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Questions

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Q: Hello! I'm from Oshkosh, Wisconsin  
A: Glad you could join us! 1:54 PM

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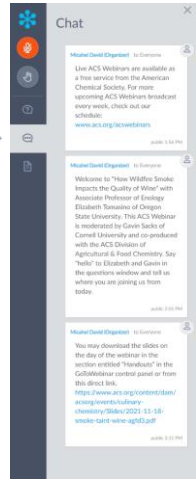


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Chat


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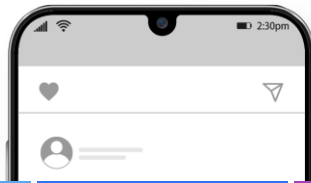


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4

## A Career Planning Tool For Chemical Scientists



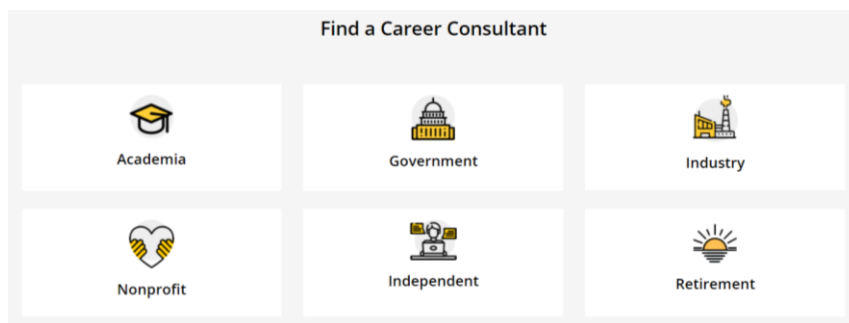
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5

5

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6

6

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October 5, 2023

**7 DEC** Careers in Academia  
December 7, 2023

**4 MAY** Careers in Industry  
May 4, 2023

**6 JUL** Is grad school right for me?  
July 6, 2023

**7 SEP** The Basics of Building Resilience  
September 7, 2023

**2 NOV** Finding and securing an internship  
November 2, 2023

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7

7

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8

8

## ACS Scholar Adunoluwa Obisesan

BS, Massachusetts Institute of Technology, June 2021  
(Chemical-biological Engineering, Computer Science & Molecular Biology)



*"The ACS Scholars Program provided me with monetary support as well as a valuable network of peers and mentors who have transformed my life and will help me in my future endeavors. The program enabled me to achieve more than I could have ever dreamed. Thank you so much!"*

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10

10





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11

11

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**Bonus Episode**  
Carolyn Bertozzi and K. Barry Sharpless chat about sharing the 2022 Nobel Prize in Chemistry  
December 6, 2022



**Bonus Episode**  
Bioorthogonal, click chemistry clinch the Nobel Prize  
October 5, 2022



**Episode #46**  
Lithium mining's water use sparks bitter conflicts and novel chemistry  
September 13, 2022



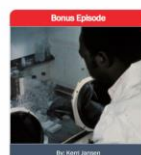
**Bonus Episode**  
Happy 100th birthday, John Goodenough!  
For John Goodenough's 100th birthday, Stereo Chemistry revisits a fan-favorite interview with the renowned scientist  
July 25, 2022



**Bonus Episode**  
Jess Wade on Wikipedia and work-life balance  
June 21, 2022



**Bonus Episode**  
The sticky science of why we eat so much sugar  
May 31, 2022



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12

12



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13

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14



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15

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<p><b>Inclusivity Style Guide</b> Designed to help staff and members use language and images that respect diversity in all its forms.</p> <p>→</p>	<p><b>ACS Webinars on Diversity</b> Covering diversity and inclusion at the workplace</p> <p>→</p>
<p><b>ACS Publications DEIR Hub</b> See what ACS Publications is doing for fostering inclusivity in scholarly publishing</p> <p>→</p>	<p><b>ACS Volunteer and ACS Meetings Code of Conduct</b> Fostering a positive and welcoming environment for attendees, volunteers and staff.</p> <p>→</p>
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Seeks to ensure fair treatment, equality of opportunity, and fairness in access to information and resources for all. We believe this is only possible in an environment built on respect and dignity. Equity requires the identification and elimination of barriers that have prevented the full participation of some groups.

#### Diversity\*\*

The representation of varied identities and differences (race, ethnicity, gender, disability, sexual orientation, gender identity, national origin, tribe, caste, socio-economic status, thinking, and communication styles, etc.) collectively and as individuals. ACS seeks to proactively engage, understand, and draw on a variety of perspectives.

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Builds a culture of belonging by actively inviting the contribution and participation of all people. Every person's voice adds value, and ACS strives to create balance in the face of power differences. In addition, no one person can or should be called upon to represent an entire community.

#### Respect

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16

16



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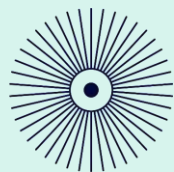
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18

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Mier., 29 de marzo, 2023 | 3:00-4:00pm ET

## La Manufactura Continua y la Química Verde

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## Nuclear Magnetic Resonance: Characterizing & Tailoring Polymers

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20


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## How Artificial Intelligence is Changing Drug Discovery


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Chief Executive Officer,  
Hepion Pharmaceuticals Inc.




**PATRICK R. MAYO, PhD**  
Senior Vice President,  
Clinical Pharmacology,  
Hepion Pharmaceuticals Inc.



**PANNA SHARMA**  
Chief Executive Officer,  
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Lantern Pharma, Inc.



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22

22

## We are in the Midst of a Massive Healthcare Crisis

For the most part, people are asymptomatic in the earlier stages of disease

### NAFLD

non-alcoholic fatty liver disease



**“Fatty liver” disease**  
associated with obesity,  
diabetes, hypertension, etc.



**Approx. 25% of global population**  
Up to 100 million in U.S.

### NASH

non-alcoholic steatohepatitis



**A more severe form of NAFLD,**  
with inflammation and liver  
scarring (fibrosis)



**1.5 – 6.5% globally**  
Up to about 20 million people in  
U.S.

### HCC

hepatocellular carcinoma



**Most prevalent type (90%) of liver cancer & liver cancer is 2 most common cancer-related death\***



**>905,000 new cases and >830,000 deaths globally\***  
**>30,000 new cases annually in U.S.\* with 5-year survival of 18%\*\***

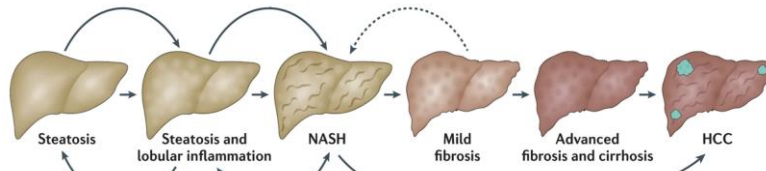


Image adapted from "From NASH to HCC: current concepts and future challenges", Anstee et al. (2019)

\*The Global Cancer Observatory (GloboCan), December 2020

\*\*UpToDate, February 2022

23

23

## Why Develop a Drug for NASH?

- No currently approved drugs for the treatment of NASH
- NAFLD/NASH may be asymptomatic with no simple and convenient diagnostic to identify subjects early in disease progression
- Symptoms may only appear when disease has progressed to the point where disease associated fibrosis is well established
- Consequences of NASH may be severe (need for liver transplant, cancer, cardiovascular disease, and death)

