NASDAQ: MBRX | moleculin.com

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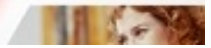

April 2024
Investor Presentation

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 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. 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, such as MB-106 & MB-107, are preliminary and subject to change until a final Clinical Study Report is published.

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DIAGNOSIS

Core Management Belief…

Anthracyclines represent the most important first line treatments for AML and Advanced STS.

Annamycin allows, for the first time ever, a clear majority of patients to benefit from these treatments.

Our Team

Management Team

Walter V. Klemp
Founder, President, CEO and Chairman

Donald Picker, PhD
Chief Scientific Officer

Jonathan P. Foster
Executive VP & Chief Financial Officer

Dr. John Paul Waymack
Senior Chief Medical Officer

Sandra Silberman, MD, PhD
Chief Medical Officer – New Products

Wolfram C. M. Dempke, MD, PhD, MBA
European Chief Medical Officer

Robert Shepard, MD, FACP
Medical Advisor

Board of Directors

Walter V. Klemp
Founder, President, CEO and Chairman

Michael D. Cannon
Director

Elizabeth Cermak
Director

John Climaco
Director

Robert E. George
Director

Joy Yan, MD, PhD
Director

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The Annamycin Opportunity in AML

Annamycin in combination with Cytarabine (AnnAraC) has potential to fill unmet need in AML; **60%** CRc (**50%** CR) in 2nd line patients reported in latest Phase 1B/2 study

AnnAraC has the potential to more than double 2nd line AML CRs

All 82 Annamycin subjects (in multiple studies) continue to show no signs of cardiotoxicity during study; Lower toxicity profile than traditional intensive therapy

Annamycin is advancing towards pivotal AML study in 2024 with expectation of securing accelerated approval pathway

Phase 2B/3 Ready

Relatively small (n=100-150), quick (12-18 months) clinical trial

Seeking SPA to reduce regulatory approval risk

Strong Data[1]

Outperforming every asset approved in AML

Other drugs approved with less CR's than our current performance

High Value Asset

Last transaction (2021) was $2 billion for a lesser asset in same space

Strong IP with patent pending through 2040+, in addition to ODD & FTD

1 – The trials referenced are active. Data is preliminary and subject to change.

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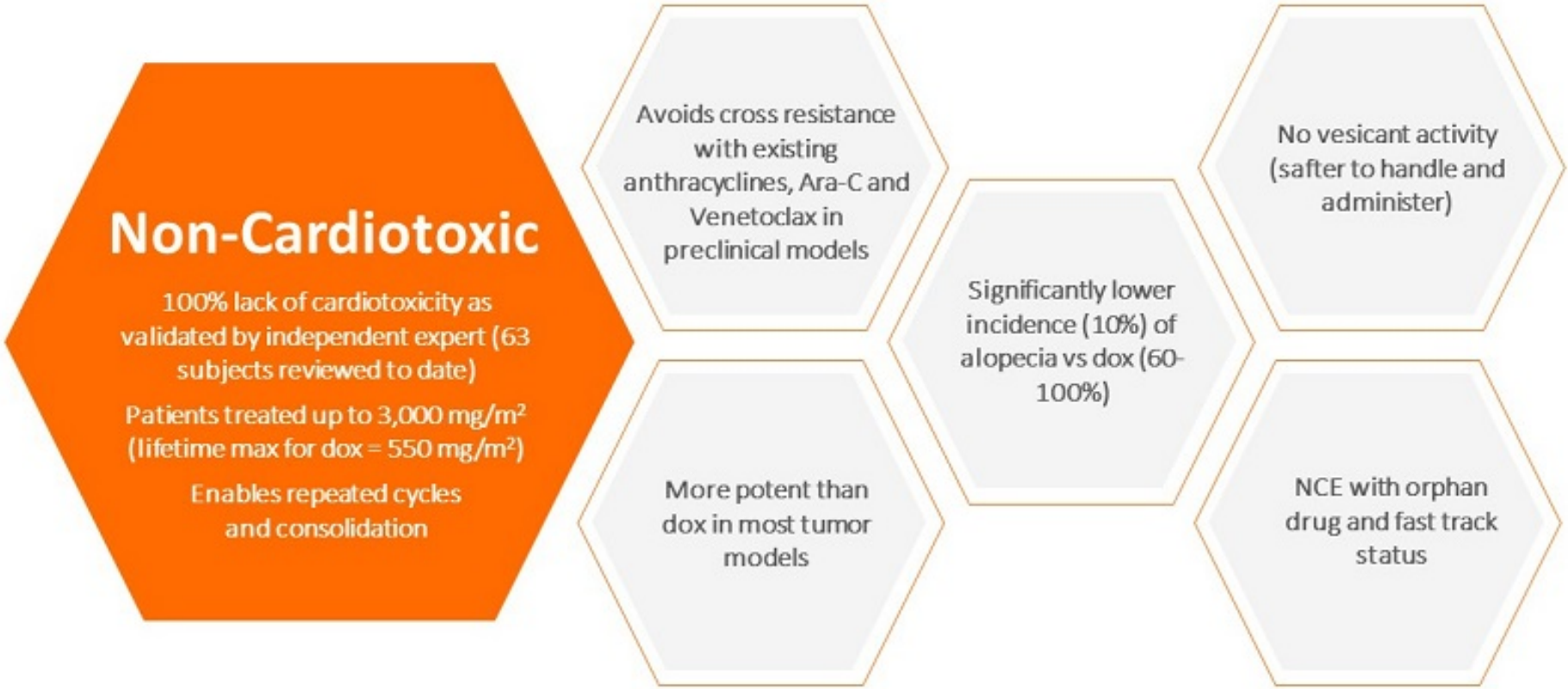
Annamycin Attributes



