



# ARV-102: Arvinas' Oral LRRK2 PROTAC® Degrader

Enabling clearance of pathologic proteins that cause neurodegenerative disease

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# Safe harbor and forward-looking statements



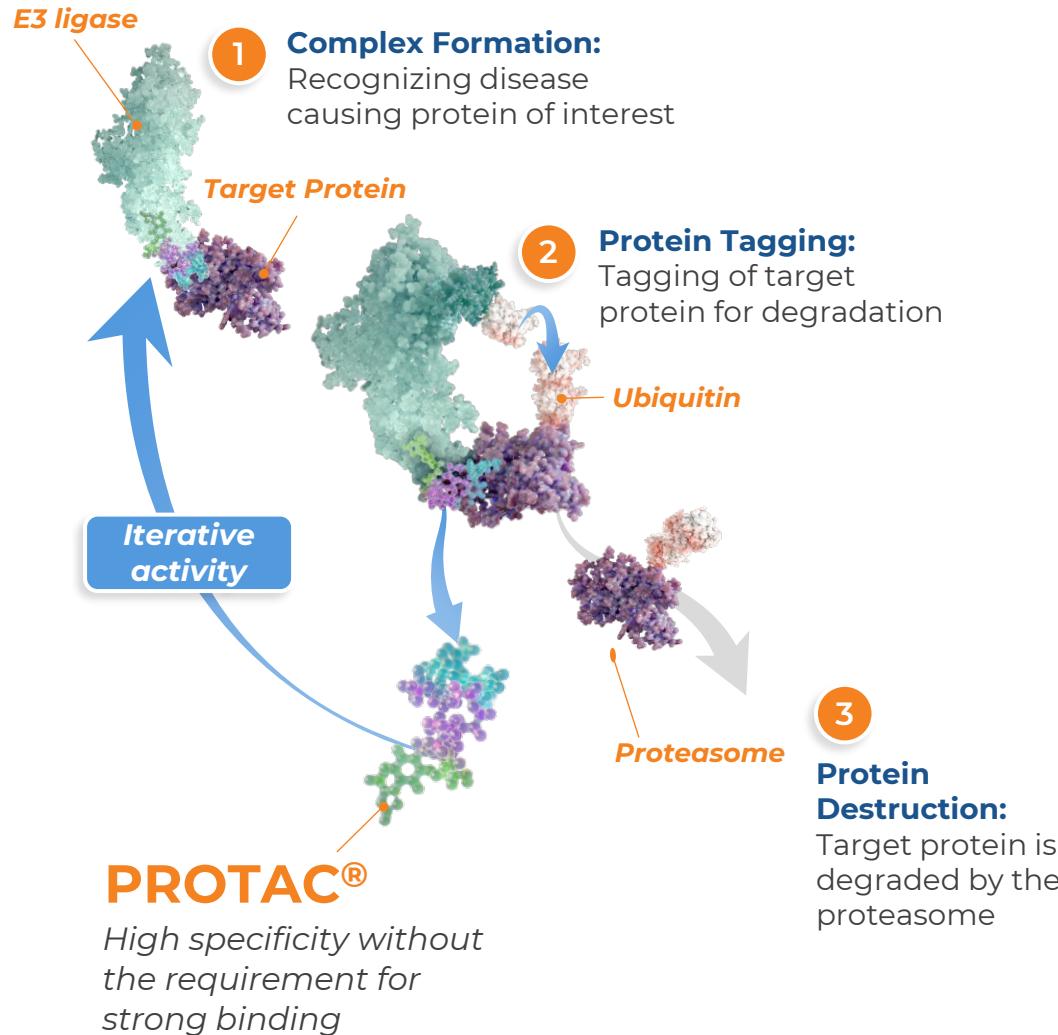
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# PROTAC® protein degraders combine the benefits of small molecules and gene-based knockdown technologies



## Arvinas' proteolysis-targeting chimera (PROTAC) degraders can:

- Eliminate (rather than inhibit) disease-causing proteins
- Disrupt scaffolding functions of target proteins
- Bind and degrade classically “undrugged” proteins
- Act iteratively (catalytically)
- Potential for oral delivery and achieve broad tissue distribution, including across the blood-brain-barrier