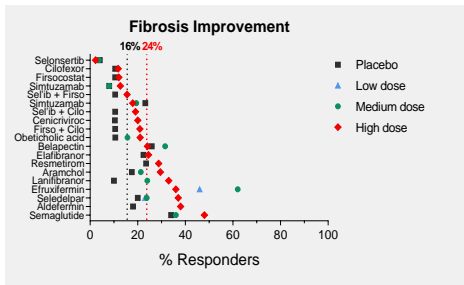


24

24



## The Challenges Nash Drug Development



**Regulatory agencies require improvement in several indices of NASH by analysis of liver biopsies:**

- Fatty deposits, cell death, inflammation and/or liver scarring (fibrosis)

**Most study outcomes have been disappointing:**

- Relatively high placebo responses
- Low responses on histologic endpoints from most candidate drugs
- Several drug candidates have been discontinued

**How can we fix the poor response rates?**

25

25

## Challenges to Achieve Development and Commercial Success AI can provide a pathway to success

### NASH

- Multifactorial disease processes – metabolism, inflammation, fibrosis
- In general, NASH drugs have poor response rates
- How can we commercialize a drug with poor response rates?

### 1. Need for Disease Modifying Drugs

- Need to develop drugs that target later stages of disease and reverse fibrosis

### 2. Need for Companion Diagnostic(s)

- Disease typically asymptomatic
- Biopsies problematic
- Develop an AI to monitor subjects in clinical trials

### 3. Need for Commercial Strategy

- Identify which subjects are best suited for our drug – target the best patient population
- Address Market Access considerations

26

26

## Summary of Rencofilstat Programs – ‘Pipeline within a Product’

Program	Pre-Clinical	Phase 1	Phase 2	Phase 3
<b>NASH</b> <i>Fast Track Designation</i>	[Progress bar spanning Pre-Clinical, Phase 1, and Phase 2]			Biopsy Liver Function
<b>Hepatocellular Carcinoma</b> <i>Orphan Drug Designation</i>	[Progress bar spanning Pre-Clinical and Phase 1]			
<b>Multiple Myeloma</b>	[Progress bar in Pre-Clinical]			
<b>Prostate Cancer</b>	[Progress bar in Pre-Clinical]			
<b>Idiopathic Pulmonary Fibrosis</b>	[Progress bar in Pre-Clinical]			
<b>Renal Fibrosis</b>	[Progress bar in Pre-Clinical]			
<b>Cardiac Fibrosis</b>	[Progress bar in Pre-Clinical]			

27

27



## WHAT IS ARTIFICIAL INTELLIGENCE (AI)?

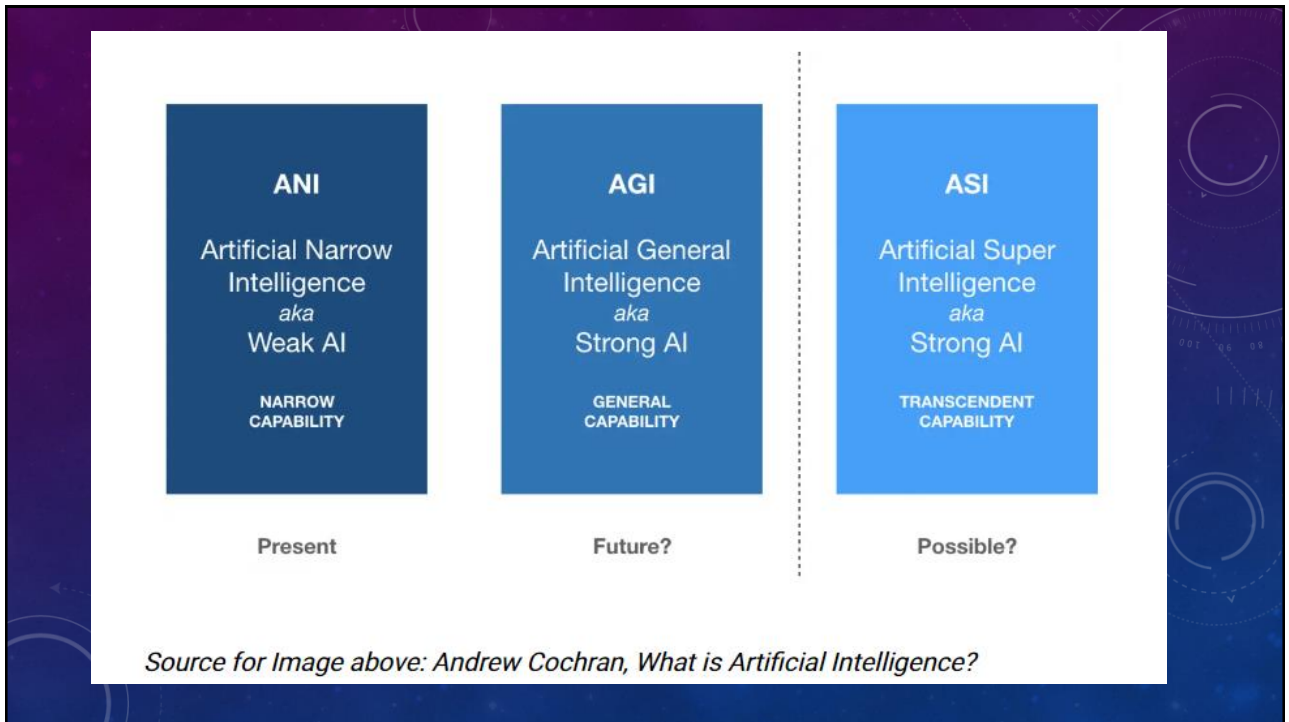
### A STRICT DEFINITION

The area of computer science that studies how machines can closely imitate human intelligence.

