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MOLECULIN

August 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 (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.

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DIAGNOSIS

Core Management Beliefs on Annamycin Positioning:

- Safer and more effective than currently prescribed anthracyclines
- Non-cardiotoxic and avoids cross resistance with dox, Ara-C and Venetoclax
- Fills an unmet need for more than half of AML patients
- Delivers more than double the CR rate of any approved treatment for r/r AML
- Potential uses extend far beyond AML

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 (MB-106)

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

All 84 Annamycin subjects (in multiple studies) continue to show no signs of cardiotoxicity during study; Lower toxicity profile than traditional intensive therapy

Annamycin is planning to begin a Phase 3 pivotal AML study in early 2025 with expectation of seeking accelerated approval pathway

Phase 3 Plan

Relatively small (n=~195), (Mid-2026) read on interim data

Primary endpoint aligned with Phase 2 experience

Strong Data[1]

Current data outperforms every asset approved in AML

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

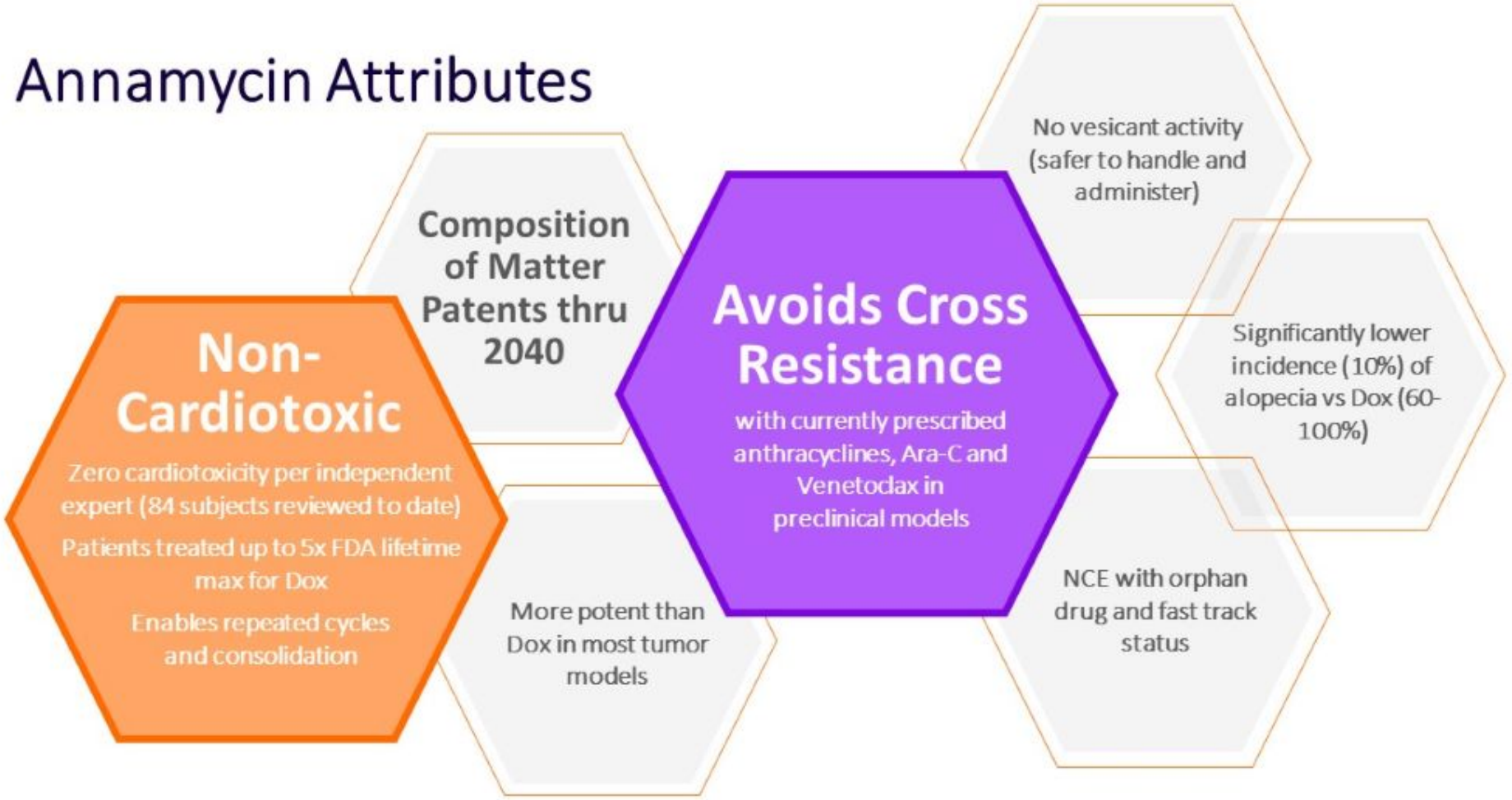
High Value Asset

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 are preliminary and subject to change.

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.