Notes: 1) Current Cardiology Review, Anthracycline Cardiotoxicity: Prevalence, Pathogenesis and Treatment, Maria Volkova and Raymond Russel III. Referenced from Cancer. 2003 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 tochange; 3) Refer to Form 10K for FYE 2023 for discussion on latest subject with an increase in troponins and our Expert's opinion.

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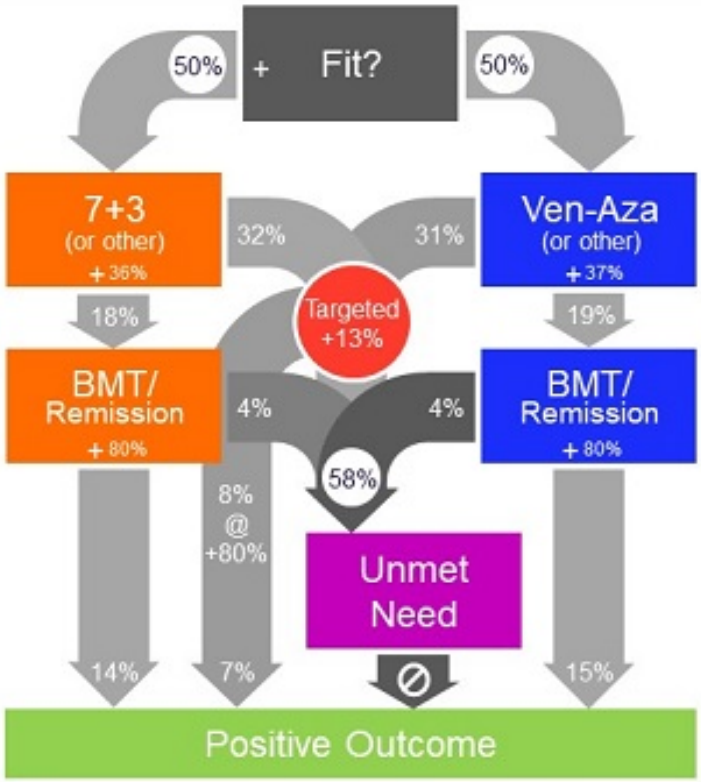
Approved Therapies are Successful for <40% of the ~20,000 Annual Newly Diagnosed AML Patients



	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%	37%	~21%
All AML benefit[1]	14%	15%	7%
Critical characteristics	Cardiotox	Still leaves significant unmet need	Limited to certain gene mutations

Notes: 1.Management estimates and shown as if Annamycin becomes approved for AML; 2. % of AML population sustaining durable positive outcome via BMT or remission; 3. Allowance made for other therapies where appropriate in the percentages shown

