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Company Report

September 17, 2013

Actinium Pharmaceuticals, Inc. (ATNM - $ 3.90)

Seeking Alpha in Radiotherapy – Initiating with Buy Rating

Healthcare / Biotechnology

Ticker:	**ATNM**
Rating:	**Buy**
Price Target:	**$ 18.00**

We are initiating coverage on Actinium Pharmaceuticals with a BUY rating and a price target of $18.00. We believe the company's technology platform that combines the targeted therapeutic ability of monoclonal antibodies with the cancer cell-killing ability of alpha and beta-emitting isotopes produces novel drugs that will ultimately become viable oncology treatments.

- **Iomab-B Potentially Entering Phase III in 2014, Impressive Phase I/II Data.** Iomab-B, a combination of a monoclonal antibody and a beta-emitting radioisotope, is being developed for patients in need of a hematopoietic stem cell transplantation (HSCT). In Phase I/II, all patients achieved Complete Response and one-year survival was 30% in advanced Acute Myeloid Leukemia (AML) patients, while historic survival in this patient population is 10%. The company is currently in talks with the FDA for the design of a Phase III study, which we expect will begin in 2014. We believe the potential market for Iomab-B in AML alone could be $500 million in the U.S. The drug could be used for HSCT in other indications such as Acute Lymphoblastic Leukemia and Non-Hodgkin's Lymphoma as well.

- **Actimab-A Innovative Treatment for AML.** Actimab-A is a radioimmunoconjugate consisting of a monoclonal antibody and the isotope actinium-225 in development for AML. Phase I data showed elimination of leukemia calls from blood in 67% of all evaluable patients who received a full dose. A new Phase I/II trial with two consecutive fractionated doses is ongoing. We expect the Phase II portion of this trial to complete in mid-2014. Actimab-A could possibly be launched by the end of 2019, potentially addressing a global AML market of $1 billion.

- **Broad Applications Possible for Several Cancer Types.** Actinium has technology to attach radioisotopes to monoclonal antibodies. The company aims to use this platform to develop in-licensed monoclonal antibodies to target several cancer types and it has a strategy to improve on marketed oncology products by adding alpha-emitting isotopes.

- **Initiating Coverage with a BUY Rating**. Our price target for Actinium is $18, which is based on the NPV of our probability-adjusted forecasts for the company's pipeline products.

Trading Data:

Last Price (09/16/2013)	$ 3.90
52–Week High (3/21/2013)	$ 7.75
52–Week Low (12/17/2012)	$ 1.00
Market Cap. (MM)	$ 64
Shares Out. (MM)	16

Earnings Estimates: (per share)

(Dec)	1Q	2Q	3Q	4Q	FY	P/E
FY_15E	NA	NA	NA	NA	-0.84	NM
FY_14E	-0.18	-0.19	-0.21	-0.20	-0.81	NM
FY_13E	-0.03A	-0.13A	-0.08	-0.09	-0.33	NM
FY_12A	-0.07	-0.09	NA	NA	-7.58	NM

Source: Laidlaw & Company estimates

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Investment Conclusions

Our price target for Actinium Pharmaceuticals is $18, which is based on the NPV of our probability-adjusted forecasts for the company's products

- **Initiating Coverage With a BUY Rating.** Our price target for Actinium Pharmaceuticals is $18, which is based on the NPV of our probability-adjusted forecasts for Iomab-B for hematopoietic stem cell transplantation patients in several indications including Acute Myeloid Leukemia (AML), Myelodysplastic Syndromes (MDS), Acute Lymphoblastic Leukemia (ALL), Hodgkin's Disease (HD), Non-Hodgkin Lymphoma (NHL) and Multiple Myeloma, and Actimab-A in AML. We believe that Actinium's pipeline has enormous potential, which is currently undervalued by the market. Our risk-adjusted projections for total sales of Actinium's products are $24 million in 2018 growing to $465 million by 2023. We have assigned only a small value to the company's other drugs in development. Any success with these other drugs could lead to potential upside to our price target.

In both Phase I and Phase II trials Iomab-B has led to effective cures in patients with no options left

- **Iomab-B Potentially Offers Enormous Opportunity.** Iomab-B is potentially transformative in AML in older patients. Currently there is no standard of care for refractory and relapsed AML while the majority of older AML patients end up in this category. Iomab-B is a combination of the in-licensed monoclonal antibody BC8 and the beta-emitting radioisotope I-131. This construct has been extensively tested in Phase I and Phase II clinical trials in approximately 250 patients with different blood cancer indications who were in need of a hematopoietic stem cell transplantation (HSCT). Iomab-B is used to condition the bone marrow of these patients by destroying blood cancer cells in their bone marrow and elsewhere thus allowing for a subsequent transplant containing healthy donor bone marrow stem cells. The company is initially focusing on the patients over 55 years old with active acute myeloid leukemia in relapse and/or refractory to existing treatments. In both Phase I and Phase II trials Iomab-B has led to effective cures in patients with no options left. The only potentially curative treatment option for older patients with refractory/relapsing AML or high risk (HR) MDS patients with active disease is bone marrow transplantation (BMT), but vast majority of patients over the age of 50 are either ineligible for myeloablative conditioning due to concomitant conditions or have a high burden and/or very resistant disease that makes reduced dose conditioning futile. Iomab-B has demonstrated ability to successfully prepare such patients for bone marrow transplants when no other treatment was indicated. In Phase I/II trials, all patients achieved Complete Response and one year survival was 30% in advanced AML patients with active disease at all does levels. Historic survival in advanced active AML is 10% according to a 2009 article in *Biology of Blood and Marrow Transplantation*. The company is currently in talks with the FDA to discuss the design of a pivotal Phase III study in HSCT. Management estimates the direct costs of such a trial to completion anticipated in 2016 will be approximately $15 million - $20

We believe the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is about $800 million - $1 billion

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million. We believe the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is about $800 million - $1 billion. We model that the Phase III trial will begin in 2014. Iomab-B has demonstrated utility in other groups of patients and other indications as well, including Acute Lymphoblastic Leukemia (ALL), Hodgkin's Disease (HD) and Non-Hodgkin Lymphoma (NHL). Actinium could potentially also develop another BC8 antibody based radioimmunoconjugate for the treatment of Multiple Myeloma. We believe the market potential for these indications could be over $4 billion.

- **Alpha-pharmaceutical for AML in Phase I/II.** The Phase I dose escalation trial for Actimab-A to determine the safety pharmacology, and biological activity of Actimab-A in AML showed no acute toxicities at doses less than 4 µCi/kg and that it has anti-leukemic activity. Bone marrow blast reductions of over 33% were seen in 7 of 11 evaluable patients at 4 weeks. Data shows elimination of leukemia cells from blood in 67% of all evaluable patients who received a full dose and in 83% of those treated at dose levels above 0.5 microCuries (uCi/kg), and eradication of leukemia cells in both blood and bone marrow in 20% of all evaluable patients and 25% of those treated at dose levels above 0.5 uCi/kg. Actinium has commenced a Phase I/II multi-center AML trial with fractionated doses of Actimab-A. Maximum enrollment in the Phase I portion of the trial is 21 patients and the Phase II portion of the trial will enroll up to 53 patients. This will be an event driven trial that will look at overall survival. We believe data from this trial will be available in mid-2014. A Phase III trial could potentially start in 2015 and would need about 200 patients, in our opinion. We believe Actinium could file a BLA with the FDA for Actimab-A in 2018. A launch could occur in 2019. We forecast the potential U.S. market for Actimab-A is about $450 million and the total worldwide market is $900 million - $1 billion.

Data shows elimination of leukemia cells from blood in 67% of all evaluable patients who received a full dose of Actimab-A in Phase I

We forecast the potential U.S. market for Actimab-A is approximately $450 million and the total worldwide market is $900 million - $1 billion

- **Technology Platform Can Address Many Indications.** The Alpha Particle Immunotherapy Technology (APIT) platform has the potential for broad applicability for the treatment of many cancer types, which allows Actinium to add new product candidates to its pipeline based on well-defined patent protected methods. The patented APIT platform technology has been co-developed with Memorial Sloan- Kettering Cancer Center. APIT is based on attaching actinium-225 (Ac-225) or bismuth-213 (Bi-213) alpha-emitting radioisotopes to monoclonal antibodies through the use of a chelating agent. Alpha-particles can kill any cell in whose immediate proximity they are released. Actimab-A was developed with the APIT platform. Actinium is seeking to create monoclonal antibody combinations with Ac-225 by utilizing antibodies with proven safety and cancer binding capabilities. Actimab-C for colon cancer and Actimab-P for prostate cancer are in preclinical studies. Actinium is collaborating with Philogen to evaluate the feasibility of Ac-225 as a payload on Philogen's L19 antibody constructs for the treatment of cancer. We expect one of these preclinical drugs could reach Phase I in late 2014/early 2015. To continue building on its platform, Actinium is expanding its monoclonal antibody strategy and also developing a strategy for a "Biobetter" program. With Biobetters, Actinium is aiming to improve upon marketed biotech drugs with

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proven safety and efficacy by adding alpha-emitters. As patent protection for many native monoclonal antibodies approaches expiration, Actinium will be able to offer the owners of those monoclonal antibodies the APIT technology that will create new, more potent drugs and give them new patent protection. Algeta developed the first alpha-pharmaceutical to reach the market. Its drug, Xofigo, is not attached to a monoclonal antibody. That company is evaluating the alpha-emitter thorium-227 as the payload for targeted molecules such as monoclonal antibodies. Actinium's alpha-emitter conjugate pipeline is more advanced than Algeta's as all of Algeta's products are in preclinical trials while Actinium's has alpha-emitting isotope/monoclonal antibody conjugate candidates in clinical trials. While Algeta is not a direct comparable company to Actinium due to its marketed drug, we believe it does illustrate the potential success that radiopharmaceutical companies have in the equity market. We also not that Algeta signed an $800 million development agreement with Bayer in 2009. Algeta has a market cap of NOK10.5 billion, or about $1.8 billion.

