

MOLECULIN

November 18, 2024
Corporate Presentation



Disclaimer



All statements contained herein other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, and our objectives for future operations, are forward-looking statements. The words “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “intend,” “expect,” and similar expressions are intended to identify forward-looking statements. We have based these forward-looking statements largely on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives, and financial needs. Our potential to sustain our relationship with MD Anderson revolves around the continued collaboration and capitalizing on intellectual property resulting from sponsored research. The feasibility and promptness of our clinical trials are influenced by regulatory stipulations from entities like the US Food & Drug Administration (FDA) and their global counterparts. As such, all of our trials, including the MIRACLE trial, are subject to timely, future filings with and feedback, allowance, approvals, etc. from the FDA and their global counterparts. The implications of global events, such as the conflict in Ukraine, the COVID-19 pandemic, and prevalent supply chain challenges, play a role in our forward-looking statements. Additionally, our ongoing need for financing, fueling our clinical trial and product development initiatives, securing regulatory approvals in essential markets, and sourcing cost-effective drug solutions are core to our forward-looking statements. Furthermore, our commitments concerning intellectual property licenses, the potential efficacy of our drug candidates, market reception, potential product liabilities, and the emerging competitive landscape are also fundamental to our forward-looking statements. Any reference related to cardiotoxicity or the lack thereof concerning Annamycin is based on our expert’s opinion as detailed in our filings, from time to time, with the SEC. Our dependencies on third-party manufacturers, strategies for establishing business collaborations, the defense of our intellectual property rights, our plans for fostering company growth, and the imperative to retain key executive personnel also guide our projections. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties, and assumptions, the future events and trends discussed in this presentation may not occur, and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements. More detailed information about Moleculin is set forth in our filings with the Securities and Exchange Commission. Investors and security holders are urged to read these documents free of charge on the SEC’s website at <http://www.sec.gov>. Data related to currently active trials of Moleculin are preliminary and subject to change until a final Clinical Study Report is published.

Recent Developments

- Announced new findings showing Annamycin overcomes resistance to Venetoclax in AML
- Released median overall survival in MB-106 trial for Annamycin in combination with cytarabine (AnnAraC) treating AML was 9.1 months for 0-6 prior lines of therapies (n=22) and 11.6 months for 2nd line subjects (n=10)
- Accelerates planned unblinded data readout for MB-108 MIRACLE Phase 3 pivotal trial for AnnAraC for the treatment of R/R/ AML to H2 2025
- Received US Institutional Review Board (IRB) approval for MB-108 MIRACLE Phase 3 pivotal trial
- Announced Q3 earnings, updated MB-106 preliminary data and MIRACLE site recruitment
- Appoints Dr. Von Hoff, a leading expert in pancreatic cancer to Moleculin's Scientific Advisory Board

AnnAraC Performance in R/R AML

	CR	50%
	CRc	60%
¹	OS	11.6 months
²	Durability	8 months+
	MRD-	78%
	BMT	44%

¹ – Median; 2L subjects (n=10) ² – Median; 1-3L responders (n=9)

It is widely recognized that the majority of 2L AML patients are underserved by available approved therapies and that better options are needed for this unmet need.

We believe the performance of AnnAraC is significantly better than any therapy every approved for use in 2L AML.

Our Team



Walter V. Klemm
Founder, President, CEO and Chairman
soliton ZENO Inc 50 Pfizer Green
Sciences



Donald Picker, PhD
Chief Scientific Officer
SYNERGY GSK Vertex



Jonathan P. Foster
Executive VP & Chief Financial Officer
Mylan Amgen Pfizer Allergan Deloitte



Dr. John Paul Waymack
Senior Chief Medical Officer
LIMEN Vertex FDA Kitey



Sandra Silberman, MD, PhD
Chief Medical Officer – New Products
AstraZeneca Roche Immunovaccines Pfizer



Robert Shepard, MD, FACP
Medical Advisor
DANA-FARBER FDA HARVARD MIT Tufts

7 FDA Approvals

2 Big Pharma Exits

14 Moleculin
Clinical Trials

\$.5 Million in Recent
Management Investment

200 Years of Drug
Development Experience



Technology Portfolio





MOLECULIN

DIAGNOSIS

Current Market Cap Creates Opportunity

- Investors focused on targeted therapies, yet Venetoclax (a chemotherapy) created far more value over last 5 years
- For 50+ years anthracyclines have remained the bedrock treatment for many cancers
- Annamycin appears to be safer and more effective than currently prescribed anthracyclines
 - Enables increase in both dosage and number of cycles
 - Fills an unmet need for more than half of AML patients
 - Potential uses extend far beyond AML into other cancers

Anthracyclines Used In:

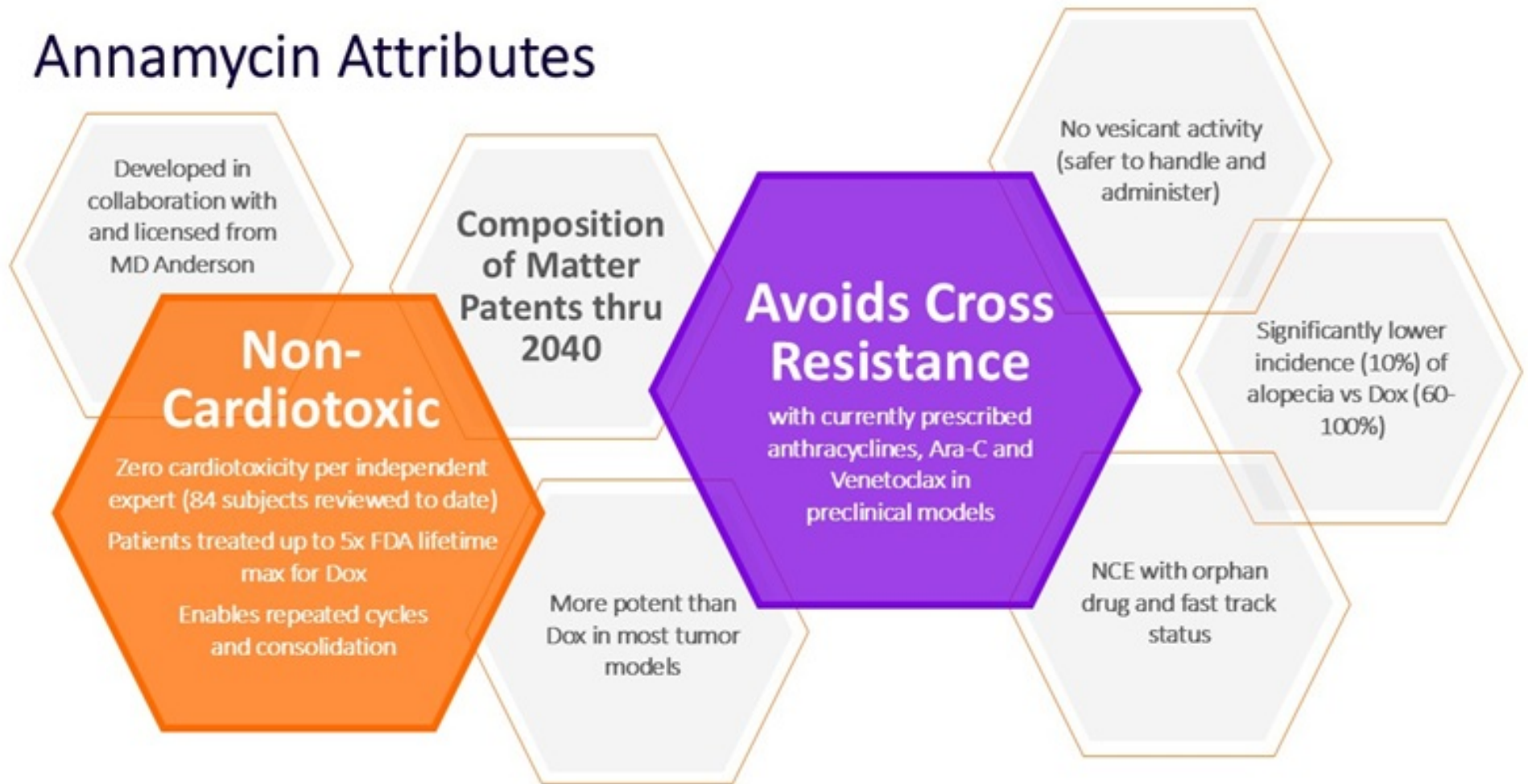
Breast cancers = 32%

AML patients = 50%

Lymphomas = 70%

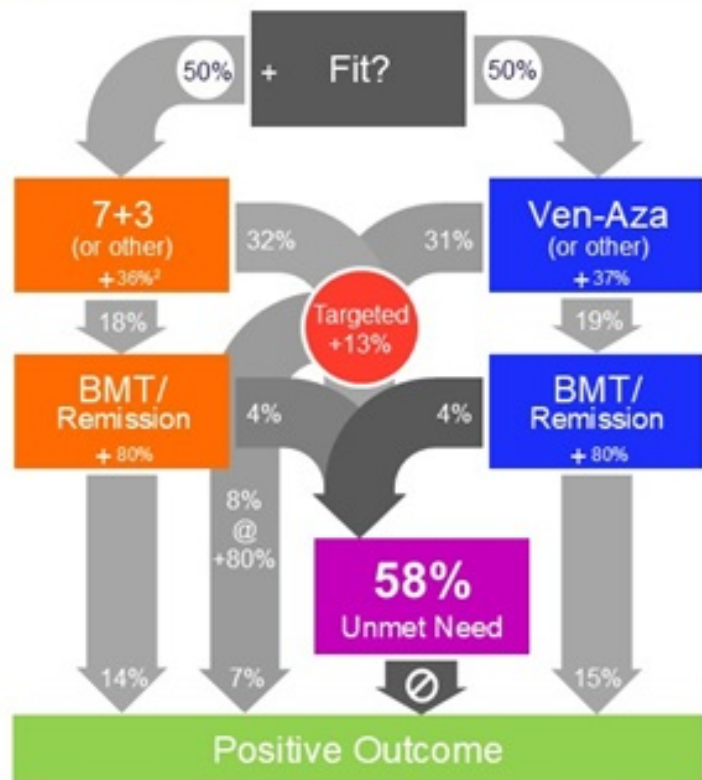
Childhood cancers = 60%

Annamycin Attributes



Notes: 1) Current Cardiology Review, Anthracycline Cardiotoxicity: Prevalence, Pathogenesis and Treatment, Maria Volkova and Raymond Russel III, Referenced from Cancer, 2008 Jun 1;97(11):2869-79. "Congestive heart failure in patients treated with doxorubicin: a retrospective analysis of three trials". Swain SM, Whaley FS, Ewer MS., PMID: 12767102; 2) Preliminary clinical studies from Moleculin; data subject to change; 3) Refer to Form 10K for FYE 2023 for discussion on latest subject with an increase in troponins and our Expert's opinion.