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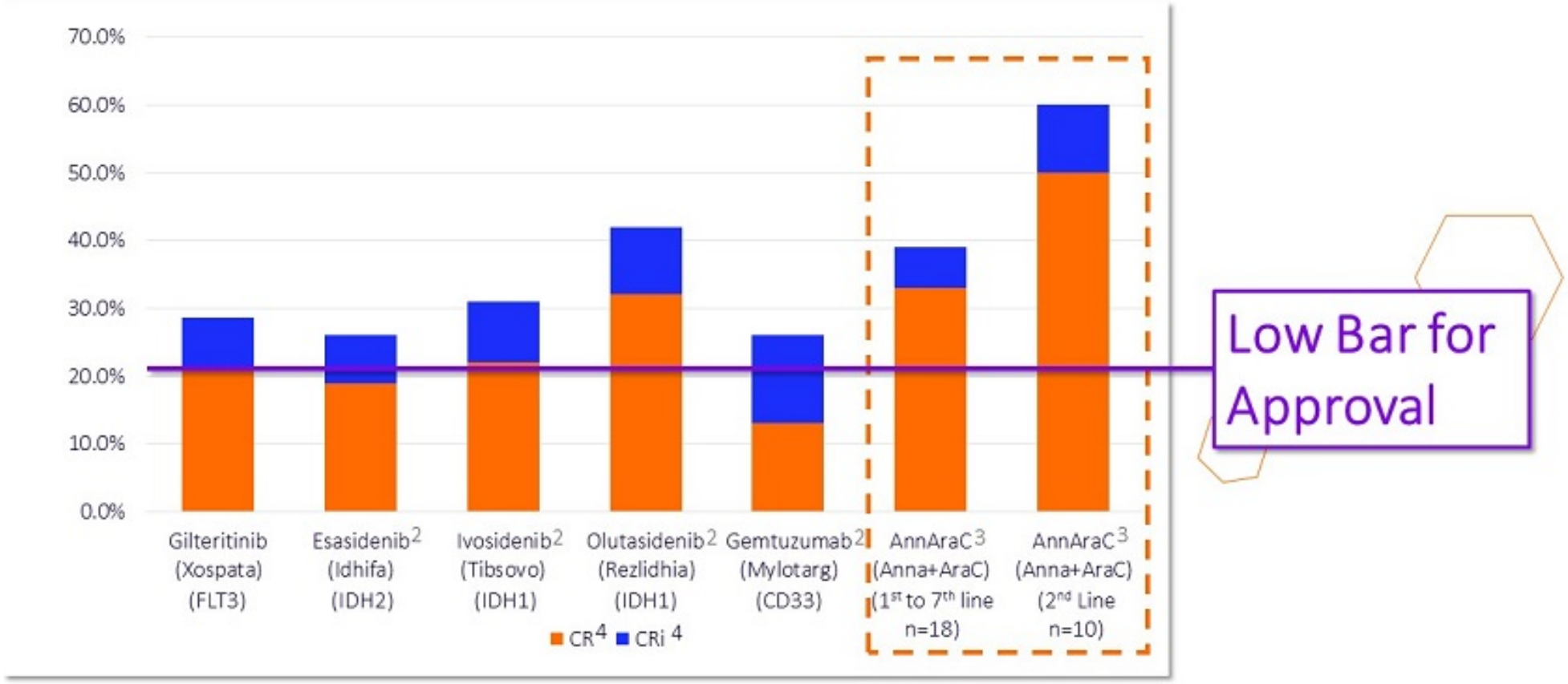
Competitive Landscape – CR/CRi Approval Rates[1]



1. This chart compares Complete Response (CR) and Complete Response with Incomplete peripheral blood count (CRi) 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.; AnnAraC studied in all comer r/r AML subjects (n=38) with data stratified for 2nd line (n=30); data preliminary and subject to change; 4. CR and CRi 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.

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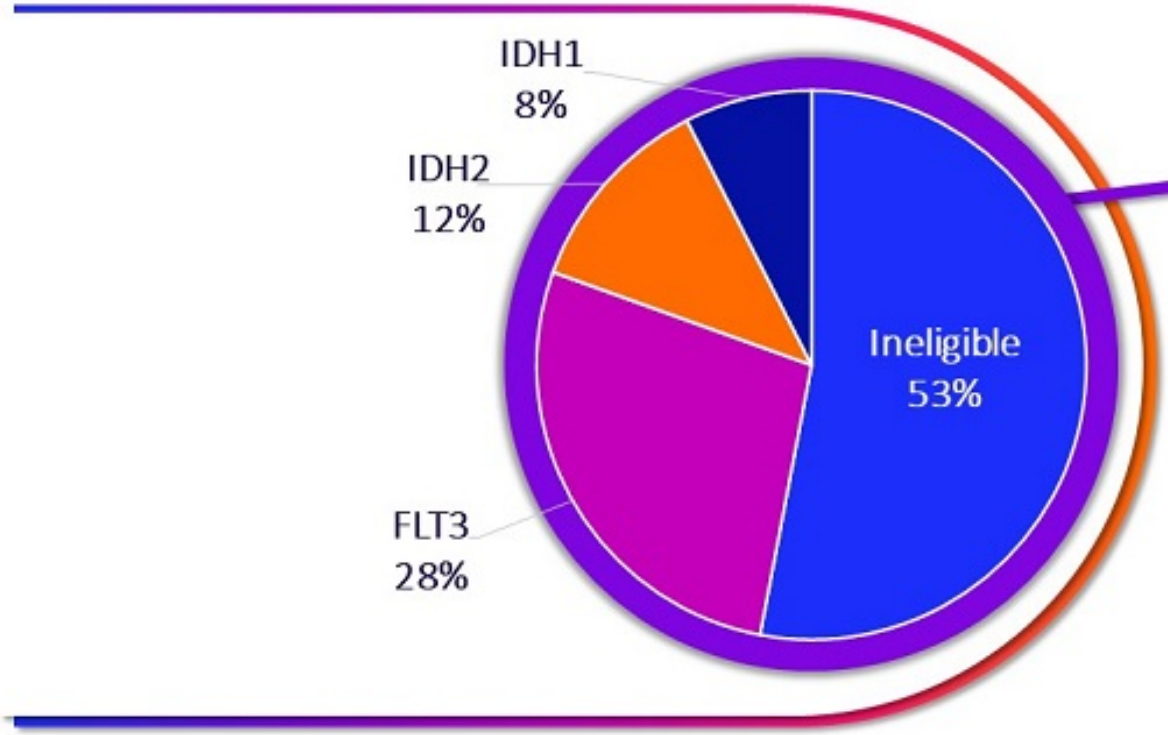
>50% of AML Patients are Ineligible for Approved Targeted Therapies



