Actinium Pharmaceuticals, Inc.

June 2015

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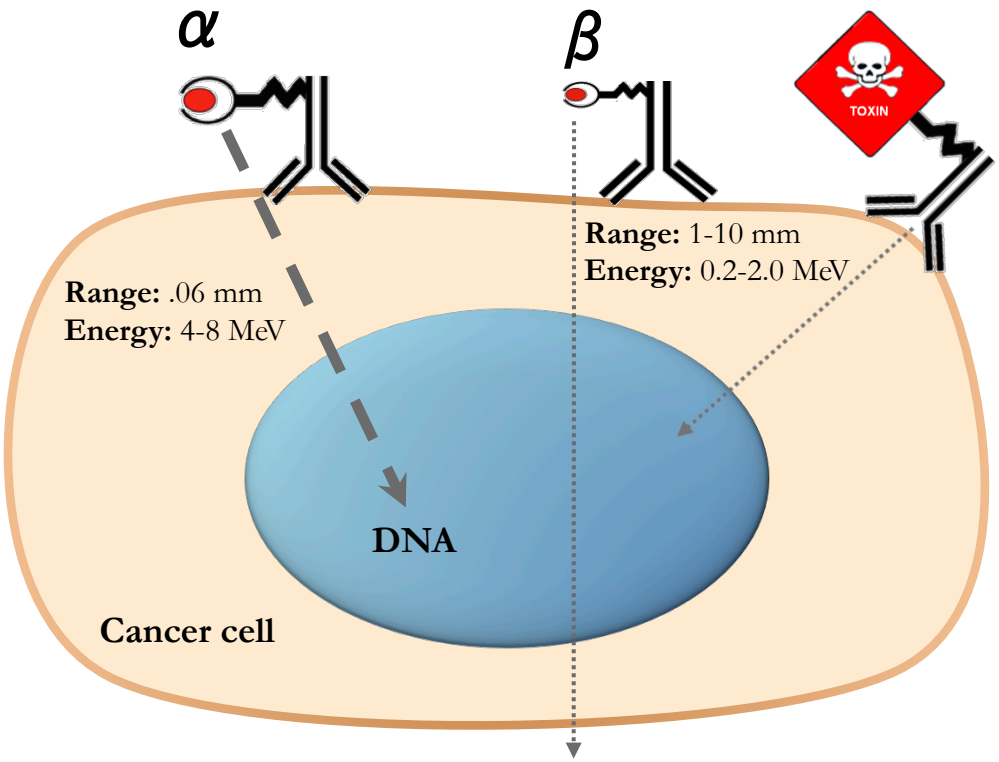
Company Overview

- ✓ Two clinical stage targeted antibodies and a platform technology:
  - ✓ Iomab-B expected to enter its single pivotal Phase III study in 2015 as a conditioning agent in elderly relapsed/refractory Acute Myeloid Leukemia (AML) patients prior to bone marrow transplant (BMT)
  - ✓ Actimab-A in ongoing Phase I/II study in elderly, high-risk untreated AML patients
  - ✓ Proprietary Alpha Particle Immunotherapy (APIT) platform poised to deliver multiple cancer drugs with blockbuster potential
- ✓ Iomab-B and Actimab-A address significant unmet medical needs and have the potential to be breakthrough therapies
- ✓ Expert team possessing the vision and desire to drive shareholder value
- ✓ Positioned to benefit from increased market recognition of targeted payload therapies and high-value niche positioning

Search and Kill - Antibody Drug Conjugates (ADC)

- Monoclonal Antibody (mAb) directs the ADC to a tumor target
- Payload used to kill the target
- Linker attaches payload to mAb
- Linker technology for toxins is critical and often causes safety issues
- Radiopharmaceutical linker are believed to be more robust causing less toxicity compared to toxins

Payload Approaches	Company
α	**α - emitters**
	Actinium Pharmaceuticals
	Algeta - Acquired by Bayer
β	**β - emitters**
	Spectrum Pharmaceuticals
	Immunomedics
	Nordic Nanovector
	Peregrine Pharmaceuticals
	Toxins
	Pfizer
	Seattle Genetics
	Immunogen
	Celldex Therapeutics
	Progenics



Attractive Pipeline

Drug	Target	Indication	Development Status: R & D	Preclin.	Phase 1	Phase 2	Phase 3
Iomab-B	CD45	BMT[1] (Bone Marrow Transplant)					
Bismab-A[2]	CD33	AML					
Actimab-A (s.d.)	CD33	AML					
Actimab-A (f.d.)	CD33	AML					
Third Program	Undisclosed	Undisclosed					
Actimab-C	Undisclosed	Colon Cancer					
Actimab-P	Undisclosed	Prostate Cancer					
Actimab-Br	Undisclosed	Brain Cancer					

s.d. – single dose
f.d. – fractionated dose

HuM 195 – Alpha Program

1. BMT or HSCT (Hematopoietic Stem Cell Transplantation) is a procedure in which cells capable of reconstituting normal bone marrow function are transplanted to a patient. Iomab-B is expected to enter a Phase III study in 2H 2015 for hematopoietic stem cell transplantation in older subjects with active refractory AML.
2. ATNM has decided to discontinue development of Bismab-A at this time due to supply, logistics and cost reasons. Actimab-A is the second generation drug of Bismab-A.