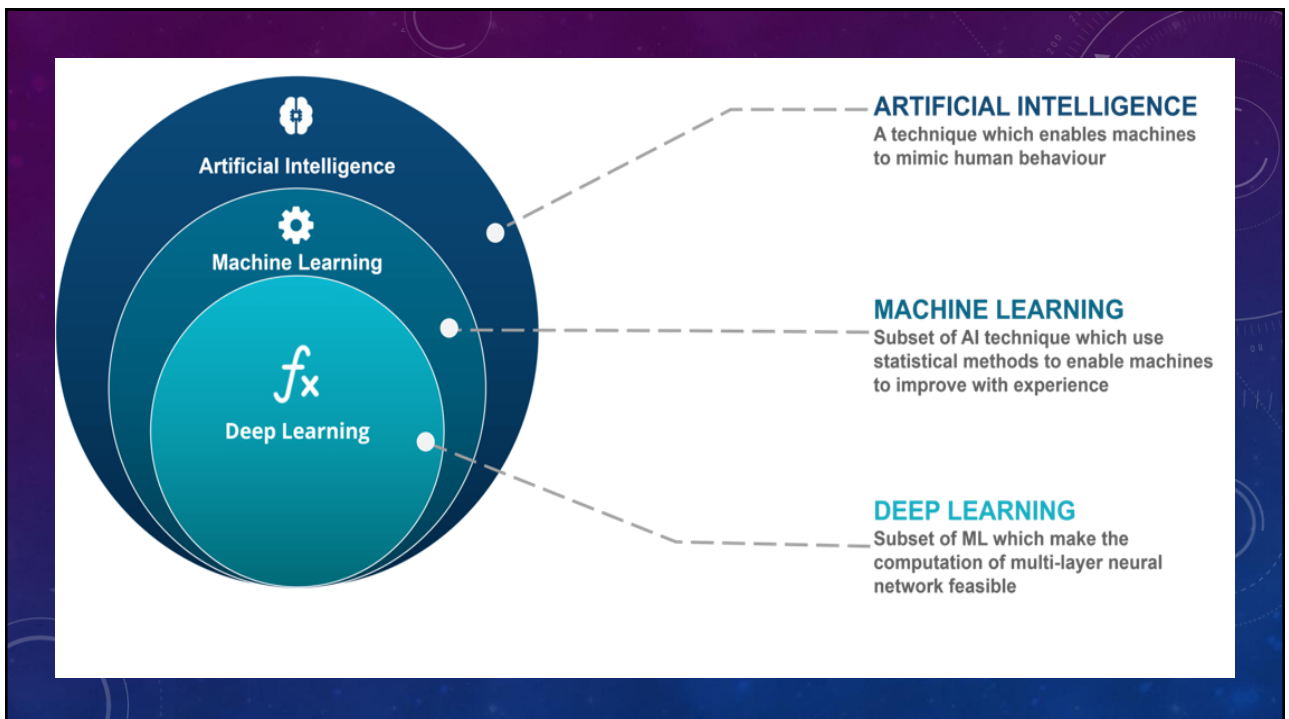
### A WORKING DEFINITION

The area of computer science that studies how machines can perform tasks that would normally require a sentient agent.

28

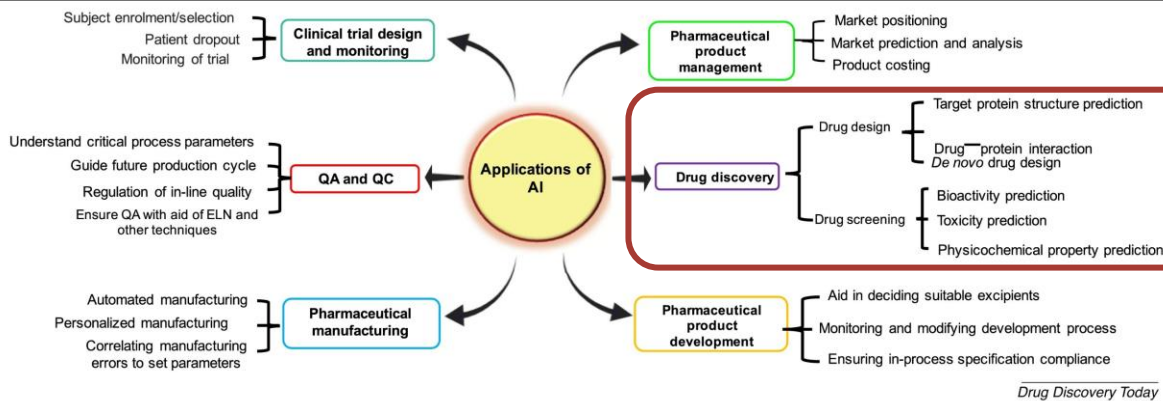


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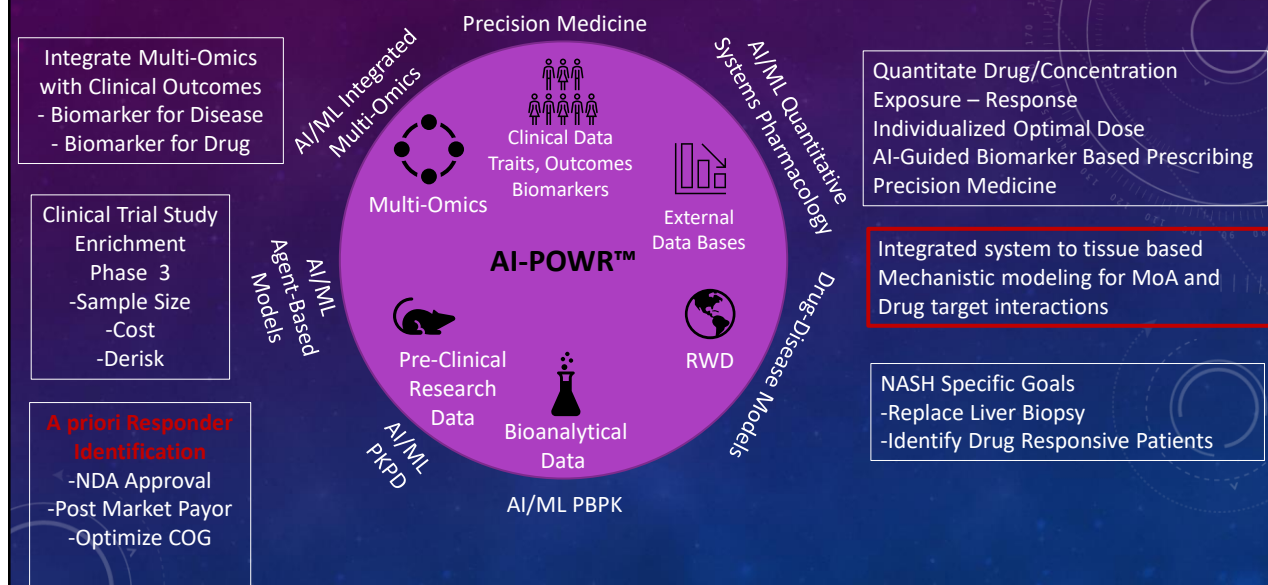
# AI/ML USE IS CHANGING DRUG DEVELOPMENT ACROSS THE FULL SPECTRUM OF DEVELOPMENTAL FUNCTIONS



Paul D, Sanap G, Shenoy S, Kalyane D, Kalia K, Tekade RK. Artificial intelligence in drug discovery and development. Drug discovery today. 2021 Jan;26(1):80.

31

## AI-POWR: AI/ML DRUG-DISEASE MODEL BASED DRUG DEVELOPMENT



32







# Lantern Pharma Inc.

## How AI is Transforming Drug Development

March 23<sup>th</sup>, 2023

Leveraging A.I., machine learning & genomics to transform the cost, pace, and timeline of oncology drug discovery and development

