

Aptose Corporate Presentation

July 2022



PRECISION ONCOLOGY FOR
THERAPIES OF TOMORROW

NASDAQ: APTO
TSX: APS

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Aptose Biosciences (NASDAQ: APTO)

Building a pipeline of “Best in Class” targeted therapies to serve cancer patients with hematologic malignancies

- Precision therapeutics designed to provide **single agent efficacy** and to be used in combination with conventional anti-cancer therapies and other targeted therapies
- Targeting key drivers of disease in cancer cells without overlapping toxicities to provide **efficacy with safety to improve the quality of life for cancer patients**

Investor highlights

- **Experienced leadership team** with deep expertise in kinase inhibitors & orphan hematologic diseases
- Clinical stage oncology company with **two highly differentiated myeloid kinase inhibitors**

HM43239 lead precision medicine as primary value driver

- Safely achieved single agent efficacy
- **Multiple complete responses (CR); response rates up to 40%+**
- Profile supports **single agent accelerated path**; clinical development progressing to combination therapy
- Positioned to become a preferred agent for broad commercial use
- **Value-driving clinical updates and milestones through 2022 and 2023**
- Value potential: Market Cap. \$75M, \$294M June 2021; 52-Week range: high \$3.13, low \$0.73



Aptose Biosciences: Clinical Stage Pipeline of Differentiated Myeloid Kinase Inhibitors

HM43239 oral myeloid kinase inhibitor clinically validated for R/R AML patients

- Clinically Safe & Effective** | **25-44% ORR** in Phase 1/2 Trial with **CRs in diverse & difficult to treat R/R AML patients**
- Near-term Value Creation** | Expansion Trials begin 2022 as passage into Registrational Studies planned for 2023
- Orphan and Fast Track** | Designations earned with impressive clinical responses across AML populations
- Broad Market Opportunities** | Across R/R and front line, fit and unfit, induction and maintenance therapies

LUXEPTINIB (CG-806) dual lymphoid and myeloid kinase inhibitor

- High Value Targets** | B-cell cancers, AML/MDS and inflammation: BTK, FLT3, LCK, LYN, Others
- Activity in Ill Patients** | Difficult to treat R/R B-cell lymphoma/CLL and R/R AML patients
- Improved Formulation** | G3 formulation being explored to reduce drug substance and increase plasma exposure

Aptose Leadership Team: Multifaceted Expertise in Therapeutic Development



Rafael Bejar, MD, PhD

Sr. VP & Chief Medical Officer



William G. Rice, PhD

Chairman, President & Chief Executive Officer



Fletcher Payne

Sr. VP & Chief Financial Officer



Philippe Ledru

Sr. VP & Chief Commercial Officer



Aptose SAB: Distinguished Opinion Leaders with Deep Oncology Expertise



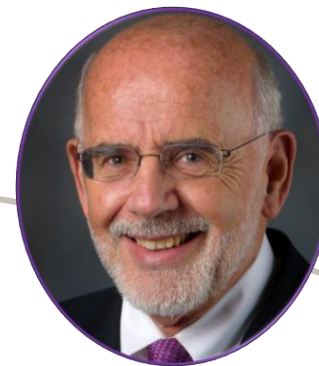
Daniel Von Hoff, MD, FACP

Former President of AACR
Board Member of ASCO
Former Presidential Cancer Advisory Board
Physician in Chief, TGen
Medical Director of Research for McKesson Specialty Health
Chief Scientific Officer for US Oncology Research
Professor of Medicine, Mayo Clinic Scottsdale



Brian J. Druker, MD

Pioneer in the field of precision medicine
Key Role in development of Gleevec - the first targeted kinase inhibitor for cancer
Member, National Academy of Medicine, National Academy of Sciences & American Academy of Arts & Sciences
Winner of Karnofsky Award, Lasker Award, Japan Prize in Healthcare and Medical Technology, Tang Prize in Biopharmaceutical Science, Sjöberg Prize
Leader of Inter-institutional Beat AML Initiative



Michael Andreeff, MD, PhD

Renowned hematology specialist
Professor of Medicine
Paul and Mary Haas Chair in Genetics
Chief, Section of Molecular Hematology and Therapy
MD Anderson Cancer Center
Expert in AML and other hematologic malignancies
Expert in drug resistance and drug mechanisms







HM43239 “239”

Oral, Daily, Myeloid Kinase Inhibitor

AML in the US: Estimated 20,240 new cases and 11,400 deaths in 2021

Continued Unmet Need for More Effective and Safe Therapies

Epidemiology	 US (2021)	 EU5 (2020)	 Japan (2021)	 China (2020)
Leukemia Incidence ³	61,090 ¹	51,820 ³	14,600 ⁷	85,400
AML Incidence	20,240²	16,580 ^{3a}	6,570 ^{7c}	31,430 ^{3b}
5-Year Prevalence (Leukemia) (2020) ³	187,560	152,230	41,280	241,750
Mortality (Leukemia)	11,400 (AML)²	31,690	8,700 ⁷	61,690



Deadly and heterogeneous cancer with 5-year survival rate at diagnosis of approx. 29%

Relapsed AML patients have a median life expectancy of < 6 months* with approved therapies

