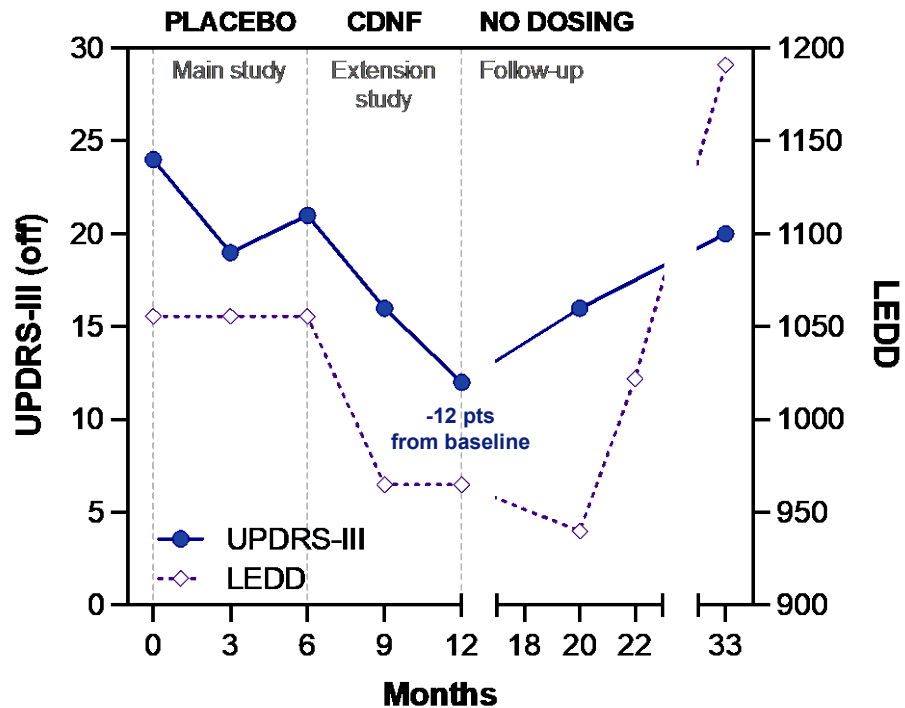
Unpublished data

An Example of a Biological Responder: Clinical Improvement Associated with a Change in CSF Biomarker Profile after Switching from Placebo to rhCDNF

- 62-year old male
- Disease duration: 10 years (from first motor symptoms)
- 6 months placebo, followed by 6 months CDNF

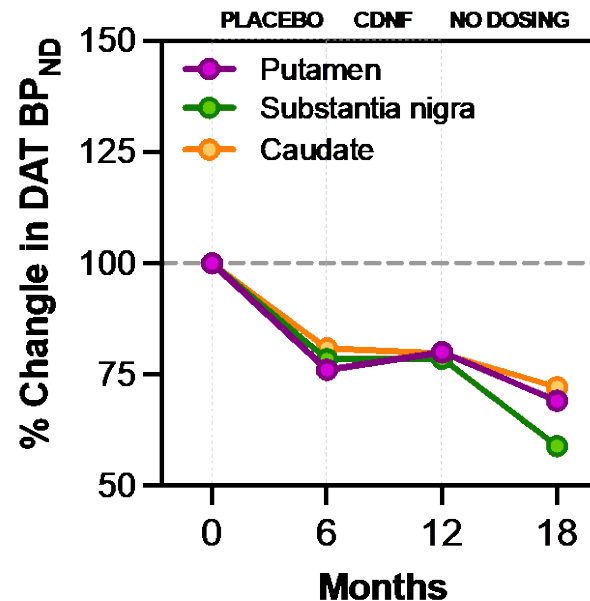
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UPDRS and LEDD



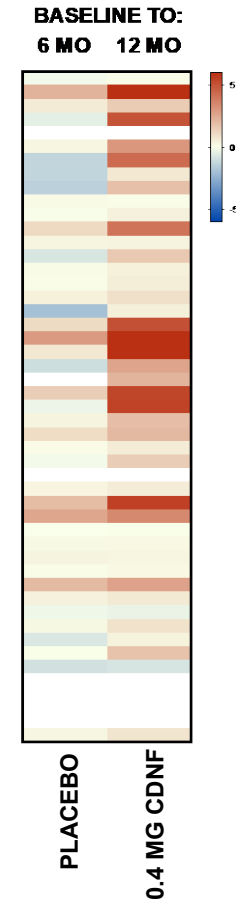
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DAT PET



3

CSF Proteomic profile



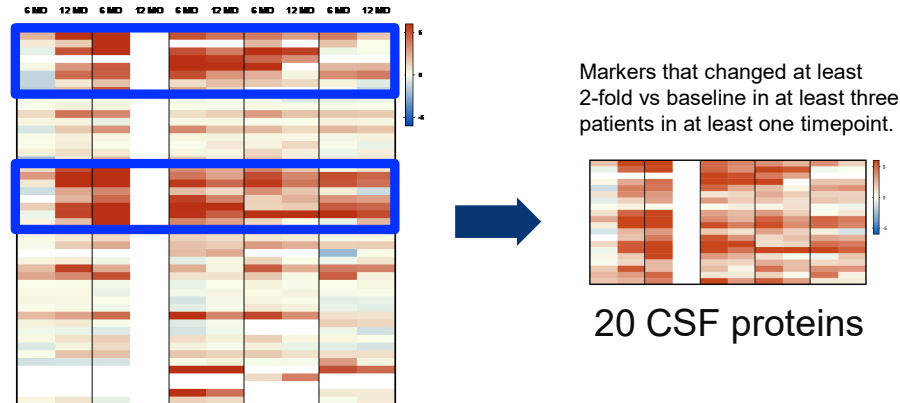
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Genotype: LRRK2 (G2019S)

- The most common mutation in familial Parkinson's but also a common mutation in sporadic Parkinson's.
- Typical manifestations of Parkinson's disease.
- Considered an excellent population for genetically targeted clinical trials in PD.