- **Impressive New CEO.** On September 16, 2013, Actinium announced that it hired Kaushik J. Dave, Ph.D., R.Ph., MBA as CEO and President. Dr. Dave has a proven track record of successful product development through FDA approval and he has an extensive background in strategic program management. Prior to Actinium, Dr. Dave served as Senior Vice President of Product Development at Antares Pharma Inc. (ATRS) since July 2009. As part of the core leadership team at Antares, Dr. Dave was instrumental in setting strategy, vision, product portfolio development and business development for that company. He led the clinical and regulatory approval of Anturol. Dr. Dave was also a key contributor to the change in company vision to combination products using Antares' medical device technology, which resulted in a robust pipeline that included development and New Drug Application (NDA) submission for Otrexup (PDUFA date 10/14/13). During Dr. Dave's tenure, Antares market cap went from about $40 million to well over $500 million. When Dr. Dave left Antares, he had 192,185 non-vested options in the company and he had 131,664 shares of non-vested stock in the company, according to regulatory filings. We believe the fact that Dr. Dave left so much equity on the table to accept the CEO position at Actinium shows his confidence in the success and potential of Actinium's pipeline. Dr. Dave has over 25 years of pharmaceutical/biotechnology industry experience, including Vice President of Product Development at Palatin Technologies (PTN) and positions at Schering-Plough and Merck (MRK), where he was responsible for steering the development of several pharmaceutical product development programs.

- **Exceptional Clinical Advisory Board.** We are also impressed with the company's Board of Directors and its Clinical Advisory Board, both of which have had hands on involvement with the company's strategy, development plan and execution throughout its history. The company's clinical advisory board and collaborators include some of the best recognized clinicians and scientists working at some of the highest regarded medical institutions in the U.S. and the world, including Memorial Sloan-Kettering Cancer Center, Johns Hopkins University,

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University of Pennsylvania, Fred Hutchinson Cancer Center and MD Anderson Cancer Center. We believe this notable Clinical Advisory Board will be beneficial to the company both in clinical development and market acceptance assuming its drug candidates are approved. We expect the hands-on relationship of the Board of Directors and the Clinical Advisory Board will continue after the arrival of Dr. Dave.

- **Upcoming Catalysts.** We expect the Phase III trial for Iomab-B in HSCT for patients with AML will begin in 2014. The trial should be completed in 2016 and potentially, the drug could be launched in late 2017, in our opinion. Actinium could conclude the Phase I/II trial for Actimab-A in AML by mid-2014. If data warrants, we estimate Phase III could start in 2015 and a BLA could be filed in 2018. We believe a drug in preclinical development could reach Phase I by late 2014/early 2015.

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Company Description

The radiopharmaceuticals that Actinium is developing include both alpha-particle and beta-particle emitters

Actinium Pharmaceuticals is a biopharmaceutical company focused on developing radioimmunotherapy drugs for the oncology market. The radiopharmaceutical components of the company's drug candidates include both alpha-particle and beta-particle emitters. Alpha-particle emitters release high energy particles that travel only short distances thus sparing non-target tissues from the effects of irradiation. Beta-particle emitters have a longer particle range with varying ability to penetrate tissue that is suitable for tumors of varying diameters. However, the long particle range may irradiate surrounding healthy tissue. Actinium's most advanced products are Iomab-B, an antibody-drug construct containing the beta-emitter iodine-131 (I-131), used in myeloablative conditioning for hematopoietic stem cells transplantation (HSCT) in various indications, and Actimab-A, an antibody-drug construct containing the alpha-emitter actinium-225 (Ac-225), currently in clinical trials for acute myeloid leukemia (AML). The company is currently designing a trial which it intends to submit for registration approval in HSCT in the setting of refractory and relapsed acute myeloid leukemia in older patients.

Actinium intends to potentially develop its most advanced clinical stage drug candidates through approval in the case of Iomab-B and up to and including a Phase II proof of concept human clinical trial (a trial designed to provide data on the drug's efficacy) in the case of Actimab-A.

The company has clinical and preclinical development relationships with world-class institutions such as Memorial Sloan-Kettering and Fred Hutchinson Cancer Research Center

Actinium was incorporated in 2000 in the state of Delaware and it has its executive offices in New York, NY. Upon Actinium's formation in 2000, it acquired Pharmactinium, Inc. and MedActinium, Inc., and through Pharmactinium, acquired certain rights to the Alpha Particle Immunotherapy Technology (APIT) platform. Core technology patents were in-licensed from N.V. Organon which also provided seed funding. Pharmactinium, had a research and development agreement with Memorial Sloan-Kettering Cancer Center (MSKCC) since 1996. In 2002, this relationship was significantly expanded and now includes research and development, preclinical development, clinical trials and commercial technology licenses. The company also has clinical and preclinical development relationships with other world-class institutions such as Fred Hutchinson Cancer Research Center (FHCRC). Actinium has a contractual relationship with Oak Ridge National Laboratory (ORNL) of the Department of Energy (DOE) which gives Actinium access to most of the current world supply of Ac-225.

Actinium became a publically traded company upon completing a transaction with Cactus Ventures, a "blank check" or "Shell" company. On December 28, 2012, Actinium entered into a transaction (a "share exchange") with Cactus. Cactus acquired 100% of the issued and outstanding equity securities of Actinium Pharmaceuticals in exchange for the issuance of approximately 99% of the issued and outstanding common stock. As a result of the share exchange, the former shareholders of Actinium became the controlling shareholders of

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Cactus Ventures. Effective April 18, 2013, Cactus Ventures changed its name to Actinium Pharmaceuticals and the stock symbol was changed to "ATNM."

The company develops drugs for treatment of cancer with intent to cure or significantly improve survival of the affected patients. All of its product candidates are in development, the company does not currently market any products. Actinium's drugs are monoclonal antibodies labeled with radioisotopes. It has one program with an antibody labeled with a beta-emitter and several programs based on a proprietary patent protected platform technology called Alpha Particle Immunotherapy Technology (APIT). The patented APIT platform technology has been co-developed with Memorial Sloan- Kettering Cancer Center. APIT is based on attaching actinium-225 (Ac-225) or bismuth-213 (Bi-213) alpha-emitting radioisotopes to monoclonal antibodies through the use of a chelating agent. Alpha-particles can kill any cell in whose immediate proximity they are released. Monoclonal antibodies are genetically engineered proteins that target specifically certain cells, and can target cancer cells. It is crucial for the success of the drug candidates to contain monoclonal antibodies that can successfully seek cancer cells and can kill them with the attached isotope while not harming nearby healthy cells. Alpha-particles potency is up to 1,000-fold higher than beta-particles, but their extremely short range limits any damage inflicted on healthy tissues.

APIT is based on attaching actinium-225 or bismuth-213 alpha-emitting radioisotopes to monoclonal antibodies through the use of a chelating agent

Actinium does not have the technology and operational capabilities to develop and manufacture monoclonal antibodies and it relies on collaboration with third parties to gain access to such monoclonal antibodies. The company has the rights to two monoclonal antibodies, HuM195 (Lintuzumab), through a collaborative licensing agreement with what was PDL Biopharma and is now part of Abbott Laboratories and BC8 with the Fred Hutchinson Cancer Research Center (FHCRC). The company is also collaborating with Philogen to study the potential of its L19 antibody with its APIT technology. Actinium's management expects other collaborative agreements with potential partners will provide access to additional monoclonal antibodies. The chemical properties of most radionuclides do not allow them to be linked directly to a monoclonal antibody. A chelator is a cage-like, complex chemical structure that holds the radionuclide and is itself chemically linked to the monoclonal antibody. The company's lead product, Iomab-B does not require a chelator but its other drugs in development do require a chelator. Iomab-B is potentially transformative in AML in older patients. Currently, there is no standard of care for refractory and/or relapsed AML patients while the majority of older AML patients end up in this category.

Iomab-B is potentially transformative in AML in older patients

Alpha-pharmaceuticals offer the potential to deliver potent and localized destruction of cancer cells with minimal effect on surrounding normal cells. The properties of alpha-pharmaceuticals provide Actinium with the opportunity to develop effective, well-tolerated therapies that are also convenient to use. There are no naturally occurring mechanisms of resistance to alpha-particle radiation, meaning that these particles should be able to kill every type of cancer cell. In addition to its potency and range of emission, there are other key considerations for evaluating the suitability of particular radioisotopes for medical use. Among them are half-life of the isotope, which is an indication of the period over which it remains radioactive, and its biodistribution and pharmacokinetics, i.e. its distribution in the body and its eventual elimination from it. For these reasons, actinium-225 (Ac-225) and the isotope derived from it, Bismuth 213 (Bi-213), were selected as the cornerstones of the company's technology. Both isotopes have relatively short half-lives and favorable and controllable pharmacokinetics. However, for efficacy, logistics and cost reasons Actinium has decided to focus

Alpha-pharmaceuticals offer the potential to deliver potent and localized destruction of cancer cells with minimal effect on surrounding normal cells

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its efforts on Ac-225 which has a 10 day half-life versus Bismuth-213's half-life of 46 minutes.