Need more effective & better tolerated targeted agents

- **DURABILITY** to achieve **lasting remissions** and **extend meaningful/quality life**
- **SAFETY** for **maintenance / MRD+ therapy** and for **drug combination therapy**
- **BREADTH** to **better treat R/R AML patients** and **overcome resistance** to current agents

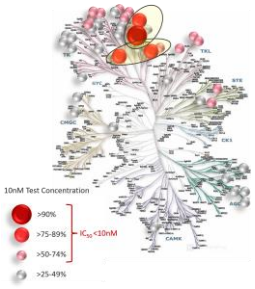
Safe and effective agents expected to expand AML market and command significant market share

Sources: 1. SEER 2021 Leukemia; 2. SEER 2021 AML; 3. The Global Cancer Observatory (GLOBOCAN) - IACR (2020) - Projections; 4. Chihara et al. Br J Haematol. 2014; 5. Chen et al. J Hematol Oncol. 2010; 21; 6. Cancer.net; 7. Ganjoho Cancer Statistics in Japan 2021
*<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7486485/> *<https://www.frontiersin.org/articles/10.3389/fonc.2021.649209/full>

^aEU5 incidence calculated by applying 32% (AML) on leukemia to obtain incidence of AML⁶
^bIn China, AML accounted for ~36.8% of all leukemias⁵ ^cIn Japan, AML accounted for ~45% of all leukemias in 2008⁴

HM43239 Effective and Well Tolerated Targeted Agent

Proven Broad Clinical Activity in AML Patients to Treat Significant Unmet Needs



Validated AML Targets

SYK, FLT3^{WT/MUT}, JAK1/2, cKIT^{MUT}

Single Agent CRs

CR and No DLT at 3 dose levels

ORR 25% in TP53^{MUT} R/R AML

Harboring adverse mutations

ORR 43% in FLT3^{MUT} R/R AML

CRs in patients failed prior FLT3i

Broad Therapeutic Window

No drug-related SAE, QTc toxicities, or CK increases

Accelerated Paths to Market in R/R Disease

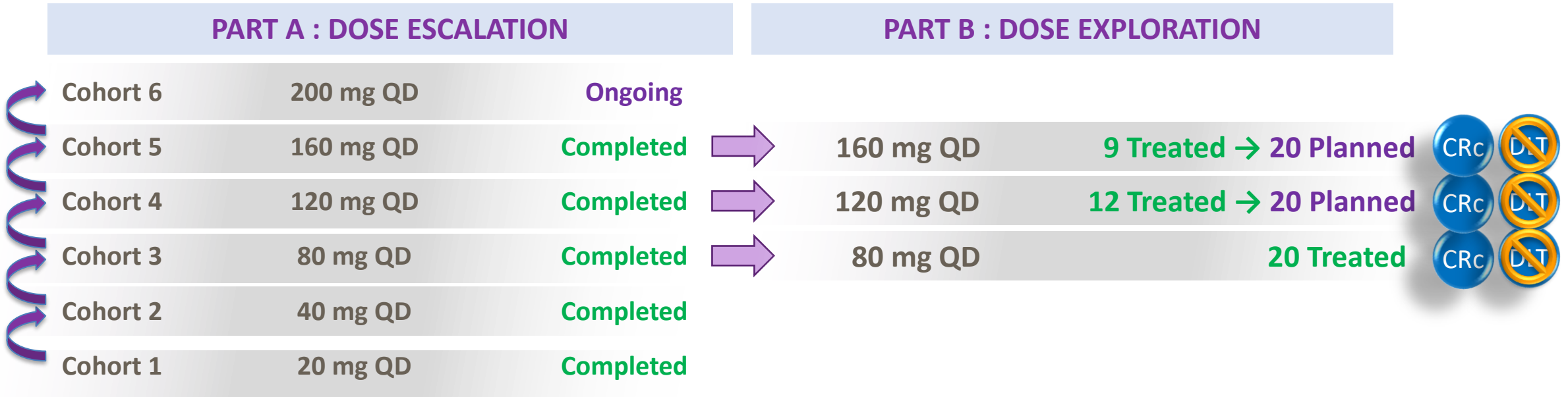
HM43239
AML Kinase Inhibitor

Broad Market Potential

R/R, 1L, Maintenance/MRD+/Combination

Emerging Clinical Data Support HM43239 as Potential Superior Therapy

HM43239 Phase 1/2 Study in R/R AML: Ongoing Dose Escalation & Dose Exploration



Favorable safety profile: No drug related SAE or death and no observed relation between delta-QTc throughout the trial. And no DLT through 160 mg dose level.