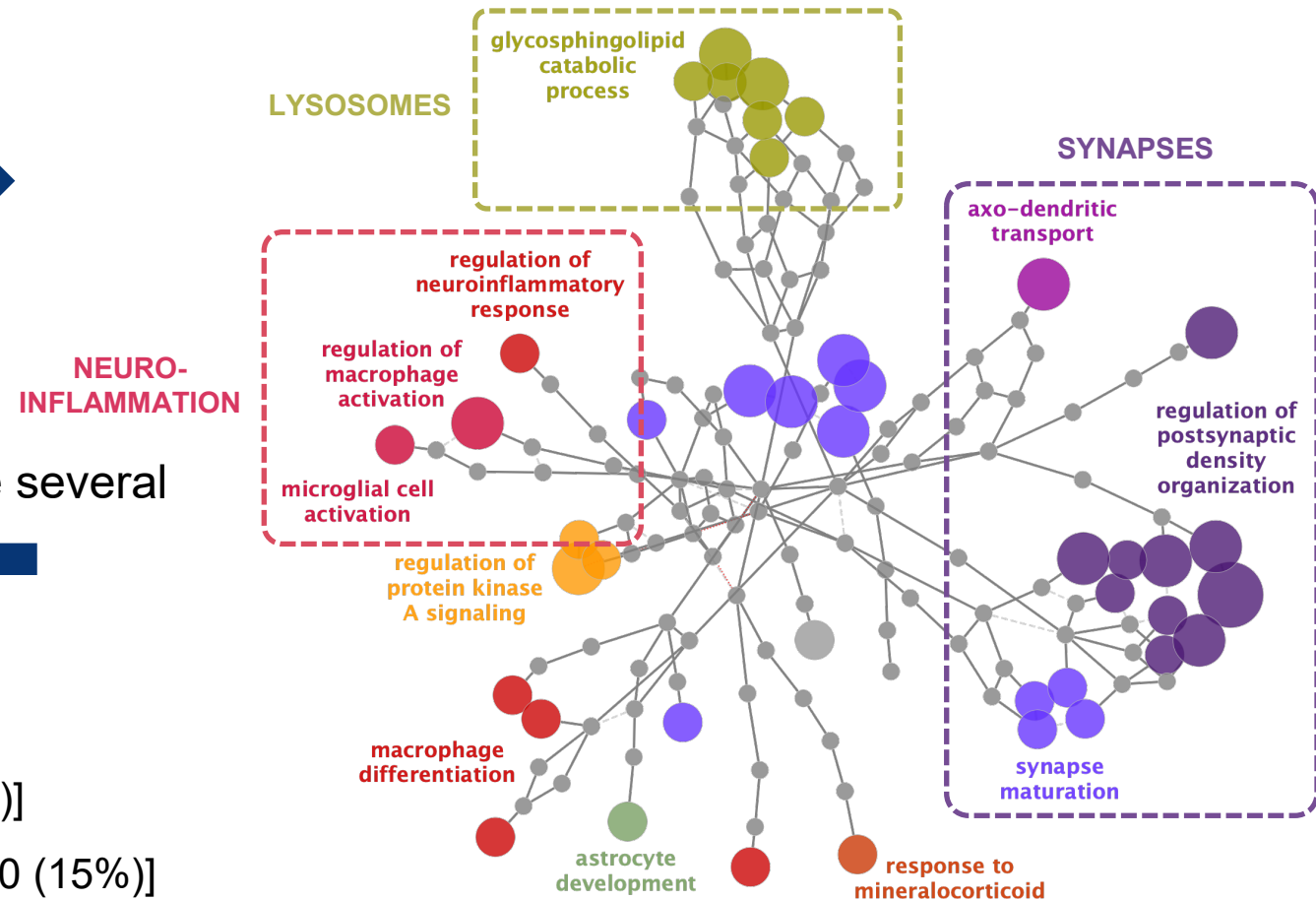
Unpublished data

A Biomarker Signature: The Twenty CSF Proteins Showing Similar Pattern of Change in the Biological Responders Have Common Functional Links



- The 20 CSF proteins that change in concert share several functional associations:
 - Lysosome function/autophagy [6 of 20 (30%) markers that changed in concert in "responders"]
 - Immune response, neutrophil activation [6 of 20 (30%)]
 - Neuronal cell adhesion and synapse assembly [3 of 20 (15%)]

Functional association: Gene Ontology (GO) term enrichment analysis of the 20 CSF proteins



Pathway analysis done in Cytoscape v3.8.2 with ClueGO plugin
(Bindea et al. Bioinformatics 25:1091–1093, 2009).

Unpublished data

Expert Scientific Advisory Board To Work With Herantis On Biomarker-Driven Development



- **Anders Gersel Pedersen**, M.D., Ph.D.
- Chairman of the Board
- Globally renowned and respected expert in CNS drug development. Previously Executive Vice President of R&D at Lundbeck for 19 years. Currently on multiple boards including e.g. Genmab.



- **Daniele Bravi**, M.D., Ph.D.
- Specialist Neurologist in movement disorders
- Renowned CNS disease expert. Previously Vice President, Chief Medical Officer, Vice President of Drug Development at Lundbeck USA



- **Alberto Espay**, M.D., professor
- Professor and chair of the University of Cincinnati James J. and Joan A. Gardner Family Center for Parkinson's Disease and Movement Disorders
- Globally renowned expert and author in biomarker-driven clinical development in movement disorders
- Chair of Movement Disorder Society's Technology Task Force



- **David Dexter**, Ph.D., professor
- Associate Research Director at Parkinson's UK and Professor of Neuropharmacology at Imperial College London
- Renowned expert in mechanisms of cell death and neuroprotection in Parkinson's disease



Update on rhCDNF and HER-096 Programs

CDNF Is Essential For Enteric Dopamine Neuron Development And Survival

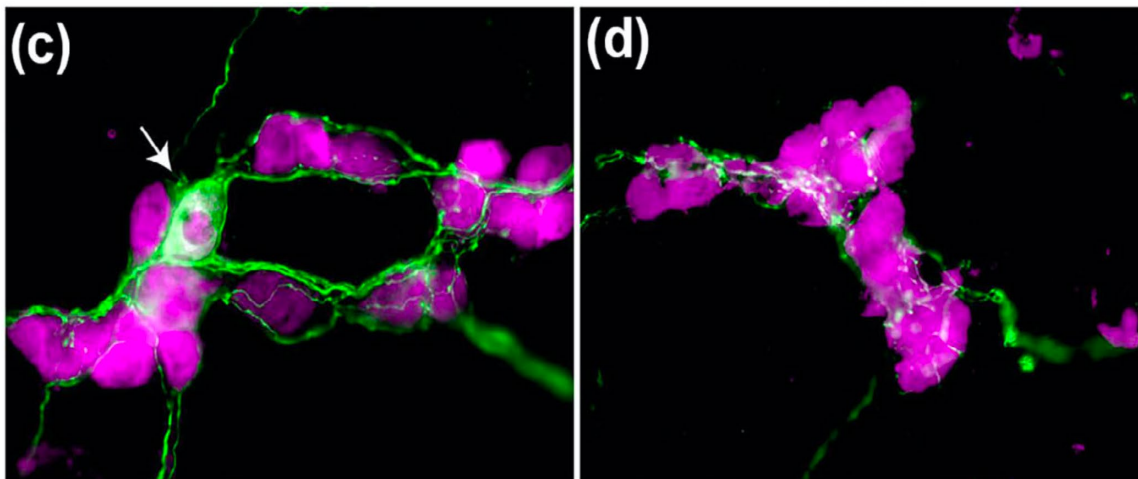
- Dopaminergic neurons occur in highest concentration in brain and gut areas of body
 - Role of CDFN can be observed in both brain and gut dopamine neurons
- CDFN deficient mice show degeneration of gut dopamine neurons
 - Results in impairment of gastrointestinal function and colonic expulsion
 - Such Non-Motor Symptoms (NMS) – eg constipation due to impaired gastrointestinal function - are a major determinant of progression of overall disability and quality of life in Parkinson's disease and often precede motor symptoms