AnnAraC Treats
All-Comers in 2nd Line

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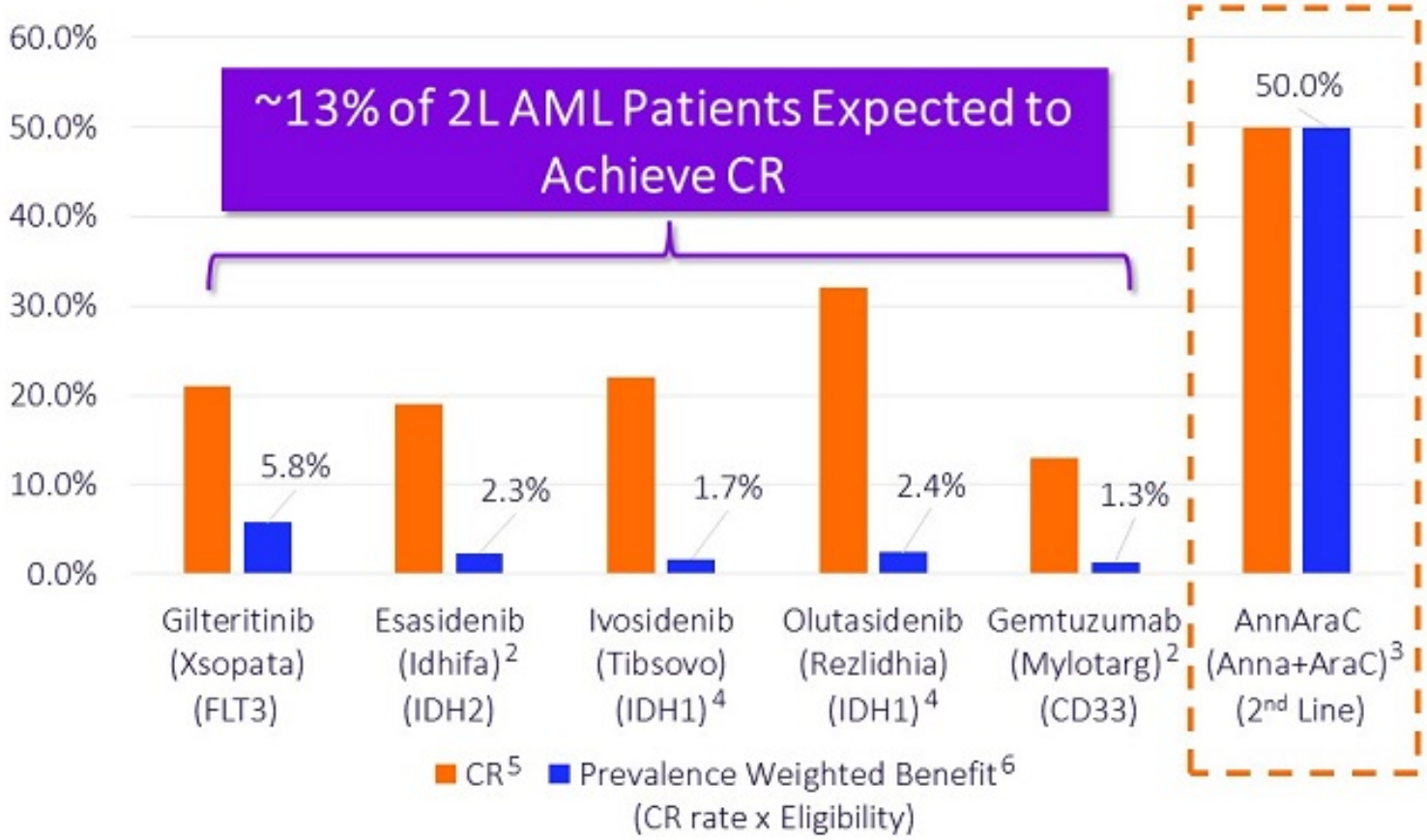
AnnAraC Should Increase 2nd Line (2L) AML CRs 2-Fold or More



1. This chart compares Complete Response (CR) rates, as submitted for FDA approval for existing 2nd line therapies (as single agents) in preliminary CR data for AnnAraC (the combination of Annamycin and AraC). 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 tolerance of frontal CD33 expression; 2. Not approved in EU; US approval only; 3. AnnAraC studied in all-comer (≥ AML subjects (n=53) with data cutoff for 2nd line (n=40); 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; 6. Thirdfall, 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 line 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 27.9% of AML population; hence 21% x 27.9% = 5.8% of the total AML population are expected to achieve CR with this therapy).