Approved Therapies are Successful for Only ~40% of AML Patients¹



	Daunorubicin (+ Ara-C)	Venetoclax (+ Azacitidine)	Targeted Therapy
Regimen	7+3	Ven-Aza	Gene-Targeted
Sub-population	Fit Patients (50%)	Unfit Elderly (50%)	55%-65% Eligible
Durable CR%	36% ²	37%	~21%
All AML benefit ³	14%	15%	7%
Critical characteristics	Cardiotox; de novo/acquired resistance	Still leaves significant unmet need	Limited to certain gene mutations

MB-106 (Annamycin + Ara-C (AnnAraC); n=22)

Line of Therapy	All Lines (1 st – 7 th)	1 st Line	2 nd Line	2 nd & 3 rd Line Combined
Subjects Evaluable To Date	22	4	10	14
Subjects Evaluable Not Dosed Per Protocol	2	0	1	1
Median Age - Years (Range)	67.5 (19-78)	56.5 (19-69)	71 (53 - 78)	69.5 (53-78)
Complete Remission (CR)	8 (36%)	2 (50%)	5 (50%)	6 (43%)
Complete Remission Composite (CRc)	9 (41%)	2 (50%)	6 (60%)	7 (50%)
Partial Response (PR)	2	0	1	2
CRc Relapsed To Date	5	1	4	4
BMT To Date	4	1	2	3
Median Overall Survival (mos)	9.1		11.6	

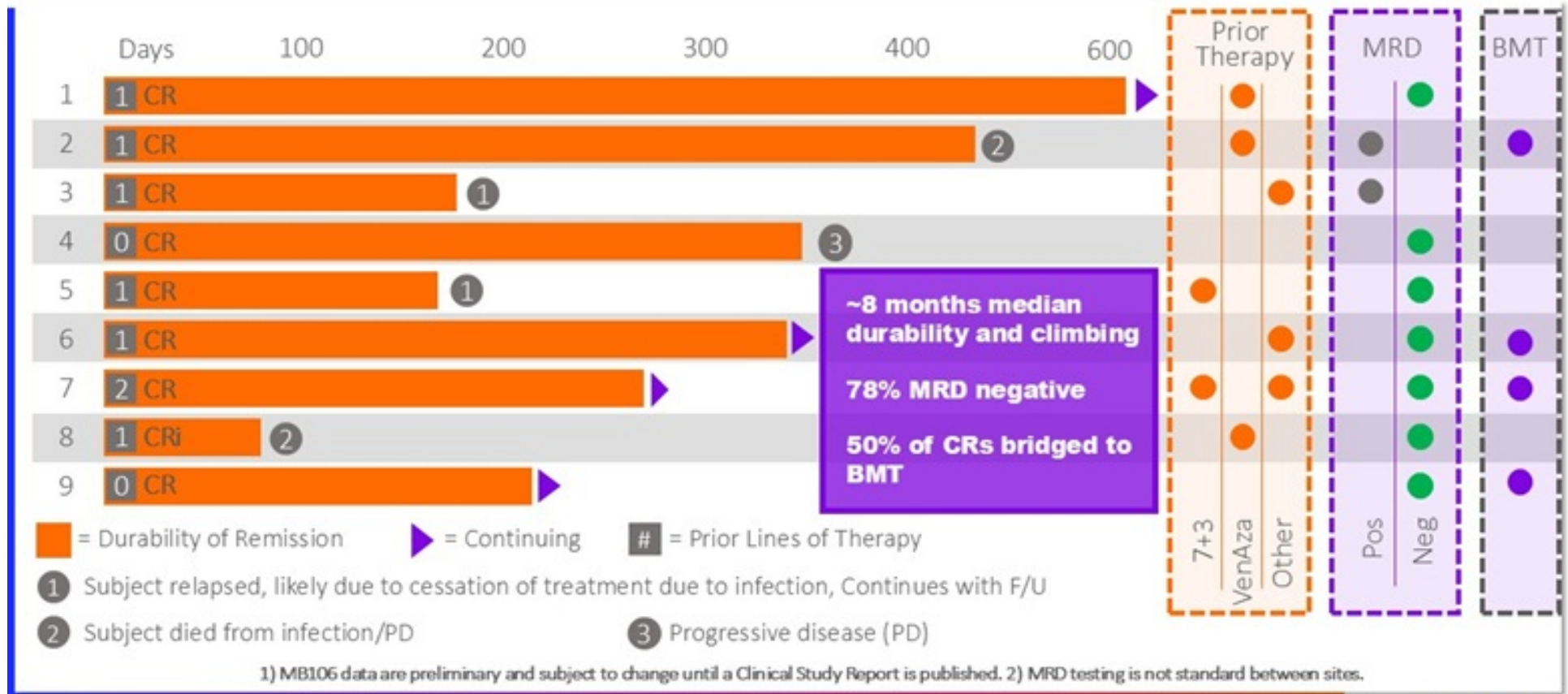
Median CRc Durability = ~8 Months and Climbing

10

Notes: 1) Data from MB-106 are for intent to treat subjects who had efficacy determined (n=22); 2) Data from MB-106 are preliminary and subject to change; and 3) Relapses include 1 death due to pneumonia (unrelated to drug).



Durability, MRD, Prior Therapies



AnnAraC 2L Efficacy in Venetoclax R/R Patients

Venetoclax regimen failure leaves patients with dismal options

Age	Relapsed or Refractory	Ven-Aza/ Ven-Dec Best Efficacy	Ven-Aza/ Ven-Dec Cycles (months)	AnnAraC Cycles	AnnAraC Efficacy	Durability of Response (months)
78	Relapsed	PD	17	3	CR	20
64	Refractory	SD	2	1	CR	12.5
64	Relapsed	CR	2	2	CRi ¹	3.3
75	Refractory	PR	6	1	PD	
75	Relapsed	CR	Unknown	0	Allergic ² , PD	

1 – Subject succumbed to an infection that, upon review, could have been avoided with proper standard of care infection prophylaxis

2 – Subject had allergic reaction to Annamycin and therefore did not receive a full treatment cycle; 1st such reaction in approximately 100 patients treated

3 – A. Maiti, C. Rausch, J. Cortes, Et al, "Outcomes of relapsed or refractory acute myeloid leukemia after frontline hypomethylating agent and venetoclax regimens, *Haematologica* online, vol. 106 No.3 (2021)

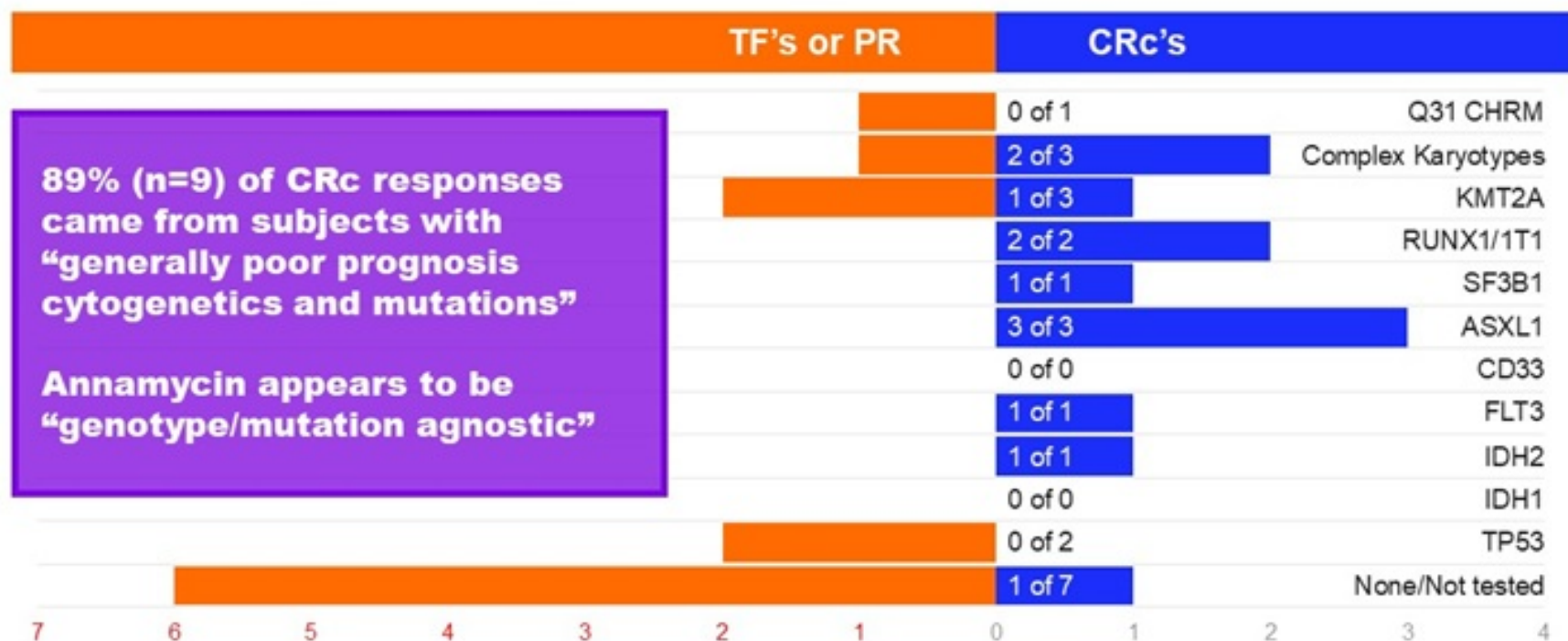
**AnnAraC 60% CRc rate
and 40% CR rate in
Venetoclax R/R AML**