Core Team

Sandesh Seth, MS
Executive Chairman

- 20+ years experience in investment banking (Cowen & Co.), equity research (Bear Stearns, Commonwealth Associations) and in industry (Pfizer, Warner-Lambert, Smith Kline)
- Head of Healthcare Investment Banking at Laidlaw & Company (UK) Ltd.
- Lead Director, Relmada Therapeutics
- MS, Pharmaceutical Science, University of Oklahoma Health Center; MBA, Finance, New York University

Kaushik Dave, PhD
President and CEO

- 25 years of broad biotech and pharmaceutical experience at both large and emerging biopharmaceutical companies
- Former Executive Vice President of Product Development, Antares Pharmaceuticals Inc., led the clinical and regulatory approval of Anturol™
- Vice President Product Development at Palatin Technologies Inc. where he obtained approval of NeutroSpec™
- Ph.D., Pharmaceutical Chemistry, University of Kansas; Pharmacy degree, University of Bath, UK; MBA, Wharton School at the University of Pennsylvania

Dragan Cicic, MD
Chief Medical Officer

- 10 years at Actinium Pharmaceuticals (ATNM), previously serving as Medical Director
- Formerly a strategic consultant at QED Technologies
- MD, School of Medicine at The Belgrade University; MBA, Wharton School at The University of Pennsylvania
- Neiman Fellow at Harvard University

Roland Turck, MD
Special Advisor to the Board of Directors

- Prepared successful launch of Xofigo
- 20+ years of pharmaceutical industry experience at Bayer, Berlex, and Schering
- Formerly the head of Bayer's Global Specialty Medicine business
- Boasts an extensive track record of developing and commercializing several major oncology products on a global scale, including Xofigo, Stivarga, Nexavar, and Campath

Advisory Boards

Bone Marrow Transplant; Iomab-B (β)		Hematology; Actimab-A (α)	
Affiliation	**Member**	**Affiliation**	**Member**
Swedish Cancer Institute; Fred Hutchinson Cancer Research Center	**John Pagel, MD, PhD** Associate Member Clinical Research Division; Associate Professor, Medical Oncology Head, Hematologic Malignancies at Swedish C.I. *Chair; Lead Investigator for Iomab-B trials*	**Columbia University Medical Center**	**Joseph Jurcic, MD** Director of Hematologic Malignancies; Professor of Clinical Medicine *Chair; Lead Investigator for Actimab-A trials*
Memorial Sloan Kettering Cancer Center	**Sergio Giralt, MD** Chief of Adult Bone Marrow Transplant Service; Professor of Medicine, Weill Cornell	**Memorial Sloan Kettering Cancer Center**	**David Scheinberg, MD, PhD** Chair of Experimental Therapeutics Center; Chair of Molecular Pharmacology & Chemistry Program *Scientific Co-Founder*
MD Anderson Cancer Center	**Richard Champlin, MD** Chair and Professor, Department of Stem Cell Transplantation and Cellular Therapy; Associate Division Head, Department of Cancer Medicine	**MD Anderson Cancer Center**	**Hagop Kantarjian, MD** Department Chair, Research Chair and Professor, Department of Leukemia, Division of Cancer Medicine
Case Western Reserve University	**Hillard Lazarus, MD** Director of Novel Cell Therapy and Professor of Medicine, CWRU School of Medicine	**Johns Hopkins Medicine**	**Richard Wahl, MD** Director, Division of Nuclear Medicine/PET; Professor of Radiology and Nuclear Medicine
Baylor Sammons Cancer Center	**M. Yair Levy, MD** Medical Director, Hematologic Malignancy Clinical Research	**Fred Hutchinson Cancer Research Center**	**Elihu Estey, MD** Professor, Division of Hematology University of Washington *WHO AML Treatment guidelines* **John Pagel, MD, PhD**
University of Colorado	**Peter McSweeney, MD** Clinical Associate Professor of Medicine	**University of Pennsylvania Health System**	**Alexander Perl, MD** Assistant Professor, Division of Hematology/Oncology

Iomab-B – Hope for Elderly AML Patients

- Iomab-B is a
  - mAb directed against CD45, a target almost universally expressed on leukemia cells, B cells, hematopoietic stem cells
  - Loaded with the radioisotope I-131 that will kill any cell that the mAb binds to