Degeneration of gut dopamine neurons in CDFN^{-/-} mice

CDNF +

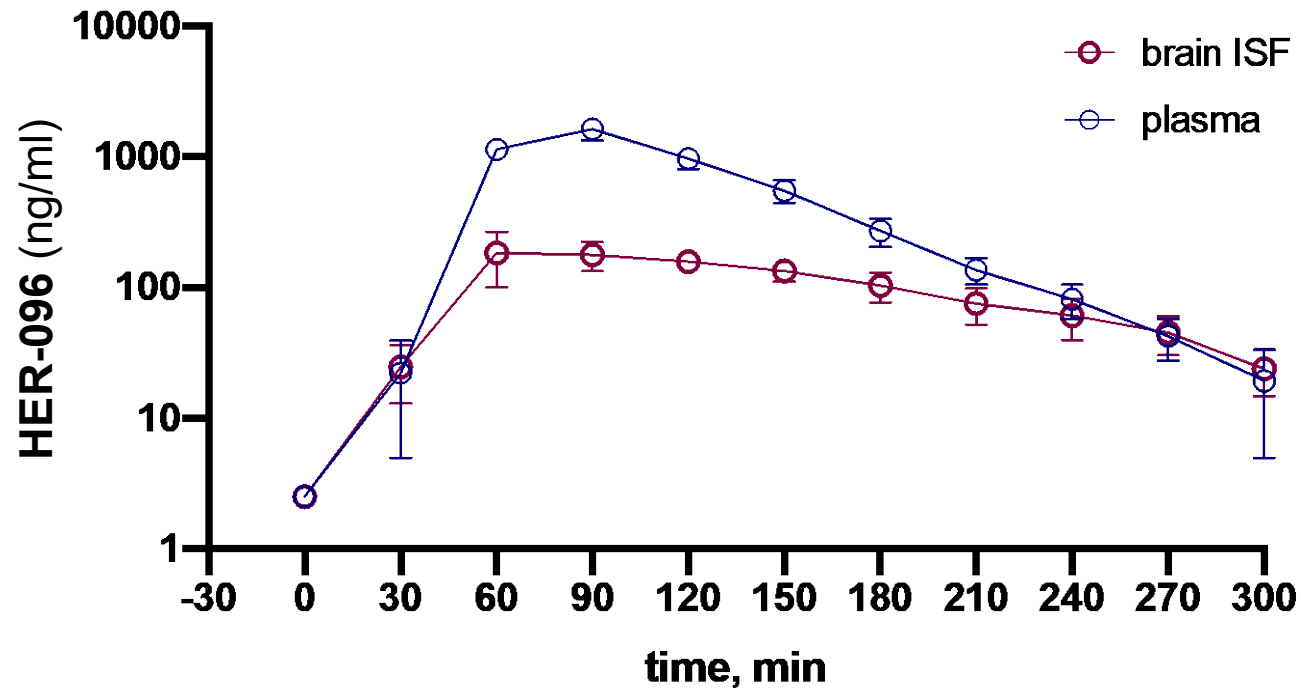
CDNF -

1.5 months



Subcutaneously Administered HER-096 Effectively Penetrates the Blood-Brain Barrier with Therapeutic Concentrations and Extended Half-life in the Brain

DUAL (BRAIN AND PLASMA) MICRODIALYSIS STUDY IN MICE



$$K_{p,uu,brain} = 0.216$$

$$\text{Brain ISF } T_{1/2} = 1.3 \text{ h}$$

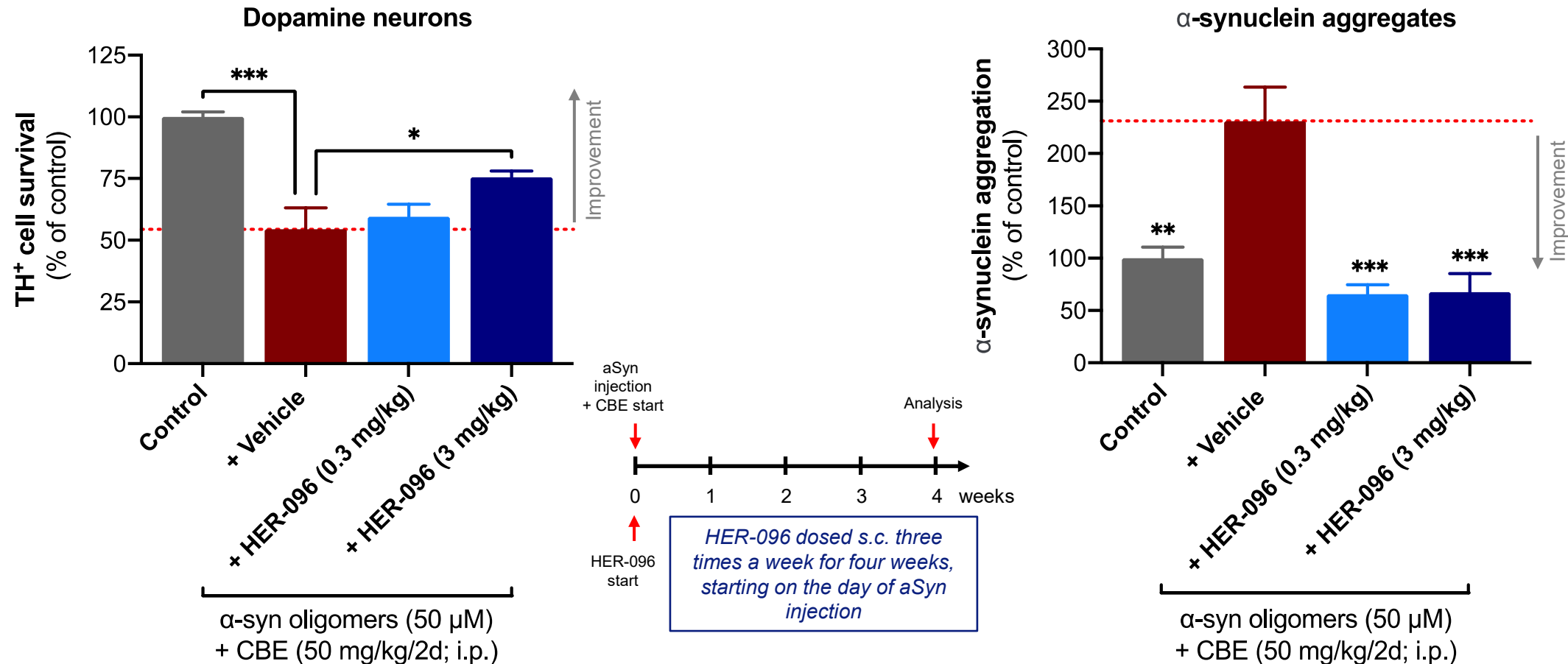
Brain ISF C_{max} = 185 ng/ml (> 180 nM)
Brain ISF $AUC_{(0-inf)}$ = 529 ng/ml*h
Brain ISF $T_{1/2}$ = 1.3 h

Plasma C_{max} = 1637 ng/ml
Plasma $AUC_{(0-inf)}$ = 2450 ng/ml*h
Plasma $T_{1/2}$ = 0.5 h

STUDY: Mice with microdialysis probes placed in the striatum and jugular vein were subcutaneously injected with 5 mg/kg HER-096 and microdialysate samples were collected for 5 h at 30 min intervals. The concentration of unbound compound was detected by LC-MS/MS and the values normalized by recovery efficiency of the microdialysis filter determined by in vitro experiments. n=4. $K_{p,uu,brain}$ = brain-to-plasma ratio of unbound compound.

xCDNF (HER-096) Impressive Protection Of Dopamine Neurons + Significantly Reduces α -Synuclein Aggregates In Vivo