Recent study³ of Ven-HMA failures
in 1L patients:

- *Dismal outcomes upon failure - OS median for R/R AML post Ven regimens is 2.4 months*
- *R/R that received salvage therapy (n=24) attained CRc 12.5% and CR 4%*

**AnnAraC > 4x better
by comparison**

MB-106 Response by Genotype and Mutation



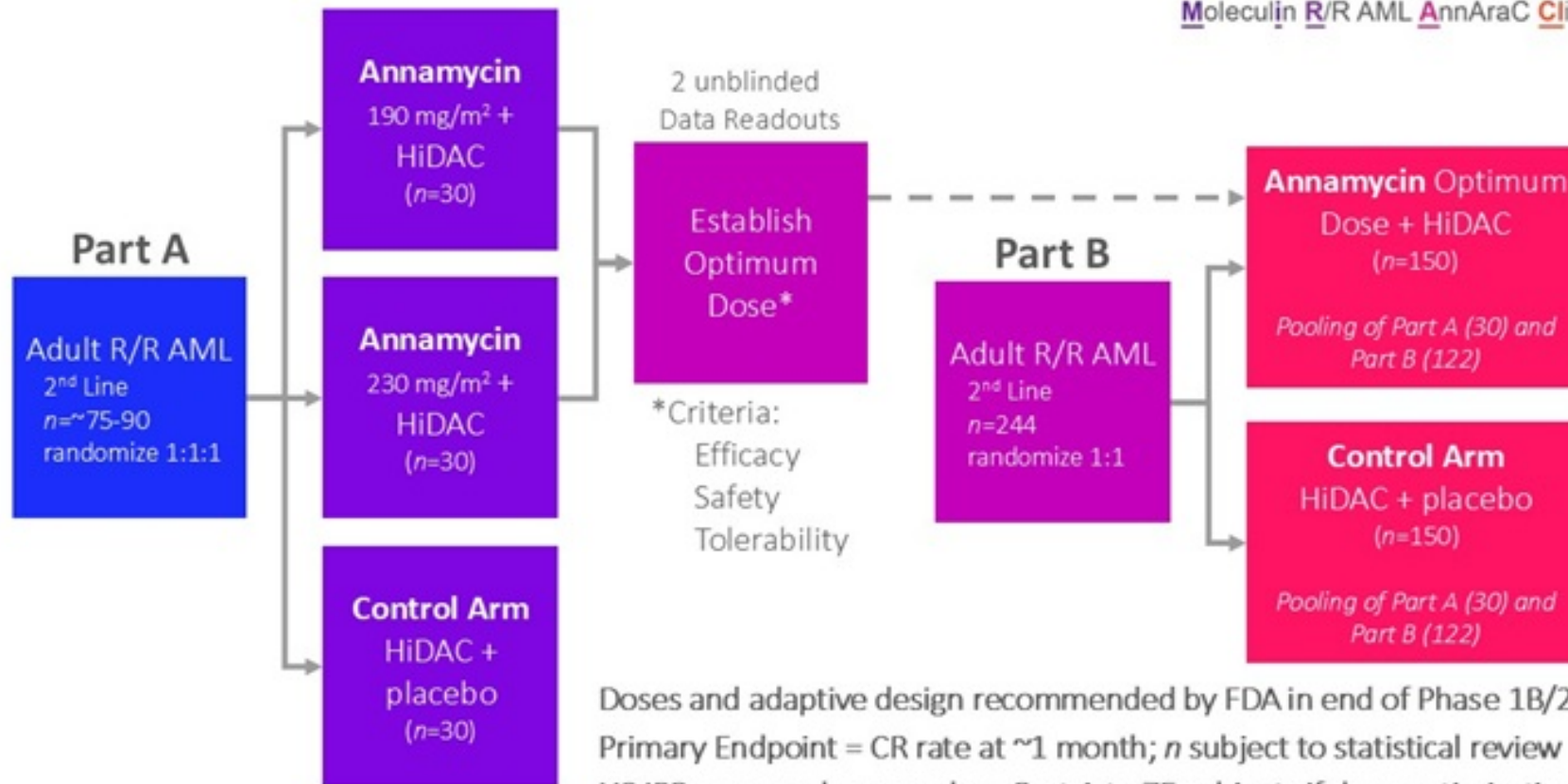
Note – n=20; Some subjects had multiple mutations or abnormalities, hence totals of treatment failures (TF), partial remissions (PR) or composite complete remissions (CRc) do not equal totals for each response category – TF's/PR's, or CRc's; Data are anecdotal only and not intended to indicate statistical significance. Not all mutations/subjects were tested.

AML Clinical History

Phase 1: MB-104 MONOTHERAPY 100-120 mg/m ²	Phase 1/2: MB-105 MONOTHERAPY 120-240 mg/m ²	Phase 1/2: MB-106 COMBINATION THERAPY Annamycin + Cytarabine
<ul style="list-style-type: none"> n = 7 17% CRi (at suboptimal dosing) Dosing limited by FDA Lifetime Anthracycline Dose (LTMAD) Trial location – US 	<ul style="list-style-type: none"> n = 20 Median lines of prior therapy = 4 Median age of 240 mg/m² (RPD2) cohort = 65 years 80% ORR in 240mg/m² Cohort (N=5) Trial location - Poland 	<ul style="list-style-type: none"> n = 22 (0-6 prior lines), n = 10 (1 prior line) All subjects (n=22) 41% CRc 2nd Line (n=10), 60% CRc, 50% CR Median age all subjects = 69 Trial location – Poland & Italy “3+5” therapy
Key Findings		
<ul style="list-style-type: none"> Well-tolerated in the study population Limited to low doses Morphologic leukemia free state was achieved in one subject in the 120 mg/m² cohort 	<ul style="list-style-type: none"> Positive correlation between response rate and dose 	<ul style="list-style-type: none"> Median overall survival: 0-6 prior lines = 9.1 mos (n=22); 1 prior line = 11.6 mos (n=10) Median durability: ~8 months and increasing Strong efficacy signal even where Ven-HMA has failed
Regulatory Significance		
<ul style="list-style-type: none"> Demonstrated safe dosing within FDA-mandated limitations for anthracycline exposure 	<ul style="list-style-type: none"> Demonstrated safe dosing beyond FDA (and EMA) limitations for cumulative anthracycline exposure and early efficacy as single agent 	<ul style="list-style-type: none"> Addition of Cytarabine supported by compelling preclinical data showing improvement over Annamycin monotherapy

Source: Clinical study reports for MB-104 & MB-105. In MB-105 CRi = BMA <5%. MB-106 data are preliminary and subject to change.
 “ITT” = Intent to treat.

Adaptive Trial Design



Doses and adaptive design recommended by FDA in end of Phase 1B/2 meeting
Primary Endpoint = CR rate at ~1 month; n subject to statistical review
US IRB approved; may reduce Part A to 75 subjects if dose optimization possible at first unblinding (n=45)

Project Optimus Guidance

FDA provided clear written guidance by recommending the comparison of 190 mg/m² vs. 230 mg/m²

Clinical experience to date shows no significant safety or efficacy difference between 190 and 230

Initial PK analysis shows no correlation between AUC or C_{max} and change in dosage from 190 to 230