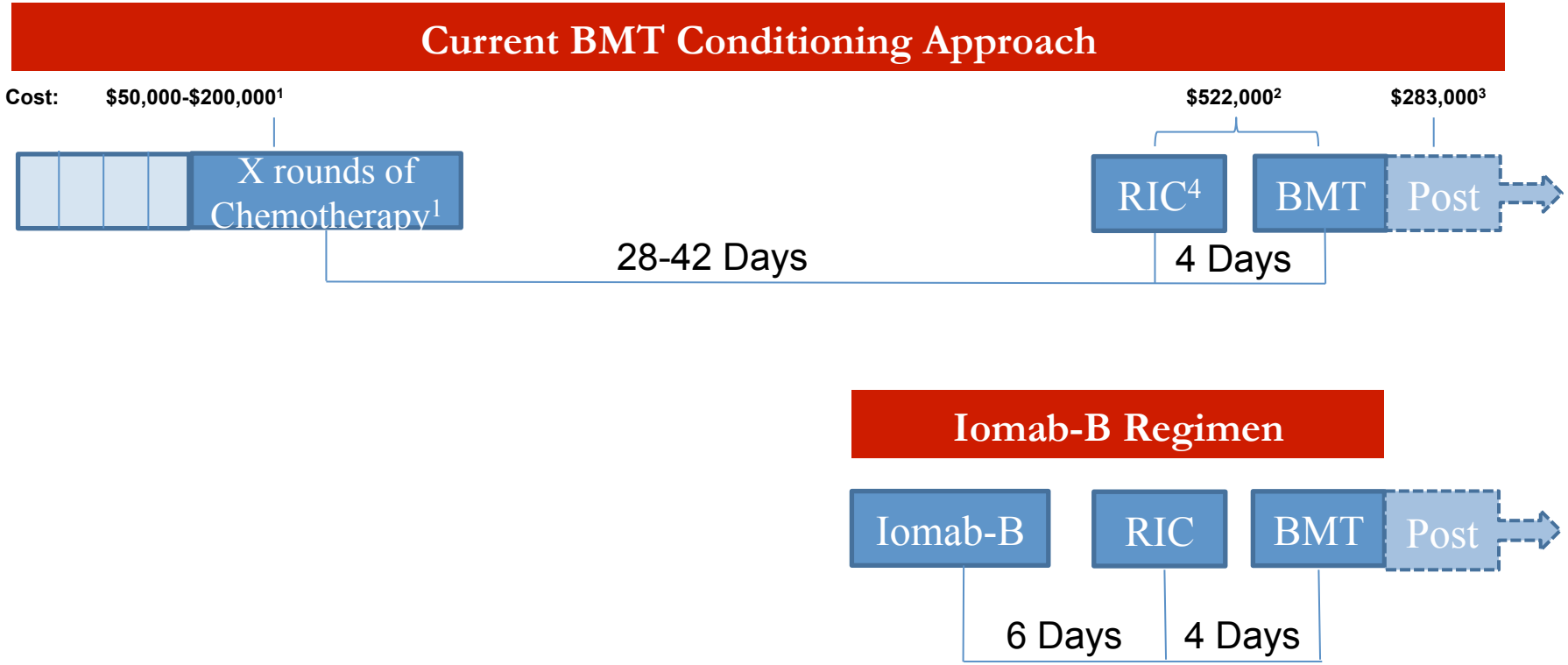
- Compelling clinical data from proof of concept trial in elderly refractory and relapsed Acute Myeloid Leukemia
  - Antibody in-licensed from Fred Hutchinson Cancer Research Center
  - Large safety database: experience with almost 300 patients in 5 Phase I and II clinical trials
  - 7 ongoing physician trials with BC8 mAb, the antibody used in Iomab-B, for other indications

- The only cure for elderly patients with relapsing refractory AML is a bone marrow transplant (BMT)
  - Unlike any alternative therapy, Iomab-B is highly effective in inducing and conditioning patients for transplant while being well tolerated
  - Iomab-B promises to resolve a major unmet medical need and to potentially disrupt the field of BMT

- Iomab-B is believed to at least double 2 year survival ("cure") compared to any alternative therapy

Iomab-B – Induction and Conditioning in One

Potentially faster pathway to a bone marrow transplant with fewer side effects



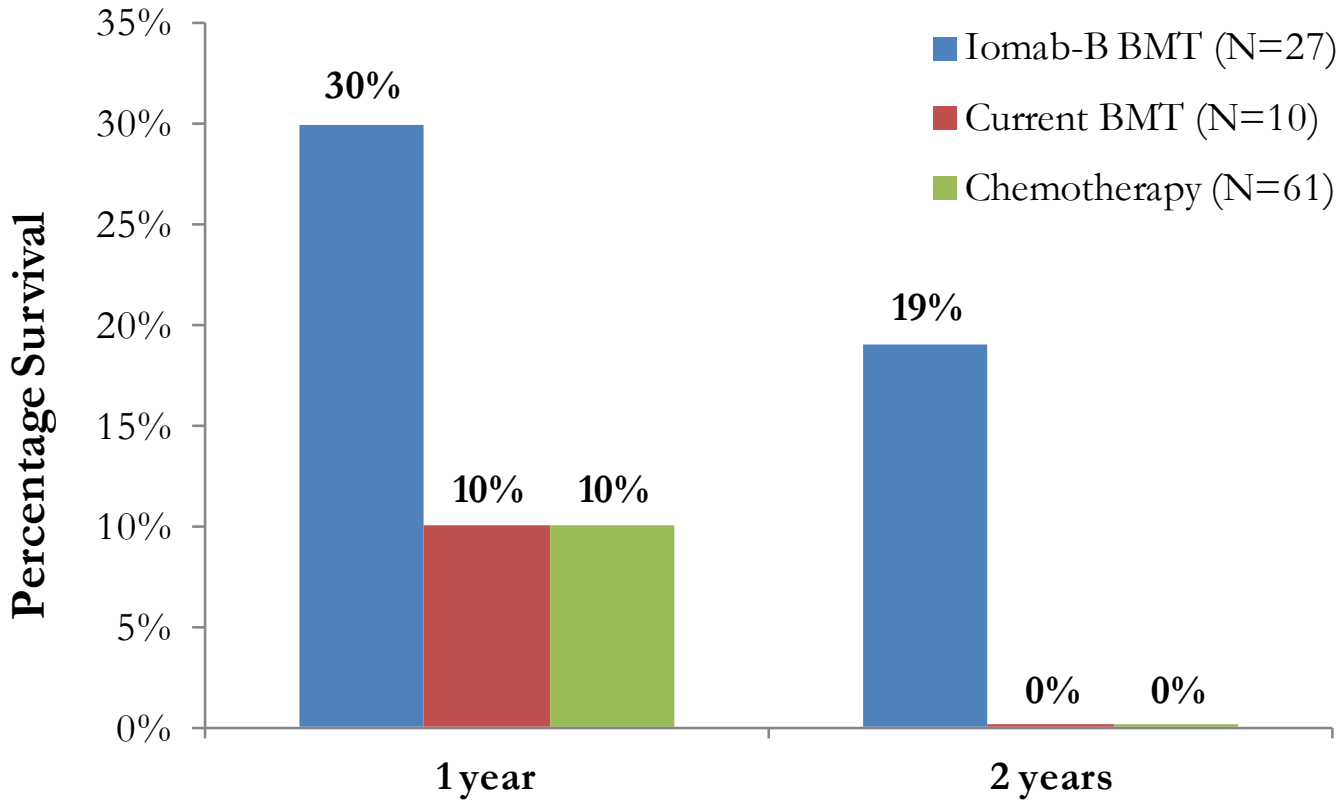
1. Chemotherapy include MEC, FLAG-IDA, high-dose cytarabine, among others. Cost is for one or two rounds of inpatient chemotherapy treatment.
2. Transplant procedural costs include 30 day pre-procedure costs (RIC, donor cell procurement, fees, hospital costs, drug costs) and excludes chemotherapy.
3. Includes various associated costs during 180 days post-procedure, including immunosuppressive therapy.
4. RIC, reduced intensity conditioning, is a lower-dose (and therefore less toxic) treatment regimen which helps to facilitate BMT, particularly in older patients.