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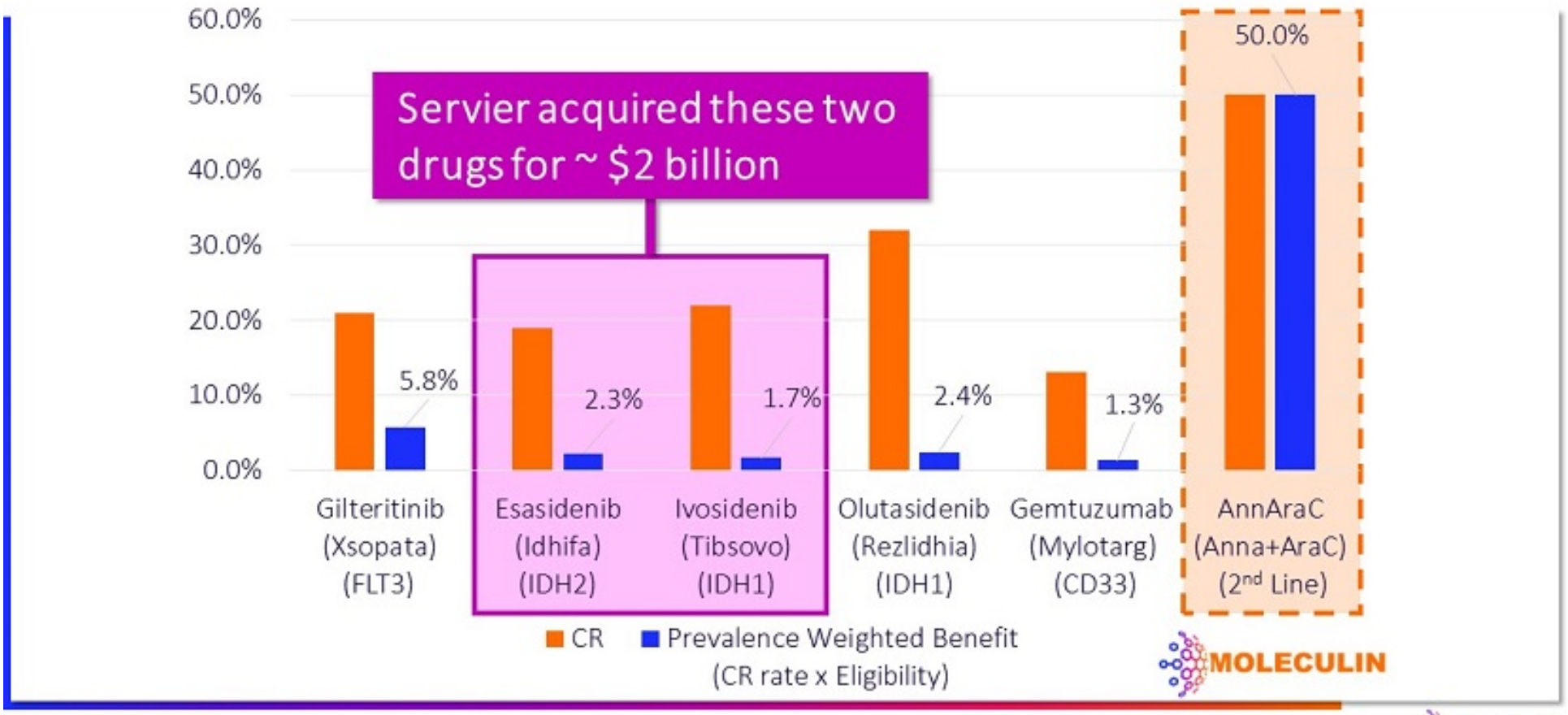
Potential Asset Value is Very High



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Potential Asset Value

	Approved			Phase 2 Complete			
	1st Line		2nd 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** **Exit[4]** (Acquisition of Celator, 2016)	**N/A**	**$2B** **Exit[5]** (Acquisition of Agios, 2021)	**~$1.5B** **Market Cap[6]**	**~$1.9B** **Market Cap[6]**	**N/A**	**~$.011B** **Market Cap[6]**