Dose Exploration continues across several cohorts: currently enrolling patients at 120 mg and 160 mg dose levels and plan to explore 40 mg dose level

HM43239 Safety and Efficacy Data Revealed a Broad Therapeutic Window as a Single Agent in R/R AML Patients

- **Safety Profile Favorable to Date**

- No drug related SAE, deaths, or AE of elevated CK (creatine kinase)
- No drug related AE of QT prolongation – No observed relation between Δ QTc and dose
- No DLT up to 160 mg and one DLT of muscle weakness (not rhabdomyolysis) at 200 mg

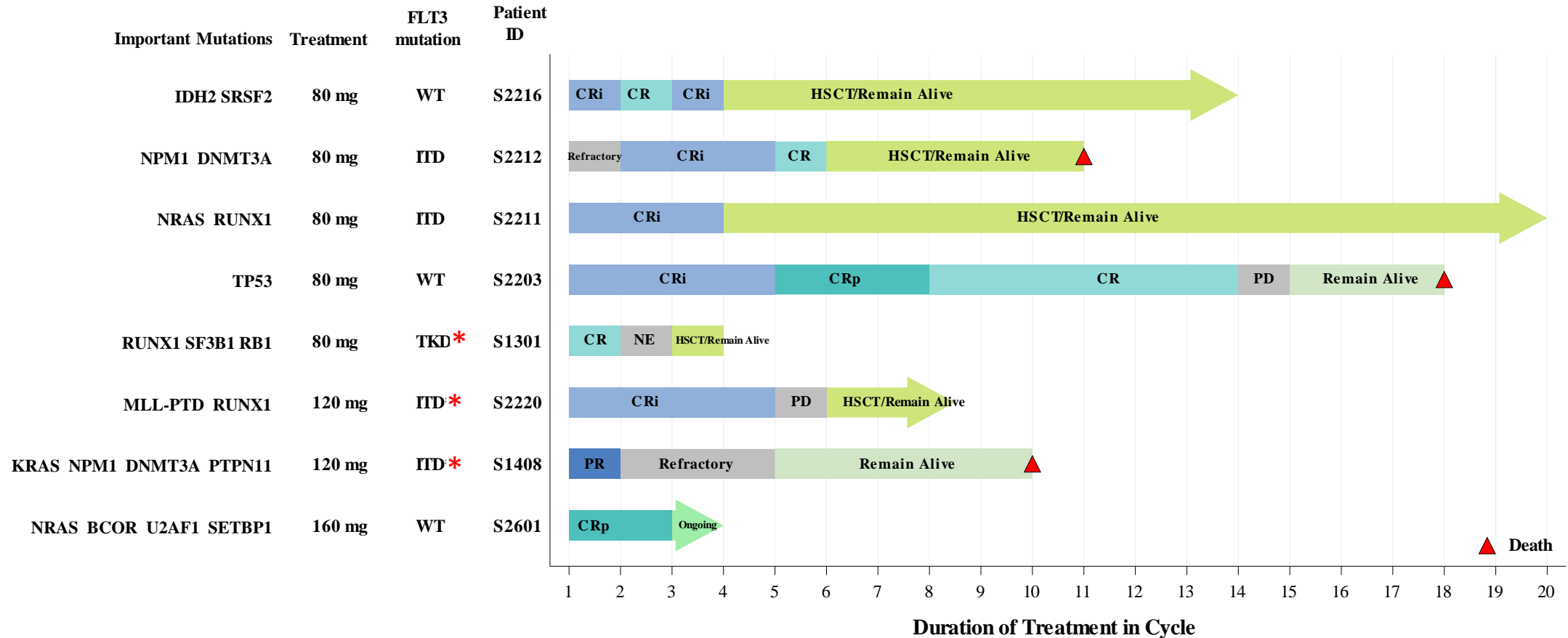
- **Demonstrated Efficacy Across a Diverse Set of R/R AML Patients**

- **CRc in AML with Adverse Mutations (FLT3^{WT})** incl. TP53-Mutant and Complex Karyotype)
- **CRc in FLT3-Mutant AML (Fast Track)** incl. Prior Failure of Other FLT3 Inhibitors

- **Identified a Broad Therapeutic Window**

- **Safely achieved efficacy at 3 separate dose levels** (80 mg, 120 mg, 160 mg) with no DLT
- Demonstrated **broad therapeutic range** across safe dose levels
- Safety profile supports **combination therapy with other agents**

HM43239 Diversity of R/R AML Patients Who Achieved a Clinical Response to Date in Phase 1/2 Study