Sources: Milliman U.S. Organ and Tissue Transplant Cost Estimates and Discussion; Overall Economic Burden of Total Treatment Costs in AML throughout the Course of the Disease (Mahmoud); Company estimates.

Iomab-B Phase I/II - Compelling Clinical Results

- Complete response rate: 100%
- Engraftment by day 28: 100%
- Non-relapse mortality (NRM): Day 100: 10%, Overall: 20%
  (NRM = 46% in comparable patients with myeloablative conditioning)
- Transplant related mortality: 14% (same as reduced intensity conditioning)

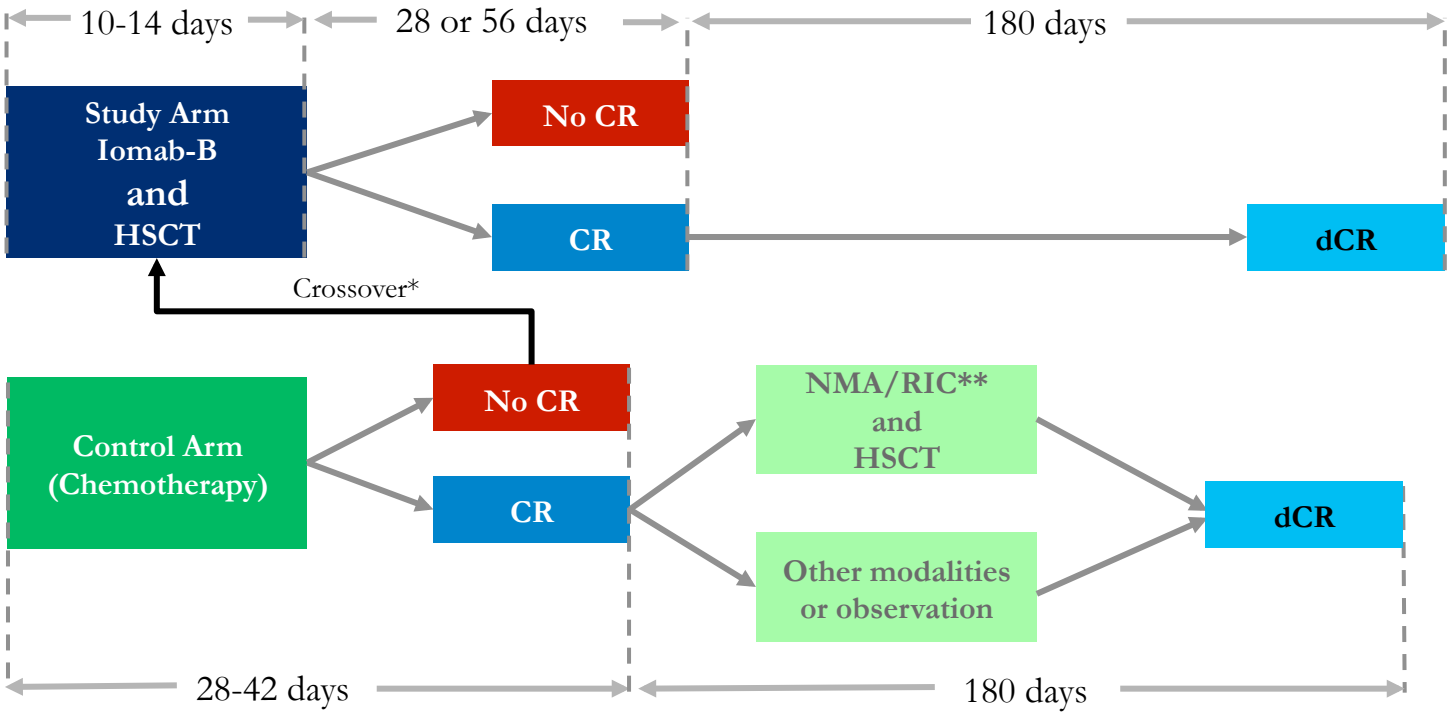
All relapsed/refractory AML patients over 50