# Our broad pipeline includes the first pivotal trials for PROTAC® degraders



Program	Therapeutic Area / Indication	Preclinical	Phase 1/1b	Phase 2	Phase 3
<b>Vepdegestrant (ARV-471)</b> Global co-development/ co-commercialization partners with  	<b>Oncology:</b> ER+/HER2- Breast Cancer	<p>★ <b>VERITAC-2:</b> vepdegestrant monotherapy 2L+ pivotal trial</p> <p>★ <b>Vepdegestrant plus palbociclib and potentially other CDK4/6 inhibitors in 2L<sup>a</sup></b></p> <p>★ <b>VERITAC-3:</b> vepdegestrant + palbociclib as 1L combination therapy (study lead-in)</p> <p>★ <b>Vepdegestrant plus CDK4 inhibitor (PF-07220060) in 1L<sup>a</sup></b></p> <p><b>VERITAC:</b> vepdegestrant monotherapy dose expansion (2L+)</p> <p><b>TACTIVE-K:</b> vepdegestrant in combination with CDK4i (PF-7220060)</p> <p><b>TACTIVE-N:</b> vepdegestrant in neoadjuvant setting (to inform potential adjuvant plan)</p> <p><b>TACTIVE-U:</b> vepdegestrant in combination with ribociclib, abemaciclib and other targeted therapies</p> <p><b>TACTIVE-E:</b> vepdegestrant + everolimus</p>			
<b>ARV-766</b>	<b>Oncology:</b> Prostate Cancer	<p>★ <b>ARV-766 monotherapy (mCRPC)</b></p> <p><b>ARV-766 monotherapy dose expansion (2L+)</b></p> <p><b>ARV-766 Phase 1/2 combination with abiraterone (pre-NHA setting)</b></p>			
<b>ARV-393 (BCL6)</b>	<b>Hematology</b>		<b>Phase 1 dose escalation</b>		
<b>ARV-102 (LRRK2)</b>	<b>Neuroscience</b>		<b>Phase 1 dose escalation</b>		
<b>Preclinical programs</b>	<b>Oncology and Neuroscience</b>	20+ programs, including KRAS-G12D/V, AR-V7, Myc, HPK1, Tau, α-Synuclein, and mHTT			

<sup>a</sup> Pending Health authority feedback on potential pivotal trial

NHA, novel hormonal agent

These agents are currently under investigation; their safety and effectiveness for these investigational uses have not yet been established.

**Pivotal Trial**

**Planned**

# Neuroscience: High potential in an area of tremendous unmet need



Each year, **>6 million** patients in the U.S. are diagnosed with Alzheimer's, Parkinson's, and Huntington's diseases alone<sup>†</sup>

## Opportunity for PROTAC® protein degraders:

- Very few disease-modifying therapies exist
- Blood-brain barrier penetration is a challenge for other modalities
- Other potential therapies have difficult routes of administration, e.g., intra-thecal

## Arvinas Neuroscience Pipeline

PROTAC protein degraders have the potential to change the treatment paradigm in neurodegenerative diseases

- Potential to cross the blood brain barrier and degrade disease-causing proteins inside cells
- Specifically target pathogenic proteins in the brain
- Potential for oral therapies



Parkinson's,  
PSP



PSP,  
Alzheimer's



MSA,  
Parkinson's



Huntington's

Phase 1 trial with LRRK2-targeting PROTAC (ARV-102) anticipated in 1H 2024

<sup>†</sup>Global data, DecisionResources.

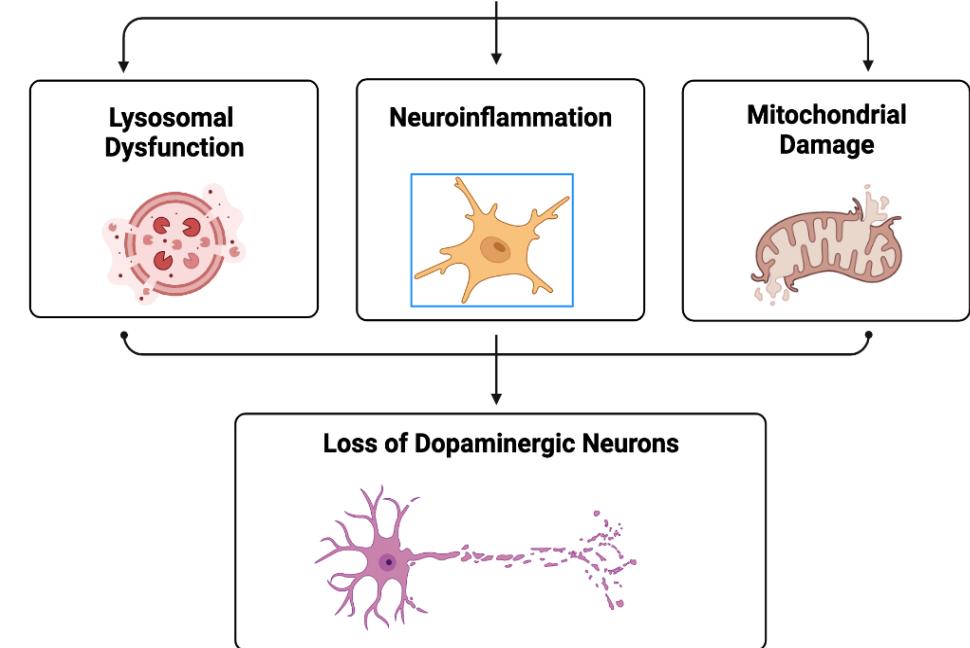
mHTT, mutant Huntingtin protein; MSA, multiple systems atrophy; PSP, progressive supranuclear palsy; LRRK2, Leucine-rich repeat kinase 2