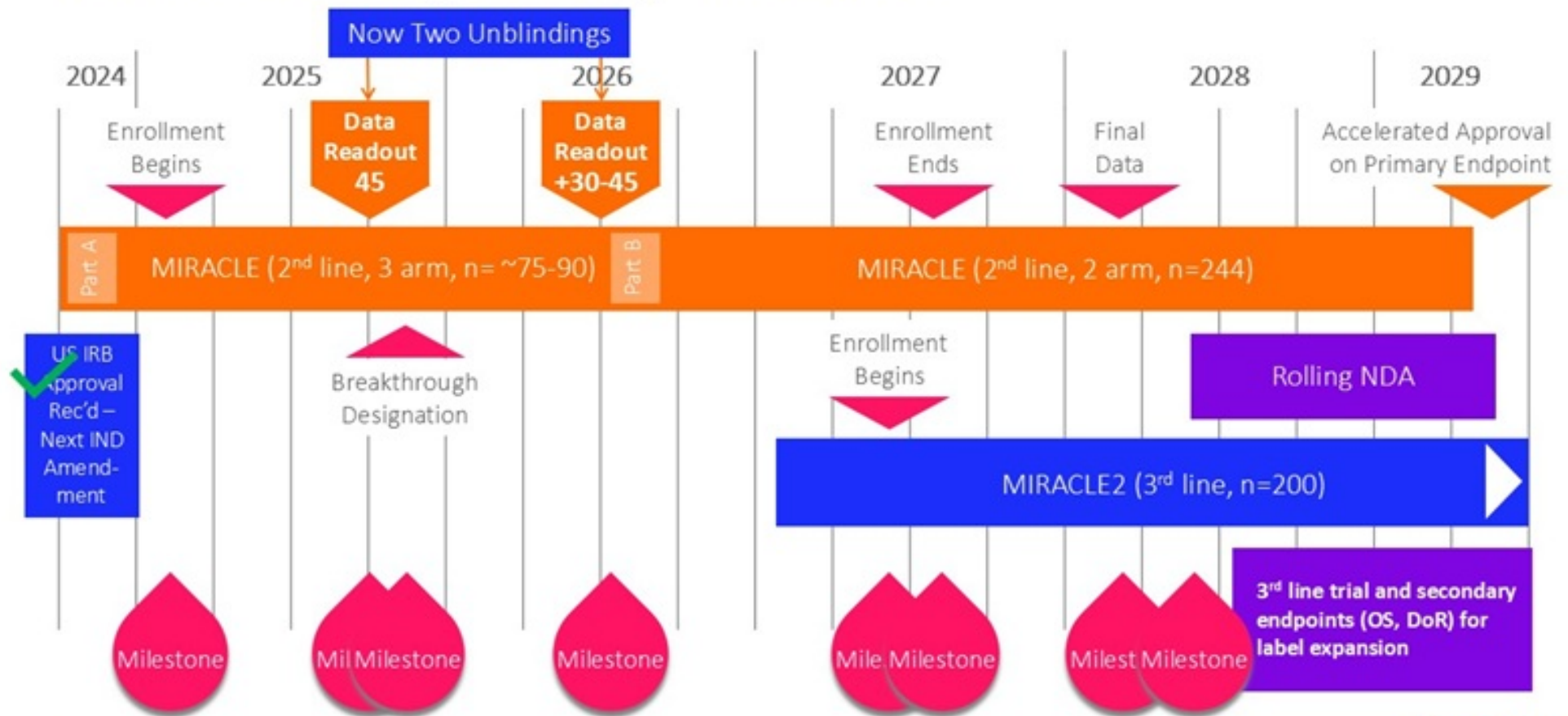
Corroborates clinical findings

Could reduce potential for future generic competition

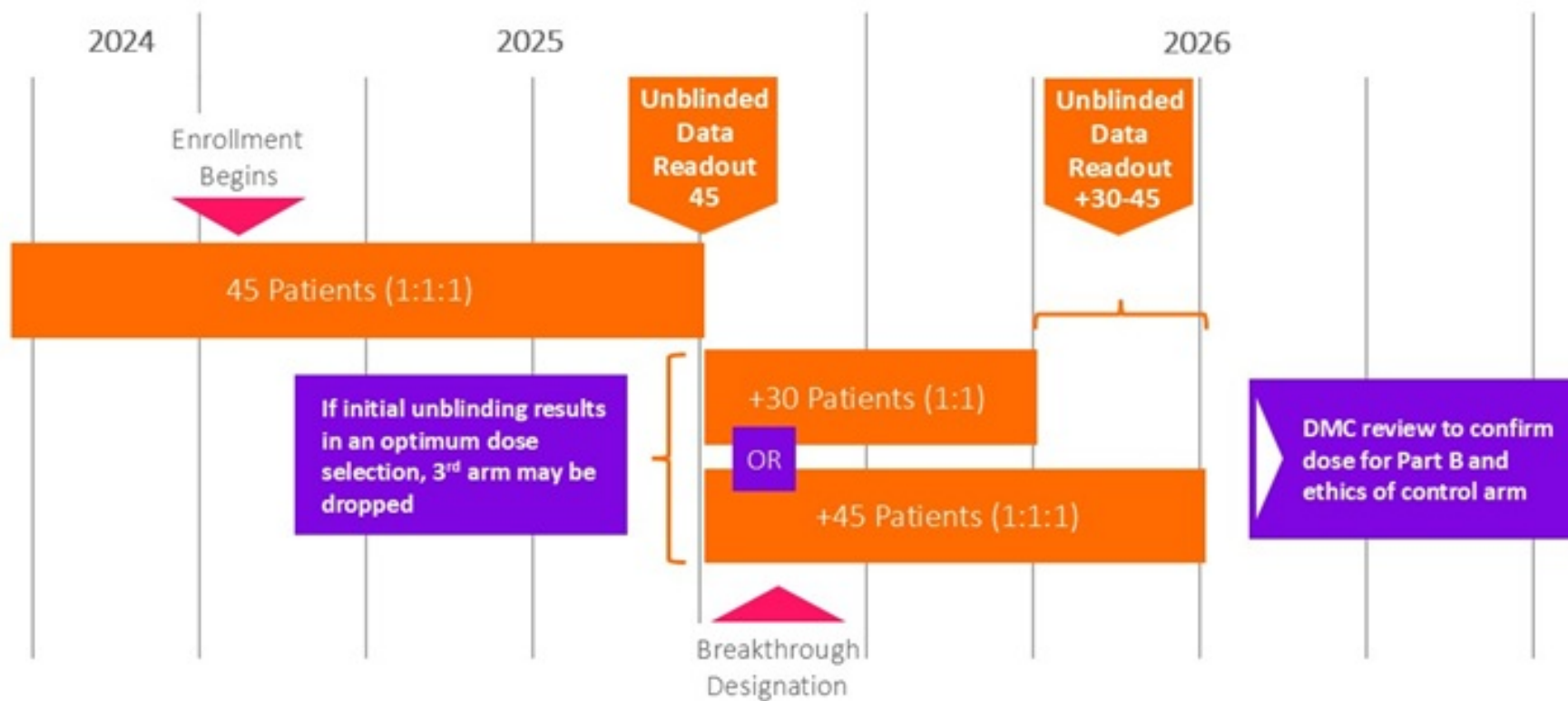
FDA is recommending the Sponsor make the choice between 190 and 230 based on totality of data (PK, PD, safety, efficacy)

Moleculin utilizing Data Monitoring Committee to provide independent review

Estimated Regulatory Timeline



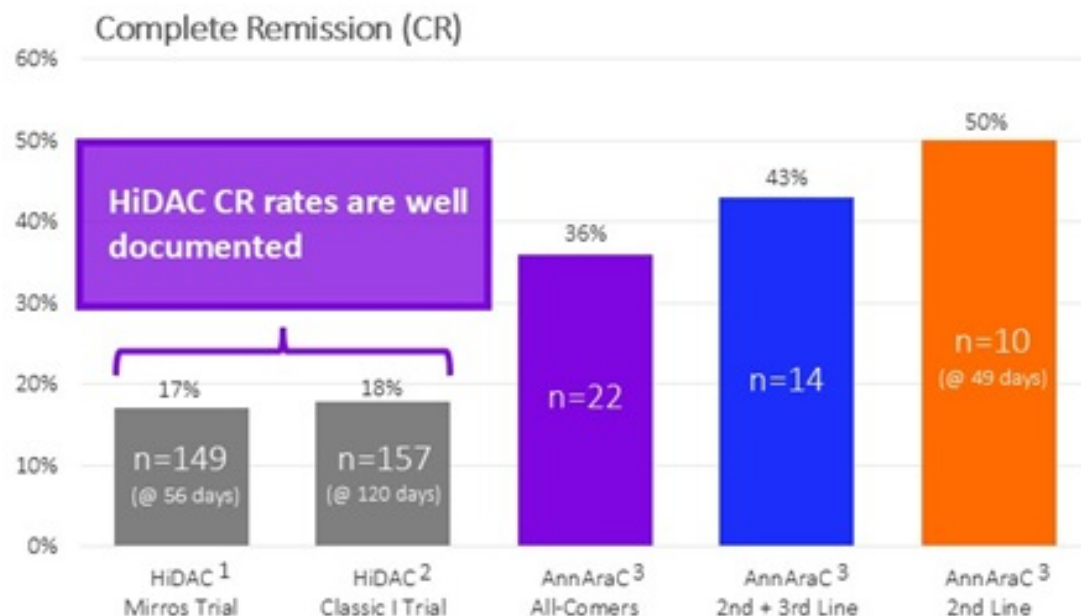
Part A Acceleration



Change to Protocol Explained

- Allows unblinding at 45 subjects for evaluation of primary endpoint, safety and tolerability
- If, at that point, it is apparent that one or the other of the two Annamycin doses (190 mg/m² or 230 mg/m²) is considered “optimum,” we will discontinue the non-optimum dosage arm and complete Part A with only 75 patients in total
- If not, we will continue Part A to 90 patients and determine “optimum” dose at that point
- It is possible that the Data Monitoring Committee (DMC) could conclude at the end of Part A that the response rate of the control arm (HiDAC + placebo) as compared with the response rate of the Annamycin arms suggests that continuation of the control arm into Part B would be unethical