The first alpha-pharmaceutical, Algeta's Xofigo, was approved in the U.S. in May for the treatment of castration-resistant prostate cancer patients with bone metastases

The first alpha-pharmaceutical was approved in the U.S. earlier this year. Algeta's (BUY-rated) Xofigo (radium-223) was approved for the treatment of castration-resistant prostate cancer (CRPC) patients with bone metastases on May 15, 2013, three months earlier than its Prescription Drug User Fee Act (PDUFA) date. We believe the early approval bodes well for the other alpha-emitting drugs in development including Actinium's products. Sites that use Xofigo will have to attain NRC licensing before utilizing the drug. The U.S. NRC ruled that sites can procure and administer Xofigo under the same framework as routinely-used nuclear medicines. It will not require additional licensing to administer the drug for physicians who are already licensed to dispense similar medications. We expect the NRC will take the same stance with Actinium's alpha-pharmaceuticals. Xofigo is Algeta's only marketed product. Algeta and Bayer signed a $800 million (EUR 560 million) deal in September 2009 for the development and commercialization of Xofigo for bone metastases. The company jointly markets Xofigo in the U.S. with Bayer and outside the U.S. it will receive royalties on sales by Bayer. Algeta also has several drugs in preclinical studies. We note that other than Xofigo, Actinium's pipeline is more advanced than Algeta's as Algeta's targeted thorium conjugate products are in the preclinical stage while Actinium has APIT alpha-pharmaceutical products in the clinic. Algeta's market cap is NOK10.5 ($1.8 billion) while Actinium's is currently $63.6 million.

The APIT platform has the potential for broad applicability for the treatment of many cancer types, which allows Actinium to add new product candidates to its pipeline based on well-defined patent protected methods. Under its sponsorship as well as activity at FHCRC, Actinium has four product candidates in active clinical trials: Actimab-A (HuM195-Ac-225), Iomab-B (BC8-I-131), BC8-Y-90 and BC8-SA. At this time, the company is actively pursuing development of Actimab-A and Iomab-B while BC8-Y-90 and BC8-SA are in physician sponsored clinical Phase I trials at the Fred Hutchinson Cancer Research Center.

Actimab-A is a combination of the in-licensed monoclonal antibody, Lintuzumab and Ac-225. It is currently in Phase I/II testing for the treatment of AML

Actimab-A, the company's first product utilizing APIT, is a combination of the in-licensed monoclonal antibody, Lintuzumab (HuM195), and the alpha emitting isotope Ac-225. It is currently in Phase I/II testing for the treatment of acute myeloid leukemia (AML) in newly diagnosed patients over the age of 60. Currently, up to two thirds of those patients are either considered ineligible for or refuse the only standard of care treatment for their condition, a chemotherapy combination of cytarabine and an anthracycline. Actimab-A has shown promising results throughout preclinical development and an ongoing clinical trial started in 2006 in treating acute myeloid leukemia (AML) in the elderly. Actinium has expanded the number of patients and number of clinical centers in an AML clinical trial launched in 2012. This trial targets newly diagnosed AML patients over the age of 60. Management estimates that the direct costs to completion of both parts of the ongoing Phase I/II trial will be approximately $7.5 million.

Iomab-B is a combination of the in-licensed monoclonal antibody BC8 and the beta-emitting radioisotope I-131

The company's lead product, Iomab-B, is not an alpha-pharmaceutical, it is a beta-pharmaceutical. Iomab-B is a combination of the in-licensed monoclonal antibody BC8 and the beta-emitting radioisotope I-131. This construct has been extensively tested in Phase I and Phase II clinical trials in approximately 250 patients with different blood cancer indications who were in need of a hematopoietic stem cell transplantation (HSCT). Iomab-B is used to condition the bone marrow of these patients by destroying blood cancer cells in their bone

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Actinium is currently in talks with the FDA to discuss the design of a pivotal Phase III study for Iomab-B in HSCT

marrow and elsewhere thus allowing for a subsequent transplant containing healthy donor bone marrow stem cells. The company has decided to develop this drug candidate by initially focusing on the patients over 55 years old with active acute myeloid leukemia in relapse and/or refractory to existing treatments. The company is currently in talks with the FDA to discuss the design of a pivotal Phase III study in HSCT. Management estimates the direct costs of such a trial to completion anticipated in 2016 will be approximately $15 million - $20 million. Another product from the platform is expected to be a second generation BC8 product linked to Ac-225, Actimab-B, which could potentially streamline logistics, while lowering manufacturing costs.

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Alpha-pharmaceuticals

Alpha-emitting radioisotopes are unstable chemical elements that decay by releasing alpha-particles. Alpha-particles consist of two protons and two neutrons bound together into a particle identical to a helium nucleus, which is classically produced in the process of alpha decay, but may be produced in other ways and given the same name. They are a highly ionizing form of particle radiation and have low penetration depth and are able to be stopped by a few centimeters of air, or by the skin. The viability of alpha-particles in medicine may be newly explored 115 years after their discovery, according to a New England Journal of Medicine editorial in July 2013. In 1996, a workshop sponsored by the Department of Energy on the development of alpha-emitters for medical use identified multiple priority areas for future clinical research, including applications for oncology and non-malignant conditions such as immune disorders and degenerative joint disease. Astatine-211 and bismuth-213 were deemed the most promising agents at the time.

Despite the current widespread availability of radiopharmaceutical agents, short-lived alpha-emitters that are suitable for intravenous medical therapy have been limited until recent advances in radiochemical separation and production of alpha-emitters made their generation feasible. The relative biologic effectiveness of alpha-emitters, which is up to a thousand times that of traditional x-rays and gamma rays (depending on the x-ray's and gamma rays' energy and the tissue type), is their most and least attractive feature. The concept of relative biologic effectiveness combines physical linear energy transfers with the radiobiologic effects of ionizing radiation in tissue to provide a medically relevant scale for comparing the potencies of various forms of ionizing radiation. Alpha-particles are efficient; they cause cell damage with a single knockout as compared with gamma-rays and beta-particles. Such killing power is rendered unattractive if it is coupled with an unforgiving half-life and inhalation or other intra-body delivery. Logistically, alpha-emitter therapy is feasible for most centers whose staff members are well-trained in radionuclide therapy as long as there is some initial investment to update existing safety procedures and to acquire alpha-tailored assay and survey devices, as well as an ongoing investment in training for radiation safety personnel.

Alpha-particles cause cell damage with a single knockout as compared with gamma-rays and beta-particles, which are less efficient

Alpha-pharmaceuticals represent a new class of cancer therapeutics that utilize the attractive properties of alpha-particle emitters to destroy cancer cells. The first alpha-pharmaceutical drug was approved by the FDA on May 15, 2013. Algeta's Xofigo was approved for the treatment of men with castration-resistant prostate cancer with bone metastases. The approval came three months ahead of the PDUFA date. We believe the early approval bodes well for the other alpha-emitter pharmaceuticals in development including Actinium's products.

The first alpha-pharmaceutical drug was approved by the FDA on May 15, 2013, three months ahead of the PDUFA date, which we think bodes well for other alpha-pharmaceuticals

Alpha-particles differ from beta-particles in several ways, most important of which, in our opinion, is the distance they travel in the body. Alpha-particles travel short distances, across only a few cells (2 - 10 typically) compared with hundreds to thousands of cells affected with beta radiation. The shorter range of

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Alpha-particles travel short distances, across only a few cells (2 - 10 typically) compared with hundreds to thousands of cells affected with beta radiation…

…thus they offer the potential to deliver potent and localized destruction of cancer cells with minimal effect on surrounding normal cells

alpha-particle radiation is beneficial because any damage to targeted tumor cells is isolated to those cells. Exposure to cells from healthy tissue can be avoided. However, being up to 1,000 times more powerful than beta-particles, alpha therapy is effective in cancers that are not sensitive to beta irradiation.

Much research is currently focused on using the damaging nature of alpha-emitting radionuclides inside the body by directing small amounts towards a tumor. Alpha-particles induce double-strand DNA breaks in adjacent tumor cells. When targeted appropriately, alpha-pharmaceuticals offer the potential to deliver potent and localized destruction of cancer cells with minimal effect on surrounding normal cells, potentially lowering side effects. There are no naturally occurring mechanisms of resistance to alpha-particle radiation, thus the direct tumor cell killing action of alpha-pharmaceuticals potentially overcomes drug-resistance mechanisms. There have been no instances in patients, of which we are aware, of toxicity associated with long-term exposure to alpha-particles.