# PROTAC®-induced LRRK2 degradation as a potential treatment for idiopathic Parkinson's Disease and Progressive Supranuclear Palsy

## Human genetics and biology create a strong rationale for differential biology of PROTAC LRRK2 degraders

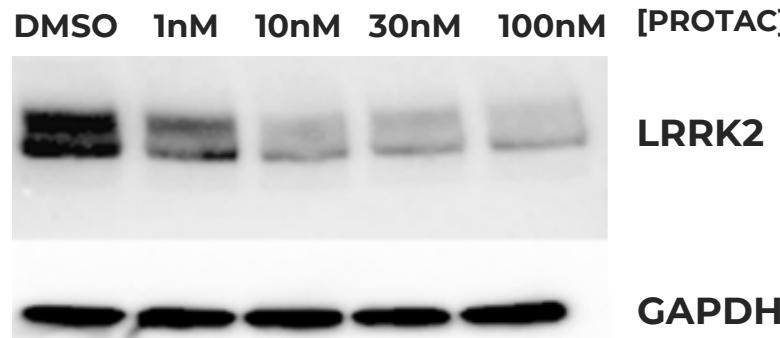
- **LRRK2 is a large multidomain scaffolding kinase**
- **Parkinson's Disease (PD)** has a diagnosed prevalence of ~1M in the US, with more than 10M worldwide<sup>1</sup>
  - No approved disease-modifying therapies for PD
  - Familial mutations and sporadic variants implicate LRRK2 in PD ('breaks on lysosome clearance')
- **Progressive Supranuclear Palsy (PSP)** is a pure tauopathy with rapid progression to death within 5-7 years
  - No approved therapies for PSP
  - LRRK2 genetic variants associated with accelerated progression time to death
- LRRK2 kinase inhibitors and an ASO in clinical trials

### Mutations in and increased expression of LRRK2

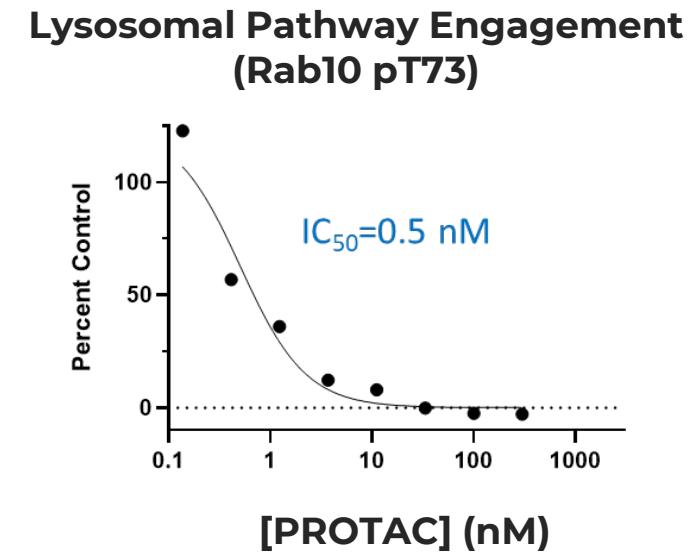
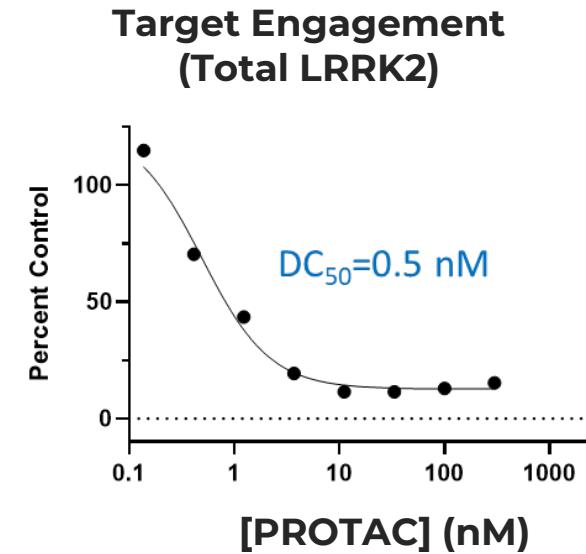


# PROTAC® induces degradation of LRRK2 in human iPSC-derived microglia, in human PBMCs, and impacts lysosomal pathway

## PROTAC-concentration induced degradation of LRRK2 in human iPSC-microglia



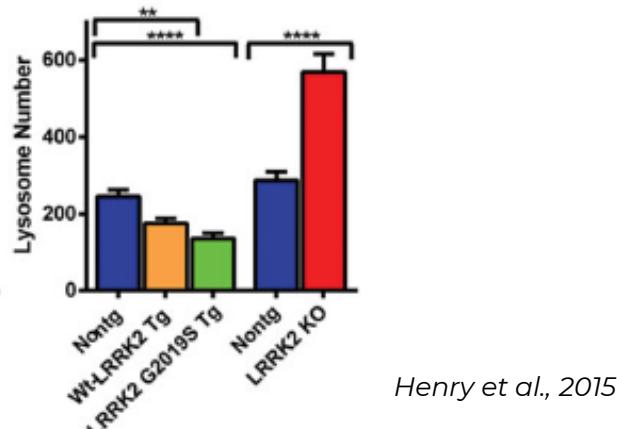
## In human PBMCs, PROTAC LRRK2 degradation aligns with effects on target & pathway engagement