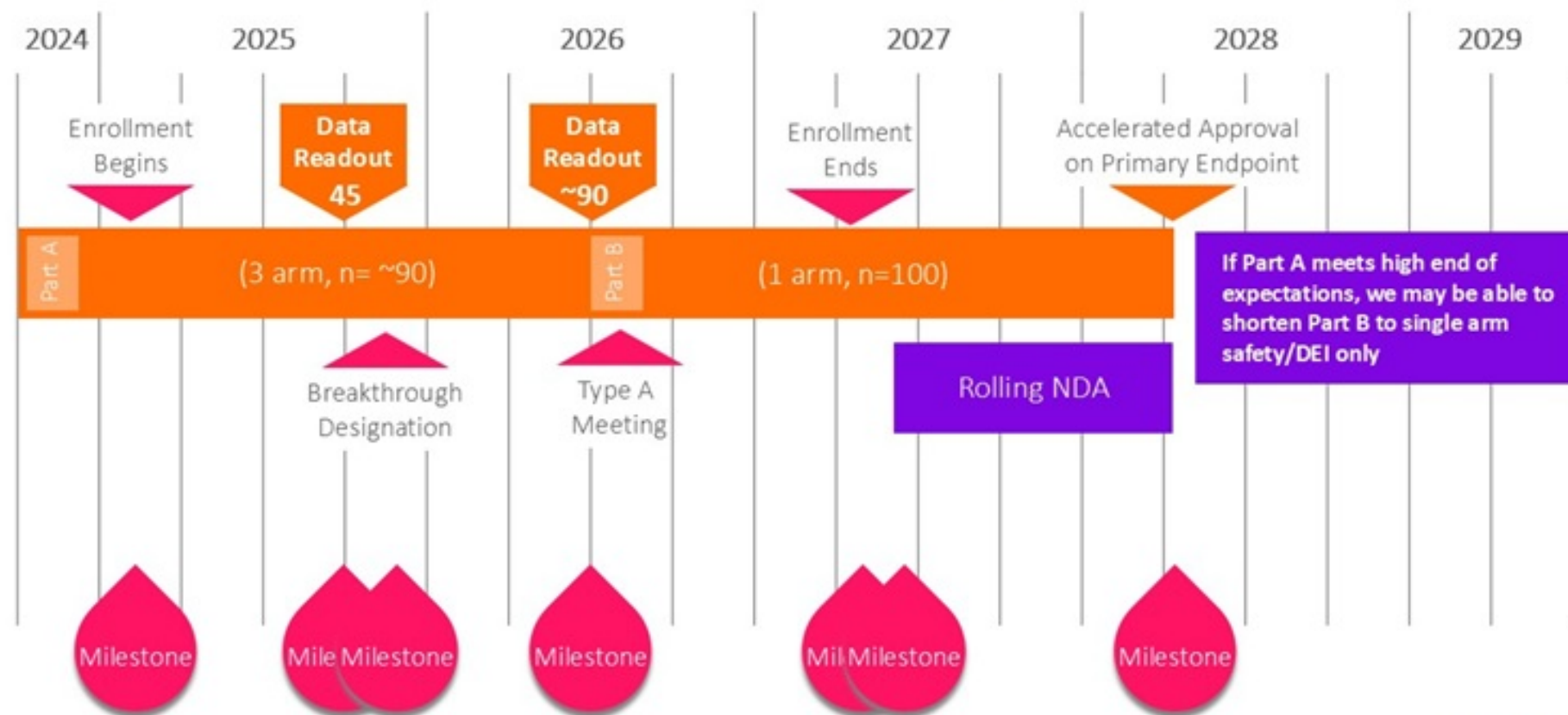
The Bar for Approval is Low



Annamycin NDA to be based on CR rate in 2nd line subjects at ~1 month

1 – Mirros Trial, 81% 2nd line patients; 17% CR, within 56 days, Konopleva et al, Blood Advances, 26 July 2022, Volume 6, Number 14; 2 – Classic I Trial, 18% CR rate within 120 days, Faderl et al, J Clin Oncol, July 2012, Volume 30, Number 20; 3 – MB-106 trial, 50% CR rate for 2nd line patients (n=10, within 49 days), 43% CR rate for 2nd + 3rd line patients (n=14), and 36% CR rate for all-comers (1st through 7th line, n=22)

Potential Accelerated Regulatory Timeline



60 sites interested

17 more sites targeted

- Interested/visited
 - Interested
 - Additional Targeted
- Updated: 11/05/24

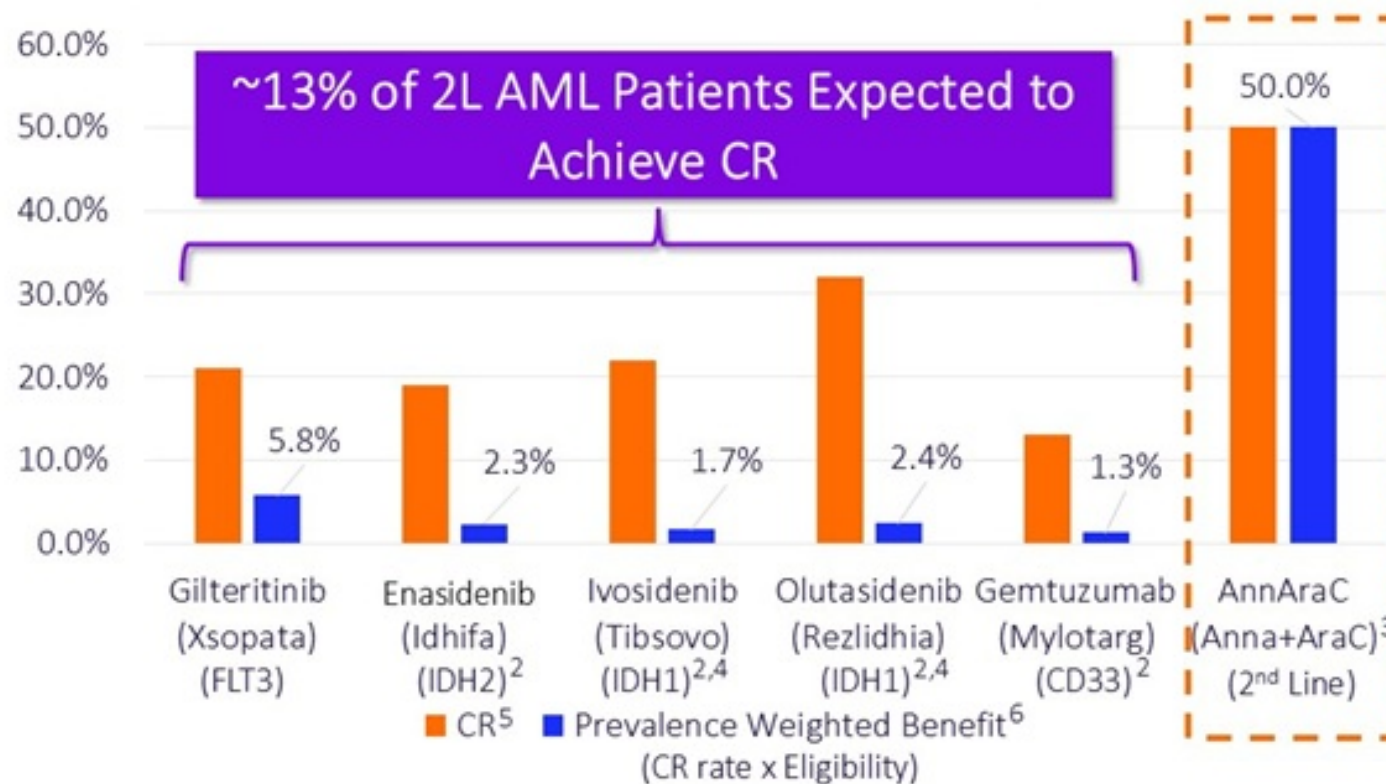


Ukraine
Georgia



Site Selection is Moving Quickly

AnnAraC Should Increase 2nd Line AML CRs 2-Fold or More



1. This chart compares Complete Response (CR) rates as submitted for FDA approval for existing 2nd line therapies (as single agents) to preliminary CR data for AnnAraC (the combination of Annamycin and Ara-C); Note: these data are from separate clinical trials with differing protocol designs and should not be considered direct comparisons. For example, existing therapies were tested in and approved only for those subjects with corresponding mutations, whereas AnnAraC data are for all relapsed/refractory AML subjects regardless of gene mutations. Mylotarg data are adjusted for subsequent studies showing reduced relevance of limited CD33 expression; 2. Not approved in EU; US approval only; 3. AnnAraC studied in all-comer r/r AML subjects (n=22) with data stratified for 2nd line (n=10); data preliminary and subject to change; 4. Assumes each drug targeting IDH1 achieves its respective CR number independent of the other (i.e., no cannibalization between drugs); 5. CR numbers for FDA approved second line therapies: F Thol et al; How I treat refractory and relapsed acute myeloid leukemia; Blood; 4 January 2024; Volume 143, Number 1. Note: some trials, including AnnAraC included patients with more than one prior lines of therapy; 6. CR rate multiplied by % of AML population presenting with targeted mutation (example: Gilteritinib achieved 21% CR rate in FLT3 subjects, which mutation is present in 27.5% of AML population, hence 21% x 27.5% = 5.8% of the total AML population are expected to achieve CR with this therapy)