The potential characteristics of alpha-emitters that make them attractive for development as alpha-pharmaceuticals are:

- Potent tumor cell killing activity
- Highly localized mode of action
- Effective range of <0.1mm or 2-10 cell diameters
- High ionizing energy that induces irreparable double-strand DNA breaks
- Single DNA hit may be lethal for a cancer cell
- Effective against chemotherapy- and radiation-resistant phenotypes
- Effective against dormant or resting cells
- Potential to minimize side effects
- Specific targeting and short range offers the potential to minimize damage to healthy tissues
- Convenient to use; easy to distribute, store, administer and dispose in dedicated facilities
- Minimal shielding required owing to very short range and low penetrating alpha-radiation. No shielding around the patient required during administration
- Administration by intravenous injection or infusion, potentially as out-patient treatment
- Half-life of select alpha-emitting isotopes appropriate for manufacture and global distribution
- Cost-effective and reliable manufacturing process of select alpha-emitting isotopes

The half-life of actinium-225 is 10 days and the half-life of bismuth-213 is 46 minutes

It is important to note that the half-life of actinium-225 is 10 days and the half-life of bismuth-213 is 46 minutes. By comparison, the first alpha-pharmaceutical on the market, Xofigo, has a half-life of 11 days. Algeta's preclinical alpha-

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pharmaceutical, thorium-227, has a half-life of 18 days. Ac-225 decays by alpha-emission through four atoms, each of which emits an alpha-particle (see Figure 1) for a total of four alpha-emissions. Ac-225 can be conjugated to antibodies using the bifunctional chelate DOTA-SCN. Ac-225-labled tumor specific antibodies can kill multiple cell lines in vitro with LD_{50} values 1,000 times less than those of analogous Bi-223 constructs.

Figure 1: Actinium-225 Decay Scheme

Source: Company reports

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Beta-pharmaceuticals

Beta-particles are high-energy, high-speed electrons or positrons emitted by certain types of radioactive nuclei. The beta-particles emitted are a form of ionizing radiation also known as beta-rays. The production of beta-particles is termed beta decay. Beta-emitters, even weak ones, can penetrate through many cells, whereas alpha-emitters can only penetrate 2 - 10 cells. Strong beta radiation can penetrate though hundreds of cells. Beta-emissions of isotopes used in medicine can penetrate 0.2mm – 12mm. Medically useful beta-emitters have energy ranges from low (Lutetium-177) to moderate (Iodine-131) to high (Yttrium-90). Until the approval of Algeta/Bayer's Xofigo for castration-resistant prostate cancer in May 2013, all the radiopharmaceuticals approved for the treatment of disease were beta-emitters. Iodine-131 (I-131) not bound to antibodies accumulates in the thyroid and has been used to treat thyroid carcinoma for over 70 years. Strontium-89 and Samarium-153 accumulate in bone and are FDA approved for the treatment of bone metastases. The use of these molecules led to the thought that targeted radioactive substances could be used to treat various cancers. Strontium-89, Samarium-153, and Lutetium-177 are all produced by nuclear reactors.

Beta-emitters, even weak ones, can penetrate through many cells, whereas alpha-emitters can only penetrate 2 - 10 cells

Over 160 clinical studies have been started over the years with I-131. Most current studies are being run by non-profit research centers. However, several for profit companies are also developing I-131 drugs. Peregrine Pharmaceuticals is developing Cotara, a treatment that links I-131 to a targeted monoclonal antibody to treat patients with glioblastoma multiforme. The company has completed a Phase II study and plans for a Phase III study. Bexxar from GlaxoSmithKline is another I-131 radiopharmaceutical. It is approved to treat patients with CD20-positive relapsed or refractory, low grade, follicular, or transformed non-Hodgkin's lymphoma who have progressed during or after rituximab therapy, including patients with rituximab-refractory non-Hodgkin's lymphoma. Bexxar consists of a monoclonal antibody (tositumomab) and I-131 (we will give more details on Bexxar later in this report). Another beta-emitting molecule, Lutetium-177 is in Phase I and Phase II studies being conducted by several institutions and corporations for prostate cancer and advanced renal cell carcinoma.

Over 160 clinical studies have been started over the years with I-131

Zevalin (ibritumomab tiuxetan) is still another beta-emitting therapeutic. It is a treatment marketed by Spectrum Pharmaceuticals (Hold-rated) for patients with relapsed or refractory, low-grade or follicular B-cell non-Hodgkin's lymphoma (NHL). It is also indicated for the treatment of patients with previously untreated follicular non-Hodgkin's Lymphoma who achieve a partial or complete response to first line chemotherapy. A Phase III for the treatment of patients with diffuse large B-cell lymphoma is underway. Zevalin therapy consists of two components: Rituxan (rituximab), a CD-20 directed monoclonal antibody, and Yttrium-90 radiolabeled Zevalin for therapy. Yttrium-90 is a beta-particle emitting radio-therapeutic produced by chemical high-purity separation from Strontium-90. Tiuxetan is a chelator. A chelator is a chemical structure that binds the radionuclide to the monoclonal antibody. Neither Zevalin nor Bexxar

A chelator is a chemical structure that binds the radionuclide to the monoclonal antibody

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have had much commercial success. GSK has cut back production due to infrequent demand and though Spectrum actively markets Zevalin and continues to develop the drug for new indications, worldwide sales in the most recent quarter were only $6.8 million.

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Targeted Payload Cancer Therapeutics

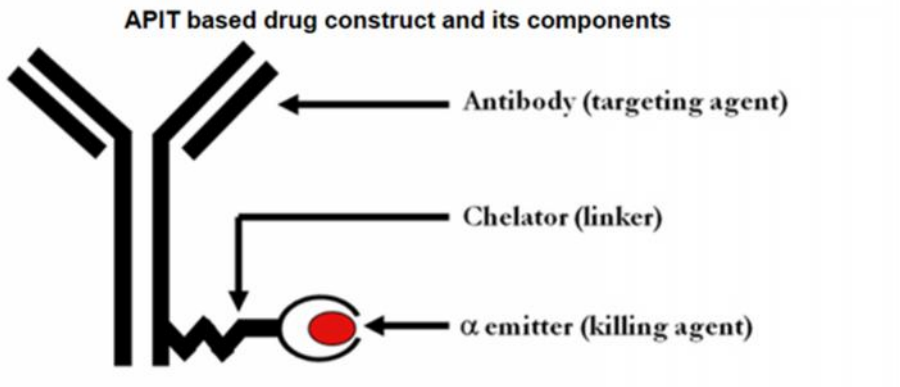
Most targeted cancer agents use a monoclonal antibody to bind to specific cancer cells

Targeted payload cancer therapeutics combine the ability of a target agent to bind a cancer cell and the ability of a toxin or radiation to kill cancer cells. Most targeted cancer agents use a monoclonal antibody to bind to specific cancer cells. The first FDA-approved monoclonal antibody linked to a toxin was Mylotarg, which was approved in 2001. That drug's use was limited due to side effects and it was withdrawn from the market on October 15, 2010. Radioimmunotherapy is a successful approach in cancer therapy that combines a homing antibody of choice to a lethal radioisotope. Two radiation-based targeted payload cancer therapeutics have been on the market for over a decade. As discussed earlier in this report, Spectrum Pharmaceuticals' Zevalin and GlaxoSmithKline's Bexxar were both approved for lymphoma in 2002 and 2003, respectively.

The APIT technology couples monoclonal antibodies with extremely potent but comparatively safe alpha-particle emitting radioactive isotopes using a chelator

Actinium is developing a pipeline of targeted alpha-pharmaceuticals via its Alpha Particle Immunotherapy Technology (APIT) platform technology that was co-developed with Memorial Sloan- Kettering Cancer Center (MSKCC). The APIT technology couples monoclonal antibodies with extremely potent but comparatively safe alpha-particle emitting radioactive isotopes using a chelator. The chemical properties of most radionuclides do not allow them to be linked directly to a monoclonal antibody. A chelator is a cage-like, complex chemical structure that holds the radionuclide and is itself chemically linked to the monoclonal antibody. By virtue of carrying radioisotopes, monoclonal antibodies bring them directly to cancer cells where the particle-emitters can selectively kill the targeted cell.

Figure 2: Alpha Particle Immunotherapy Technology (APIT) Construct



Source: Company reports

APIT is Actinium's Alpha Particle Immunotherapy platform technology. Actinium believes that its biggest market opportunity lies in the applicability of

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A broad range of solid and blood borne cancers can be potentially targeted by monoclonal antibodies to enable treatment with its APIT technology

its APIT platform technology to a wide variety of cancers. A broad range of solid and blood borne cancers can be potentially targeted by monoclonal antibodies to enable treatment with its APIT technology. The APIT technology could potentially be applied to monoclonal antibodies that are already FDA approved to create more efficacious and/or safer drugs ("Biobetters"). Certain beta-emitters, specifically iodine-131 in Iomab-B, the company's lead product, do not require a chelator.