# Lysosome number is reduced in PD models and increased by LRRK2 genomic knock out and by PROTAC® degraders

## Lysosome number is reduced in PD patients\* and models

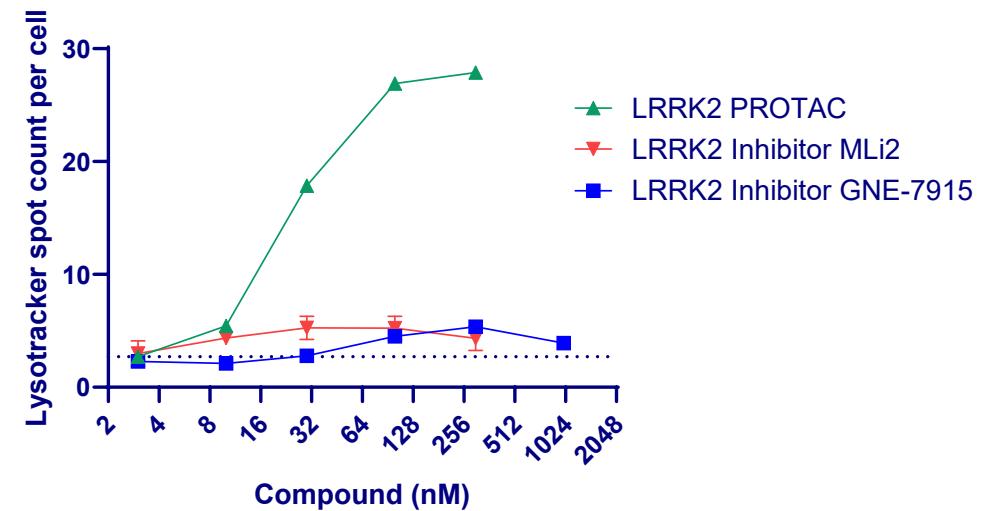
Lysosome number is reduced in PD models, and is increased in LRRK2 KO astrocytes



Henry et al., 2015

## LRRK2 PROTAC degrader induces increase in lysosome number per cell compared to LRRK2 Inhibitor(s)

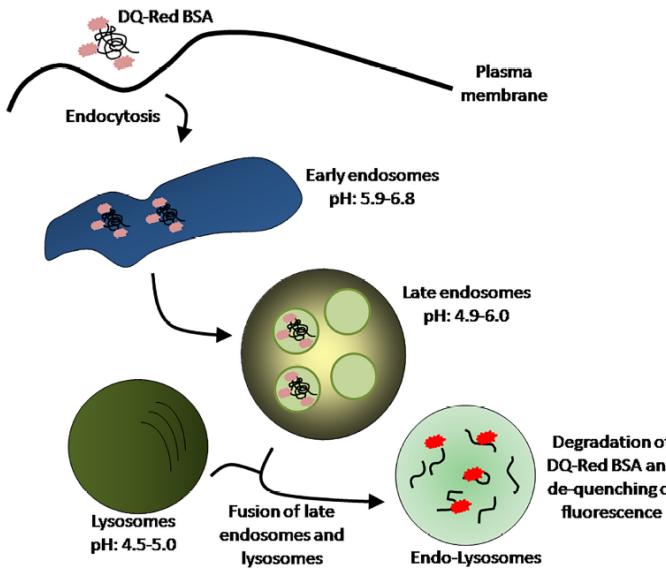
LRRK2 PROTAC degrader increase lysotracker (LT) spot count compared to kinase inhibitors in A549 cells



- Mutant familial PD and increased LRRK2 expression puts the brakes on the lysosomal clearance system.
- Autophagy (clearance dependent on lysosome) is reduced with increased LRRK2 expression, LRRK2 familial mutation (G2019S), and LRRK2 activity/levels in rat neurons (R. Wallings et al., 2019)
- LRRK2 PROTAC activity is consistent with literature showing an increase in lysotracker spot count observed in LRRK2 KO astrocytes (Henry et al., 2015)