Potential Asset Value

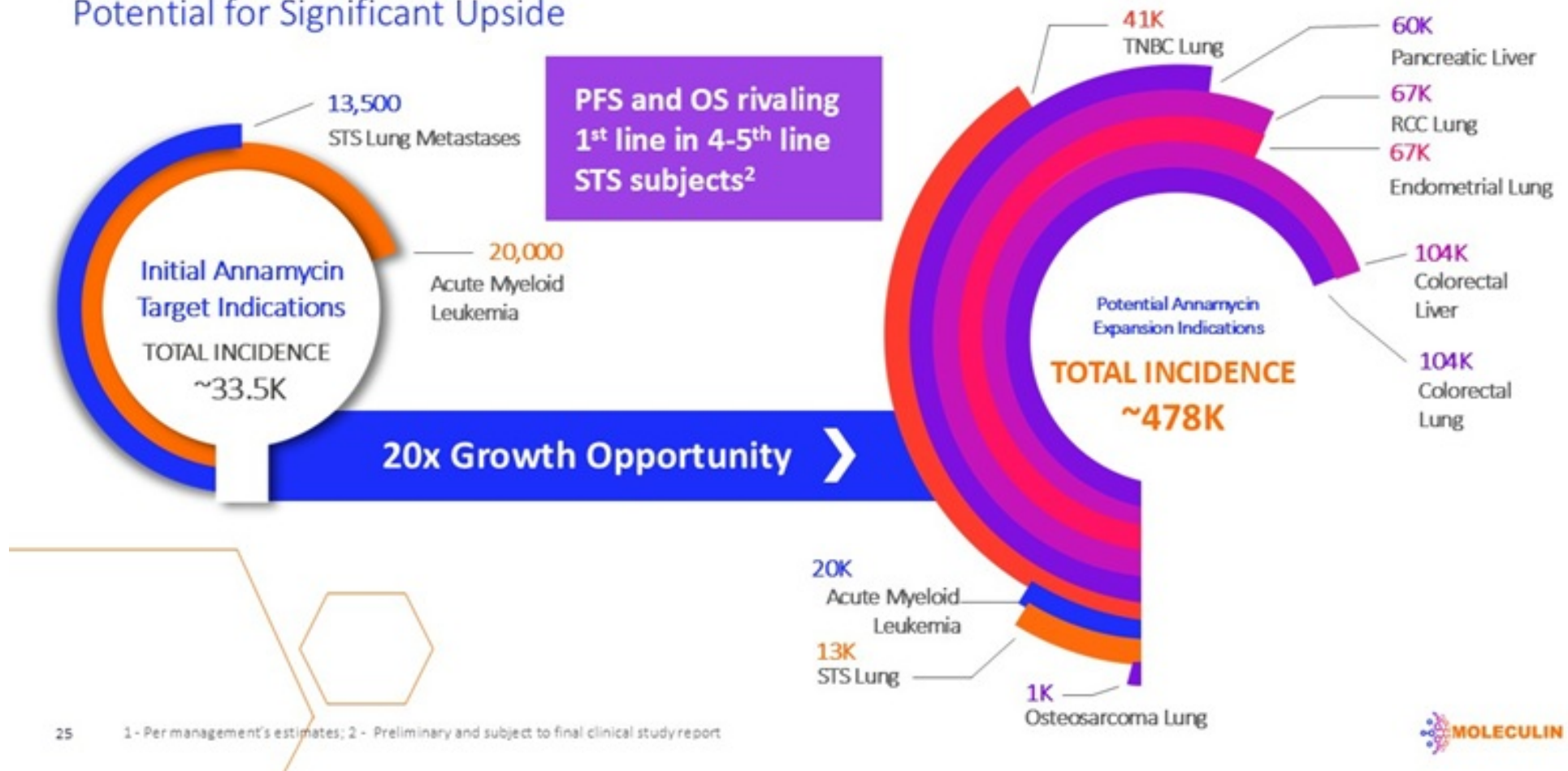


	Approved			Phase 2 Complete			
	1 st Line		2 nd Line				
	Jazz	AbbVie	Servier	Kura ¹	Syndax ¹	JNJ ¹	Moleculin
	Vyxeos	Ven-Aza	Idhifa/Tibsovo	Ziftomenib	Revumenib	617	Annamycin
N	153	286	199/174	20	57	17	10
CR	38%	37%	19%/25%	35%	18%	24%	50%
CRC	48%	64%	23%/33%	40%	25%	47%	60%
AML Population	50%	50%	15-23%	30% ²	24% ²	30% ²	60%
Revenue ³	\$128M	\$2B	~\$150M				
Valuation	\$1.5B	N/A	\$2B	~\$1.5B	~\$1.9B	N/A	~\$.015B
	Exit⁴ (Acquisition of Celator, 2016)		Exit⁵ (Acquisition of Agios, 2021)	Market Cap⁶	Market Cap⁶		Market Cap⁶

1. All three are pursuing essentially the same patient population; best overall performance from either NPM1 mutation or KMT2A rearrangement cohorts; 2. Limited to 2nd Line due to low CRC performance; 3. Jazz and AbbVie revenue per SEC disclosure, Servier revenue per Management estimate based on Agios revenue disclosure for Tibsovo sales and Idhifa royalties; 4. Company press release - <https://investor.jazzpharma.com/news-releases/news-release-details/jazz-pharmaceuticals-and-celator-pharmaceuticals-announce>; 5. Company press release - https://servier.com/wp-content/uploads/2022/11/servier-completes-acquisition-agios-oncology-business_PR.pdf; 6. As of April 11, 2024, calculation of Share Price multiplied by Shares Outstanding

The Full Annamycin Opportunity¹

Potential for Significant Upside



Financials

Nasdaq: MBRX



~\$9.4M Cash Balance²



~\$17.3M Market Cap³



3.0M Shares O/S and 6.1M Shares Fully Diluted Outstanding⁴



~32K – 65-day Avg. Daily Trading Vol.⁵

Notes: 1: Not Used; 2: Cash on hand as of September 30, 2024 ; 3: As of September 30,2024, and using fully diluted shares outstanding of 6.1M w/ price per share = \$2.84 per share; 4: Fully diluted common stock outstanding as of September 30, 2024; 5: Barrons.com Nov. 8, 2024 12.58PM

Upcoming Milestones



PROGRAM	MILESTONE	ESTIMATED TIME OF ACHIEVEMENT
Annamycin AML	Begin contracting with MIRACLE trial sites	2H 2024
	First subject treated in MIRACLE trial	1Q 2025
	Data Readout (n=45) unblinded efficacy/safety review	2H 2025
	Data Readout (n=~75-90) unblinded and Optimum Dose set for MIRACLE trial	2H 2026
	Begin enrollment of 3 rd line subjects in MIRACLE2	2027
	Enrollment ends for 2 nd line subjects	2027
	Primary efficacy data for 2 nd line subjects; Rolling NDA submission begins	2028
Annamycin STS Lung Mets	Final MB-107 Data Readout	2025
	Identify Next Phase of Development / Pivotal Program	2025