NASDAQ :LTRN

35

## Forward Looking Statements

This presentation contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These forward-looking statements include, among other things, statements relating to: future events or our future financial performance; the potential advantages of our RADR<sup>®</sup> platform in identifying drug candidates and patient populations that are likely to respond to a drug candidate; our strategic plans to advance the development of our drug candidates and antibody drug conjugate (ADC) development program; estimates regarding the development timing for our drug candidates and ADC development program; expectations and estimates regarding clinical trial timing and patient enrollment; our research and development efforts of our internal drug discovery programs and the utilization of our RADR<sup>®</sup> platform to streamline the drug development process; our intention to leverage artificial intelligence, machine learning and genomic data to streamline and transform the pace, risk and cost of oncology drug discovery and development and to identify patient populations that would likely respond to a drug candidate; estimates regarding patient populations, potential markets and potential market sizes; sales estimates for our drug candidates and our plans to discover and develop drug candidates and to maximize their commercial potential by advancing such drug candidates ourselves or in collaboration with others. Any statements that are not statements of historical fact (including, without limitation, statements that use words such as "anticipate," "believe," "contemplate," "could," "estimate," "expect," "intend," "seek," "may," "might," "plan," "potential," "predict," "project," "target," "model," "objective," "aim," "upcoming," "should," "will," "would," or the negative of these words or other similar expressions) should be considered forward-looking statements. There are a number of important factors that could cause our actual results to differ materially from those indicated by the forward-looking statements, such as (i) the impact of the COVID-19 pandemic, (ii) the risk that our research and the research of our collaborators may not be successful, (iii) the risk that none of our product candidates has received FDA marketing approval, and we may not be able to successfully initiate, conduct, or conclude clinical testing for or obtain marketing approval for our product candidates, (iv) the risk that no drug product based on our proprietary RADR<sup>®</sup> AI platform has received FDA marketing approval or otherwise been incorporated into a commercial product, and (v) those other factors set forth in the Risk Factors section in our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the Securities and Exchange Commission on March 20, 2023. You may access our Annual Report on Form 10-K for the year ended December 31, 2022 under the investor SEC filings tab of our website at [www.lanternpharma.com](http://www.lanternpharma.com) or on the SEC's website at [www.sec.gov](http://www.sec.gov). Given these risks and uncertainties, we can give no assurances that our forward-looking statements will prove to be accurate, or that any other results or events projected or contemplated by our forward-looking statements will in fact occur, and we caution investors not to place undue reliance on these statements. All forward-looking statements in this presentation represent our judgment as of the date hereof, and, except as otherwise required by law, we disclaim any obligation to update any forward-looking statements to conform the statement to actual results or changes in our expectations.

36

# Using AI, Lantern is Transforming Drug Discovery Timelines and Cost

Lantern has launched **9 programs** in two years, and is anticipating launching Multiple Phase 1 trials in 2023

## Lantern's Drug Development Model



Large Scale/Multi-omics  
Oncology Data



Proprietary AI  
platform RADR®



Accelerated timeline  
and reduced cost

### Transforming Early Stage Discovery & Development

Traditional Model



3 - 5 + Years



\$10 - 50 + Million

Reduces  
**Significant**  
Time & Cost

Lantern's Model

2 Years

\$1-5 Million

"In around two years, Lantern has progressed its GBM program from initial RADR® insights, to wet lab validation, to late stage IND enabling studies - significantly cutting typical drug development timelines and cost"

([Biopharmatrend, 2022](#))

### Sharpening Later Stage Clinical Trials

Traditional Model



6 - 12 + Years



\$100 - 500 + Million

Reduces  
**Significant**  
Time & Cost

Lantern's Model

3-5 Years

\$25-100 Million

"AI-driven patient stratification helps to focus clinical trials with potentially fewer and more select patients, which are more likely to respond, ultimately saving time and money"

(Panna Sharma)

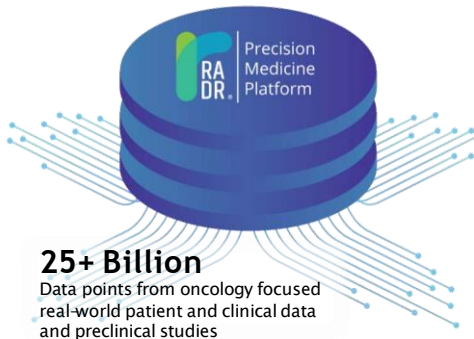
# RADR® is Lantern's AI and ML Platform that Powers Oncology Drug Discovery and Development



Precision  
Medicine  
Platform

## Response Algorithm for Drug Positioning & Rescue

A proprietary integrated data analytics, experimental biology, oncology-focused, machine-learning-based platform focused on drug development



**80%+**

Prediction  
Success

**130K+**

Patient  
Records

**154+**

Drug-tumor  
interactions

**200+**

Advanced ML  
Algorithms

**Leverages** cutting edge machine-learning approaches and techniques to generate powerful data-driven insights

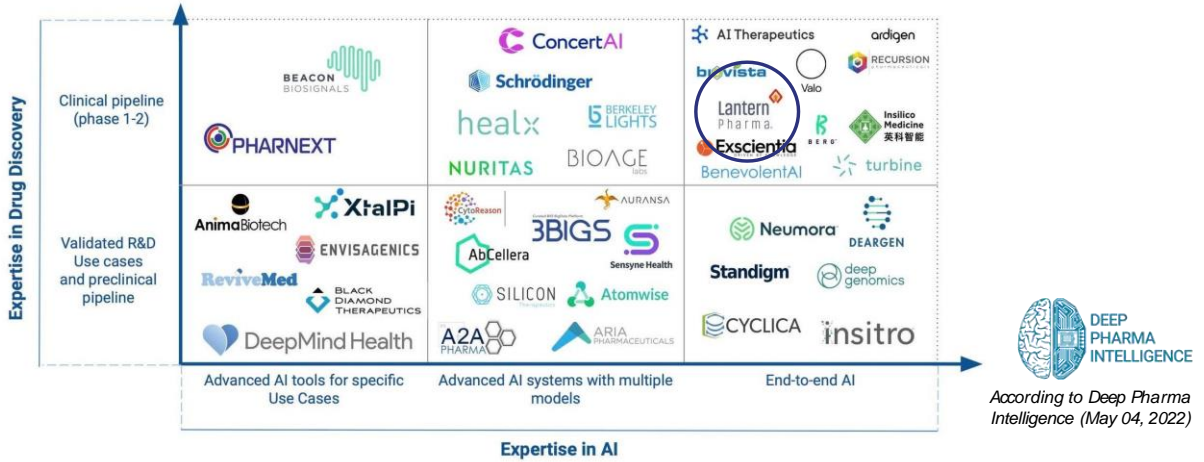
**Enables** rapid informatics based hypothesis generation which can be validated in wet-lab

**Uses** biology driven machine-learning algorithms to achieve higher prediction accuracy in real world settings

**Employs** a platform that is scalable, robust, expanding and replicable to support a range of drug development needs

# Lantern Pharma is a Top 10 End-to-End AI Drug Discovery Company

## Comparison of Top-40 Leading AI for Drug Discovery Companies Expertise in Drug Discovery R&D



39

# RADR® has 4 Multi-Faceted Modules that are Facilitating Oncology Drug Discovery and Development of Lantern and its Collaborators

### Discover Mechanism of Action

Use RADR® to find potential Mechanism of Action (MoA) of the Compound / Drug

### Identify New Disease Indications

Identify and prioritize type/subtype of cancer for your compound with use of RADR®

### Determine Optimal Drug Combinations

Use different algorithms and methods from RADR® to find potential Drug combinations

### Generate ML-Driven Biomarker Signatures for Patient Selection

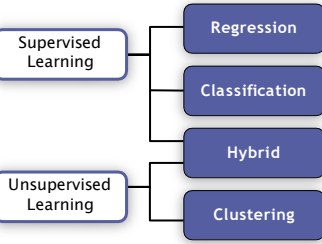
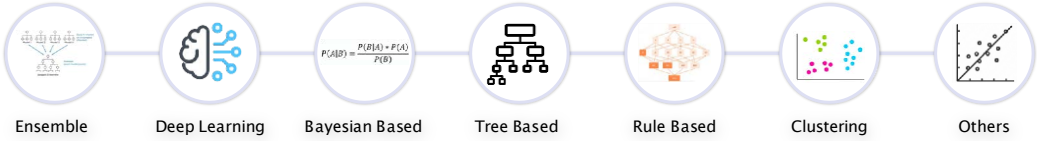
RADR® can derive Machine Learning based gene signatures, which can guide biomarker strategies and CDx (Companion Diagnostics)