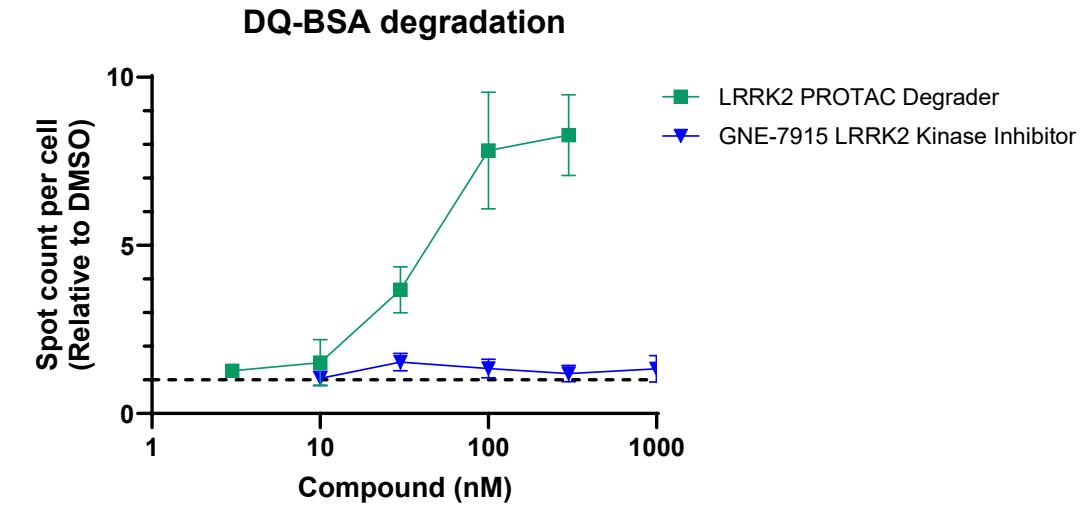
# LRRK2 PROTAC® enhances lysosome-based degradation (to improve lysosomal protein clearance in neurodegeneration)

## DQ-Red BSA can be used to monitor lysosome-mediated degradation



Marwaha and Sharma, Bio-protocol, 2017

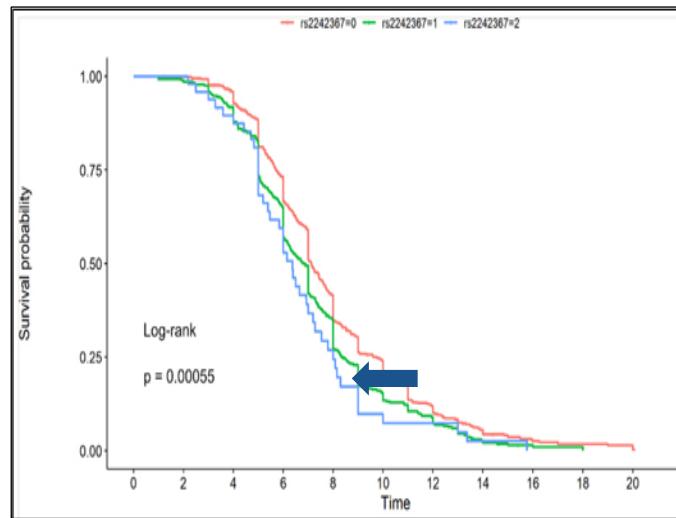
## LRRK2 PROTAC enhances lysosome degradation compared to the inhibitor



- Comparable pharmacology for target engagement observed for LRRK2 PROTAC and kinase inhibitors (data not shown)
- Ongoing studies in microglia, astrocytes, and neurons (in the context of fPD mutations and pathology)
- LRRK2 PROTAC induces enhanced lysosomal clearance

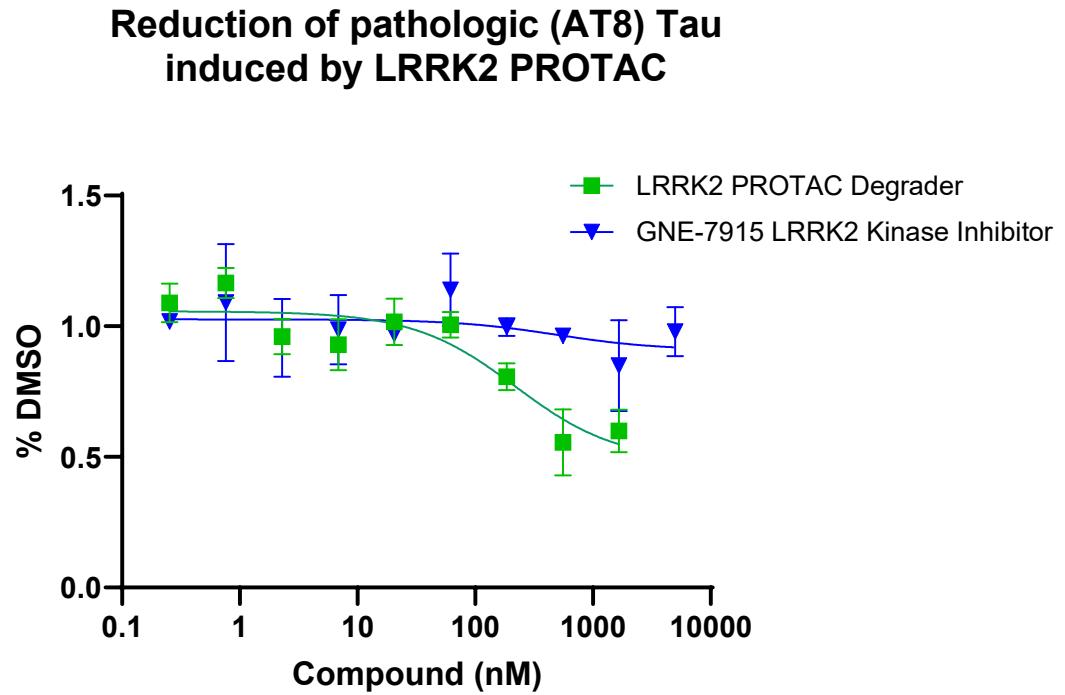
# PSP genetics implicate LRRK2 in progression of disease LRRK2 PROTAC® degraders induce reduction of pathologic tau