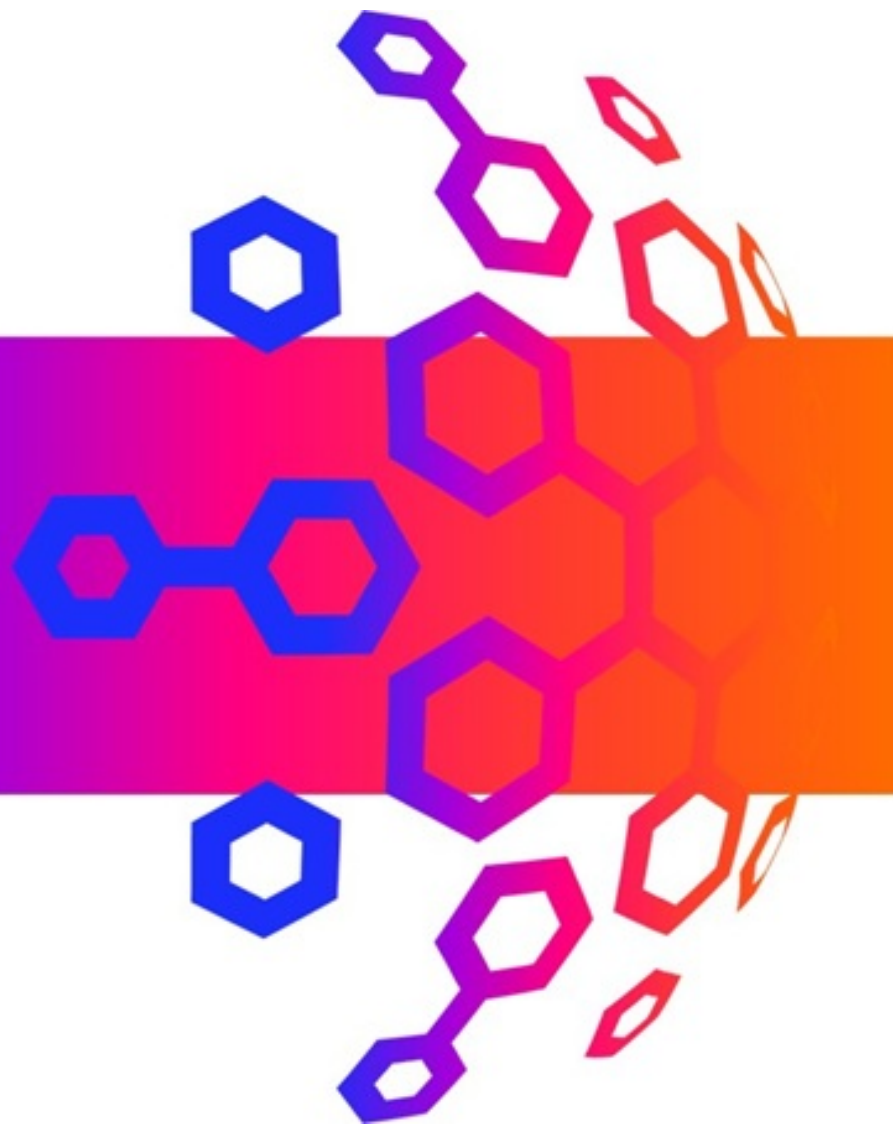
miRACLE

Moleculin R/R AML AnnAraC Clinical Evaluation

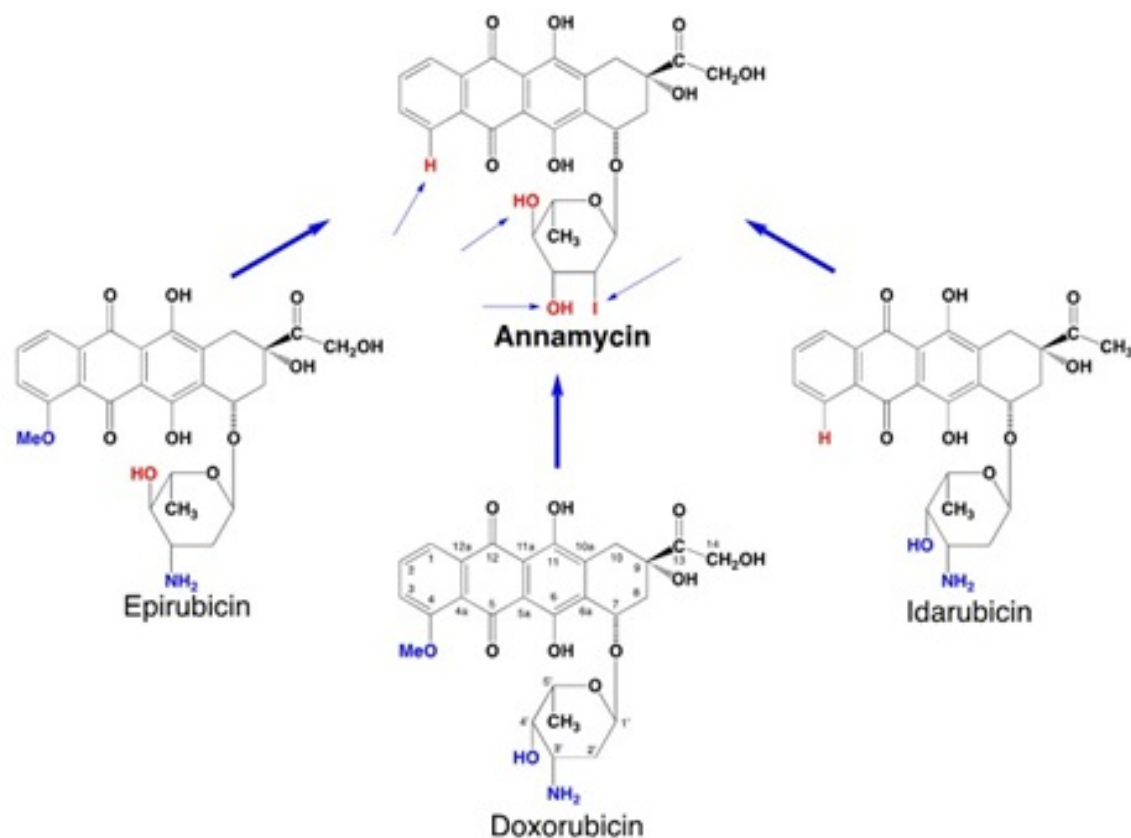
Phase 3 pivotal clinical trial designed to seek accelerated new drug approval for Annamycin in the treatment of relapsed or refractory acute myeloid leukemia. Targeted to begin recruiting in the first quarter of 2025



Appendix



Annamycin: A Next-Generation Anthracycline



Unique new structure:

- Incorporates key structural elements of 3 different clinically used anthracyclines, plus
- The 3'-deamination and introduction of iodine at C-2

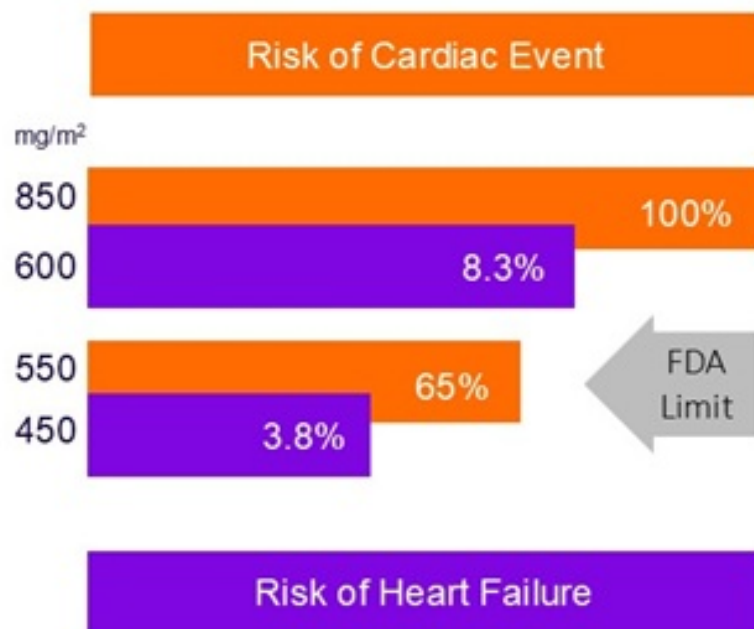
Result:

- Elimination of cardiotoxicity
- Overcomes MDR1 resistance mechanisms
- Increased potency
- Rapid cellular uptake
- Improved tissue and organ distribution
- Active against leukemias resistant to:
 - a) clinically use anthracyclines
 - b) Ara-C
 - c) Venetoclax

Annamycin Has Demonstrated Substantially Greater Cardiac Safety Compared to Approved Anthracyclines



Current Anthracyclines

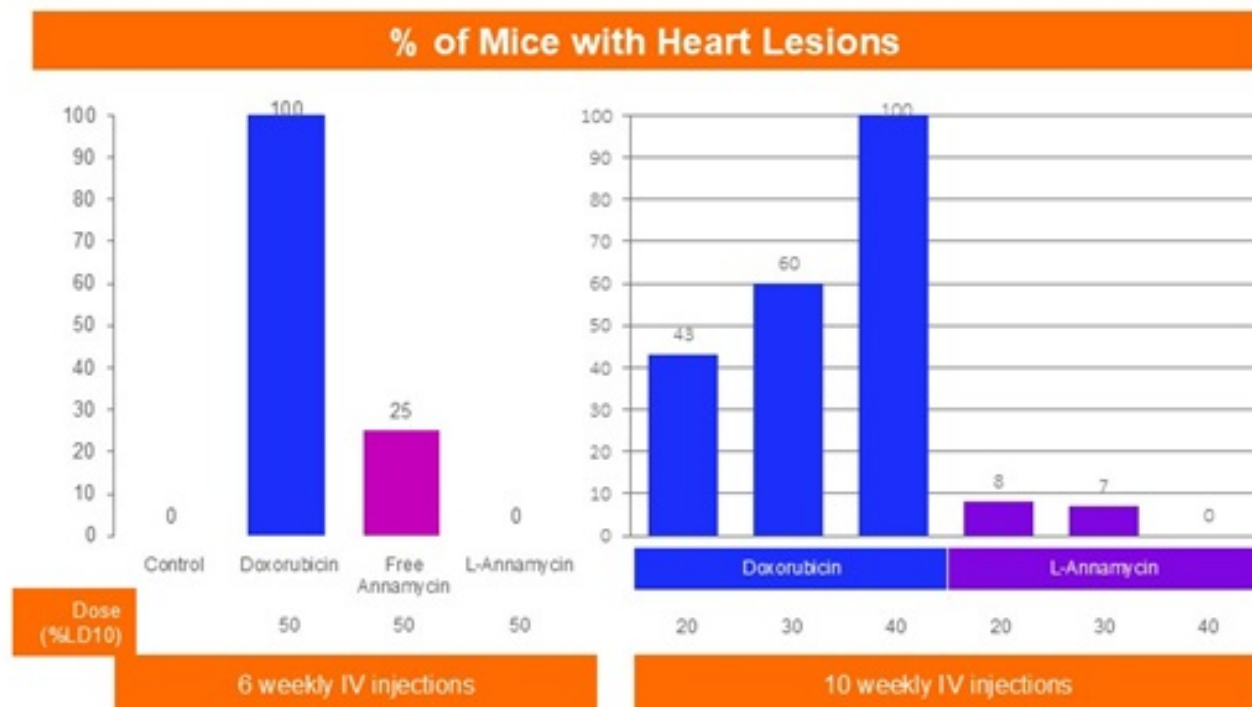


Annamycin

Zero Cardiotoxicity

- Wider therapeutic window
- Avoids multidrug resistance
- Better tissue/organ targeting