40



# RADR®'s Library of Over 200+ Advanced Algorithms Powers its Multi-Faceted Modules

## Example RADR® Algorithms



### Examples

- Predicting drug sensitivity values, e.g. IC50
- Predicting blood brain barrier (BBB) permeability of a compound
- Predicting synergy values by combining compounds
- Identifying patient populations that can be targeted through a MoA
- Stratifying patients as responder, partial-responder, or non-responder
- Biomarker pattern-based patient clustering
- Predicting outcomes for companion diagnostic usage in a clinical trial

- Diversity of algorithms allow us to handle various input data types and solve different biological problems
- Lantern has filed patents for ensemble algorithms in cancer drug development

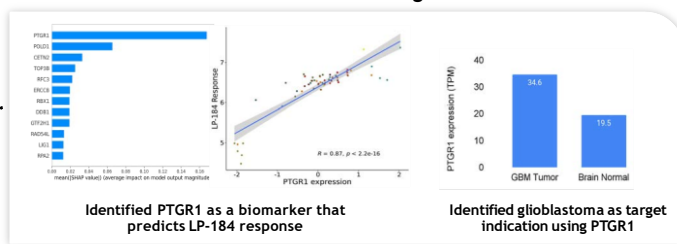
41

# RADR®'s Framework to Develop Actionable AI Insights Using Billions of Datapoints

## Input Data



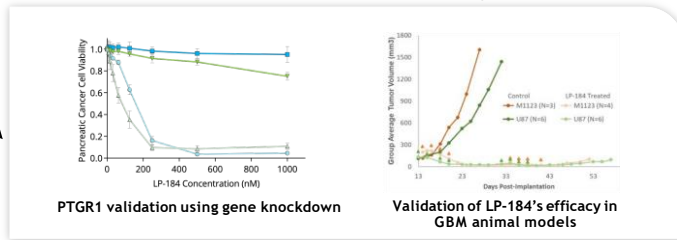
## RADR® Derived Insights



## Actionable Insights



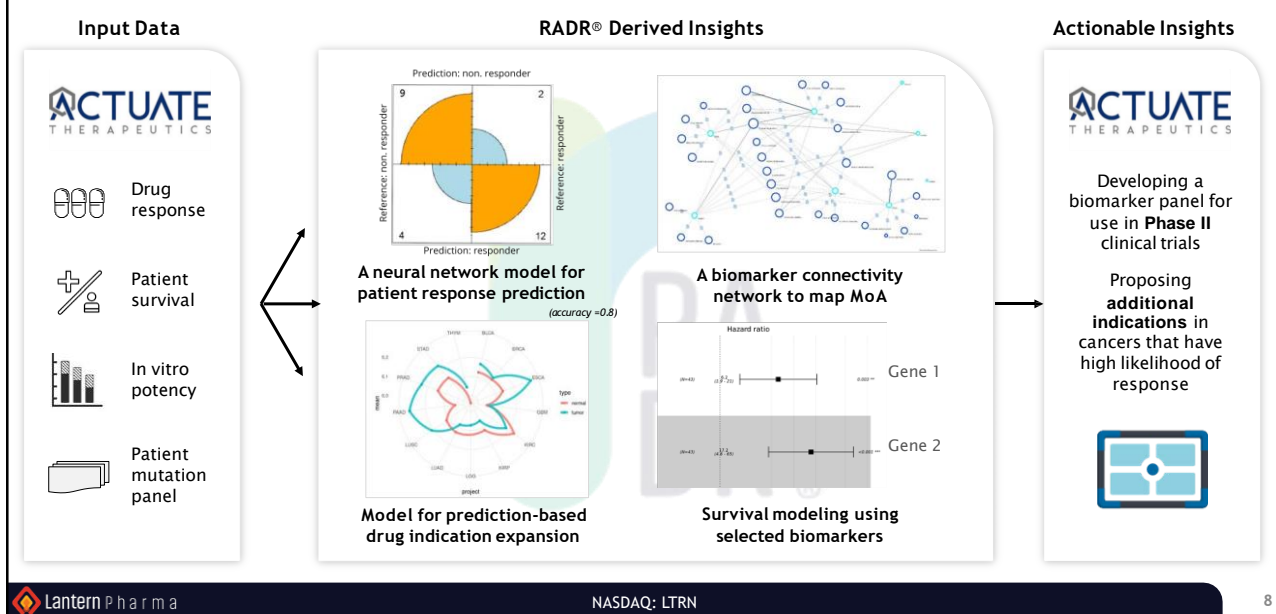
## Validation of RADR® Derived Insights



42

## RADR® Facilitates the Rapid and Cost-effective Development of Drug Assets

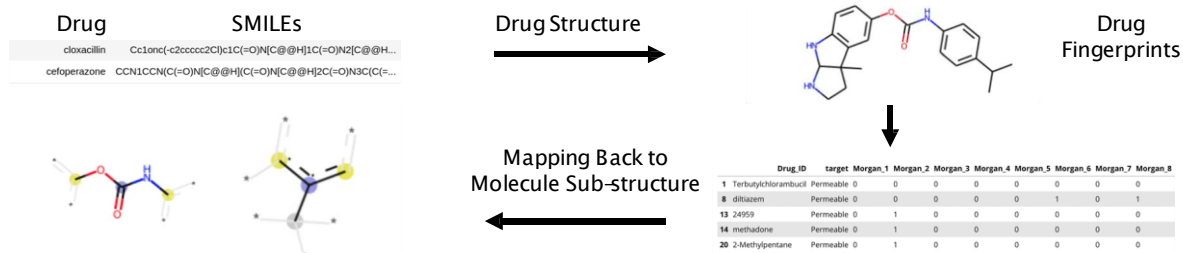
Framework of Lantern's RADR® collaboration with Actuate Therapeutics



43

## RADR® Is a Top Performing A.I. Platform for Predicting a Drug's Blood Brain Barrier Permeability

Using the drug SMILE structure information, RADR® can create more than 4500 features that represent the atomic properties of a drug, including fingerprints and descriptors



Comparing the RADR derived model performance using the [TDC](#) (Therapeutics Data Commons)

TDC_Fgp_Brocattelli Leaderboard	Rank	Model	AUROC
TDC_BB_Rartias Leaderboard	1	Treebag	0.928

Leaderboard					
Rank	Model	Contact	Link	#Params	AURC
1	BaseBoosting	Andrew Li	GitHub, Paper	23	0.923
2	XCBoost	Hao Tian	GitHub, Paper	29	0.905
3	SimGCN	Suman Kalyan Bera	GitHub, Paper	1,103,000	0.901