## LRRK2 SNP implicated in progression accelerated time to death by 1 year in PSP<sup>†</sup>



- Stage 1: 1001 PSP cases, 841 pathology confirmed, ~5 million SNPs for analysis
- Stage 2 confirmation analysis: 415 pathology confirmed PSP; Pooled analysis: 1239 PSP cases

## LRRK2 PROTAC induces reduction of AD induced pathologic tau compared to inhibitor



Preliminary data indicate LRRK2 PROTAC induces pathologic tau protein reduction in two tauopathy mouse models (Tg4510 and PS19)

# Arvinas' oral PROTAC® LRRK2 degrader reaches multiple "deep brain" regions in non-human primates and degrades LRRK2

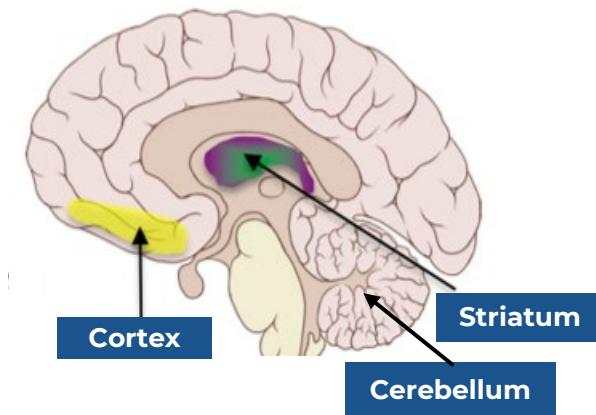
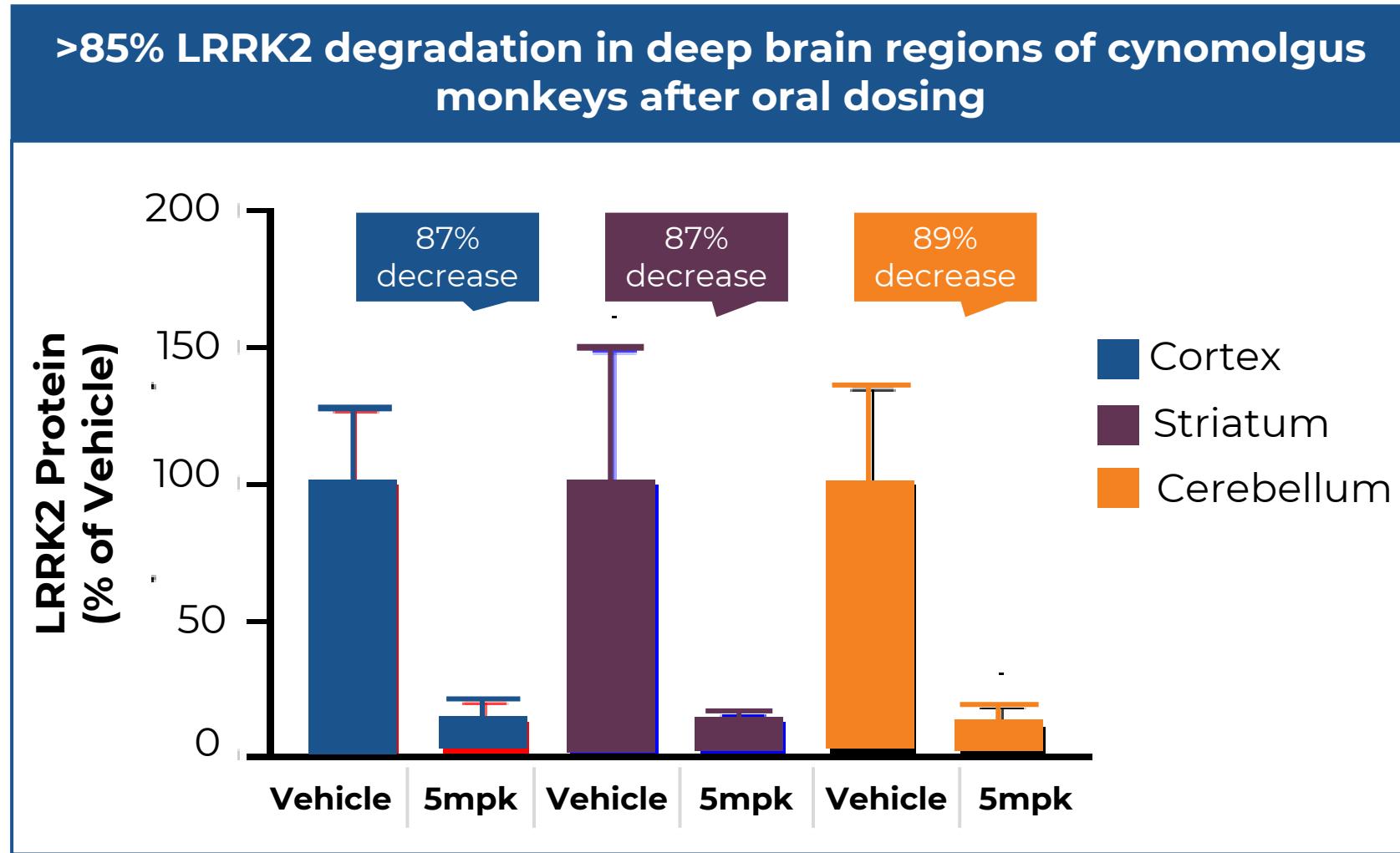
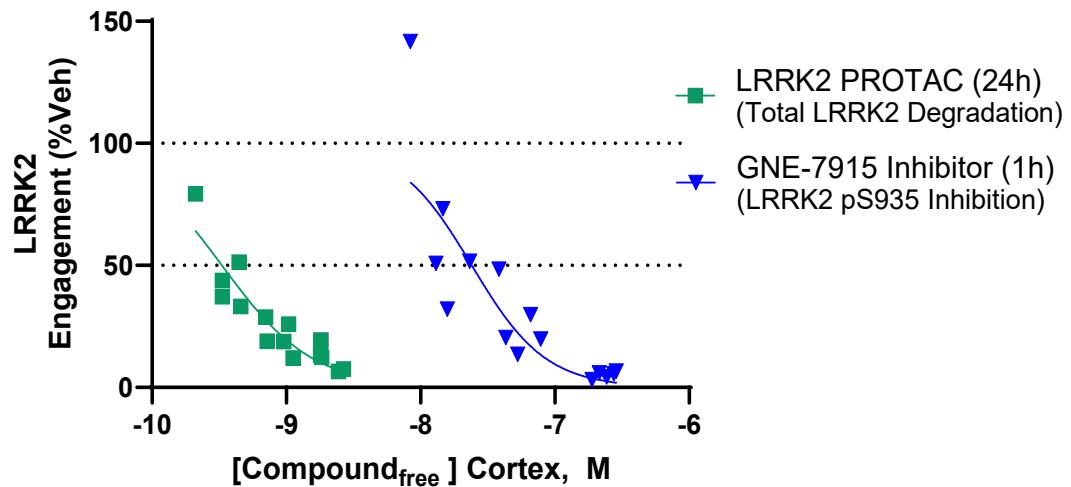