There is only one alpha-pharmaceutical on the market and it is not an antibody-targeted payload cancer therapeutic

There is only one alpha-pharmaceutical on the market and it is not an antibody-targeted payload cancer therapeutic. Xofigo (radium-223) is not attached to a monoclonal antibody as it is drawn to places where calcium is used to build bone in the body, including the site of faster, abnormal gone growth such as that seen in the skeletal metastases of men with advanced, castration-resistant prostate cancer. There are targeted payload cancer therapeutics (TPCTs) that have reached the market. In the case of most TPCTs, the targeting agent is a monoclonal antibody protein complex that can be designed to bind to specific cancer cells. The first TPCT approved by the FDA was Mylotarg, introduced in 2001 and was on the market until its side effects led to its market withdrawal in 2010. Two radiation-based TPCT treatments are on the market, as we mentioned earlier. Spectrum Pharmaceuticals' Zevalin has been on the market since 2002 and GlaxoSmithKline's Bexxar since 2003. Both have beta-emitting payloads, Yitrium-90 for Zevalin and Iodine-131 for Bexxar. Both are indicated for the treatment of Non-Hodgkin's lymphoma. While both are potent drugs that produce excellent results, neither drug has been commercially successful. Seattle Genetics' Adcetris is a TPCTs whose payload is an antimitotic agent. Adcetris was approved by the FDA in August 2011 for the treatment of anaplastic large cell lymphoma and Hodgkin's lymphoma. Actinium Pharmaceuticals, Algeta, Peregrine Pharmaceuticals, Areva Med/Roche, Novelos, Genentech/ImmunoGen and several other companies are also developing TPCT products, though only Actinium, Algeta and Areva Med/Roche are developing a TPCT with an alpha-particle emitting payload.

We mentioned Spectrum Pharmaceuticals' Zevalin earlier in the beta-pharmaceuticals section. Zevalin is a targeted cancer payload therapeutic that combines the beta-emitter Yttrium-90 with Rituxan, a CD-20 directed monoclonal antibody. Bexxar, from GlaxoSmithKline, is a targeted cancer payload therapeutic that utilizes another beta-emitter, I-131. Bexxar (Iodine I-131-tositumomab) is a murine antibody conjugated to I-131 that recognizes and binds to the CD20 antigen found specifically on B-lymphocytes. It is capable of initiating a host immune response to those B-cells to which it is attached, and it also triggers apoptosis in a significant proportion of the cells to which it binds. It is used for the treatment of follicular non-Hodgkin's lymphoma. In November 2010, GSK announced it was cutting back on production due to infrequent demand. Areva Med has a drug in Phase I that is a targeted payload cancer therapeutic that combines the alpha-emitter lead-212 with the antibody Herceptin (for breast cancer) to treat HER-2 positive intra-abdominal metastases of ovarian cancer. The Phase I trial was launched in July 2011 and is expected to be completed in approximately two years. Novelos has a small molecule, broad-spectrum, beta-emitting targeted payload cancer therapeutic that is comprised of a proprietary phospholipid ether analog (PLE) acting as a cancer-targeted delivery and retention vehicle, covalently labeled with I-131, a cytotoxic (cell-killing) radioisotope that is already in common use to treat thyroid and other cancer types. This drug is in a Phase Ib dose-escalation trial.

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Actinium has an alpha-emitter targeted payload cancer therapeutic in preclinical development for glioblastoma multiforme (GBM)

As we mentioned earlier, Peregrine Pharmaceuticals is developing Cotara, a novel therapy in Phase II clinical development for the treatment of glioblastoma multiforme (GBM), the deadliest form of brain cancer. Cotara links the radioactive isotope Iodine-131 to a targeted monoclonal antibody designed to bind to the DNA histone complex that is exposed by dead and dying cells found at the center of solid tumors. Cotara's targeting mechanism enables it to bind to the dying tumor cells, delivering its radioactive payload to the adjacent living tumor cells and essentially destroying the tumor from the inside out, with minimal radiation exposure to healthy tissue. Actinium has an alpha-emitter targeted payload cancer therapeutic in preclinical development for GBM.

Algeta, the first company, along with its partner Bayer, to receive approval for an alpha-pharmaceutical, Xofigo, is making progress with its second alpha-pharmaceutical technology. The company has six thorium-227 programs now underway. Thorium-227 is an alpha-particle emitting element. Algeta intends to evaluate its targeted thorium conjugates (TTCs) in a broad range of cancer types to determine whether the TTC platform could offer advantages over naked (un-armed) antibodies or antibody-drug conjugate technologies that use cytotoxic drugs (rather than alpha-emitting isotopes) as payloads. All of Algeta's TTC programs are in the preclinical stage. Preclinical data supporting Algeta's TTC approach have been presented at scientific conferences. In these studies, Algeta and its academic collaborators have generated promising results that demonstrate the targeted cancer cell-killing effect of thorium-227 conjugated to tumor-targeting antibodies such as trastuzumab (Herceptin) and rituximab (Rituxan) in validated models of breast cancer and lymphoma, respectively. We expect a drug from the TTC program to enter Phase I by the end of 2014.

There are other targeted payload cancer therapeutics that are marketing or are in development that are not radiopharmaceuticals. Adcetris (brentuximab vedotin) is an antibody-drug conjugate directed to the protein CD30, which is expressed in classical Hodgkin lymphoma and systemic anaplastic large cell lymphoma (sALCL). On February 28, 2011 Seattle Genetics submitted a Biologics License Application or BLA to the U.S. Food and Drug Administration (FDA) for the use of Adcetris in relapsed or refractory Hodgkin's lymphoma and relapsed or refractory systemic anaplastic large cell lymphoma (sALCL). The drug was granted accelerated approval by the FDA on August 19, 2011 for relapsed Hodgkin lymphoma and relapsed sALCL and conditional marketing authorization from the European Medicines Agency in October 2012 for relapsed or refractory Hodgkin lymphoma and relapsed or refractory sALCL. Adcetris consists of the chimeric monoclonal antibody brentuximab (which targets the cell-membrane protein CD30) linked to three - five units of the antimitotic agent monomethyl auristatin E. The antibody portion of the drug attaches to CD30 on the surface of malignant cells, delivering MMAE which is responsible for the anti-tumor activity. Adcetris is the most potent drug for treating relapsed/refractory Hodgkin's lymphoma after stem cell transplantation. Adcetris is Seattle Genetics' only marketed product. Consensus estimates for Adcetris are $172.2 million in 2013 and $206.6 million in 2014. This drug is in Phase II and Phase III development for several other indications. All of Seattle Genetics other drugs in development are in Phase I or are in the preclinical stage. Seattle Genetics has a market capitalization of over $5.8 billion.

Genentech and ImmunoGen have collaborated on the development of Kadcyla (trastuzmab emtansine). This is an targeted payload therapeutic that combines Genentech's Herceptin (the HER2 monoclonal antibody trastuzumab) with ImmunoGen's cytotoxic agent mertansine (DM1). Herceptin alone can stop the

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growth of breast cancer cells by binding to the HER2 receptor. Mertansine enters cancer cells and kills them by binding to tubulin, which interferes with mitosis and promotes apoptosis. As Herceptin targets HER2, which is only over-expressed in cancer cells, the drug delivers the toxin specifically to tumor cells. The FDA approved Kadcyla on February 22, 2013.

Overall, about 25 other targeted payload cancer therapeutics are in development, excluding Actinium's products.

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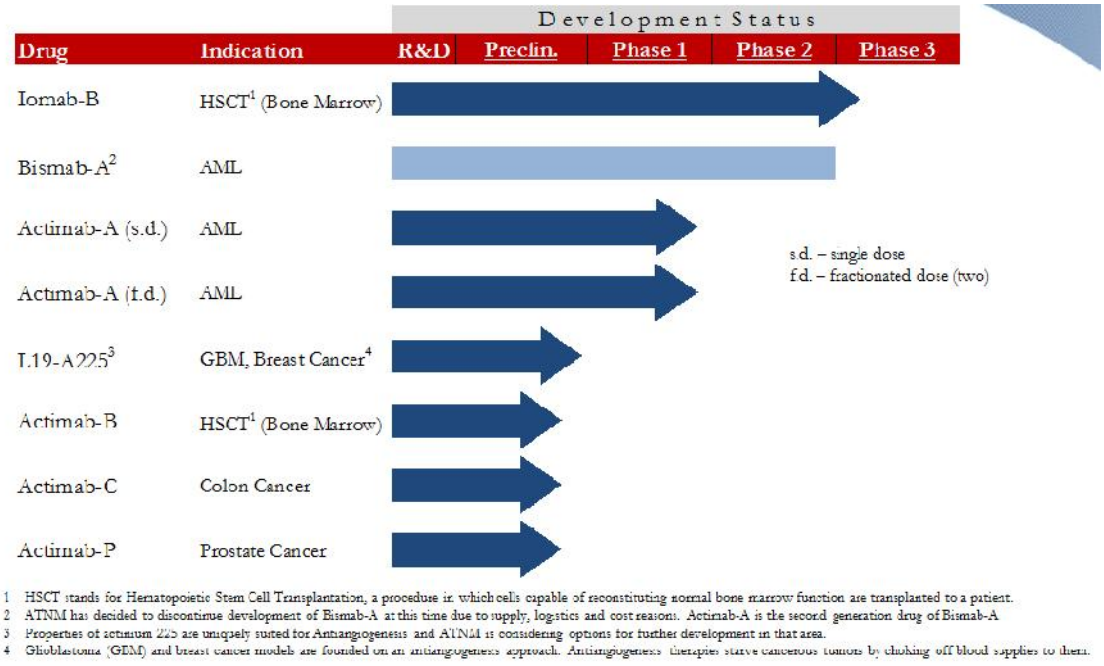
Pipeline