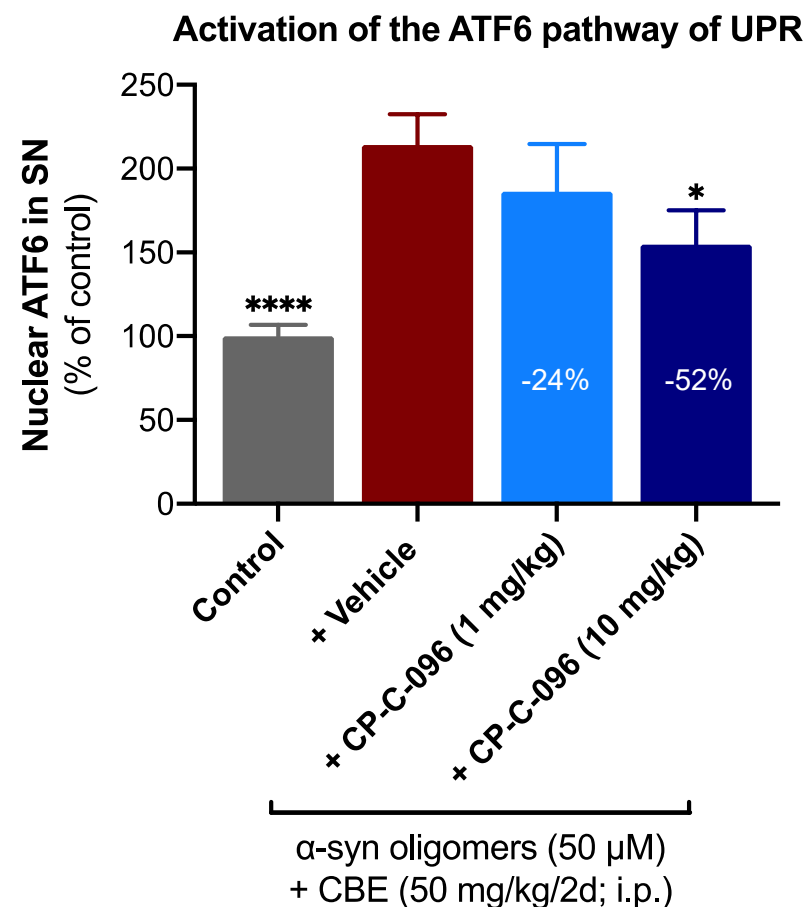
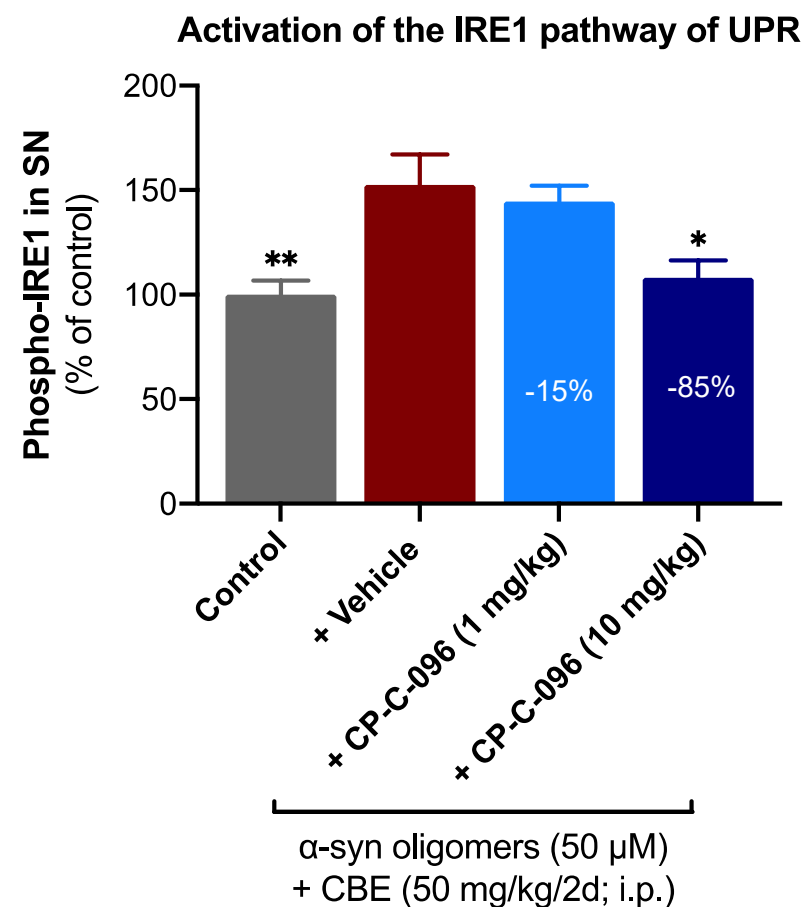
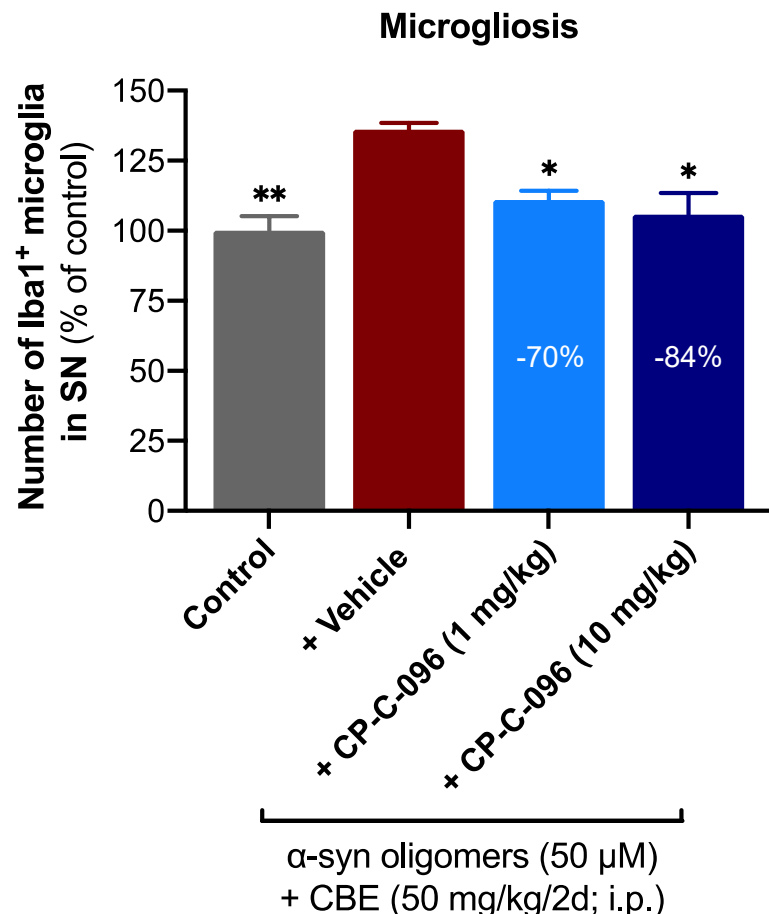
High protection of dopamine neurons, plus almost complete eradication of α -synuclein aggregates



STUDY: Test compound CP-C-096 was administrated subcutaneously in dose 1mg/kg or 10 mg/kg three times per week for four weeks starting from the day of a-synuclein oligomers injection. Animals were sacrificed at day 28 after the model initiation, and neuronal survival and alpha-synuclein aggregation in substantia nigra were assessed by immunohistochemistry (n=5). *p<0,05 ANOVA with post-hoc Fisher's test versus group treated with vehicle.