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

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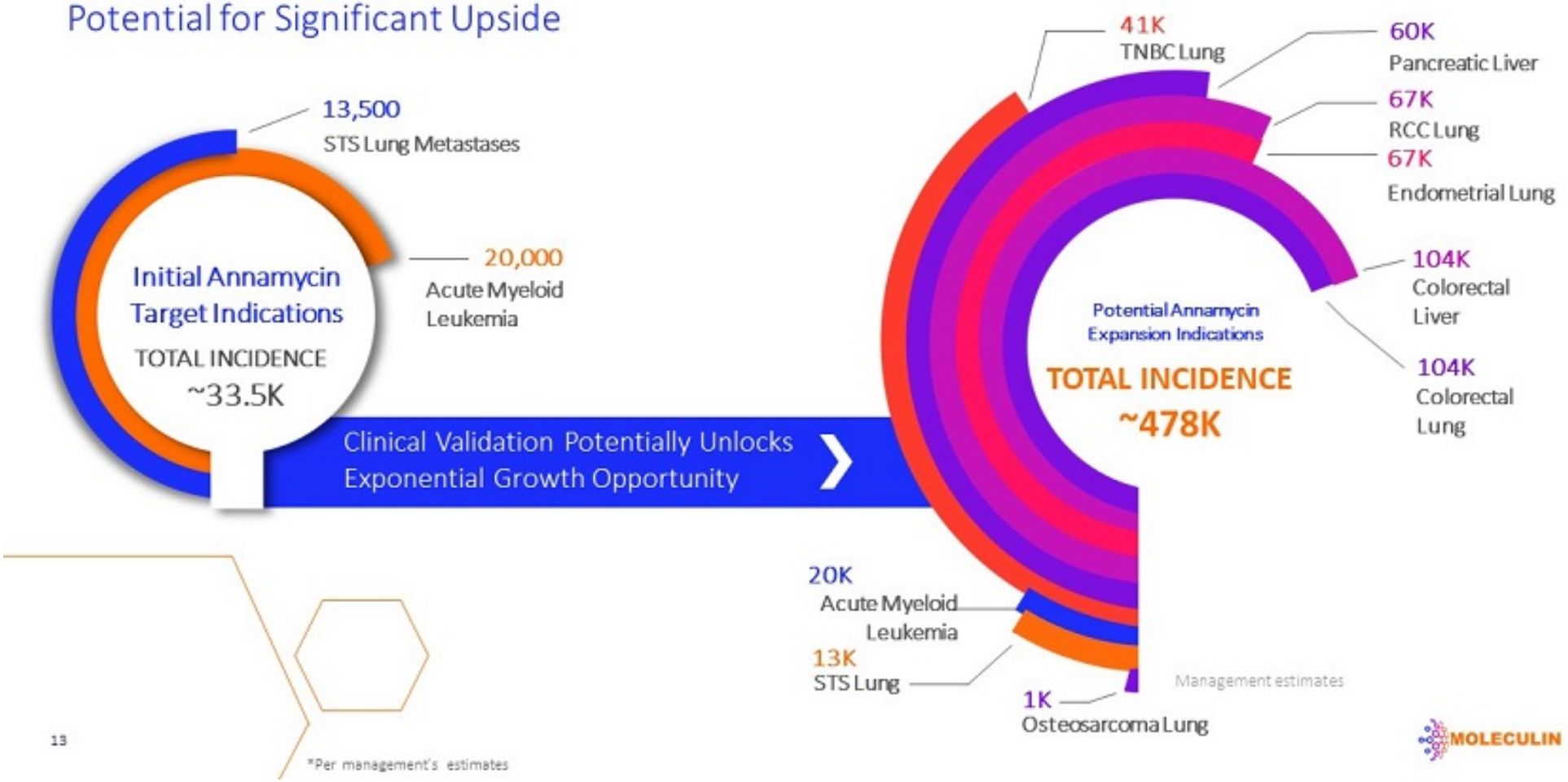
The Full Annamycin Opportunity

Potential for Significant Upside



*Per management's estimates

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Advancing Annamycin in AML

Phase 1: MB-104 MONOTHERAPY 100-120 mg/m^2	Phase 1/2: MB-105 MONOTHERAPY 120-240 mg/m2	Phase 1/2: MB-106 COMBINATION THERAPY Annamycin + Cytarabine
• N = 6 • 17% CRi (at suboptimal dosing) • Dosing limited by FDA Lifetime Anthracycline Dose (LTMAD) • Trial location – US	• N = 20 • Median lines of prior therapy = 4 • Median age of 240 mg/m^2 (RPD2) cohort = 65 years • 60% CR/CRi in 240mg/m^2 Cohort (N=5) • Trial location - Poland	• N = up to 27 (20 recruited to date) • 39% CRc (ITT) (N=18), 60% CRc (2nd Line) (N=10) • Prior therapies range 0-6 • Median age = 69 • Trial location – Poland & Italy
Key Findings		
• Well-tolerated in the study population • Limited to low doses • Morphologic leukemia free state was achieved in one subject in the 120 mg/m^2 cohort	• Positive correlation between response rate and dose	• "3+5" therapy • Durability: up to 13 months and increasing • Early evidence of efficacy in patients with previous therapy failures
Regulatory Significance		
• Demonstrated safe dosing within FDA-mandated limitations for anthracycline exposure	• Demonstrated safe dosing beyond FDA (and EMA) limitations for cumulative anthracycline exposure and early efficacy as single agent	• 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 is preliminary and subject to change. "ITT" = Intent to treat.