Figure 3: Actinium Pharmaceuticals' Pipeline



Source: Company reports

Iomab-B has completed a Phase I/II trial as a preparatory regimen in conjunction with fludarabine and reduced intensity radiation conditioning in patients who are ineligible for HSCT

Actimab-A is currently in a Phase I/II trial in newly diagnosed elderly acute myeloid leukemia

Actinium's lead product is Iomab-B. Iomab-B is anti-CD45 murine monoclonal-antibody, known as BC8, labeled with I-131. The drug has completed a Phase I/II design trial as a preparatory regimen in conjunction with fludarabine and reduced intensity radiation conditioning in patients who are ineligible for hematopoietic stem cell transplantation (HSCT). The company expects it will enter a regulatory approval trial in 2014, subject to developing appropriate commercial scale and type manufacturing and the FDA approval to commence a pivotal trial. A second drug, Actimab-A is currently in a Phase I/II trial in newly diagnosed elderly acute myeloid leukemia (AML). A third drug, Bismab-A is no longer in development by the company. Both Bismab-A and Actimab-A use the same monoclonal antibody as a targeting agent but they rely on Ac-225 and Bi-213, respectively, as payloads. A Phase I/II trial was completed with Bismab-A, which made it at the time the most clinically advanced Actinium drug. However, despite the success of the trial, a comparison to the second generation agent Actimab-A, has led Actinium to pursue the development of the second generation agent while putting the first drug on hold. Actimab-A has far superior potency at lower dosing levels, supply and logistics advantages and far lower manufacturing costs. Because of Bismab-A's similarity to Actimab-A, the company believes, and we concur, that results of the Bismab-A Phase I/II trial provides an important indication of the safety and efficacy of Actimab-A.

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Using its patented Alpha Particle Immunotherapy Technology (APIT) platform and via its collaboration with the Memorial Sloan Kettering Cancer Center (MSKCC), Actinium has preclinical data on potential drug candidates in several other cancer indications and expects to further develop these into clinical stage drug candidates.

Iomab-B for Hematopoietic Stem Cells Transplantation (HSCT)

Actinium in-licensed Iomab-B from the Fred Hutchinson Cancer Center

Actinium in-licensed Iomab-B from the Fred Hutchinson Cancer Center (FHCC) in Seattle, WA. The company has obtained rights for all the commercial uses. FHCC played a pivotal role in developing the entire field of bone marrow transplantation and the lead Hutchinson researcher, Dr. E. Donnall Thomas received the 1990 Nobel Prize in physiology/medicine for work in this area.

The initial indication for Iomab-B is bone marrow conditioning for HSCT in refractory/relapsed older (55 years and above) acute myeloid leukemia (AML) patients. Hematopoietic stem cells (HSCs) are blood cells that form all other types of blood cells. In particular, they are the precursor to red blood cells, white blood cells and platelet-forming cells. In adults, HSCs are typically found in the bone marrow, mostly in the pelvis, ribs, vertebrae, femur, and sternum. Hematopoietic stem cell transplant (HSCT) is a medical procedure involving the transplantation of HSCs. HSCT is also referred to as bone marrow transplantation. The chemotherapy or irradiation given immediately prior to a transplant is called the conditioning regimen, the purpose of which is to help eradicate the patient's disease and the entire or most of the bone marrow (to suppress immune rejection of the transplant) prior to the infusion of HSC. The bone marrow can be ablated with dose-levels that cause less injury to other tissues. Usually these patients are given high doses of chemotherapy and total body irradiation before receiving a stem cell transplant to keep their immune system from rejecting the donor stem cells and to kill any diseased cells that remain in the body. However, this group of patients has a high risk of developing possibly life-threatening treatment-related side effects such as infections, damage to vital organs such as lungs, liver, kidney and heart, as well as graft versus host disease (GVHD). In allogeneic transplants a combination of cyclophosphamide with total body irradiation is conventionally employed. This treatment also has an immunosuppressive effect that prevents rejection of the HSC by the recipient's immune system. The post-transplant prognosis often includes acute and chronic graft-versus-host disease that may be life-threatening. However, in certain leukemias this can coincide with protection against cancer relapse owing to the graft versus tumor effect. Autologous transplants may also use similar conditioning regimens, but many other chemotherapy combinations can be used depending on the type of disease.

Over 250 patients have been treated with Iomab-B in five Phase I and Phase II trials in various indications

There are three ongoing physician directed trials with Iomab-B in AML and other blood cancer indications in the context of HSCT. Thus far, over 250 patients have been treated with the drug in five Phase I and Phase II trials in various indications, including 68 patients treated in Phase I/II in older refractory/relapsing AML and high-risk Myelodysplastic Syndromes (HR MDS) patients with active disease. The company is currently in talks with the FDA to discuss the design of a pivotal Phase III study in HSCT.

In both Phase I and Phase II trials Iomab-B has led to effective cures in patients with no options left. The only potentially curative treatment option for older patients with refractory/relapsing AML or HR MDS patients with active disease

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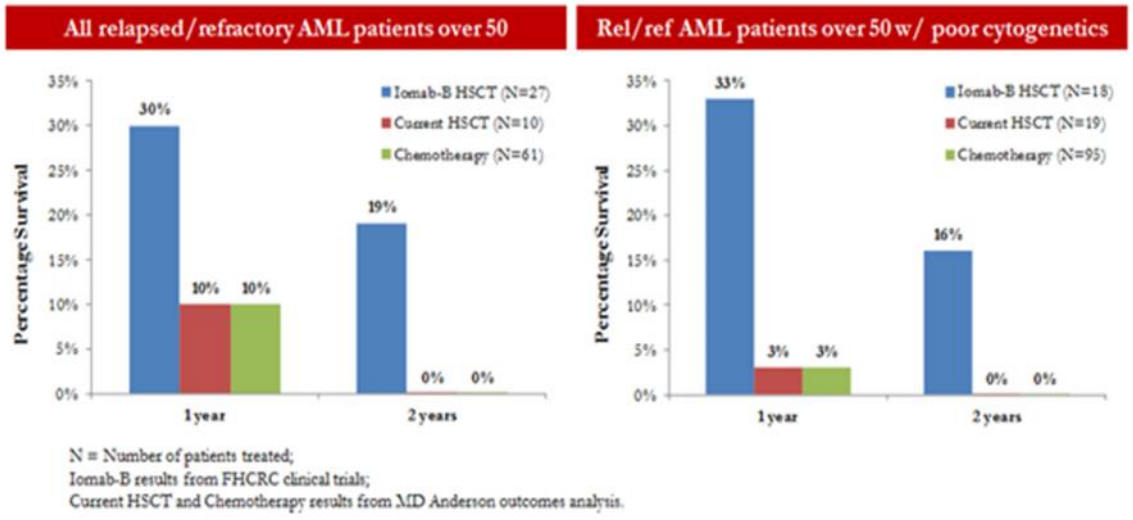
Iomab-B has demonstrated ability to successfully prepare patients for bone marrow transplants when no other treatment was indicated

is bone marrow transplantation (BMT), but vast majority of patients over the age of 50 are either ineligible for myeloablative conditioning due to concomitant conditions or have a high burden and/or very resistant disease that makes reduced dose conditioning futile. Iomab-B has demonstrated ability to successfully prepare such patients for bone marrow transplants when no other treatment was indicated. Actinium intends to develop Iomab-B through a regulatory approval via a pivotal registration trial in refractory/relapsing AML patients, which would allow for a relatively quick path to the market and provide a potentially curative treatment to patients who currently have little or no chance of achieving even a temporary remission, let alone a cure.

All patients achieved complete response and one-year survival was eight of the 27 patients, or 30%, in advanced AML patients with active disease at all dose levels

Figure 4 below shows Iomab-B Phase I/II data compared to historical data from M.D. Anderson. Iomab-B patients were treated at does levels to the critical normal organ ranging from 12 Gy to 26 Gy, with the maximum tolerated dose (MTD) established at 24 Gy. (Gy = Grey, a measure of absorbed radiation). In the Phase II portion of the trial, 20 patients with active disease were treated at MTD. All patients achieved complete response and one-year survival was eight of the 27 patients, or 30%, in advanced AML patients with active disease at all dose levels. At six months, disease free survival (DFS) was about 60% in the Iomab-B treated population.

Figure 4: Iomab-B Clinical Trial Data



Source: Company reports

Based on the strength of the results showing its curative potential in Phase I/II, Actinium is poised to begin a Phase III trial for Iomab-B for bone marrow conditioning for HSCT in refractory/relapsed older AML patients. The company is currently in talks with the FDA on the design of a single pivotal Phase III trial to obtain marketing approval for Iomab-B. We expect a Phase III trial would require approximately 150 patients – 250 patients, randomized 1:1 for Iomab-B and currently used re-induction chemotherapy both followed by HSCT. We believe the endpoint for the Phase III trial will be durable complete remission at six months. In the control group, we would expect a durable complete remission of 20% - 30% at six months.

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Actinium estimates the direct costs of a Phase III trial for Iomab-B to completion anticipated at the end of 2016 will be approximately $15 million - $20 million

We model that the Phase III trial will begin in 2014. Actinium estimates the direct costs of a Phase III trial for Iomab-B to completion anticipated at the end of 2016 will be approximately $15 million - $20 million. We estimate the drug will be launched for bone marrow conditioning for HSCT in refractory/relapsed older (55 years and above) acute myeloid leukemia (AML) patients in late 2017. Iomab-B could potentially be a curative treatment for patients over age 55 with AML who currently have little or no chance of achieving even temporary remission. We forecast a launch in high risk MDS could occur in late 2019.