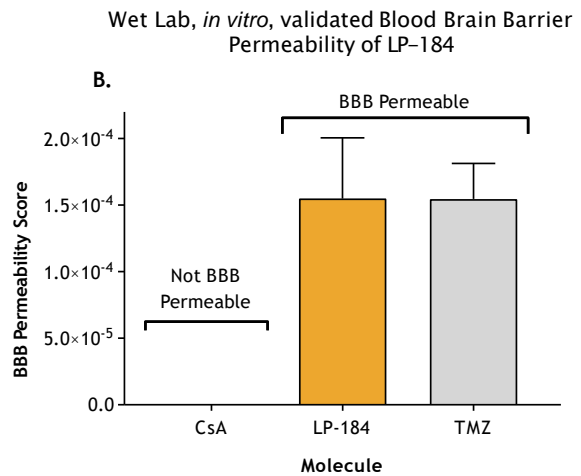
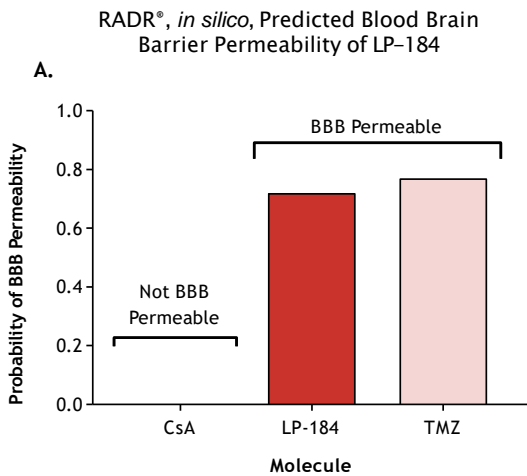
RADR® derived model is the top ranked model on the TDC leaderboard

Lantern Pharma

9

44

## RADR®'s Blood Brain Barrier Predictions Validated in the Wet Lab

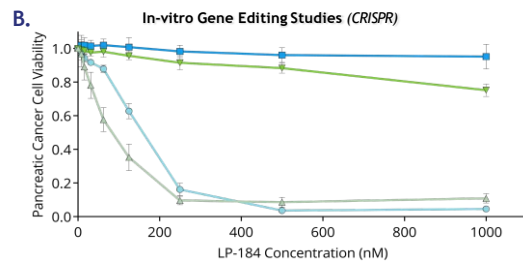
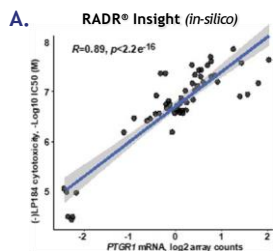


45

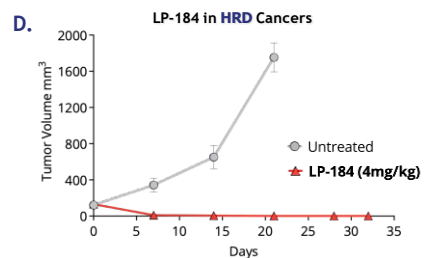
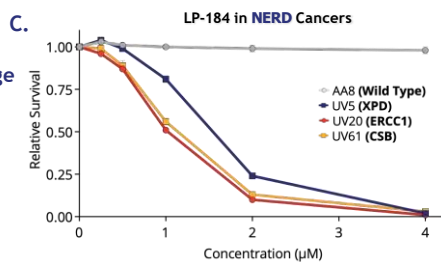
## LP-184 has a Unique Mechanism of Action Leveraging Synthetic Lethality

LP-184's MoA was predicted by RADR® and validated with in-vitro/in-vivo studies

**PTGR1 activates LP-184 into its highly potent and cytotoxic form**  
 In-vitro experiments confirmed the RADR® insight and that LP-184 was highly potent in cells with overexpression of PTGR1



**LP-184 shows exquisite potency in cancers with deficiencies in DNA damage repair (DDR) pathways**  
 including cancers with nucleotide excision repair (NERD) and homologous repair deficiencies (HRD)



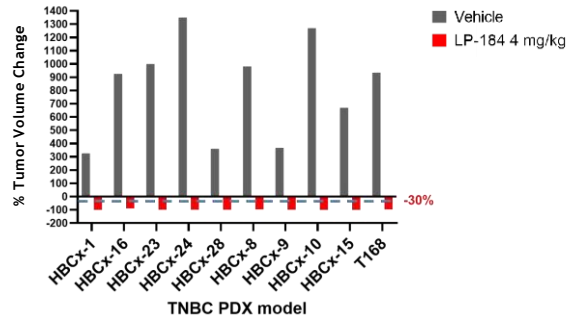
46

## Cancer Models with Common DNA Damage Response Deficiencies are Highly Sensitive to LP-184 Treatment

PDX model	Cancer type	IC50 (nM)	DDR Mutations
ctg1194	NSCLC	31	ATM
ctg2440	Prostate	31	PMS2
ctg1522	Pancreatic	45	ATR, BRIP1, PARP1
ctg2532	NSCLC	54	CHEK1, FANCA, NBN, RAD50
ctg3167	Prostate	54	BRCA2, ATM, FANCA, FANCI, FANCM
ctg3537	Prostate	54	BRCA2, CDK12, FANCI, RAD54L,
ctg0166	NSCLC	57	ATM, FANCD2, NBN
ctg1643	Pancreatic	57	BRCA1, BRIP1,
ctg2429	Prostate	92	ATM, ATR, PALB2,
ctg0302	Pancreatic	110	BRCA2, ATM, BLM, FANCA
ctg1680	NSCLC	140	PARP2
ctg0192	NSCLC	200	BRCA1, RAD54L
ctg3337	Prostate	230	RAD51C
ctg0314	Pancreatic	270	BRCA2, CDK12, PALB2
ctg0381	Pancreatic	2,900	ATM, BRCA1, BRCA2

- PDX-derived cell lines with mutations in key HR and NER genes are **highly sensitive to LP-184**
- Only 1 model was not highly sensitive to LP-184 (highlighted in blue)

### LP-184 Completely Inhibits Tumor Growth in Triple Negative Breast Cancer (TNBC) PDX Mouse Models



- Across 10 TNBC PDX mouse models LP-184 treatment resulted in 107-141% tumor growth inhibition
- All 10 TNBC PDX models were HR deficient
- 7/10 TNBC models were resistant to PARP inhibitors Olaparib/ Niraparib and to doxorubicin/ cyclophosphamide

## Lantern and NCI A.I.-Driven Collaboration Identify ATRT Sensitivity to LP-184 - Published in *Frontiers in Drug Discovery*

 **frontiers** | Frontiers in **Drug Discovery**

Artificial intelligence platform, RADR<sup>®</sup>, aids in the discovery of DNA damaging agent for the ultra-rare cancer Atypical Teratoid Rhabdoid Tumors

Joseph McDermott<sup>1\*</sup>, Drew Sturtevant<sup>1</sup>, Umesh Kathad<sup>1\*</sup>, Sudhir Varma<sup>2\*</sup>, Jianli Zhou<sup>1</sup>, Aditya Kulkarni<sup>1</sup>, Neha Biyani<sup>1</sup>, Caleb Schimke<sup>1</sup>, William C. Reinhold<sup>2</sup>, Fathi Eloumi<sup>2</sup>, Peter Carr<sup>1</sup>, Yves Pommier<sup>2</sup> and Kishor Bhatia<sup>1</sup>