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Significant Patient Experiences in MB-106 (Annamycin + Ara-C)

Line of therapy	2nd Line						1st Line
Age	78	64	70	72	64	53	69
Relapsed or Refractory	Relapsed	Refractory	Relapsed	Relapsed	Relapsed	Refractory	1st Line
Prior Therapy (Cycles)	2 Arm Study (7 mos) Ven/Aza (17)	Ven/Aza (3)	Kladrybine/ AraC (2) AraC (11)	Kladrybine/LD AraC (7)	Ven/Aza (2)	7+3+Kladrybine (1) / Aza (4)	None
Best Response in MB-106	CR	CR	CR	CR	CRi	CR	CR
Durability - Developing	~13 mos (developing)	BMT ~9 mos (developing)	~4 mos (relapsed)[1]	~5 mos (developing)	~3 mos (death-pneumonia)[1]	~3 mos (developing)	~4 mos (developing)
Date 1st Treated/ Annamycin Cycles[2]	Feb 2023 / 3	Jun 2023 / 1	Sep 2023/2	Oct 2023/2	Nov 2023 / 1	Dec 2023/ 2	Nov 2023 / 1

1 – These patients did not receive standard of care for antimicrobial prophylactic therapy in leukemia patients; site deficiencies were corrected as soon as identified. 2 – Cycle = 5 days of Ara-C + 3 of Annamycin; Data are preliminary and subject to change; Duration measured from date of treatment.

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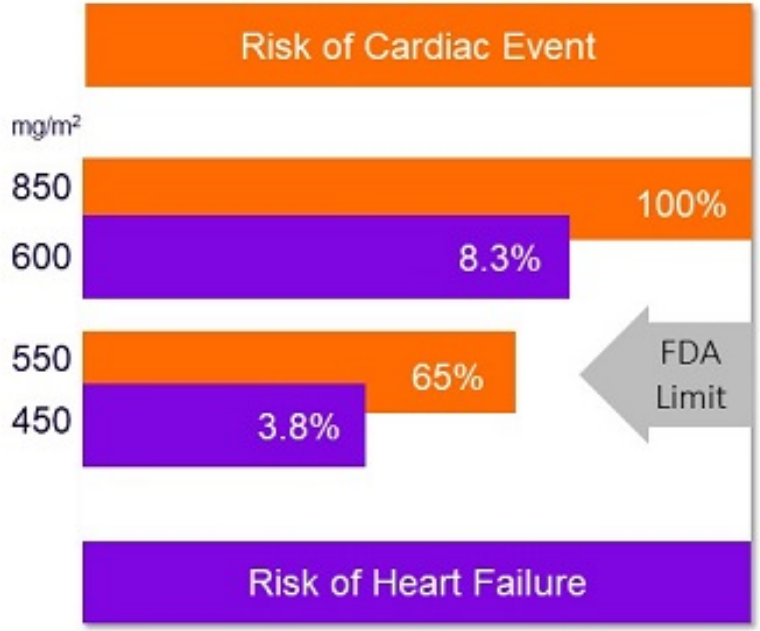
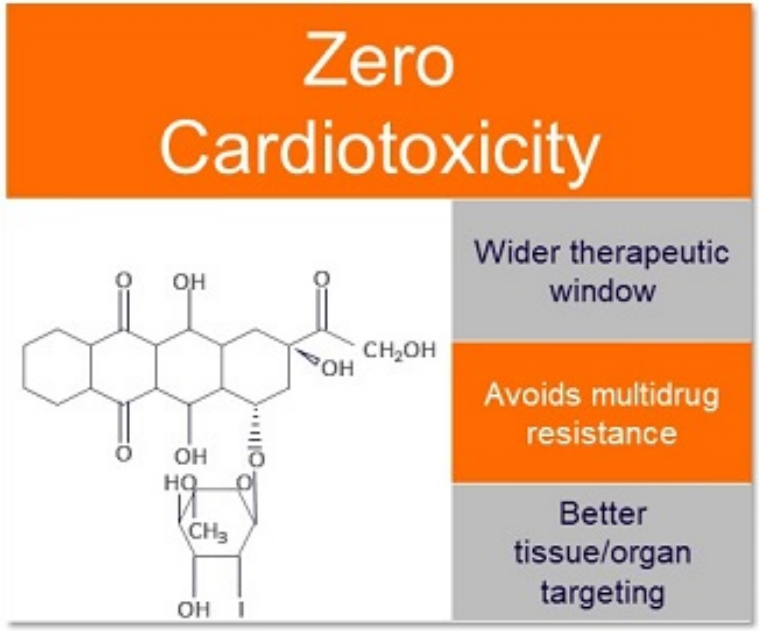
Annamycin Has Demonstrated Substantially Greater Cardiac Safety Compared to Approved Anthracyclines