Iomab-B has demonstrated utility in other groups of patients and other indications including ALL, HD and NHL

As we stated earlier, the targeting part of the Iomab-B construct is a monoclonal antibody that targets CD45, an antigen widely expressed on hematopoietic cells but not on other tissues. Due to this broad expression, Iomab-B has demonstrated utility in other groups of patients and other indications as well, including Acute Lymphoblastic Leukemia (ALL), Hodgkin's Disease (HD) and Non-Hodgkin Lymphoma (NHL). Actinium could potentially also develop another BC8 antibody based radioimmunoconjugate for the treatment of Multiple Myeloma. These are follow-on indications which could be pursued simultaneously or delayed, for cash conservation, and financed from commercial revenues. We project a launch in ALL could occur in late 2020, with additional launches in NHL and HD in late 2021 and Multiple Myeloma in late 2022. Based on current therapies, we believe a course of Iomab-B therapy could be priced at $85,000. We believe the market potential for these indications could be over $4 billion.

Phase I/II Trial for Bismab-A

The two clinical trials in AML patients with Bismab-A have been completed with promising results

Bismab-A is a radiopharmaceutical consisting of Lintuzumab (HuM195, a humanized version of M195, a murinie monoclonal antibody), and bismuth-213. Bismuth-213 is a daughter, i.e., product of the degradation of Ac-225, with cancer cell killing properties similar to Ac-225, but it is less potent. The antibody was developed by PDL BioPharma and licensed to Actinium. Lintuzumab is a humanized IgG1 antibody that targets CD33, a 67-kD cell-surface glycoprotein expressed on most myeloid leukemia cells. Lintuzumab has modest activity against AML, it can produce remission in some patients with AML and eliminate minimal residual disease in acute promyelocytic leukemia. The Phase I/II trial has been completed which at the time made Bismab-A clinically the most advanced of Actinium's drugs. The two clinical trials in patients with acute myeloid leukemia with Bismab-A have been completed with promising results. They were both conducted by Dr. Joseph Jurcic at Memorial Sloan Kettering Cancer Center.

The Phase II arm of the Bismab-A study has shown signs of the drug's efficacy and safety, including reduction in peripheral blast counts and complete responses in some patients

Actimab-A has far superior potency at lower dosing levels, supply and logistics advantages, and far lower manufacturing costs

The Phase II arm of the Bismab-A study has shown signs of the drug's efficacy and safety, including reduction in peripheral blast counts and complete responses in some patients. Despite the success of the trial, a comparison to the second generation agent, Actimab-A, led Actinium to conclude that it should halt the development of Bismab-A in favor of dedicating resources to the development of Actimab-A. Actimab-A has far superior potency at lower dosing levels, supply and logistics advantages, and far lower manufacturing costs. Bismuth-213 is made from Actinium-225 in a process that has to be performed at a hospital using high quantities of Actinium-225. This leads to severe supply limitations, high costs and special training requirements. By utilizing Ac-225 directly, Actinium has improved the drug's potency, cost margin and ease of use. Because of Bismab-A's similarity to Actimab-A, it is thought that the

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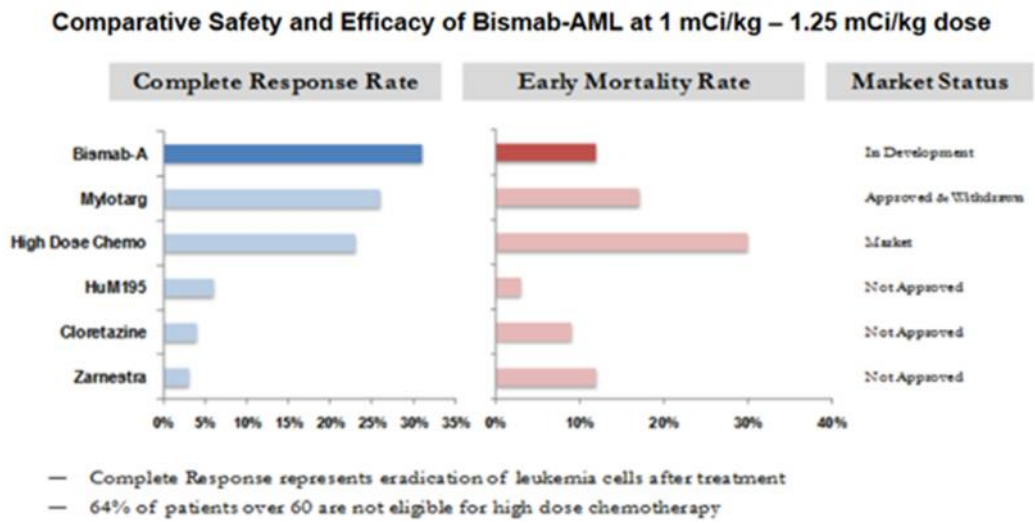
results of the Bismab-A Phase I/II trial provide an important indication of the safety and efficacy of Actimab-A.

Bismab-A has been administered to almost 50 patients to date. It has maintained a low side effect record and shown clear indications of efficacy. Therapeutic dose has been established at 1 mCi/kg (mCi-milliCurie; kg-kilogram) – 1.25 mCi/kg. Twenty patients were treated at that dose range and results showed comparable efficacy with early therapy related mortality significantly lower than among the patients with similar characteristics treated by approved therapies and other therapies in clinical development. Eligibility criteria for the Bismab-A trial were: AML patients over the age of 60 ineligible for other treatments and patients with relapsed or refractory AML.

Bismab-A has efficacy similar to approved products and superior to pipeline products, but at the same time has a better side effect profile than approved products

Comparison of safety and efficacy data of Bismab-A to approved products and others under development in similar patient populations (relapsed/poor cytogenetics/secondary AML patients over 60 years of age) is presented in Figure 5 below. The data indicate that Bismab-A has efficacy similar to approved products and superior to pipeline products, but at the same time has a better side effect profile than approved products and therefore could provide treatment to patients currently ineligible for treatment with approved products.

Figure 5: Iomab-B Clinical Trial Data Comparison



Source: Company reports

Phase I Trial With Single Dose of Actimab-A

Actimab-A is a radioimmunoconjugate consisting of Lintuzumab, a humanized version of M195 murine monoclonal antibody, and the isotope actinium-225. This is the same antibody that is used in Bismab-A. The monoclonal antibody binds to the CD33 antigen, which is expressed on the surface of myeloblasts including acute myelogenous leukemia cells and delivers the cytotoxic alpha-particles to these cells. As we mentioned above, the humanized version of M195 was originally developed by PDL BioPharma (now Abbott Biotherapeutics) using its SMART technology. PDL BioPharma later licensed the rights to Actinium. A chelator binds actinium-225 to Lintuzumab. It took 12 years to develop the proper chelating agent and method of chelation.

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Eligibility criteria for the Phase I single dose trial with Actimab-A were similar to those for the Bismab-A trial: AML patients over the age of 60 ineligible for other treatments and patients with relapsed or refractory AML.

In the Phase I trial, Actimab-A was tolerable at doses less than 4 µCi/kg and had anti-leukemic activity

The first-in-man Phase I dose escalation trial to determine the safety, pharmacology, and biological activity of Actimab-A in AML is being done in collaboration with MSKCC. Fifteen patients (median age, 68 years; range, 45 years – 80 years) with relapsed/refractory AML were treated to date. Patients received a single infusion of Actimab-A at doses of 0.5, 1, 2, 3, or 4 µCi/kg (µCi –microCurie; total dose, 23–390 µCi). Actimab-A is tolerable at doses less than 4 µCi/kg and has anti-leukemic activity. No acute toxicities were seen. Dose limiting toxicity was suppression of the entire bone marrow lasting over 35 days and consequent death due to sepsis. It occurred in one patient treated with 3 µCi/kg and in both patients receiving 4 µCi/kg. Toxicities outside of the target organ (bone marrow) were limited to transient grade 2/3 liver function abnormalities. With follow-up from 1 month – 24 months (median, 2 months), no evidence of damage to kidneys due to radiation was seen. Peripheral blood blasts (leukemia cells) were eliminated in 8 of 13 evaluable patients who received a full treatment dose. Bone marrow blast reductions of over 33% were seen in 7 of 11 evaluable patients at 4 weeks, including 3 patients who after the treatment had 5% or fewer blasts. Data shows elimination of leukemia cells from blood in 67% of all evaluable patients who received a full dose and in 83% of those treated at dose levels above 0.5 microCuries (uCi/kg), and eradication of leukemia cells in both blood and bone marrow in 20% of all evaluable patients and 25% of those treated at dose levels above 0.5 uCi/kg.

Data shows elimination of leukemia cells from blood in 67% of all evaluable patients who received a full dose and in 83% of those treated at dose levels above 0.5 microCuries

Figure 6: Actimab-A versus Bismab-A in a Comparable Trial in AML Patients Over the Age of 60 Ineligible For Other Treatments and Patients With Relapsed or Refractory AML

Parameter	Bismab-A	Actimab-A
Elimination of peripheral blasts	27%	63%
Bone Marrow blasts decrease by 50% or more	28%	50%
Bone Marrow blasts 5% or less post treatment*	0%	20%

* More than 5% of bone marrow blasts signifies persistent presence of leukemia cells.