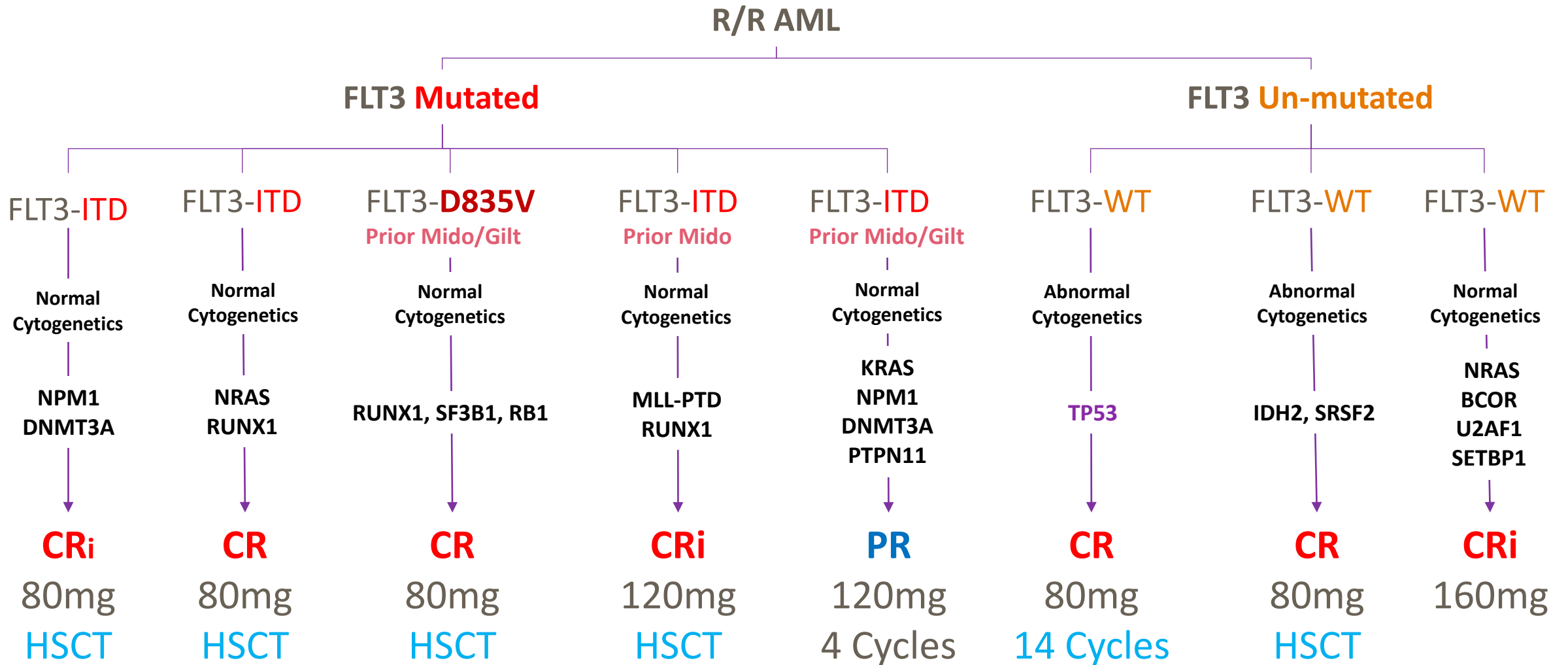
Abbreviation: CR, complete response; CRi, complete response with incomplete hematologic recovery; CRp, complete response with incomplete platelet recovery; HSCT, hematopoietic stem cell transplantation; NE, not evaluable; PD, progressive disease; PR, partial remission.
 Note: 'Ongoing' means treatment is still ongoing; 'Remain Alive' indicates patients' status in follow-up after treatment termination; The right arrow at the end of horizontal bar indicates patients are still on study, whereas without the right arrow indicates patients discontinued from study.
 Note: Each response assessed at a regular visit is considered to have started 1 cycle before the assessment; however the start of the response is considered the integer part of (study day/28) if the response occurred at the End of Treatment visit.

*Indicates patients who received prior FLT3 inhibitors, including gilteritinib and/or midostaurin.

Data as of July 14, 2022

HM43239 AML Patients with Best Clinical Responses to Date

Observed 7 CRc and 1 PR in Diverse and Challenging Patient Populations



HM43239 Overall Response Rate (CRc + PR)

7 CRc and 1 PR to Date in Phase 1 as a Single Agent in R/R AML Patients

Mutation Status	All Patients			Evaluable Patients		
	N = 45 Patients	Number Responders	Response Rate	N = 41 Patients	Number Responders	Response Rate
FLT3+	20	5	25%	19	5	26.3%
FLT3+ with prior FLT3i	7	3	42.9%	7	3	42.9%
FLT3-WT	25	3	12%	22	3	13.6%
TP53+	4	1	25%	3	1	33.3%

Overall Response Rate for "All Patients" and "Evaluable Patients" Receiving ≥ 80mg HM43239

- Findings represent a snapshot in time: The reported safety, tolerability, PK, PD and efficacy findings reported herein represent the data available may change as additional patients are assessed and more data are collected.
- "Evaluable Patients" removes those non-evaluable patients who did not have a response evaluation and had no other evidence indicating refractory disease in the peripheral blood.
- Most CRc patients went to HSCT and cannot be evaluated for transfusion independence assessment.

Abbreviation: CR, complete remission; CRc, composite complete remission; CRp, complete remission with incomplete platelet recovery; CRi, complete remission with incomplete hematological recovery; PR, partial remission. Note: efficacy evaluable patients include all patients with at least 80% drug compliance during Cycle 1 or who had reported a DLT during Cycle 1, and who reported relevant data for efficacy interpretation such as bone marrow assessment, CBC counts, reason for treatment termination.

^[1] Overall response includes CRc and PR.

^[2] CRc includes CR, CRh, CRp and CRi.

^[3] The reported prior FLT3 inhibitors include gilteritinib, midostaurin and sorafenib.