Current Anthracyclines



Annamycin



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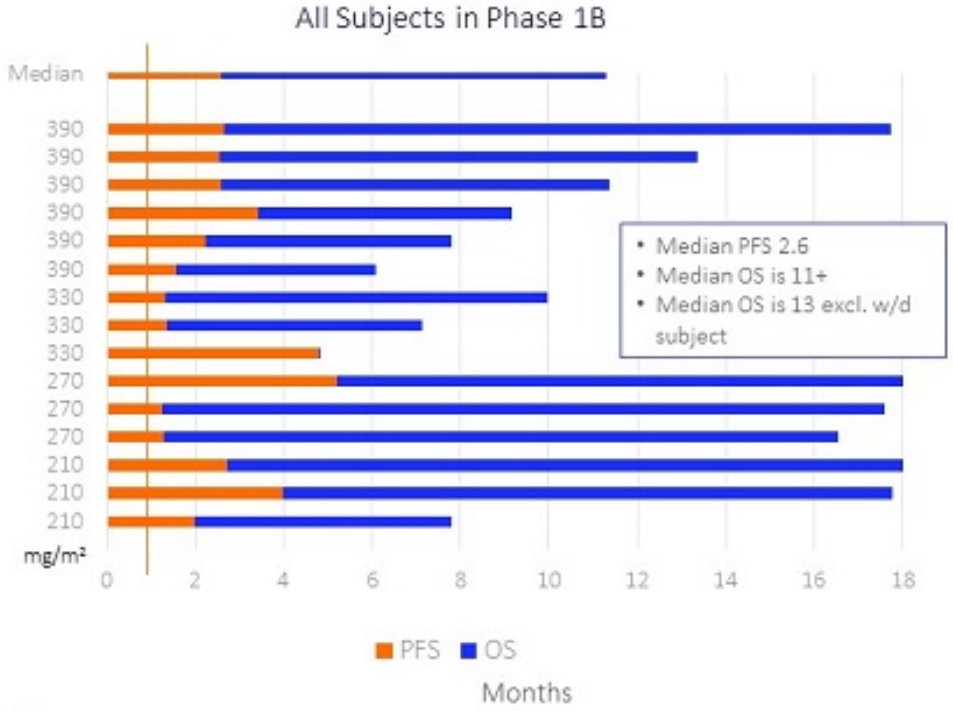
Annamycin Demonstrates Efficacy in STS Lung Metastases (MB-107)

Demonstrated Stable Disease After Two Treatment Cycles



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

Preliminary MB-107 Summary as of Jan 8, 2024						
Progression Free Survival Months (mos)	All Subjects	Phase 1B All Subjects	Phase 2 All Subjects	All Subjects Treated at ≤330 mg/m²	All Subjects with 2 or Fewer Prior Therapies (≤ 2PT)	All Subjects ≤ 330 mg/m² & ≤ 2PT
1 mos or >	100%	100%	100%	100%	**100%**	**100%**
2 mos or >	56%	67%	53%	61%	**83%**	**78%**
3 mos or >	25%	27%	24%	30%	**42%**	**56%**
4 mos or >	16%	13%	18%	22%	**25%**	**33%**
5 mos or >	9%	7%	12%	13%	**8%**	**11%**
6 mos or >	6%	0%	12%	9%	**8%**	**11%**
n =	32	15	17	17	**12**	**9**
Median mos	2.3	2.6	2.0	2.1	**2.7**	**3.1**
Median Prior Therapies (Range)	3 (1-11)	3 (1-9)	3 (1-11)	3 (1-11)	2 (1-2)	**2 (1-2)**
Median O/S mos	Developing	11.3	Developing	Developing	Developing	Developing

Overall survival (OS); Phase 2 Subjects Interim at this Time, as Majority of Subjects Continue Survival (N/A)

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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
- Supports preclinical research at UTMB
- Past & current externally funded trials – MD Anderson Cancer Center; Emory University, Aflac Cancer & Blood Disorders Center, Children's Healthcare of Atlanta; Madame Curie Institute (Poland), and others in discussion

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Cash to Fund Operations into the Fourth Quarter of 2024[1]

Nasdaq: MBRX

~$23.6M Cash Balance[2]

~$10M Market Cap[3]

~2.2M Shares Outstanding[4]

~55K 3-Month Avg. Weekly Volume[3]

Notes: 1: Based on Management's current expectations and planned increase in development activities 2: As of December 31, 2023; 3: 3: As of April 12, 2024; 4: Common stock outstanding as of March 14, 2024

Upcoming Milestones

PROGRAM	MILESTONE	ESTIMATED TIME OF ACHIEVEMENT
Annamycin AML	Complete MB-106 clinical trial	1H 2024
	Present topline data from MB-106 clinical trial	1H 2024
	End of Phase 2 (EOP2) Meeting	1H 2024
	Report outcome of MB-106 End of Phase 2 Meeting	2H 2024
	Initiate pivotal program	2H 2024 into 1H 2025
Annamycin STS Lung Metastases	Final MB-107 data readout	Q2 2024
	Identify next Phase of Development / Pivotal Program	1H 2024
	Initiate first line study	Q3 2024

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DIAGNOSIS

Core Management Belief…

Anthracyclines are among the most important treatments for AML and Advanced STS.

Annamycin allows, for the first time ever, a clear majority of patients to benefit from these treatments.