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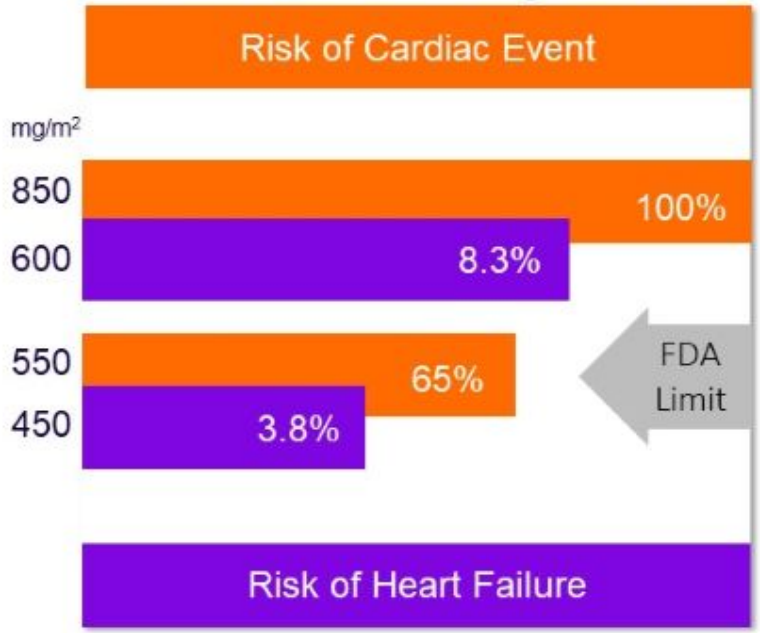
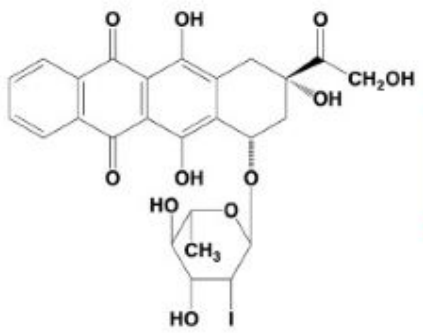
Annamycin Has Demonstrated Substantially Greater Cardiac Safety Compared to Approved Anthracyclines

Current Anthracyclines



Annamycin

Zero Cardiotoxicity



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

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 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.

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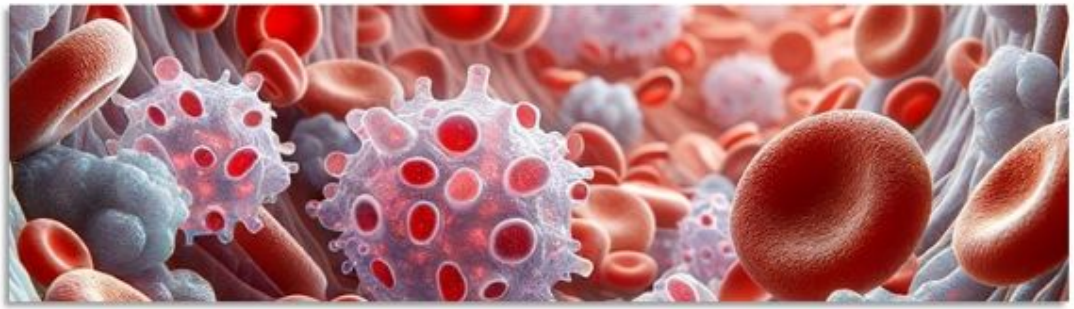
Acute Myeloid Leukemia (AML)

A type of cancer that starts in the blood-forming cells of the bone marrow, leading to the rapid growth of abnormal white blood cells

Symptoms include fatigue, frequent infections, easy bruising, and bleeding



~160,000
Cases Worldwide[2]

~20,000
Newly Diagnosed Annually (U.S.)[2]

5-Year Survival

Significant unmet need for more effective and tolerable therapies in the elderly and relapse/refractory setting

1: Cite for AML quote is : https://www.futuremedicine.com/doi/10.2217/fon-2022-1286#:~:text=However%2C%20more%20than%20half%20of,is%20key%20for%20such%20people; 2: Villatoro A, (2020) Leukemia Stem Cell Release From the Stem Cell Niche to Treat Acute Myeloid Leukemia. Front. Cell Dev. Biol. 8:607. doi: 10.3389/fcell.2020.00607; 3: Glabbeke M V, et al. Prognostic Factors for the Outcome of Chemotherapy in Advanced Soft Tissue Sarcoma: An Analysis of 2,185 Patients Treated With Anthracycline-Containing First-Line Regimens—A European Organization for Research and Treatment of Cancer Soft Tissue and Bone Sarcoma Group Study. Journal of Clinical Oncology, Vol 17, No 1 (January), 1999: pp 150-157.