Figure modified from Beuriat et al. 2022

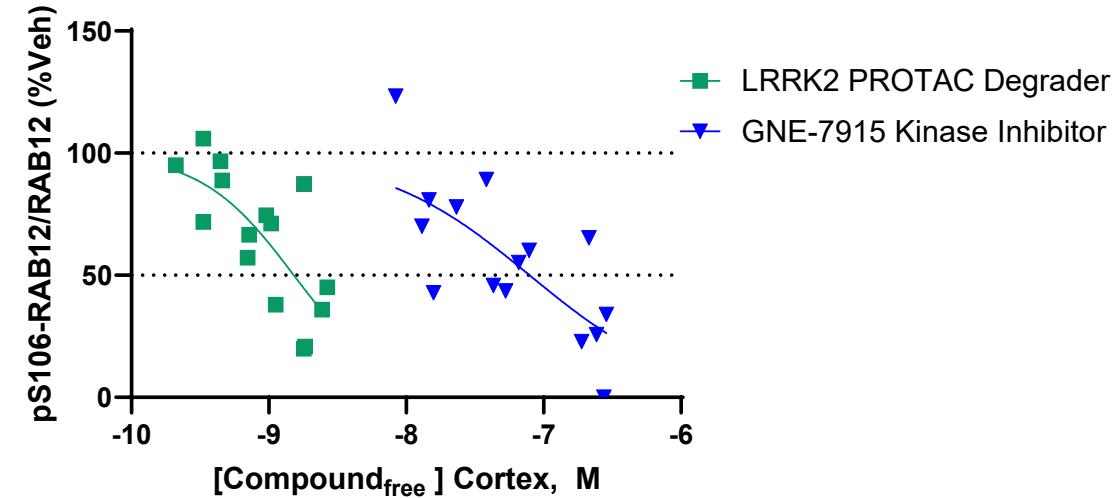
# PROTAC® LRRK2 degrader shows better target engagement, enhanced potency and pathway engagement versus a LRRK2 inhibitor