Data as of July 14, 2022

HM43239 Potential for Accelerated Path Supported by Expansion & Registration Trials

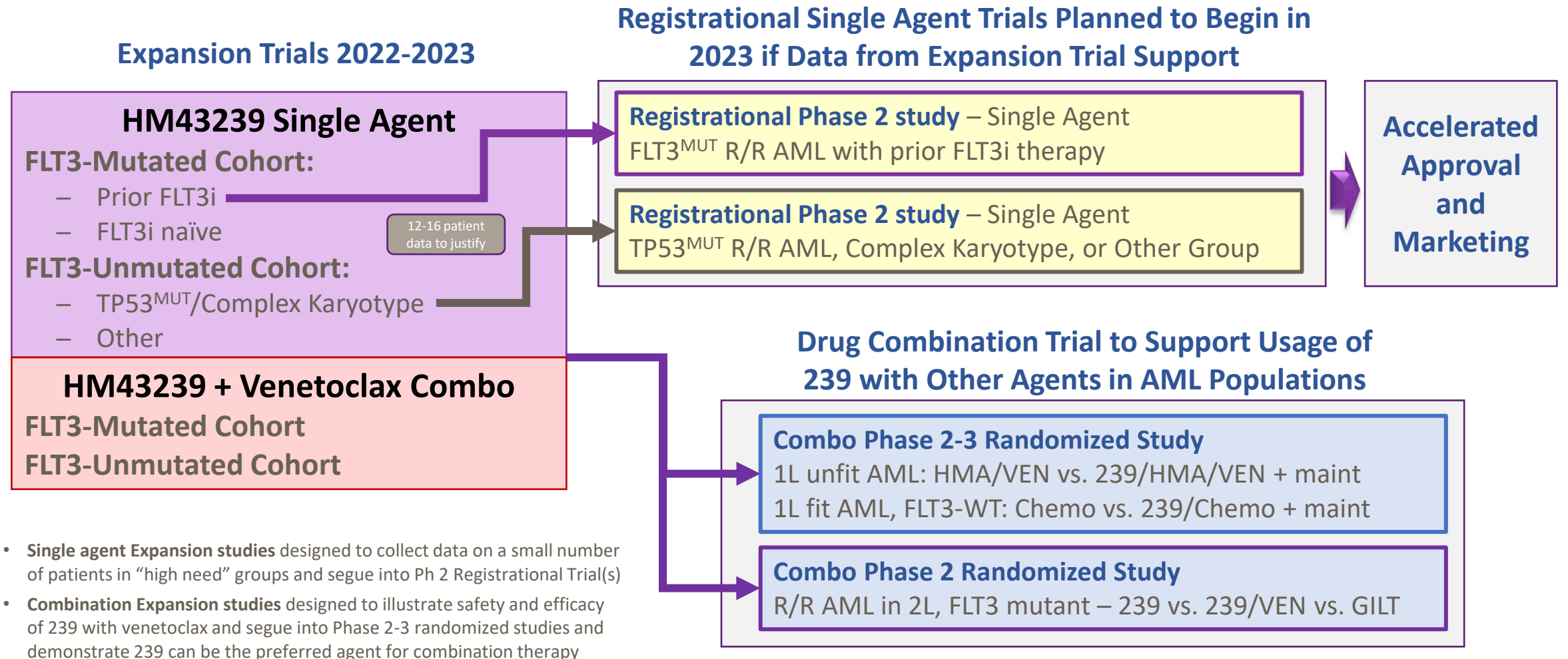
Current Dose Escalation/Dose Exploration Phase 1/2 Trial in R/R AML Patients

- Continue **Exploration of Molecular Subgroups (Genotypes)** for **Potential Fast Track Designations**
 - Expect Continued Dose Exploration at 120 mg and 160 mg to **Deliver Rolling News Flow**
- Selected **3 Expansion Doses** (80 mg, 120 mg, 160 mg) and **Patient Populations** for Expansion Trials

Transitioning to Expansion Trials in AML Patients as Run-up to Registrational Trials

- **120 mg** planned as **Primary** Single Agent Expansion Dose with **80 mg** and **160 mg** as Bracketing Doses
- **FLT3 Mutated R/R AML Expansions (Fast Track Designation)**, including Prior FLT3i Failure
 - Plan Single Agent to begin 2H2022 and Combination (239+Ven) to begin 1H2023
- **FLT3-Unmutated R/R AML Expansions** (with Adverse Mutations), including TP53-Mutated
 - Plan Single Agent to begin 2H2022 and Combination (239+Ven) to begin 1H2023
- **Registrational Trial(s)** planned to begin 2H2023 via segue from Expansions