FDA Recommended Model Shows Annamycin's Lack of Cardiotoxicity

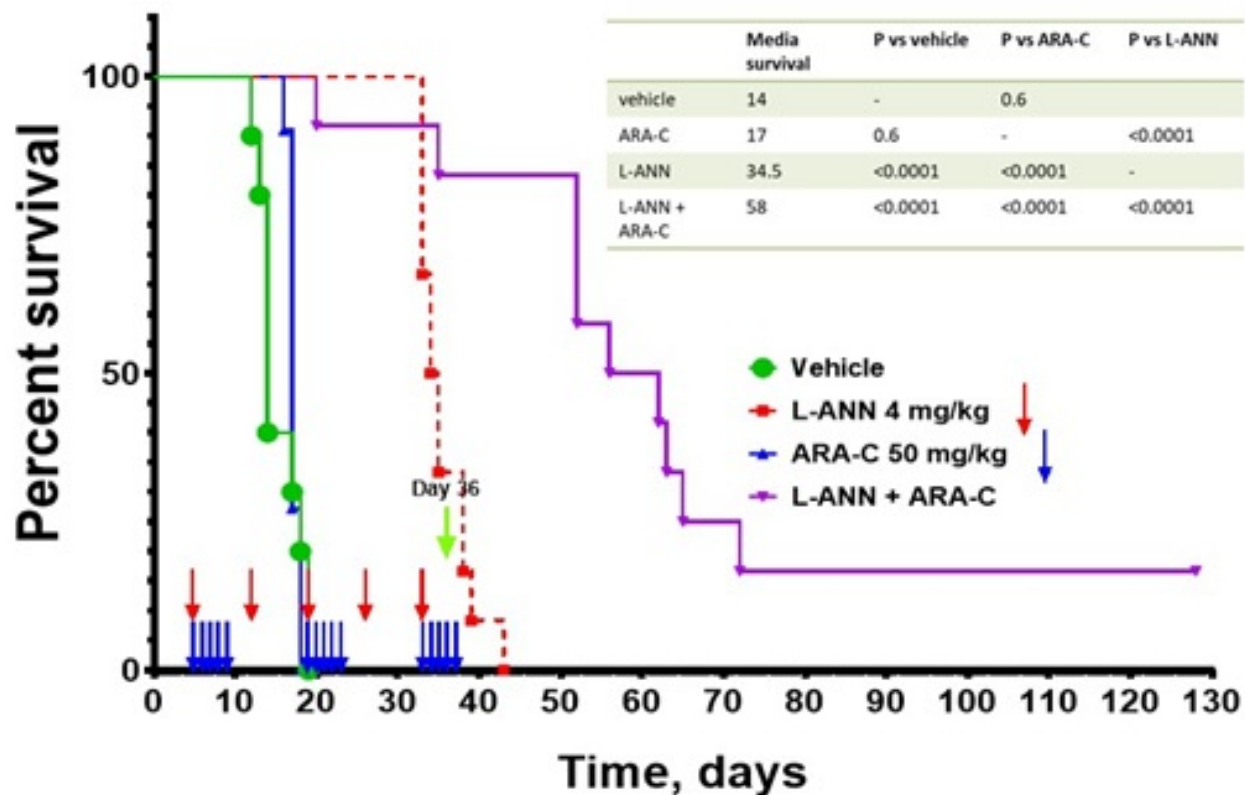
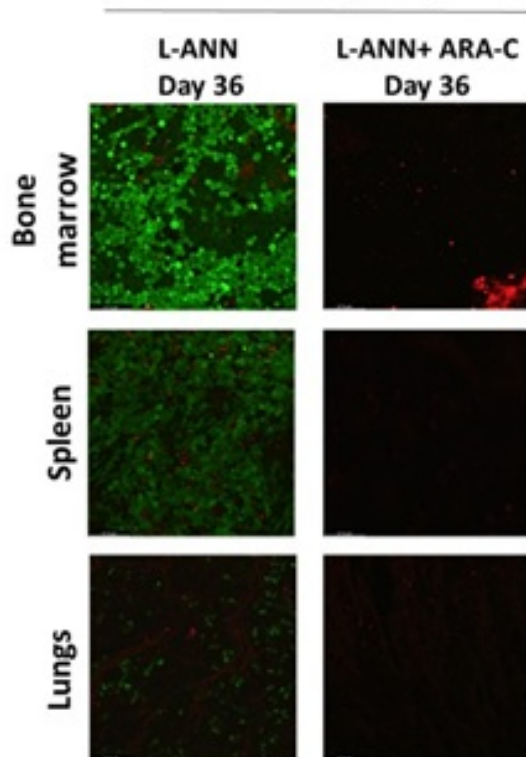


The gold standard preclinical Bertozzoli model for measuring cardiotoxicity shows Annamycin is effectively non-cardiotoxic when compared with doxorubicin.

Free Annamycin (API only) is substantially less cardiotoxic than doxorubicin and L-Annamycin (as formulated) is essentially non-cardiotoxic.

Annamycin Synergizes with ARA-C in Increasing Survival in p53-null, FLT3 mutated AML Model (AML-mTurquoise2)

Analysis of Minimal Residual Disease (MRD)



Performance of AML Therapies in 2nd Line

CLAVELA: International Randomized Phase III Study of Elacytarabine Versus Investigator Choice in Patients with Relapsed/Refractory Acute Myeloid Leukemia

381

R/R AML
subjects

Elacytarabine

(compared with)

7 different NCCN
recommended therapies

Therapies compared:

- high-dose cytarabine (HiDAC)
- MEC
- FLAG/FLAG-Ida
- low-dose cytarabine
- hypomethylating agents
- hydroxyurea
- supportive care

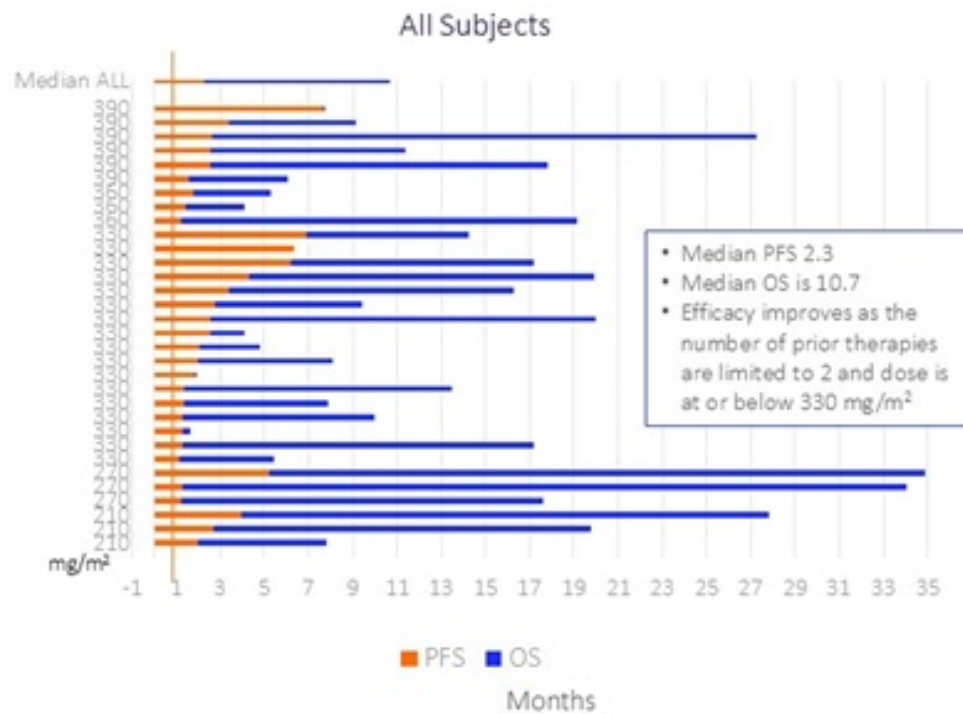
Results:

There were no significant differences in OS (3.5 v 3.3 months), response rate (CR = 15% v 12%) between the elacytarabine and control arms, respectively. There was no significant difference in OS among any of the investigator's choice regimens.

Gail J. Roboz, Todd Rosenblat, Martha Arellano, Marco Gobbi, Jessica K. Altman, Pau Montesinos, Casey O'Connell, Scott R. Solomon, Arnaud Pigneux, Norbert Vey, Robert Hills, Tove Flem Jacobsen, Athos Gianella-Barradori, Olivind Fass, Sylvia Vetthusand, and Francis J. Giles

Annamycin Demonstrates Efficacy in STS Lung Metastases (MB-107) - As Reported in Feb 2024

Demonstrated Stable Disease After Two Treatment Cycles



Demonstrated Improvement with Dose ≤ 330 mg/m² and Fewer Prior Therapies

Preliminary MB-107 Summary as of Sep 23, 2024

Progression Free Survival Months (mos)	All Subjects	Phase 1B All Subjects	Phase 2 All Subjects (330&360 mg/m ²)	All Subjects Treated at 330mg/m ²	All Subjects with 2 or Fewer Prior Therapies ($\leq 2PT$)	All Subjects ≤ 330 mg/m ² & $\leq 2PT$
1 mos or >	100%	100%	100%	100%	100%	100%
2 mos or >	59%	67%	53%	61%	75%	67%
3 mos or >	28%	27%	29%	30%	42%	44%
4 mos or >	19%	13%	24%	22%	25%	22%
5 mos or >	16%	13%	18%	17%	17%	22%
6 mos or >	13%	7%	18%	13%	17%	11%
n =	32	15	17	23	12	9
Median PFS mos	2.3	2.0	2.6	2.0	2.7	2.8
Median Prior Therapies (Range)	3 (1-11)	4 (1-8)	3 (1-11)	3 (1-11)	2 (1-2)	2 (1-2)
Median O/S mos	10.7	13.5	10.2	9.4	12.8	14.3

Soft Tissue Sarcoma Mets to the Lungs

MB-107 studied Annamycin monotherapy in Advanced STS subjects with lung metastases*

All Comers (n=32)

Median prior tx = 3

OS = ~11 months

2nd Line (n=9)

Median prior tx = 1

OS = ~14 months

“We don’t expect to see these kinds of responses in STS patients with lung metastases who have stopped responding to 1st line therapy...let alone in 4th line!” STS KOL

* Preliminary results, subject to final clinical study report which is expected to be issued in late 2024 or early 2025

Science Advisors



Waldemar Priebe, PhD
MD Anderson Cancer Center
Founding Scientist & SAB Chair



Dr. Daniel Von Hoff
Mayo Clinic

Hematology Oncology



Dr. Martin Tallman
Northwestern University



Dr. Jorge Cortes
Augusta University



Dr. Michael Andreef
MD Anderson Cancer Center



Dr. Giovanni Martinelli
Bologna University

Global Network



All technology licensed from MD Anderson Cancer Center (MDACC)



Supports continuing preclinical research on our technology at MDACC close to \$1M per year



Active contractors in US, EU and Asia for drug production and distribution as well as for clinical trial management



Past & current externally funded trials – MD Anderson Cancer Center; Emory University, Aflac Cancer & Blood Disorders Center, Children's Healthcare of Atlanta; Northwestern University (NIH & BrainUp); Madame Curie Institute (Poland), and others in discussion