N = Number of patients treated
Iomab-B results from FHCRC clinical trials; Current BMT and Chemotherapy results from MD Anderson outcomes analysis
Sources: Blood 2009 114:5444-5453; unpublished FHCRC data

Iomab-B - Pivotal Phase III Trial Design

- Trial design as discussed with FDA[1]:
  - Single pivotal study, pending trial results
  - Patient population: refractory AML patients 55 years of age or older[2]
  - 1:1 randomization
  - Trial arms: study arm and control arm with physician's choice of conventional care with curative intent
  - Trial size: 150 patients total, 75 patients per arm



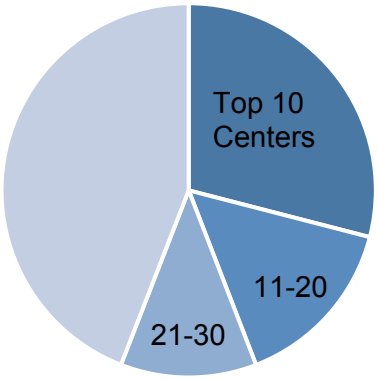
*Control arm subjects with no CR are offered crossover to Iomab-B for ethical reasons.
**Nonmyeloablative Conditioning/Reduced Intensity Conditioning.

1. Based on the End of Phase II meeting and subsequent communications with the FDA.
2. Refractory is defined as either primary failure to achieve a complete remission after 2 cycles of induction therapy; relapsed after <6 months in complete remission; second or higher relapse; or relapsed disease not responding to intensive salvage therapy

Iomab-B - A Compelling Commercial Opportunity

- No standard of care in this indication
- BM transplant market is highly concentrated
  - Top 15 centers perform up to 40% of AML transplants
  - 30 trial centers will be included in the pivotal trial – a majority of total potential market
  - Those centers will be fully activated by the time of launch
  - Centers that are PPS exempt represent at least 20% of the market
  - A small number of MSLs or Reps can cover this universe
- The addressable market in the US is about 4,000 - 7,000 older patients with relapsing / refractory AML
- CD45 mAb clinical production will already be scaled appropriately for commercial use