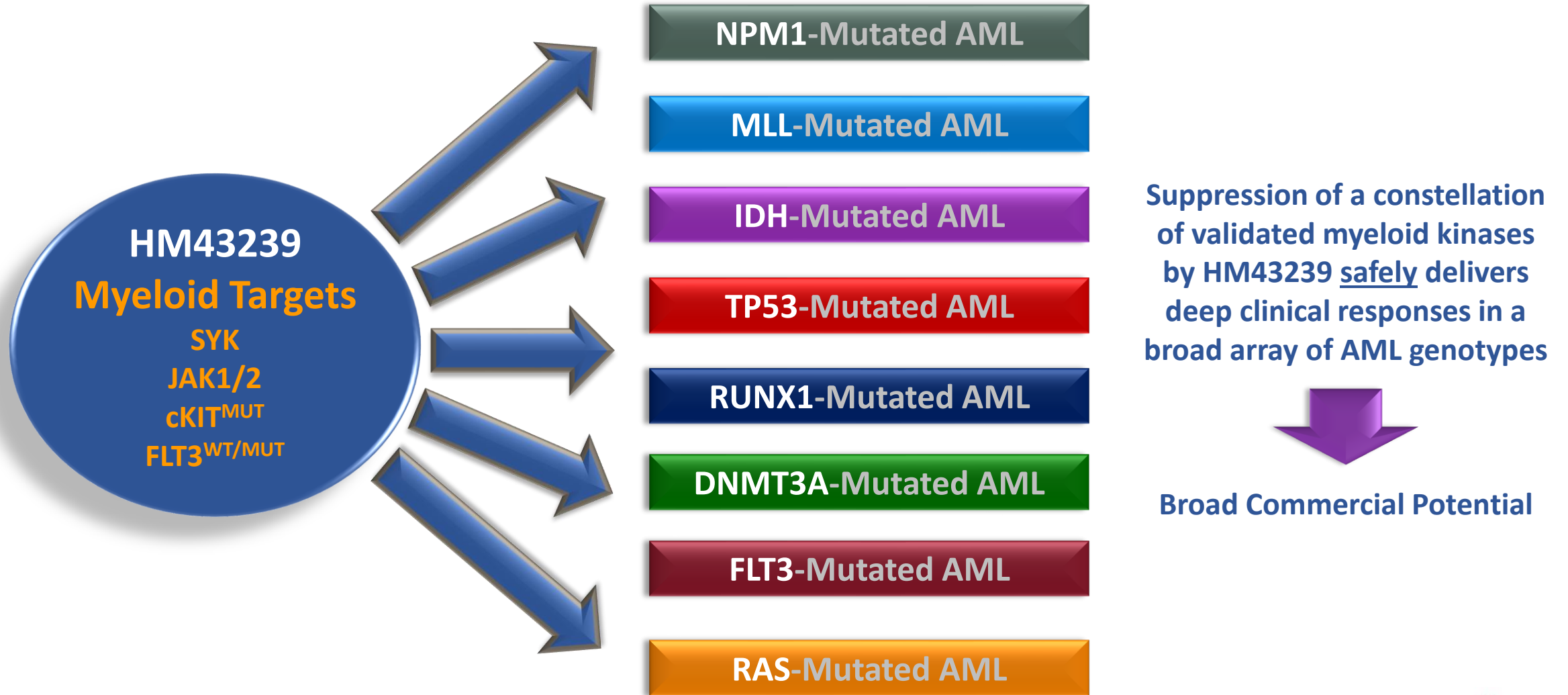
HM43239 Global Dose Expansion Trial Planned to Support Phase 2 Registrational Trials for Accelerated Approval and Drug Combination Trials for Broad Commercialization



Clinical Development Plan Sets the Stage for Broad Commercial Success

HM43239: Safely Delivers Clinical CRs in AML Patients with Diverse Mutations

Broad Commercial Potential Unlike Any Other Targeted Agent for AML



HM43239 TPP: Safe, Oral, Daily, Targeted Agent for Diverse AML Patients

Proven Broad Clinical Activity to Deliver Complete Remissions (CRs) in Diverse R/R AML Patients

- **Genetic diversity** (FLT3, TP53, NRAS, KRAS, IDH1, IDH2, MLL, NPM1, PTPN11, DNMT3A, RUNX1, etc.)
- **FLT3-unmutated** (with complex karyotype and adverse mutations, incl. TP53^{MUT})
- **FLT3-mutated** (incl. prior failure by other FLT3i)
- **Three dose levels** rendering CR with no DLT

Developing as Single Agent (For Accelerated Approval)

- FLT3-Mutant R/R AML Failed Prior FLT3i | Fast Track Designation Awarded in FLT3 Mutated Patients
- TP53-Mutant AML / Complex Karyotype | Potential for Fast Track Designation if Data Continue to Support

Developing in Combination with Venetoclax +/- HMA

- Global Phase 2-3 Randomized Drug Combination Trials in Earlier Lines of Therapy

Efficacy with Strong Safety Profile Suggests Preferred Agent for Broad Commercial Usage

- R/R Therapy in FLT3+/-
- 1L Therapy in Fit/Unfit and FLT3+/-
- Combination Therapy
- Maintenance / MRD(+) Therapy

HM43239 Potential Commercial Opportunity in the AML Market

AML Patient Population Segment	Estimated Treatable Population with HM43239	Estimated Median Duration of Treatment	Estimated Peak Market Share (%)	US Sales Potential (2035) - USD
FLT3(+) RR AML / Prior FLT3i (Gilt)	~ 400	3 months	60%	~\$25 mil
FLT3(+) RR AML / No Prior FLT3i	~ 1,500	3 months	50%	~\$185 mil
FLT3(WT) RR AML*	~ 1,500	7 months	60%	~\$55 mil
FLT3(+) 1L AML Unfit	~1,600	9 months	65%	~\$160 mil
FLT3(WT) 1L AML* Fit	~ 5,000	10 months	45%	~\$420 mil
FLT3(+/WT) Maintenance / MRD(+)	~5,000	Continuous	65%	~\$450 mil

Acute Myeloid Leukemia
Global Market Report 2022

- The global AML market is experiencing strong growth and is predicted to grow to > \$1.8 billion in 2026
- Effective and safe agents have the potential to expand the market further

* Population with IDH1&2-WT and either NPM1 and/or Chromatin mutations representing ~50% of the AML patient population. This segment excludes FLT3 and/or IDH1/2 mutant patients.