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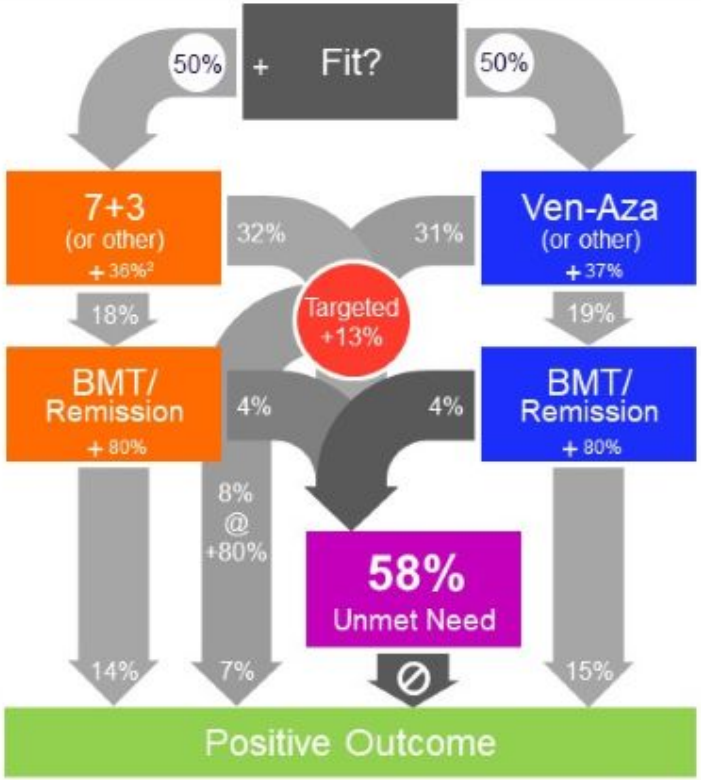
Approved Therapies are Successful for Only ~40% of AML Patients[1]



	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

Notes: 1.Management estimates; 2. Net of relapse, Management estimate, varies depending on study; 3. % of AML population sustaining durable positive outcome via BMT or remission, allowance made for other therapies where appropriate in the percentages shown

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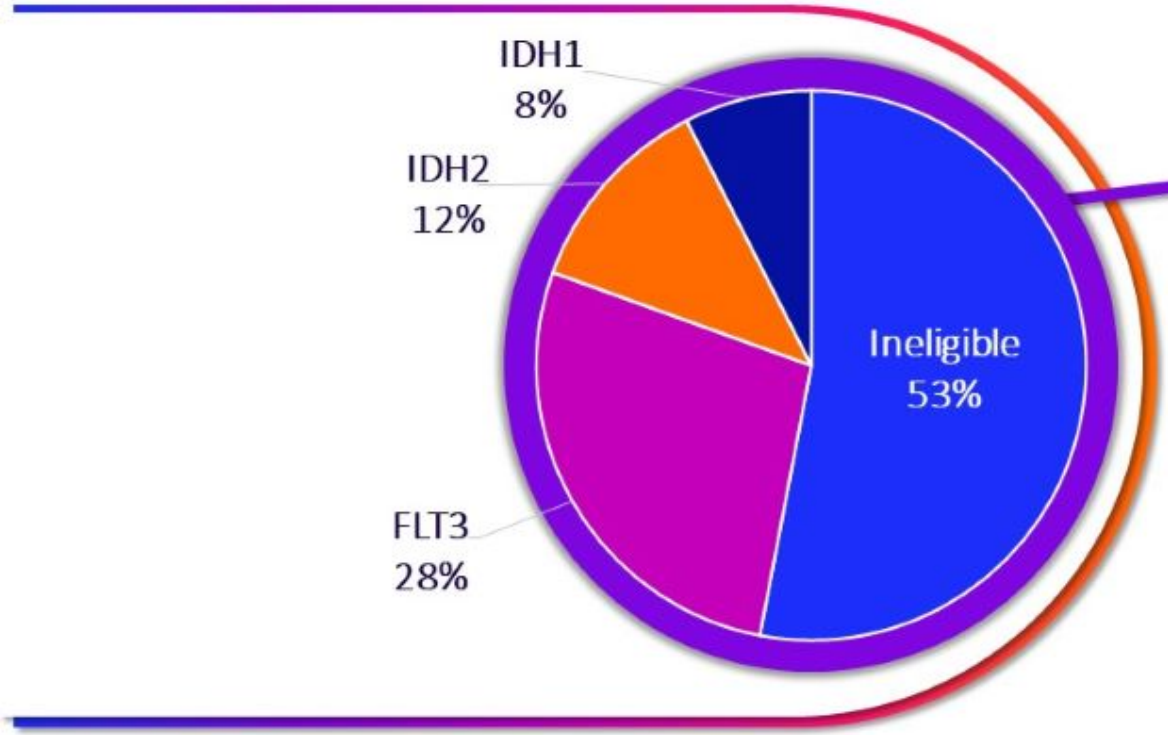
>50% of AML Patients are Ineligible for Approved Targeted Therapies