xCDNF (HER-096) Potent Impact On Key Pathologies Of Parkinsons

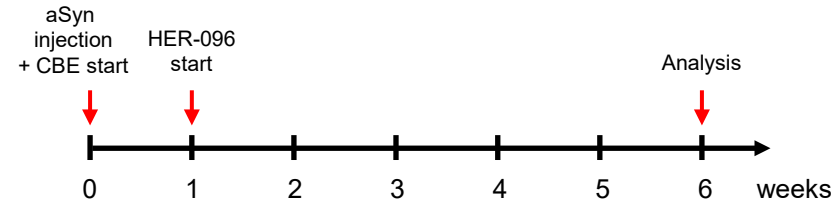
Attenuates Unfolded Protein Response And ER Stress, Thus Reduces Cell Death
>80% reduction of key neuroinflammatory/microgliosis marker, and 85% and 52% reductions of activated IRE1 and ATF6



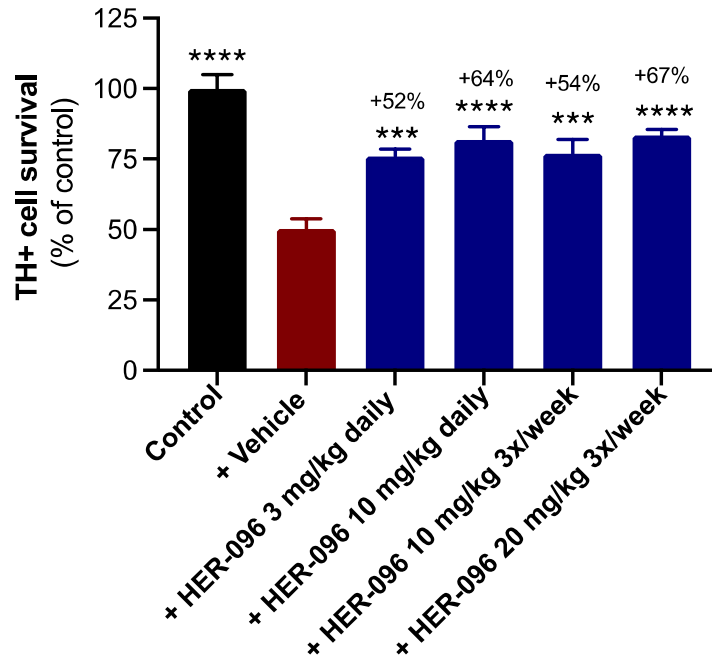
STUDY: Test compound CP-C-096 was administrated subcutaneously in dose 1mg/kg or 10 mg/kg three times per week for four weeks starting from the day of a-synuclein oligomers injection. Animals were sacrificed at day 28 post-aSyn injection, and microglia activation and selected UPR markers (ATF6, phospho-IRE1) in substantia nigra were assessed by immunohistochemistry (n=5). *p<0.05 ANOVA with post-hoc Fisher's test versus group treated with vehicle.

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xCDNF (HER-096) Convincing Protection Of Dopamine Neurons, Reduction Of α -Synuclein And Neuroinflammation In Therapeutic Dosing Regimen

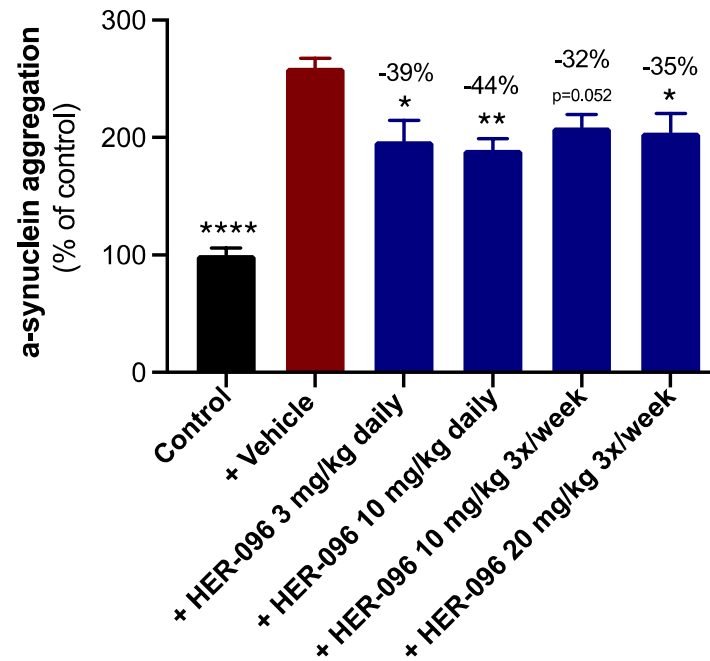


Dopamine neurons number in SN



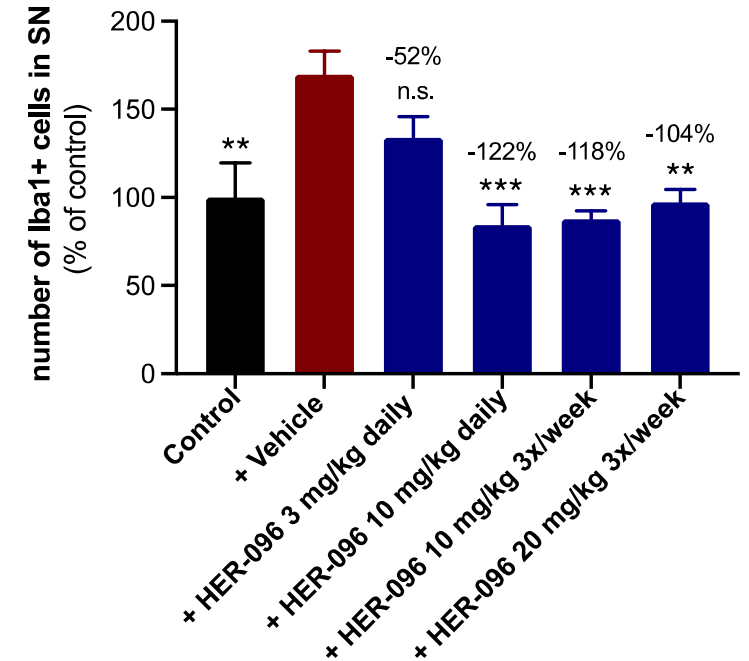
Compound dosing (s.c.) started 7 days after aSyn injection and continued for 5 weeks

Alpha-synuclein deposition



Compound dosing (s.c.) started 7 days after aSyn injection and continued for 5 weeks