HM43239 Clinically Validated, Once Daily, Oral Myeloid Kinase Inhibitor

Confidence of Clinical Investigators and KOLs



Targets Constellation of Kinases Important in AML

- Potent inhibitor of myeloid kinases SYK, FLT3^{WT/MUT}, JAK1/2 and mutant forms of c-KIT associated with transformation and resistance
- Potential to treat genetically defined AML patients across multiple lines of therapy & populations
- Safety & efficacy foretell significant market potential for R/R, 1L, FLT3-/+ , Fit/Unfit AML populations



Clinical Validation Supports Path of Rapid Development for Breadth of AML Patients

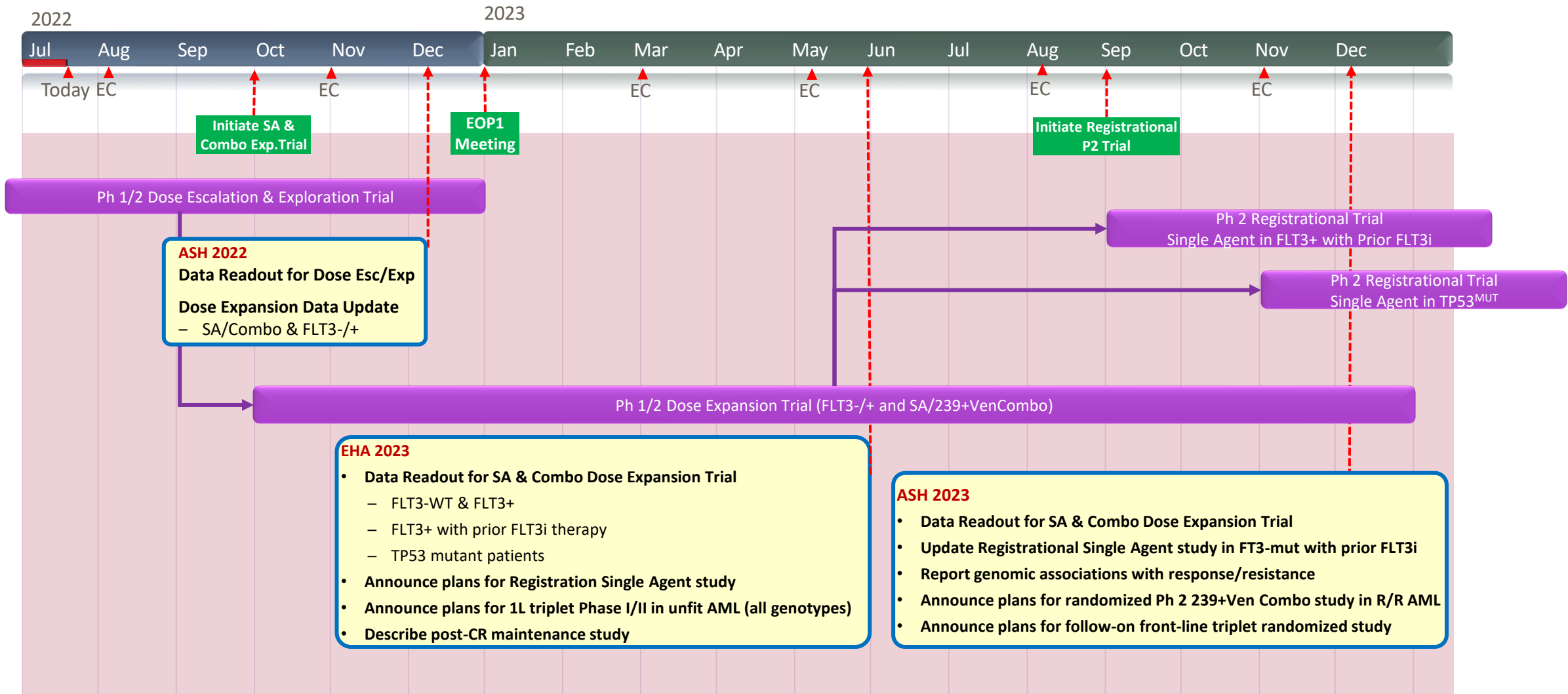
- **FLT3-Mutated Patients**
 - CRc in patients who failed prior FLT3 inhibitors (midostaurin and gilteritinib)
 - CRc in patients with ITD and TKD mutated FLT3
 - FDA Fast Track received for FLT3^{MUT} R/R AML
- **FLT3-Unmutated Patients**
 - CRc in patients harboring diverse mutations: NPM1, DNMT3A, N/KRAS, MLL, TP53, IDH2, U2AF1, RUNX1, Others
- **Broad Therapeutic Window**
 - Well tolerated across three active & safe doses
- **Preferred Agent Profile for Combination Therapy**



Program Goals Supporting Rapid Development

- *Explore Molecular Subgroups* for Potential Fast Track Designations
- *Single Agent Expansion Trial (239)* planned 2H2022
- *Combo Expansion Trial (239+Ven)* planned 2H2022
- *Registrational Ph2 study(ies)* planned 2023 from Expansions
- **Broad commercialization goals** supported by clinical development in diverse patient populations