Cancer treatment centers sorted by procedural volume – HSCT for AML

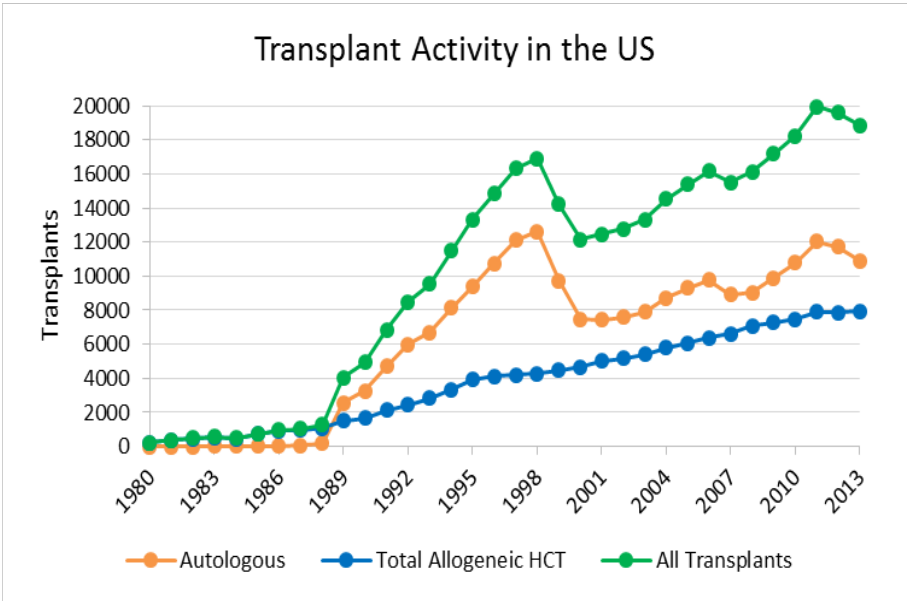


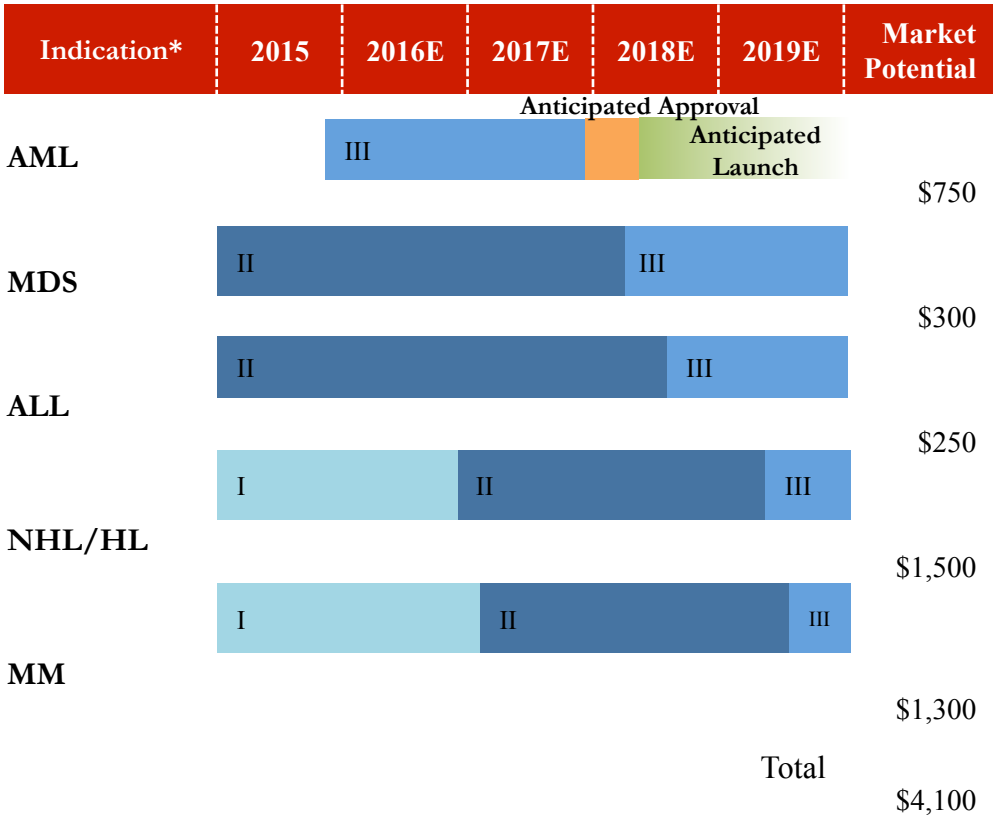
The majority of transplants occur at 30 high-volume centers

A Dynamic Market - Bone Marrow Transplant

Currently no approved treatments for Iomab-B targeted patients implies blockbuster potential

HSCT Fastest Growing Hospital Procedure





Sources: Healthcare Cost and Utilization Project, AHRQ; US Dept. of HHS; CIBMTR (Preliminary review of information submitted to the CIBMTR)

Phase I and Phase II represent physician trials at Fred Hutchison Cancer Research Center. Phase III trials represent ATNM sponsorship. Timelines are projections and the Company makes no representation as to their ability to meet these timelines.
Sources: "Current Uses and Outcomes of Hematopoietic Stem Cell Transplantation 2010", CIMBTR Summary Slides;
"Trade, foreign policy, diplomacy and health: Pharmaceutical Industry", WHO website, http://www.who.int/trade/glossry/story073/en/;
"Hematopoietic stem cell transplantation A Global Perspective", NIH Public Access, JAMA 2010; Company Estimates

Actimab-A - Addressing a Significant Unmet Need

- The only new drug approved in the past decades was Mylotarg, a CD-33 ADC, that was withdrawn from market due to toxicity (linker issue)
- While directed against same target, Actimab-A expected to have less toxicity
  - Anti-CD-33 antibody labeled with Actinium-225, an alpha emitter
  - High dose of energy, limited range
- Imitation the sincerest form of flattery: Bayer working on Thorium
- Other assets in development in similar indication, but none close to market
- Most interesting:
  - Quizartinib: FLT3 inhibitor – targeted about 30% of AML patients (ph3)
  - AG-221: IDH-2 inhibitor – targets 10% of predominantly intermediate risk AML patients (ph1/2)
  - SGN-CD33A: CD-33 ADC – toxicity remains to be seen (ph1)
- Potentially additional opportunity in consolidation

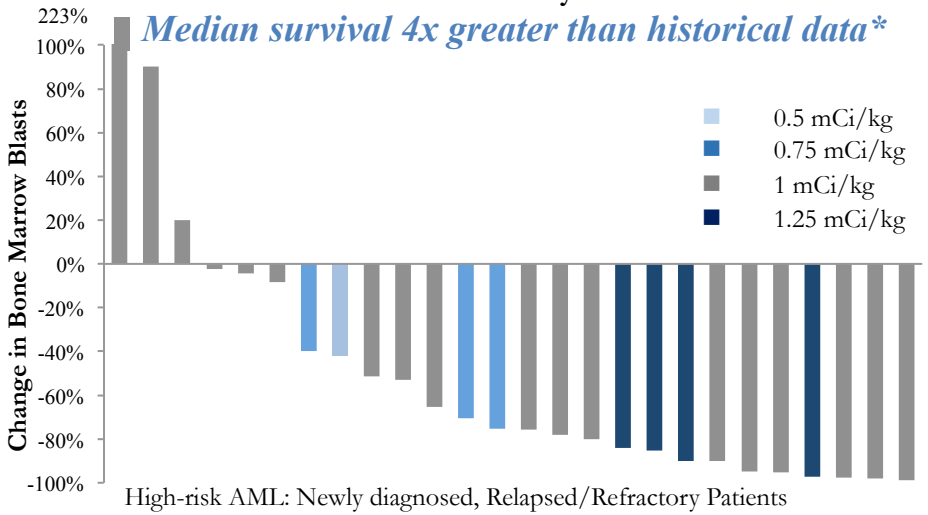
HuM195-Alpha Program

Second generation Actimab-A 500x more potent than Bismab-A

	1st Generation **Bismab-A Profile**	2nd Generation **Actimab-A Advantages**
Target:	♦ AML	♦ AML
Effectiveness:	♦ Proof of concept in humans	+ 500x more potent than Bismab-A
Clinical Stage:	♦ Promising results in Phase II	♦ Currently in a Phase I/II Trial
Supply Chain:	♦ Complex, high COGS	+ Simple, 10x lower COGS
Ease of Use:	♦ Complex on site preparation	+ Central manufacturing