 **Lantern Pharma.**

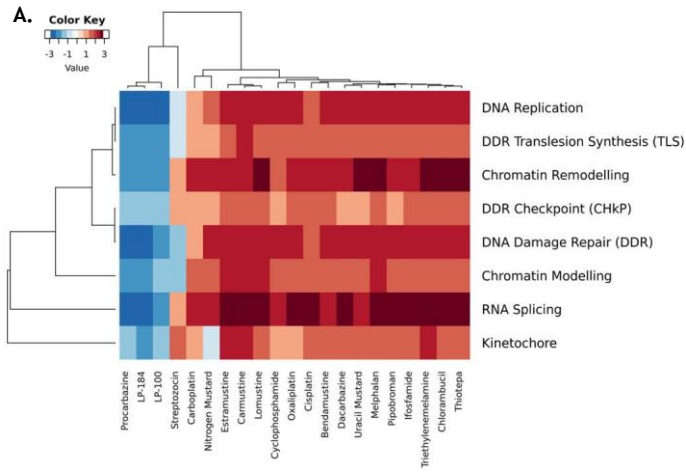
 **NIH NATIONAL CANCER INSTITUTE**

- Systematic comparison of drug activity demonstrated key differences among alkylating agents that inform positioning
- Integrated multi-omic data bioinformatic analysis provides a rationale to examine potential use of LP-184 in cancers with loss of *SMARCB1* and *SMARCA4*, such as ATRT
- Using small number of patient tumor RNA-seq samples, RADR<sup>®</sup> predicted extreme drug responsiveness of LP-184 for ATRT
- RADR<sup>®</sup> A.I. Insights were validated by *in vitro* and *in vivo* experiments.
- A.I. driven models for drug discovery can be widely used for other rare cancers.

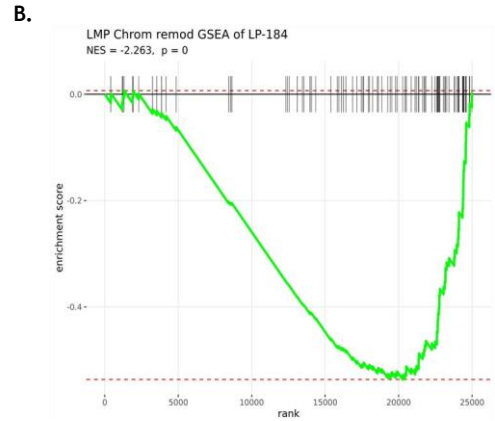


## Gene Enrichment Analysis Predicts Cancers Deficient in DNA Damage Repair/Chromatin Remodeling to be Uniquely Sensitive to LP-184

LP-184 Response is Strongly Correlated With Gene Sets Involved with DNA Repair and Chromatin Remodeling



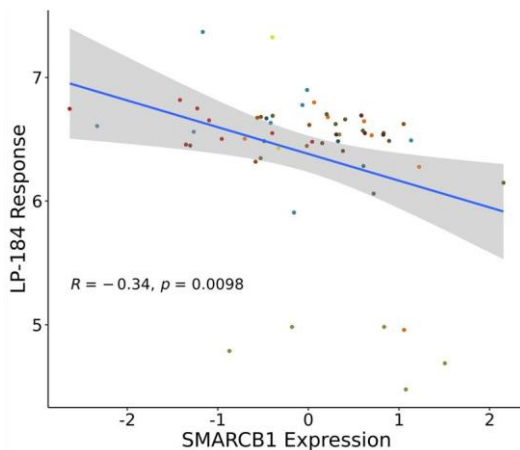
Gene's Associated with Chromatin Remodeling are Strongly Negatively Correlated with LP-184



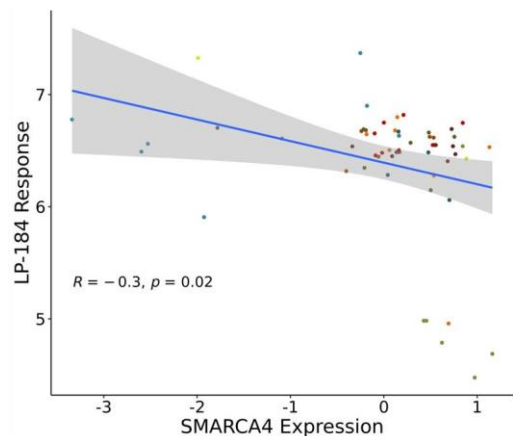
49

## Sensitivity to LP-184 is Significantly Negatively Correlated With Driver Mutations of ATRT

**A.** LP-184 Sensitivity is Negatively Correlated with SMARCB1 Gene Expression



**B.** LP-184 Sensitivity is Negatively Correlated with SMARCA4 Gene Expression

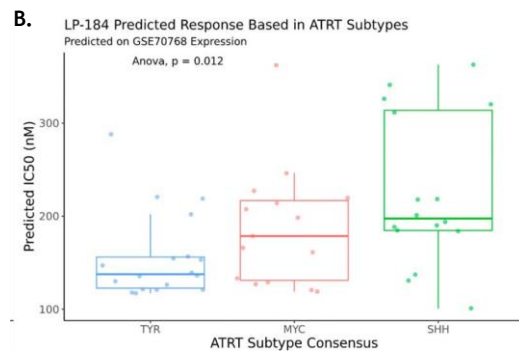
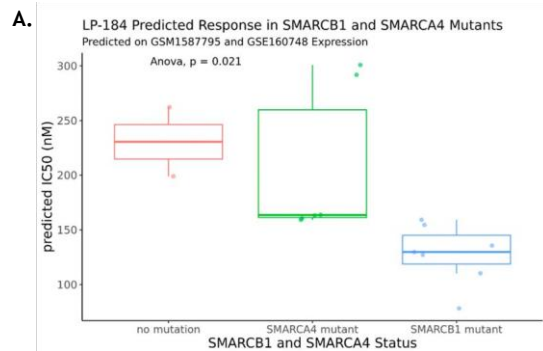


50

## RADR® Predicts ATRT Sensitive in Patients with Limited Patient Gene Expression Data

M.L. model prediction of LP-184 sensitivity in ATRT patients with either no SMARCB1 mutation, a SMARCB1, or SMARCA4

M.L. prediction of LP-184 sensitivity in ATRT patients with different genetic SMARCB1 genetic subtypes