AnnAraC Treats All-Comers in 2nd Line

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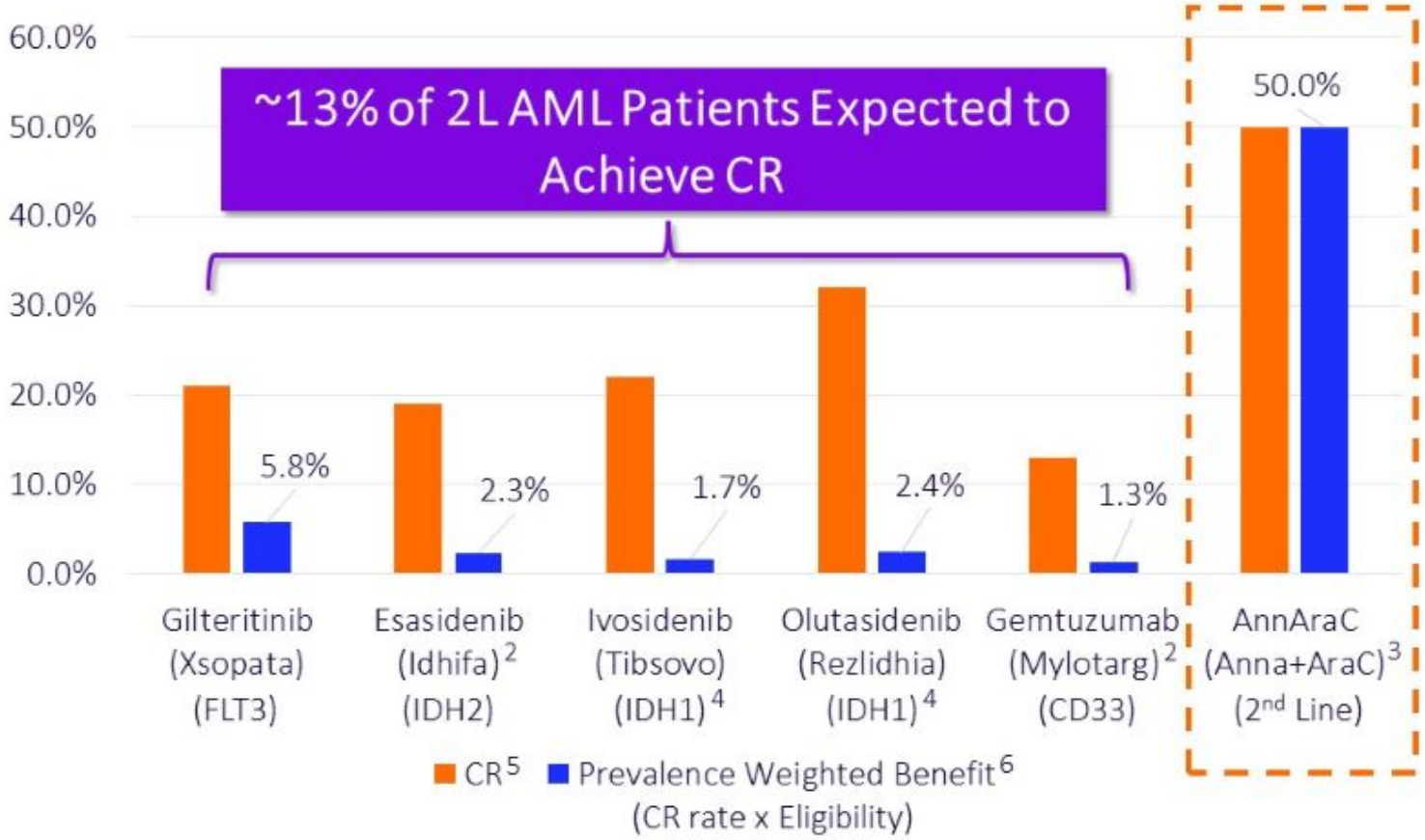
AnnAraC Should Increase 2nd Line (2L) AML CRs 2-Fold or More