Bismab-A + Cytoreduction

Median survival 4x greater than historical data*



High-risk AML: Newly diagnosed, Relapsed/Refractory Patients

Bismab-A vs. Actimab-A Monotherapy

Actimab-A efficacy superior to Bismab-A

Parameter	Bismab-A	Actimab-A
Peripheral blast elimination	27%	67%
Bone marrow blasts decrease ≥50%	28%	53%
Bone marrow blasts ≤5% post treatment	0%	20%

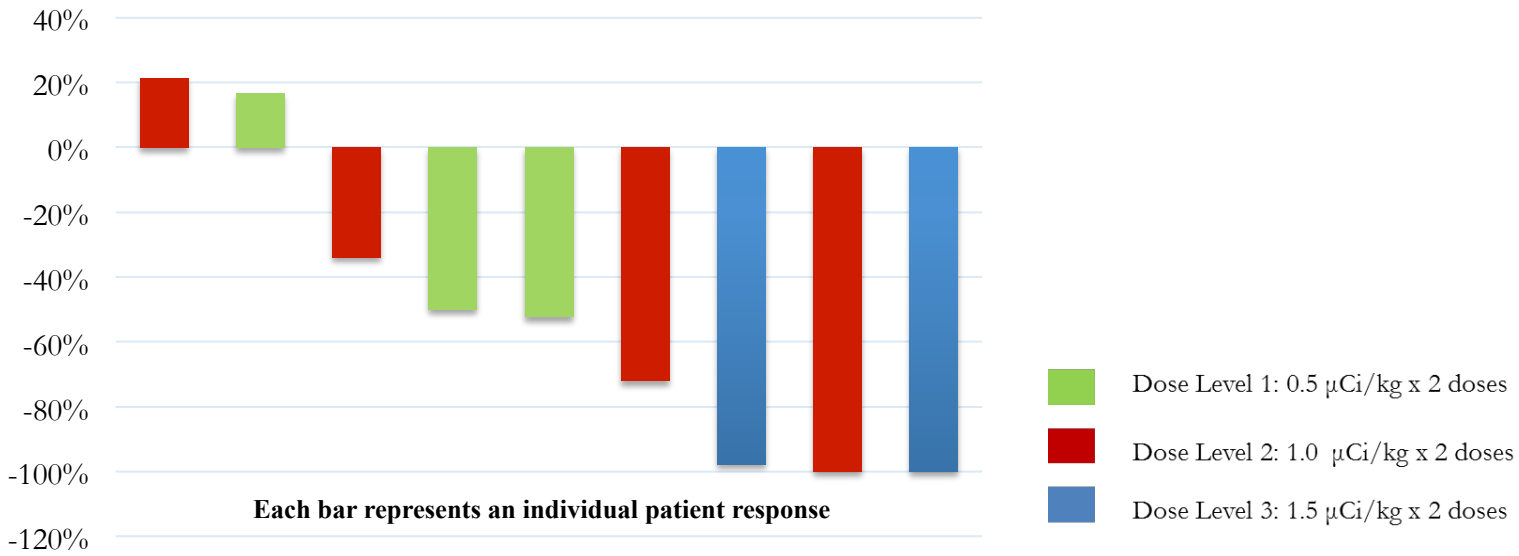
Relapsed/Refractory Patients only

* Median survival 7.6 mo. vs 1.7 mo. historically for untreated. Each bar equals an individual patient response.
Sources: Clin Cancer Res. 2010, 16(21):5303-5311; Jurcic JG et al. Blood (ASH Meeting Abstracts) 2012, 118:768; Company documents

Actimab-A - Promising Phase I/II Interim Data

- Conducted at Memorial Sloan Kettering, MD Anderson, Johns Hopkins, Columbia University, University of Pennsylvania, Fred Hutchinson, Baylor Sammons Cancer Center
- Twelve patients evaluated thus far; all high-risk, elderly, not eligible for 7+3
  - Median age of 77, range 68-87
  - Nine had secondary AML; all had intermediate or poor cytogenetics
  - Three (25%) had responses: two CRi and one CRp
  - Dose Level 1 - no responses; Dose Level 2 - 17% ORR; Dose Level 3 - 67% ORR
- No significant drug related safety issues thus far; fourth dose level ongoing and likely MTD

Clear anti-leukemic effect in most patients



Sources: Phase I Trial of Targeted Alpha-Particle Therapy Using Actinium-225 (^{225}Ac)-Lintuzumab (Anti-CD33) in Combination with Low-Dose Cytarabine (LDAC) for Older Patients with Untreated Acute Myeloid Leukemia (AML), 56th ASH Annual Meeting and Exposition. Abstract #5293;
Oran B, and Weisdorf DJ, Survival for older patients with acute myeloid leukemia: a population-based study. Haematologica 2012; 97(12):1916-1924.
N Okuyama et al, Prognosis of acute myeloid leukemia transformed from myelodysplastic syndromes: A multicenter retrospective study, Leukemia Research 37 (2013) 862–867.