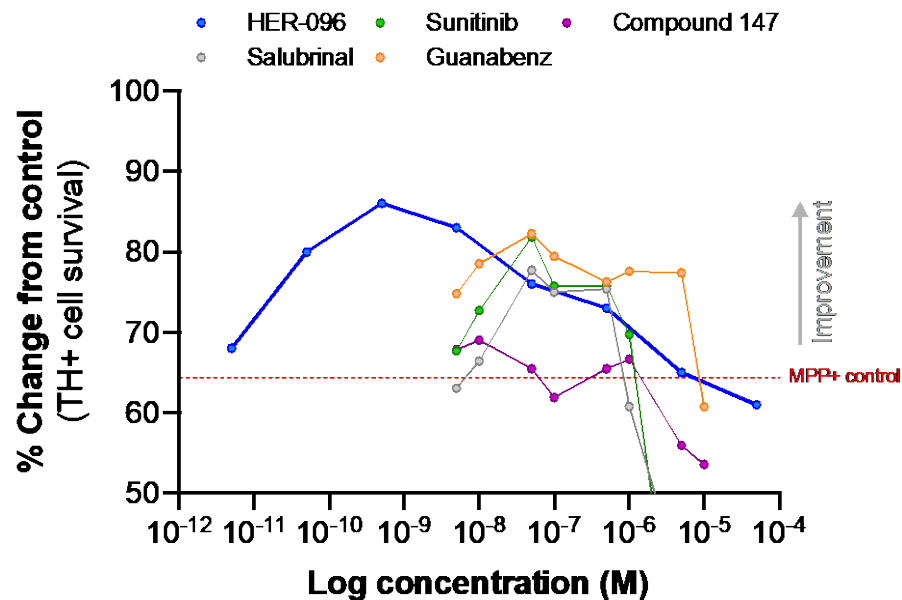
Neuroinflammation



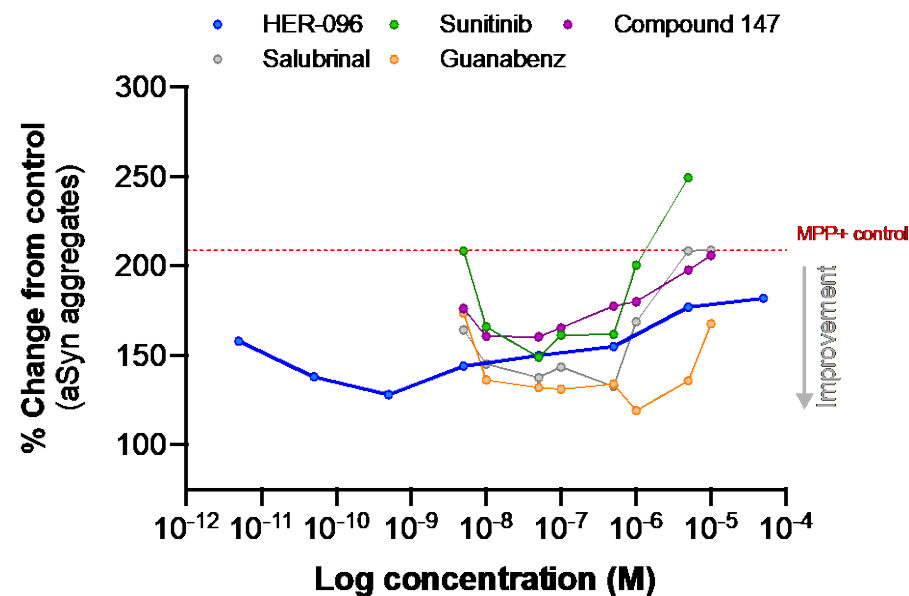
Compound dosing (s.c.) started 7 days after aSyn injection and continued for 5 weeks

HER-096 Has Superior Pharmacological Properties When Compared to Several Other UPR Modulating Compounds

DOPAMINE NEURON SURVIVAL



ALPHA-SYNUCLEIN AGGREGATION



- HER-096 has superior potency and significantly wider therapeutic window of activity compared to sunitinib (IRE1), Compound 147 (ATF6), salubrinal (PERK) and guanabenz (PERK).

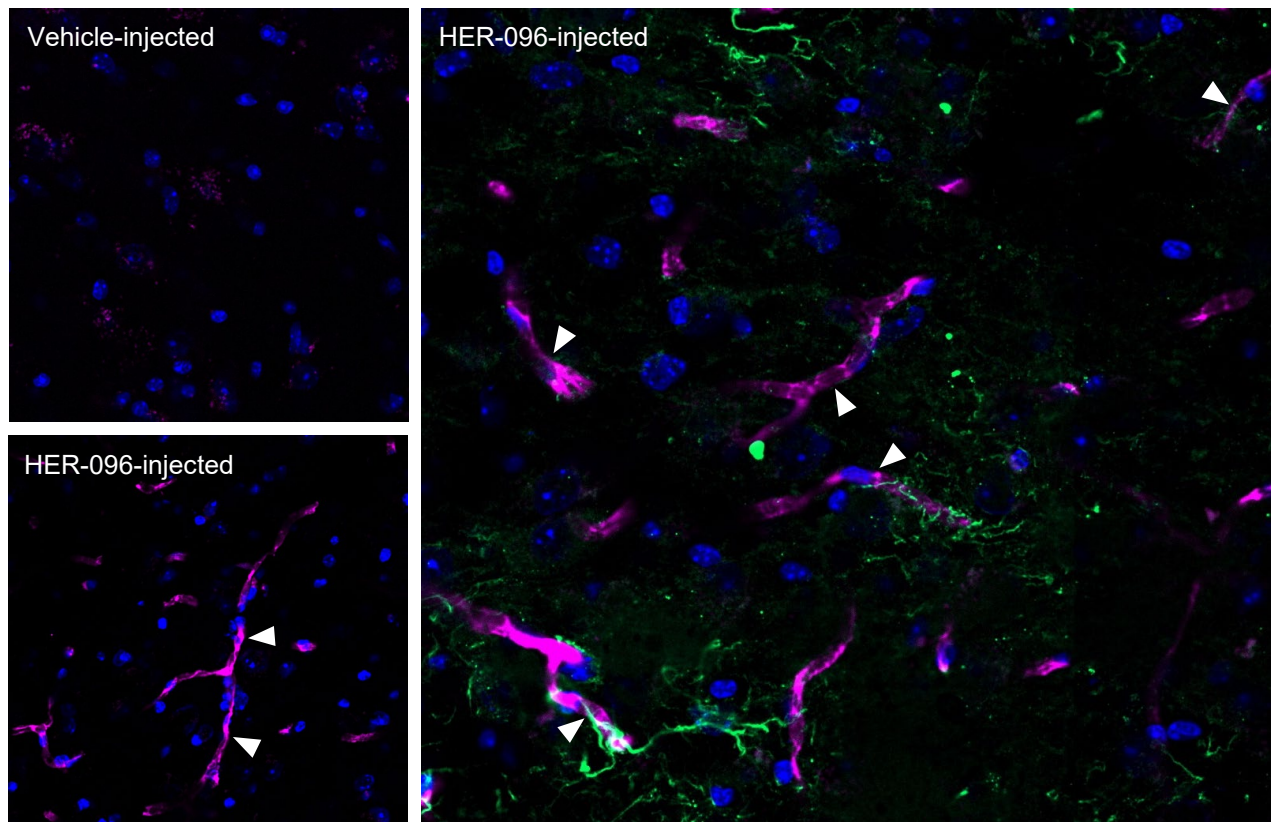
Sunitinib is an FDA-approved multi-target kinase inhibitor that modulates IRE1 α kinase and RNase activities (Korennykh et al. Nature 457: 687-694, 2009; Ali et al. EMBO J 30: 894-905, 2011).

Salubrinal is a selective inhibitor of eIF2 α dephosphorylation (PERK pathway) that protects cells from ER stress (Boyce et al. Science 307: 935-939, 2005).