HM43239 Potential Timelines of Value Driving Milestones



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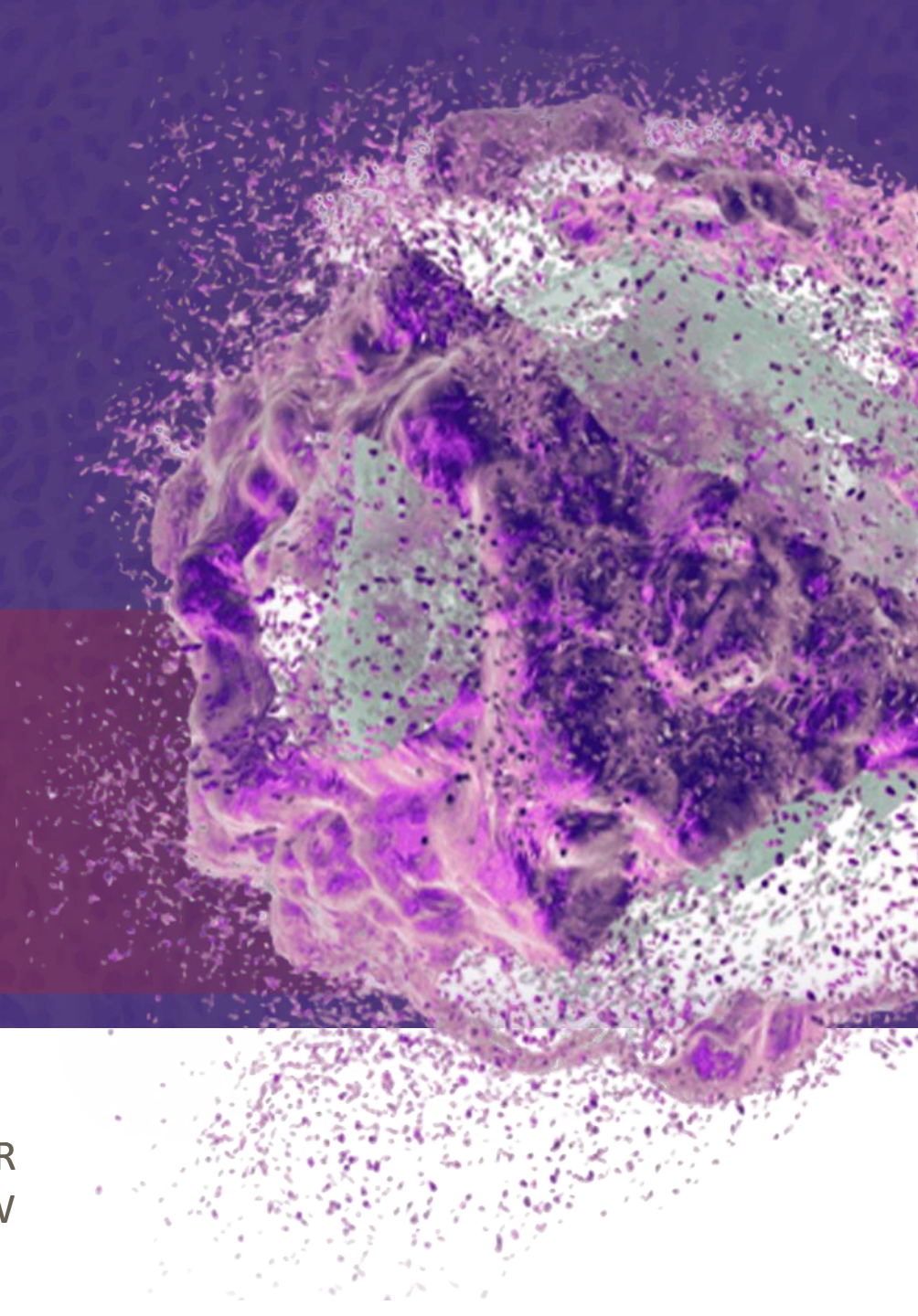
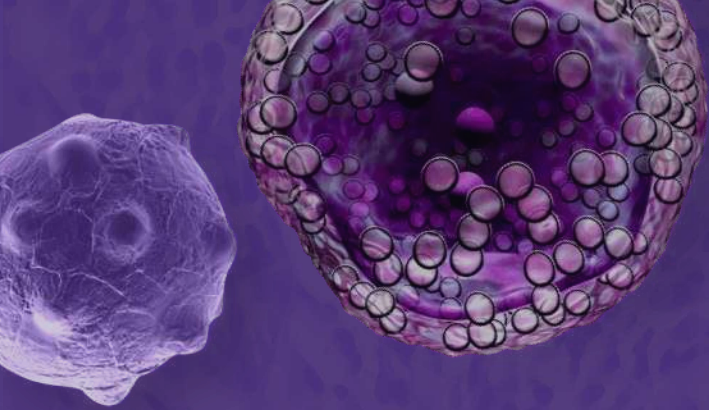
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We thank our partners, investigators, and investors for helping us bring novel drugs to patients with the greatest need.

A P T O S E
BIOSCIENCES

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