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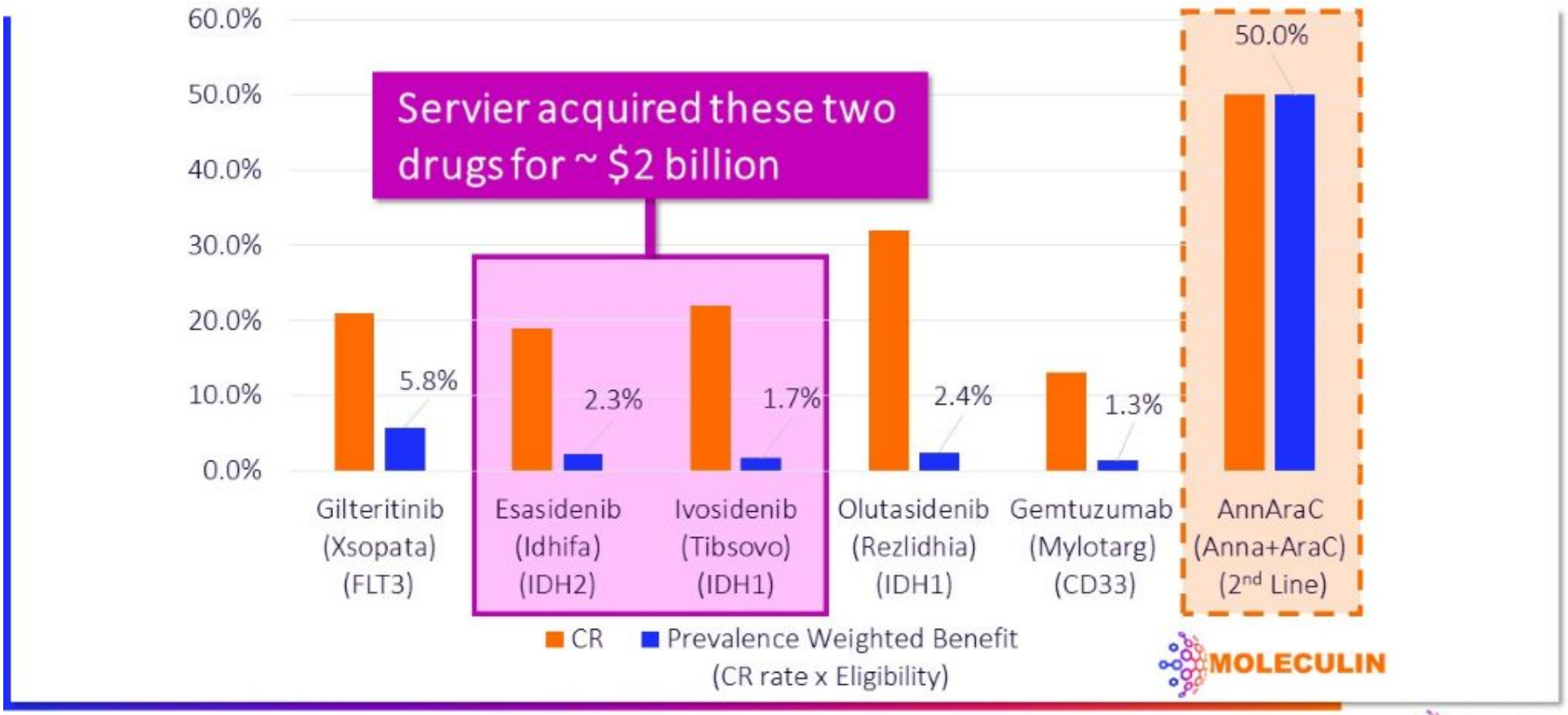
Potential Asset Value is Very High



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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AML Clinical History

Phase 1: MB-104 MONOTHERAPY 100-120 mg/m²	Phase 1/2: MB-105 MONOTHERAPY 120-240 mg/m2	Phase 1/2: MB-106 COMBINATION THERAPY Annamycin + Cytarabine
• N = 7 • 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/m² (RPD2) cohort = 65 years • 80% ORR in 240mg/m² Cohort (N=5) • Trial location - Poland	• N = 22 all lines (0-6), N = 10 (2nd line) • All subjects (N=22) 41% CRc (ITT) • 2nd Line N=10, 60% CRc • Prior therapies range 0-10 • Median age all subjects = 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/m² cohort	• Positive correlation between response rate and dose	• "3+5" therapy • Durability: ~7 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 are preliminary and subject to change.
"ITT" = Intent to treat.

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

Line of Therapy	All Lines (1st – 7th)	1st Line	2nd Line	2nd & 3rd 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	3	0	**3**	3
BMT To Date	2	0	**1**	2

Median CRc Durability = ~7 Months and Climbing

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).