Iterative (catalytic) PROTAC advantage results stronger LRRK2 and lysosomal pathway engagement vs. a LRRK2 inhibitor<sup>a</sup>

LRRK2 PROTAC vs. Kinase inhibitor (Tmax)



Lysosomal Pathway Engagement (LRRK2 PROTAC vs. Inhibitor)



<sup>a</sup> G2019S familial Parkinson's Disease mouse model

LRRK2, Leucine-rich repeat kinase 2

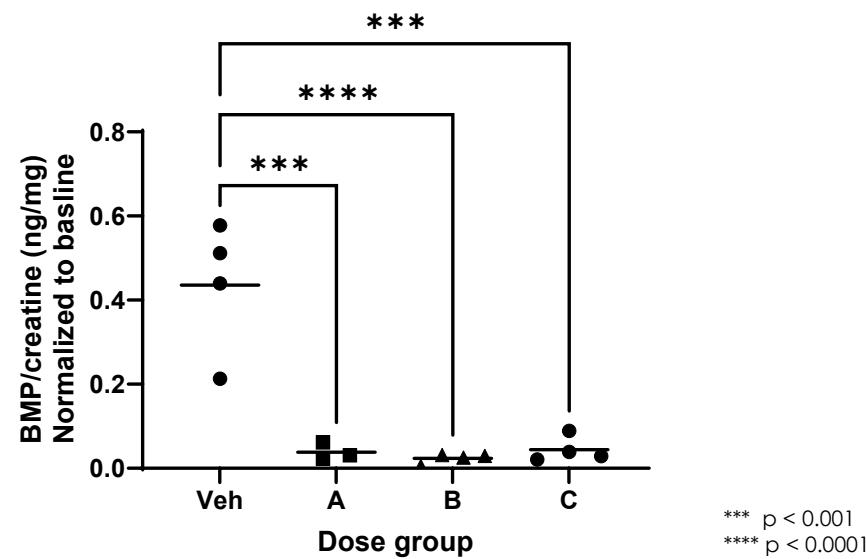
Data presented at 2023 Keystone Summit: Autophagy and Neurodegeneration

# Our LRRK2 degrader induces biomarker changes that reinforce confidence in the PROTAC® mechanism of action in the brain and periphery



## PROTAC-induced reductions observed in key lysosomal marker in cynomolgus monkey

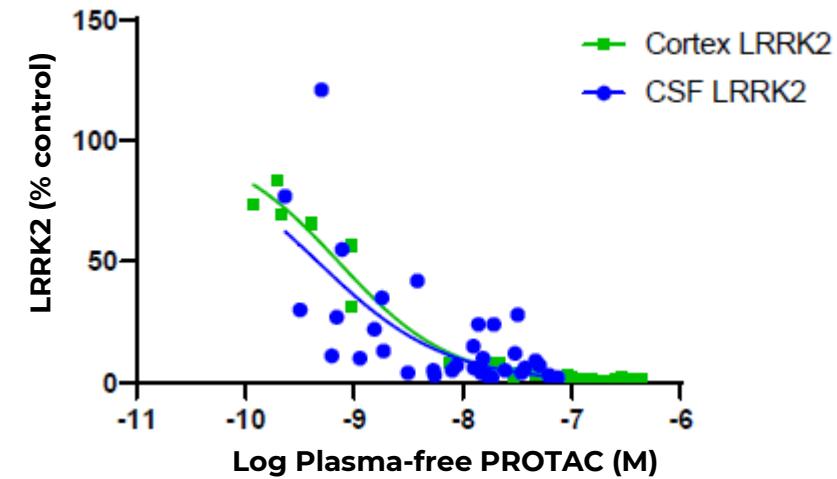
### BMP reductions in cynomolgus monkeys



BMP levels were measured by UPLC-MS/MS and normalized to creatinine and then expressed relative to baseline.

## PK/PD of LRRK2 reduction in cortex and CSF following oral dosing in cynos

### CSF LRRK2 reductions in cynomolgus monkeys; surrogate compartment for brain



Equivalent PK/PD supports the utility of measuring CSF LRRK2 as a surrogate for monitoring LRRK2 reductions in the brain.

# PROTAC® protein degraders have the potential to change the treatment paradigm in neurodegenerative diseases



## Preclinically, LRRK2 PROTAC protein degraders:

- Increase lysosome number and degradative capacity
- Reduce pathologic tau
- Degrade in deep brain regions following oral dosing
- Impact clinically relevant biomarkers in primates

## Opportunity for PROTAC protein degraders:

- Very few disease-modifying therapies exist
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- Potential to cross the blood brain barrier and degrade disease-causing proteins inside cells
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Phase 1 trial with LRRK2-targeting PROTAC (ARV-102) anticipated in 1H 2024

# Thank you - Team Arvinas!