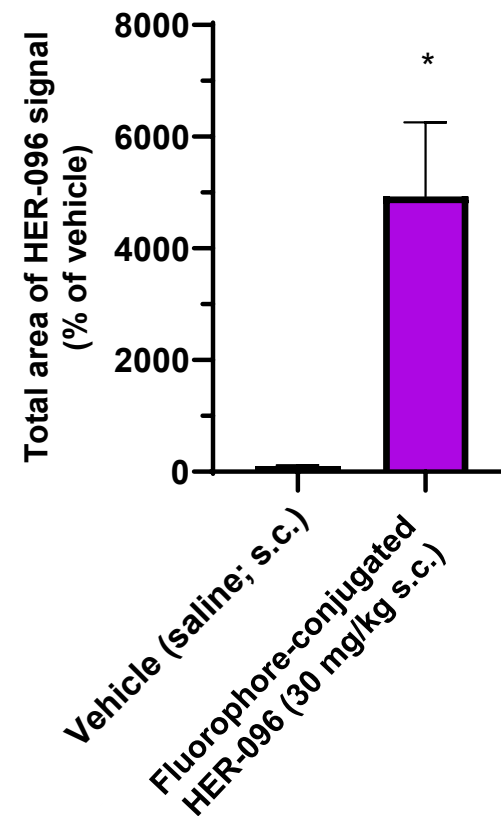
Guanabenz is an inhibitor of eIF2 α dephosphorylation (PERK pathway; Tsaytler et al. Science 332: 91-94, 2011).

Compound 147 is an ATF6 activator (Paxman et al. eLife 7: e37168, 2018).

Uptake of HER-096 by Multiple Cell Types of the Brain Following Subcutaneous Injection



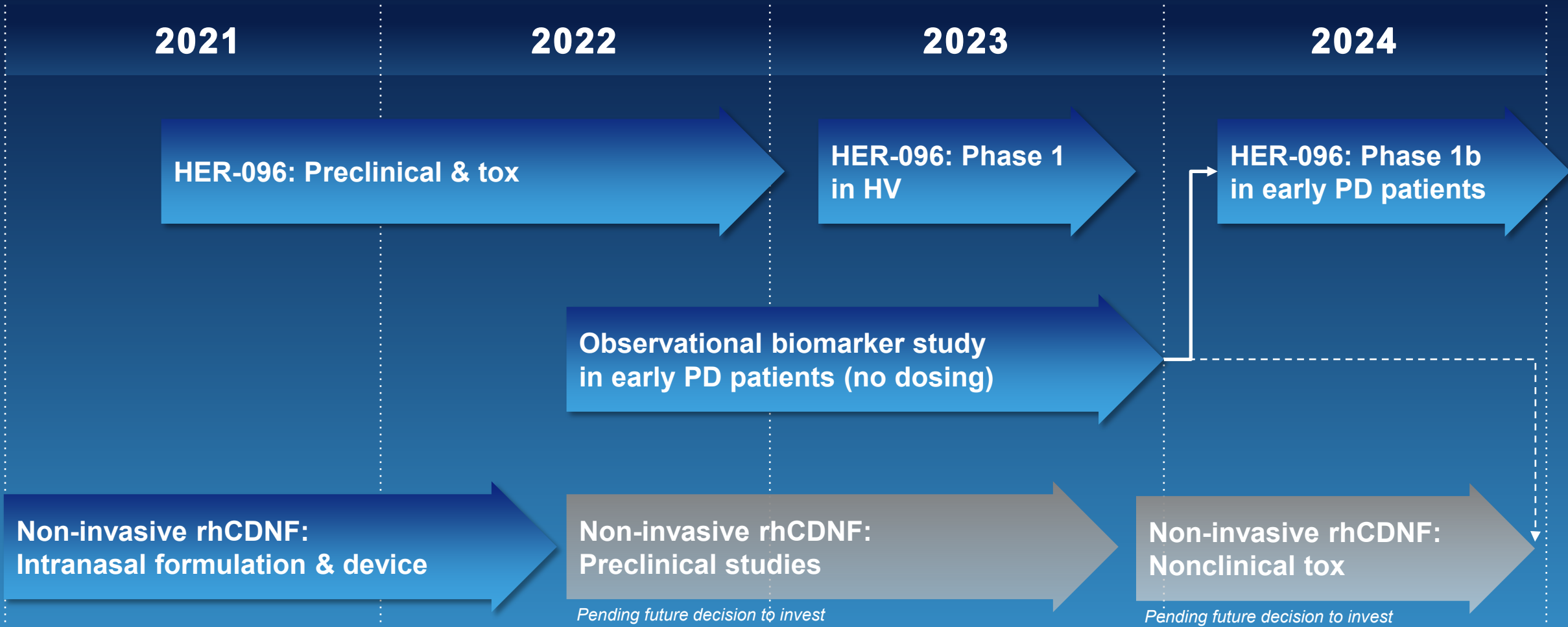
Nuclear marker Fluorophore-conjugated HER-096 GFAP (astrocyte marker)



* $p < 0.05$ versus Vehicle; t-test

- Fluorophore-conjugated HER-096 s.c. administered (30 mg/kg) to healthy mice. Tissues collected and analyzed at 90 min post-injection.

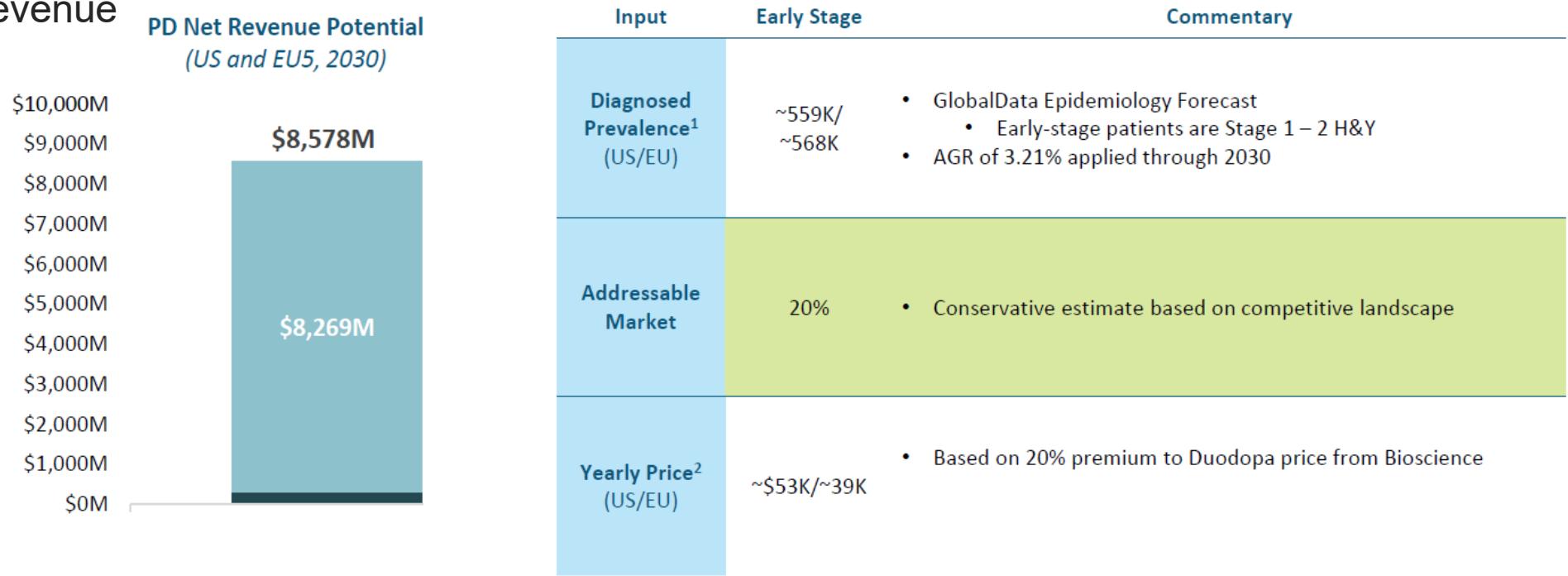
Planned Development Timelines for HER-096 and rhCDNF