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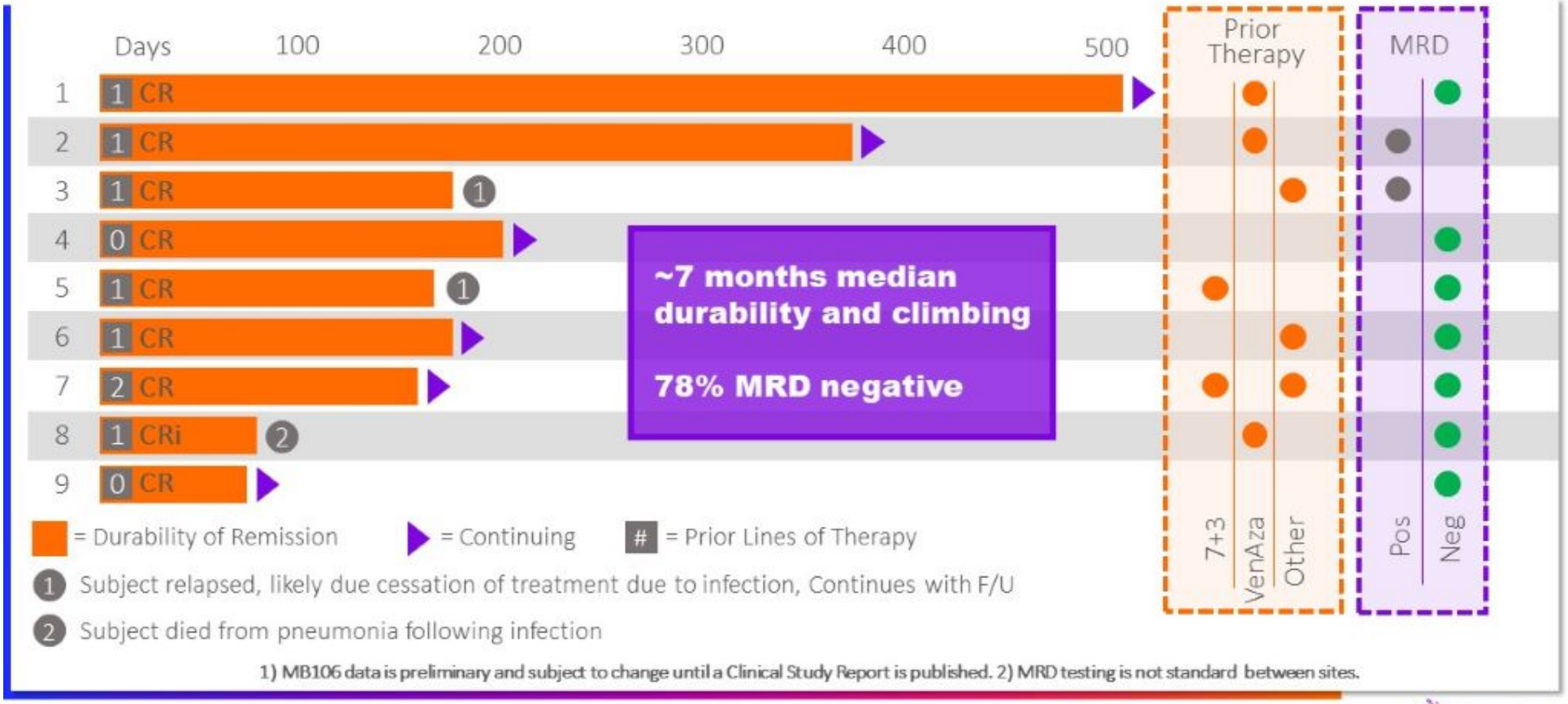
Durability, MRD, Prior Therapies



1) MB106 data is preliminary and subject to change until a Clinical Study Report is published. 2) MRD testing is not standard between sites.

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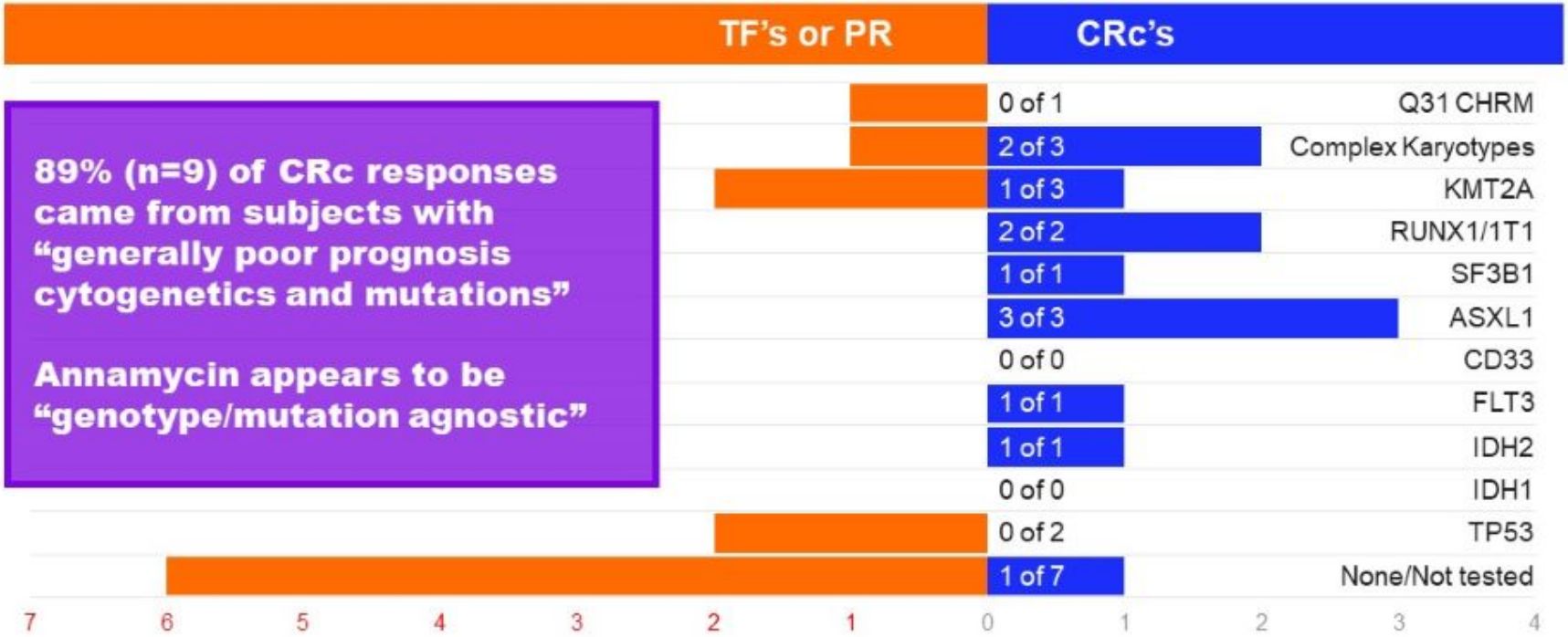
MB-106 Response by Genotype and Mutation



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.