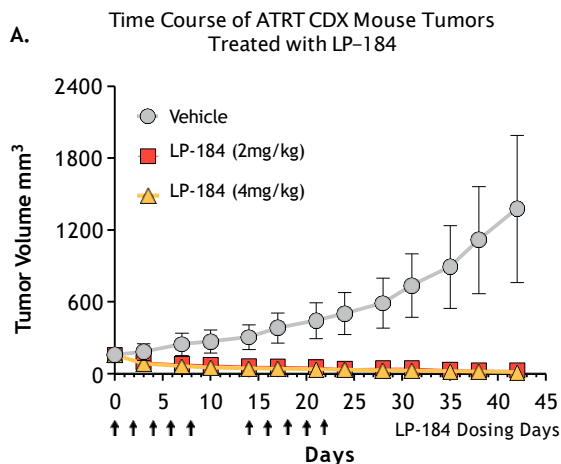
51

## Atypical Teratoid Rhabdoid Tumor Cancer Cells are Exceptionally Sensitive to LP-184 - Validating RADR® Predictions

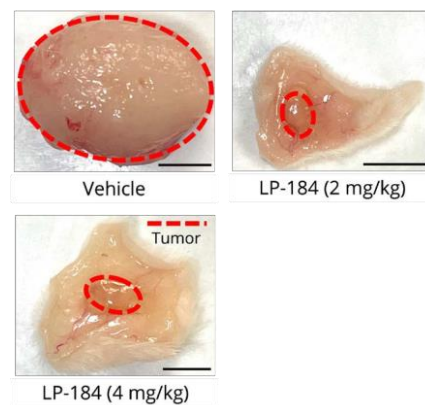


### CDX ATRT mouse model treated with LP-184

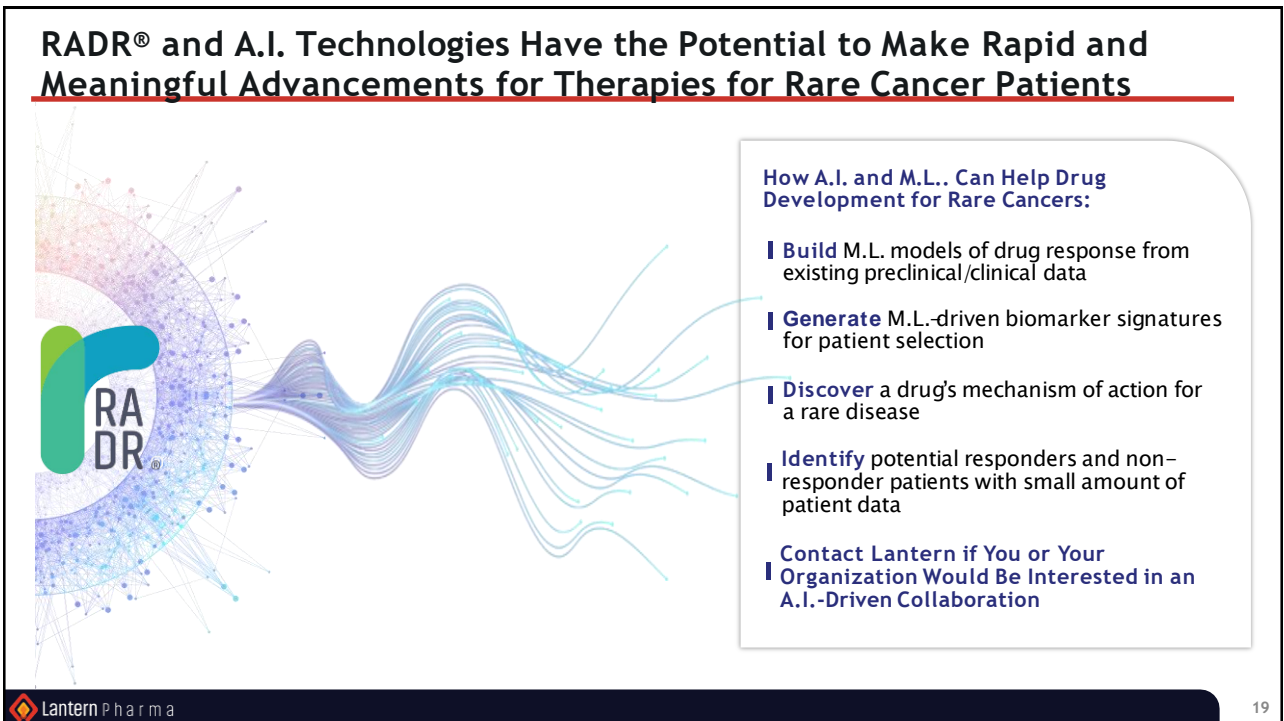
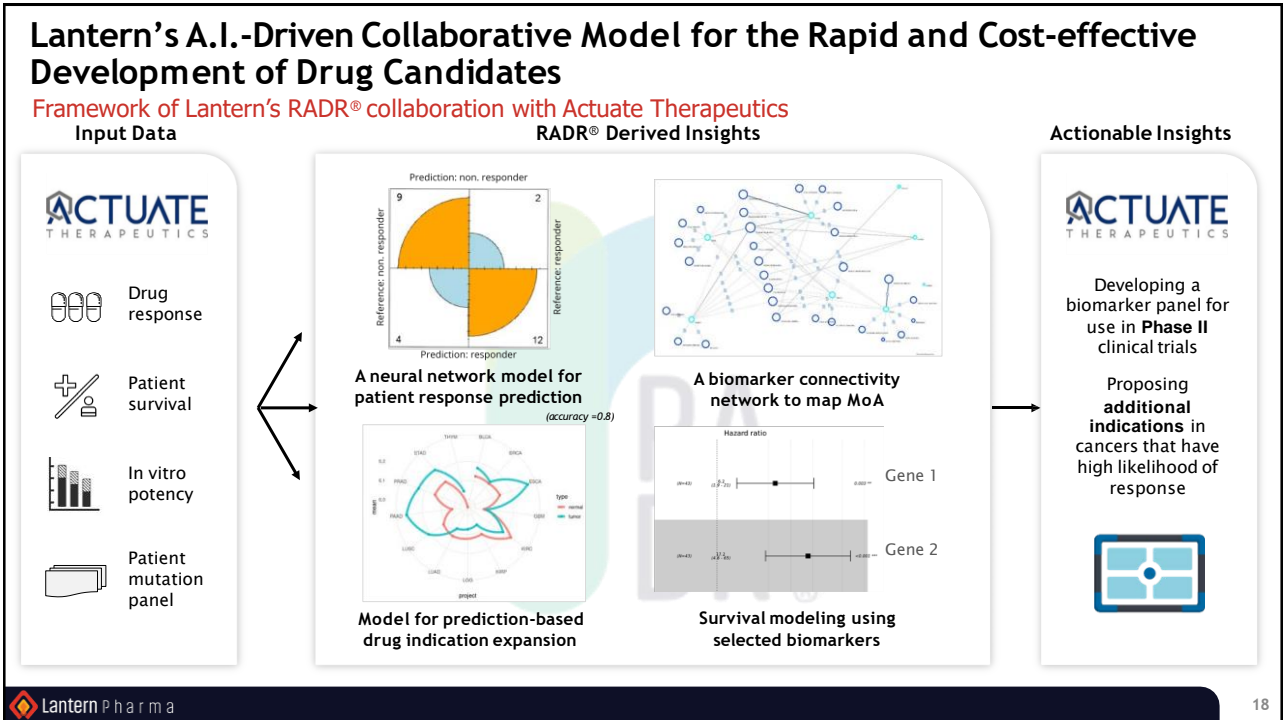
LP-184 treatment leads to near-complete tumor regression in ATRT mouse xenograft models



**B.** Terminal ATRT Mouse Tumor Sizes After Treatment of Vehicle or LP-184



52





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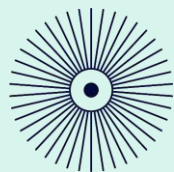
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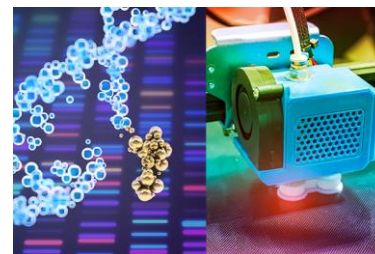
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