The indicated timelines are subject to change, depending on availability of funding, finalisation of clinical trial design, regulatory interactions, Covid, etc.
HV = healthy volunteers; PD = Parkinson's disease

Enormous Commercial Potential For rhCDNF &/Or HER-096 In Parkinsons

- Disease modifying treatment rhCDNF/HER-096 for Parkinson’s disease could reach **more than €8 bn** in total annual revenue

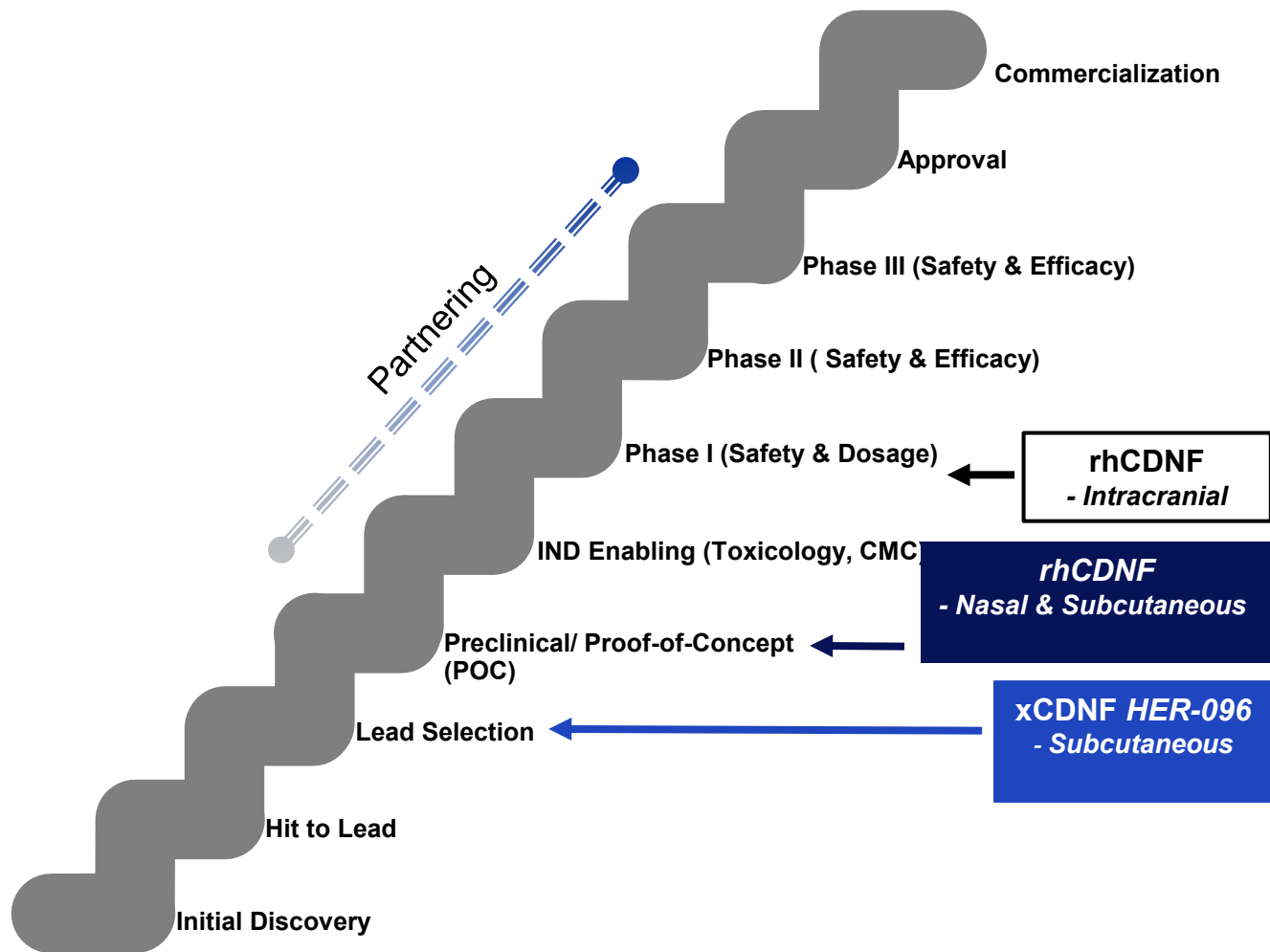


- Herantis business model is focused on **partnering** with large pharma; we **continue to dialogue with potential partners**
- Timing of deals typically anytime following pre-clinical through to clinical proof of concept (after Phase I/II)
- **Size of deals anywhere from \$0.5bn to \$1.5bn** eg Merck/Yumanity, Roche/Prothena, GSK/Alector

Desperate & Amplifying Need For Disease Modifying Therapies (DMT's) Like rhCDNF and xCDNF

- Successful innovation urgently needed to address Parkinson's pandemic
- Other drug classes eg mAbs hold/held a lot of promise for neurodegenerative diseases, but facing challenges
 - target α -synuclein protein preventing aggregation and potentially halting Parkinsons progression
 - cinpanemab (Biogen 2020), venglustat (Sanofi 2021) discontinue
 - prasinezumab (Roche) continuing following 'just enough evidence' to advance into further development
- Challenging for similar pipeline candidates, and amplifies that a major unmet need remains in bringing DMTs & neuroprotective agents to market, currently dominated by symptomatic treatments
- ***Herantis' rhCDNF and xCDNF HER-096 well positioned in competitor space***

Timelines & Some Of The Key Planned Milestones



2H 2021	Parkinson's Disease and other neurodegenerative diseases	rhCDNF:	Intranasal administration formulation milestones	✓
2H 2021	Parkinson's Disease	HER-096: (xCDNF)	Pre-clinical efficacy and additional PoC milestones	✓
1H 2022	Parkinson's Disease and other neurodegenerative diseases	rhCDNF:	Proof of brain distribution intranasal	
2H 2022	Parkinson's Disease and other neurodegenerative diseases	CLINICAL:	Observational biomarker study start in early PD patients*	
Q1 2023	Parkinson's Disease	HER-096: (xCDNF)	IND/CTA clinical trial application approval	

* pending funding



Program Development
Milestones

Newsflow 2021/22



Summary

- **Unparalleled biomarker data, and clear biomarker program ahead**

- *Strong impact on markers of disease; clear correlation with clinical & imaging improvements*

- **Potent neuroprotection**

- *Restores proteostasis, needed for neuronal survival, convincingly crosses BBB*

- **Significant market opportunity**

- *PD pandemic is multi \$bn need, intense need for neuroprotective agents, successful innovation*

- **Rich potential newsflow**

- *Several near and medium term milestones anticipated en route to clinic*

Focus moving forward is to shape our development programs to further identify the biological and biomarker based Parkinson's populations that most benefit from CDNF, establish new and innovative research paths that fit our rhCDNF and HER-096 assets.

Corporate Presentation

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Marking A Decade of Successful Research on CDNF

Thank You!