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MiRACLE

Molecul**i**n **R**/R AML **A**nnAraC **Cl**inical **E**valuation

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 1Q2025.

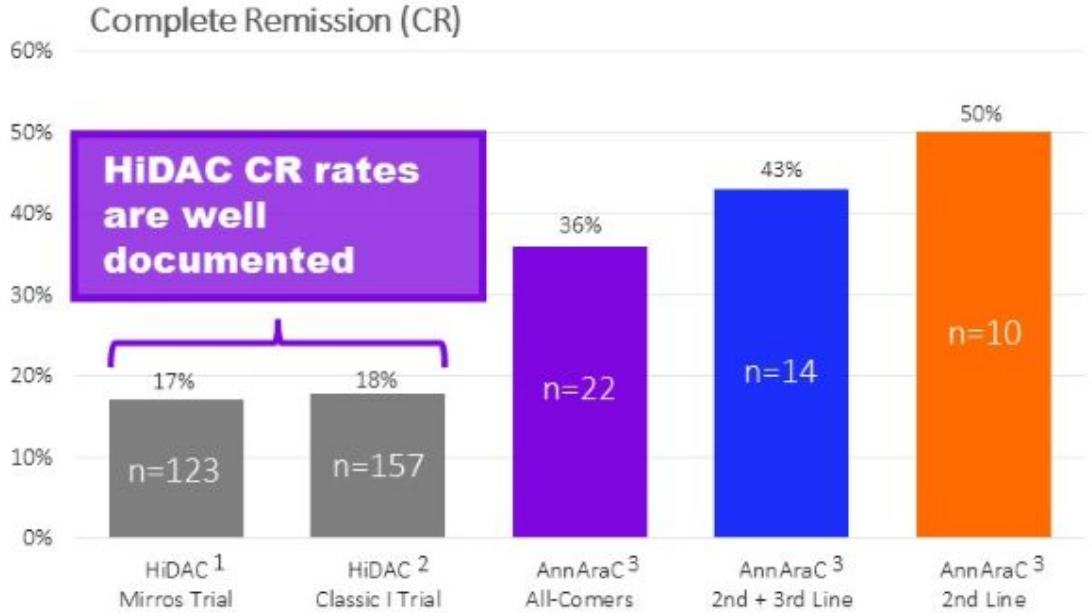
MIRACLE Adaptive Trial Design Based on EoP1B/2 Guidance

- Adaptive 3 arm randomized, double-blind Phase 3 pivotal trial comparing AnnAraC at two different doses to placebo, each in combination with High Dose Ara-C (HiDAC)
- n=75 randomized 1:1:1 between 190 mg/m^2, 230 mg/m^2 and placebo
- FDA review of optimum dose (190 or 230) established by first 75 subjects followed by an additional ~120 subjects randomized 1:1 between optimum dose and placebo, both in combination with HiDAC (total trial: n=~195)
- Endpoints:
  - Primary: CR at 1 month
  - Secondary: durability of remission and OS
- Treatment failures in either arm may cross over after 1 month to SoC (list to be determined; excludes Annamycin)

Planned MIRACLE2 Follow-On Clinical Trial

- n=200 randomized between optimum dose established in initial MIRACLE trial and placebo, each in combination with HiDAC
- Same trial design as used with final 120 subjects in initial MIRACLE trial except enrolling 3rd line patients instead of 2nd line patients
- Targeted to begin after establishing optimum dose in initial MIRACLE trial

The Bar for Approval is Low



MIRACLE trial is targeting 2nd line subjects; MIRACLE2 is targeting 3rd line subjects

1 – Mirros Trial, 81% 2nd line patients, Konopleva et al, Blood Advances, 26 July 2022, Volume 6, Number 14; 2 – Classic I Trial, 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), 43% CR rate for 2nd + 3rd line patients (n=14), and 36% CR rate for all-comers (1st through 7th line, n=22)

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Path to Potential Approval in 2nd Line AML

Rapidly Advancing Towards Potential Approval While Creating Optionality for Potential Commercialization

Unmet Need, Data Generated to Date and Peer Valuation Suggest Potential for Significant Value Creation