Near-term Value Drivers

Multiple milestones over the next 12-18 months

- Iomab-B
  - Submit Phase III IND
  - Start Phase III trial
  - Enrollment Updates
  - ASCO and ASH Updates
- Actimab-A
  - Complete Phase I trial
  - Complete manufacturing improvements
  - Start Phase II trial
  - ASCO and ASH Updates
- Third Program
- Strategic
  - Licensing
  - Collaborations
  - Partnering

ATNM Summary - At The Cusp Of Transformation

- ✓ Within 12 months, company to be in Phase III and Phase II clinical trials
- ✓ Iomab-B expected to enter Phase III in 2015
  - ✓ High unmet medical need – relapsed/refractory AML
  - ✓ Believed to disrupt the BMT market
  - ✓ Commercialization risk lowered by successful trial
- ✓ Actimab-A expected to enter phase II
  - ✓ High unmet medical need – newly diagnosed AML
  - ✓ 67% response in most recent cohort
  - ✓ Low-intensity therapy with validated alpha radiation
- ✓ Proprietary Alpha Particle Immunotherapy (APIT) platform poised to deliver multiple cancer drugs with blockbuster potential
- ✓ Expert team possessing the vision and desire to drive shareholder value

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ATNM - Significant Progress Moving Iomab-B Forward

- Technology transfer from Fred Hutchinson almost completed
- Commercial scale production of BC8 process is being developed and a batch for clinical trial use being produced
- IND to be submitted later this year
- Clinical trial plan in final review
- Trial centers are selected and briefed. Once the IND is approved, centers will be contracted and trained
- First patients to be recruited within 6 month after IND
- Data read-out expected 2 years after trial start

Pros and Cons - The Case For Radiopharmaceuticals

- Radiopharmaceuticals are difficult to handle
- They can be successfully commercialized when no simpler, equally efficient alternative is available at launch
- The key advantage of targeted RI is that they are effective and well tolerated
- Benefit from simpler linker technology compared to ADCs
  - No need to bind and later release toxins
- While management of RI is complex, it is not difficult per se
  - Logistics (complexity depending on half life – 8 days for I-131)
  - Isolation (4-7 days)
  - Multidisciplinary approach
  - Possibly different stakeholder economics

Success Factors For Radiopharmaceuticals

	Zevalin, Bexxar	Xofigo	Iomab-B
Competition	Rituximab competition - Abundance of data - Ease of use - Roche's marketing power	Unique positioning - OS benefit in HRPC patients with symptomatic bone mets - QoL endpoints o Well tolerated o SRE etc. benefit	Unique positioning, no alternative for curative approach - Refractory, relapsed active AML in patients above 55 years of age
RIT complexity	- Coordinate efforts of HemOnc and Nucl Med - Logistical challenges, Y90 rarely used, short half-life (<3 days) - Dosimetry (initially) with yet another radioisotope	- Coordinate efforts of HemOnc and Nucl Med - Long half-life (11 days) but single source for Ra223 - No dosimetry - No quarantine	- Coordinate efforts of HemOnc and Nucl Med - Long half-life (8 days) and 131-I widely available - Dosimetry with 131-I - Quarantine (4-7 days)

Success Factors for Radiopharmaceuticals

	Zevalin, Bexxar	Xofigo	Iomab-B
OS benefit	No	Yes	Yes
Economics	- In-patient while competition as outpatient - Economic incentive of infusion - No outpatient option	- Outpatient - Helps Urologists to keep patients longer vs. Oncologists	- In-patient, all patients are hospitalized anyhow - Allows more HCT
Reimburse-ment	- Disadvantage vs. injectables	- New code required - Unique	- New code required - PPS exempt hospitals - unique
2014 sales	50 Mio US$?	300 Mio US$ (year 2 post launch)	

Market Potential of Product Pipeline

#	Cancer Indication	Cases/Yr. in Target Market[1]	Target Population	Worldwide Market Potential ($mm)[2]
1st	**Bone Marrow Transplant (BMT)**	**48,000**	**48,000**	**$4,100**
2nd	**Acute Myeloid Leukemia (AML)**	**41,600**	**24,000**	**$920**
3rd	Glioblastoma Multiforme (GBM)	26,500	26,500	$1,100
4th	Prostate Cancer (metastatic)	591,000	298,455	$5,959
5th	Metastatic Colorectal Cancer	536,000	241,200	$4,824

1. Target market includes USA, EU and Japan
2. Market Potential calculated based on assumption that Actinium products for solid cancer indications will be priced at $20,000 per treatment; BMT preparation product will be priced at $85,000 per treatment; AML product will be priced at $60,000 per treatment; and GBM product will be priced at $60,000 per treatment. Estimates based on independent third party research and adjusted for lower pricing in non-US markets.

BMT (Iomab-B)

- The $1.3 billion Bone Marrow Transplant (BMT) market in the US is largely unaddressed by novel pharmaceutical drug companies
- BMT is the fastest growing hospital procedure in the US
  - ~20,000 of the ~60,000 BMTs in 2010 were performed in the US
- Sustained growth in patients treated over 55 yrs old
  - 8% in 2000 to 21% in 2005 and 27% in 2007

AML (Actimab-A)

- Acute Myeloid Leukemia is the deadliest form of leukemia
  - 55% of AML patients are over 65 years old
  - Disease is worse in older people
  - Insufficient treatment options are available in the marketplace
  - Treatment kills as many patients as it helps due to toxicity

Source: "Current Uses and Outcomes of Hematopoietic Stem Cell Transplantation 2010", CIBMTR Summary Slides; Company estimates