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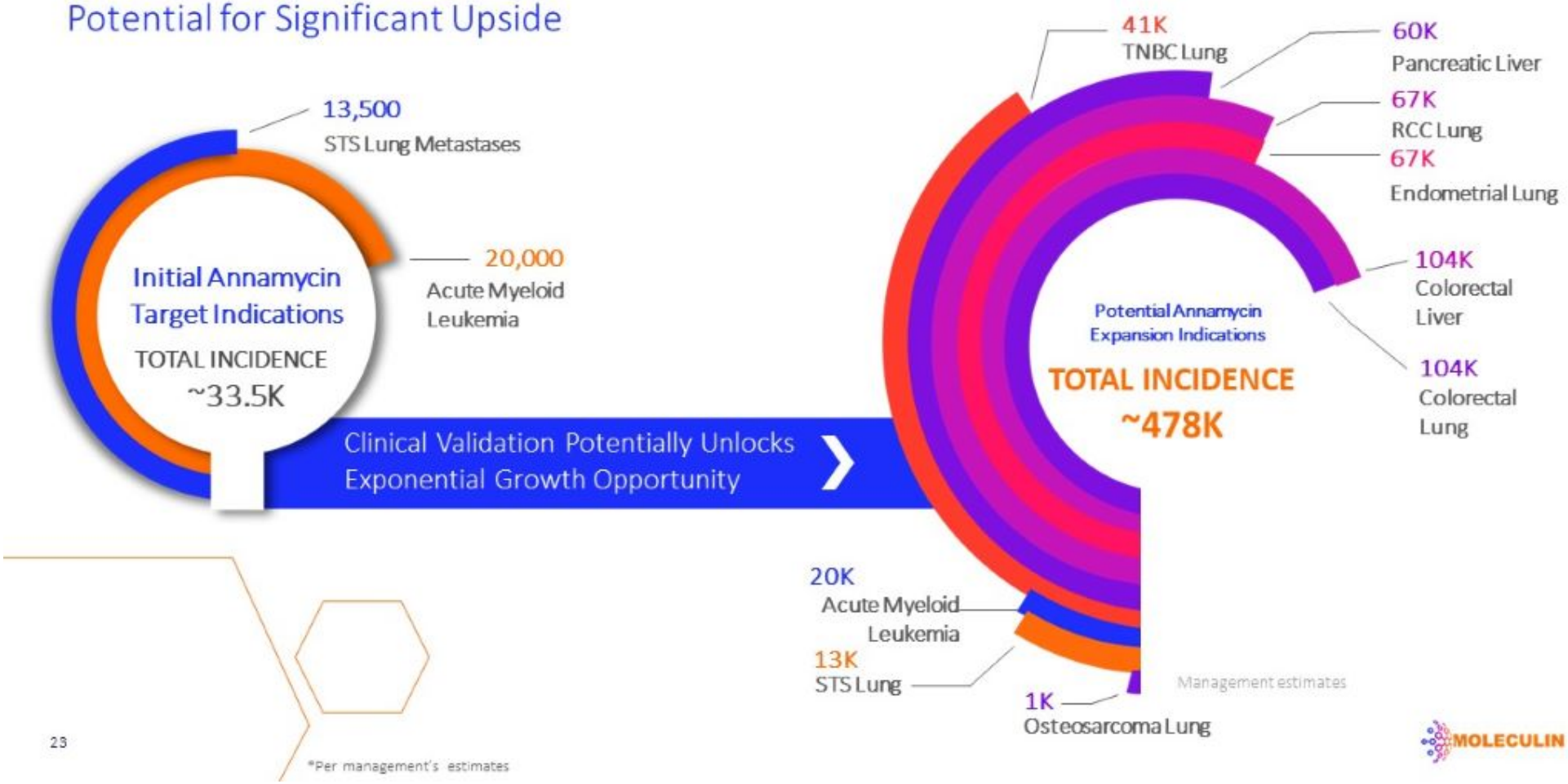
The Full Annamycin Opportunity

Potential for Significant Upside



*Per management's estimates

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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
- 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; Madame Curie Institute (Poland), and others in discussion

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

Nasdaq: MBRX

~$17M Cash Balance[2]

~$13.1M Market Cap[3]

~2.5M Shares Outstanding[4]

~30K - 30 Trading Day Daily Volume[5]

Notes: 1: Based on Management's current expectations and planned increase in development activities 2: As of March 31, 2024; 3: 3: As of May 2, 2024 w/ price per share = $5.14 per share x (229,506 pre-funded warrants+ 2.31M common stock o/s); 4: Common stock outstanding as of May 2, 2024 + pre-funded warrants 5. 30 trading day lookback 5/9/24

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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
	Interim data (n=75) unblinded and Optimum Dose set for MIRACLE trial	Mid 2026
	Begin enrollment of 3rd line subjects in MIRACLE2	2026
	Enrollment ends for 2nd line subjects	2027
	Final data for 2nd line subjects	2028
	Begin NDA submission	2H 2028
Annamycin STS Lung Mets	Final MB-107 Data Readout	2025
	Identify Next Phase of Development / Pivotal Program	2025

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