Source: Company reports

Phase I/II AML Trial With Two Consecutive Fractionated Doses of Actimab-A

In the new Phase I/II trial, patients are eligible if they have previously untreated newly diagnosed acute myeloid leukemia, are age 60 years or older and are unfit for or decline intensive chemotherapy, or are 70 years or older with newly diagnosed AML

Bismab-A trials and the Phase I Actimab-A trial were focused on relapsed, refractory and other difficult to treat acute myeloid leukemia patients. In the new multicenter Phase I/II trial, patients are eligible if they have previously untreated newly diagnosed acute myeloid leukemia, are age 60 years or older and are unfit for or decline intensive chemotherapy, or are 70 years or older with newly diagnosed AML. This target population has had better outcomes than relapsed and refractory patients who have been most of the patients in Actinium's previous trials. In addition, the new trial includes low doses of chemotherapy with the goal of further improving patient outcomes. Actinium received clearance from the FDA and has commenced a Phase I/II multi-center AML trial with fractionated doses of Actimab-A. Actinium has expanded the number of participating clinical centers to five centers: MSKCC, Johns Hopkins

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Medicine, University of Pennsylvania Health System, Fred Hutchinson Cancer Center and MD Anderson Cancer Center.

The Phase II portion of the trial will be an event driven trial that will look at overall survival

Actinium currently expects that it will take approximately 6 months to complete the Phase I portion of the trial and an additional 1 – 1 ½ years to complete the Phase II portion of the trial. Maximum enrollment in the Phase I portion of the trial is 21 patients in dose escalating cohorts of 3 patients each with the goal of determining the maximum tolerated dose (MTD) for Actimab-A. There is a six week interval between dose levels. Once MTD has been determined, it will be used as the dose level for the Phase II portion of the trial which will enroll up to 53 patients. This will be an event driven trial that will look at overall survival. Median overall survival for similar populations in literature is 2 months – 5 months.

Actinium is targeting the end of the Phase II trial by the middle of 2014

Actinium is targeting the end of the Phase II trial by the middle of 2014. Interim results could potentially be released at ASH in 2014. Once the results of Phase II of this trial are available, the company will consider petitioning the FDA for an allowance to modify the Phase II trial for use as a pivotal trial. If this approach is allowed by the FDA, Actinium expects it will need approximately 120 patient enrollments in the pivotal Phase II, including 53 patient from the allowed Phase II trial. Although similar regulatory pathways were approved in the recent past, whether it will be approved for this particular product will depend on trial results, FDA's policies and other currently undeterminable factors. Management estimates that the direct costs to completion of both parts of the Phase I/II trial will be approximately $7.5 million. We expect a Phase III trial will be required. A Phase III trial could potentially start in 2015 and would need about 200 patients, in our opinion. We believe Actinium could file a BLA with the FDA for Actimab-A in 2018. A launch could occur in 2019. Based on current competitive oncology products, we model that a course of therapy could be priced at $60,000.

A Phase III trial could potentially start in 2015 and would need about 200 patients, in our opinion

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Preclinical Development Pipeline

Actimab-B for Hematopoietic Stem Cell Transplantation (HSCT)

Actinium is collaborating with Fred Hutchinson Cancer on developing for certain uses the anti-CD45 monoclonal antibody BC8 which is the backbone of Iomab-B. The CD45 antigen is expressed on effectively all white blood cells and has significant potential, when labeled with radioisotopes, to efficiently eradicate leukemia and lymphoma cancers and ablate bone marrow in preparation for hematopoietic stem cell transplantation. The utility of Iomab-B has been successfully demonstrated in clinical trials and Actinium intends to develop the drug through approval. However, replacing I-131 with Ac-225 would enable a wider usage of the drug due to logistics and supply chain considerations and at the same time significantly reduce the cost of goods sold. The antibody has already been in extensive preclinical trials labeled with bismuth-213, the daughter of actinium-225 and the company believes that availability of a vast body of relevant preclinical data coupled with a significant clinical experience with all the drug construct components could lead to an accelerated path into the clinic. Actinium has all commercial rights to and possession of the cell line for this antibody.

Replacing Iomab-B's I-131 with Ac-225 would enable a wider usage of the drug due to logistics and supply chain considerations and at the same time significantly reduce the cost of goods sold

Monoclonal Antibody Expansion

Actinium is seeking to create monoclonal antibody combinations with Ac-225 by utilizing antibodies with proven safety and cancer binding capabilities. This is similar to Algeta's Targeted Thorium Conjugates (TTC) approach. Algeta is evaluating the alpha-emitter thorium-227 as the payload for targeted molecules such as monoclonal antibodies. The programs' intent is to develop alpha-pharmaceuticals with increased potency and a more localized tumor killing effect than current therapies. Algeta has six programs in preclinical development, including one with Genzyme/Sanofi to evaluate thorium-227 conjugated to a novel, but undisclosed, tumor-targeting antibody. Actinium will focus on unmet needs in the market where no other treatments are available. It has four monoclonal antibodies under consideration in preclinical studies.

Actinium will focus on unmet needs in the market where no other treatments are available

Actinium has been working collaboratively with the owner of rights to an anti-A33 monoclonal antibody that targets metastatic colon cancer to co-develop that antibody labeled with Ac-225. That drug would be Actimab-C. MSKCC has expressed interest in commencing a clinical trial under a Physician IND. Preclinical work with an A33 monoclonal antibody – Ac-225 construct has shown acceptable toxicity profiles and encouraging proof of principal efficacy in mouse models, with complete elimination of metastatic disease in a number of animals. The monoclonal antibody has already been in clinical trials in its native form and coupled with beta-emitting isotopes. Actinium has prepared a number of strategic documents with the owner of the antibody rights and is evaluating further development and collaboration strategies.

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Actinium has also collaborated with MSKCC and a commercial third party on development of an Ac-225 labeled monoclonal antibody highly specific for prostate cancer cells. This drug would be Actimab-P. Preclinical mouse models have demonstrated encouraging proof of principal results in prostate cancer mouse models.

Actinium is collaborating with Philogen to evaluate the feasibility of Ac-225 as a payload on Philogen's L19 antibody constructs for the treatment of cancer. L19 is a single chain monoclonal antibody that targets the extra domain B (EDB) of fibronectin, a glycoprotein of the subendothelial extracellular matrix. EDB is associated with angiogenesis and is present only in fibronectin of newly formed blood vessels in tumors and in tissues undergoing extensive remodeling. It is expressed by tumor vasculature, but not by normal vasculature. This represents a potential point of entry into the anti-angiogenesis market. There is an ongoing open trial for the L19 antibody labeled with radioisotopes and an Ac-225 labeled monoclonal antibody could potentially be included in that trial via an amendment to the existing IND. Such an amendment would contain a new protocol and other data based on additional labeling work that is planned. Actinium has had discussions with Philogen and is currently evaluating approaches for further collaboration. This anti-angiogenesis monoclonal antibody construct is in preclinical development for glioblastoma multiforme and breast cancer.

Due to availability of extensive clinical data on the use of the above listed monoclonal antibodies both as native and as radiolabeled, and extensive clinical data on the use of its anti-leukemia monoclonal antibody (HuM195 labeled with either Bi-213 and Ac-225), Actinium expects to pursue a regulatory clearance of a physician trial IND from the FDA which would allow a company sponsored Phase I trial to begin within 8 – 12 months in one of the above indications once funding is provided and a final agreement has been reached with the antibody owners. We expect one of the preclinical drugs could reach Phase I in late 2014/early 2015.

We expect one of the preclinical drugs could reach Phase I in late 2014/early 2015

"Biobetters"

To continue building on its platform, Actinium is expanding its monoclonal antibody strategy and also developing a strategy for a "Biobetter" program. With Biobetters, Actinium is aiming to improve upon marketed biotech drugs with proven safety and efficacy by adding alpha-emitters. As patent protection for many native monoclonal antibodies approaches expiration, Actinium will be able to offer the owners of those monoclonal antibodies the APIT technology that will create new, more potent drugs and give them new patent protection. Actinium intends to form alliances, joint ventures and/or licensing deals with companies that have commercial monoclonal antibody drugs. Actinium would not be the first company to do this, Areva Medical has a program with Roche in which it is attaching its alpha-emitter to Roche's Herceptin to create a Biobetter. We expect this strategy to result in additional growth potential for Actinium.

Actinium is aiming to improve upon marketed biotech drugs with proven safety and efficacy by adding alpha-emitters

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Business Strategy

We expect the company will partner its products prior to commercial launch

While we have modeled that Actinium takes its products to commercialization alone to give investors a better appreciation of the value of the company's pipeline, we expect the company will partner its products prior to commercial launch. We believe Actinium intends to potentially develop its most advanced clinical stage drug candidates through approval in the case of Iomab-B and up to and including a Phase II proof of concept human clinical trial in the case of Actimab-A. Actinium may elect to commercialize Iomab-B with a partner in the U.S. or out-license the drug post-Phase III results. Outside of the U.S., the company will likely out-license the rights to develop and commercialize the product to a strategic partner, in our opinion. In the case of Actimab-A, Actinium will most likely seek to enter into strategic partnerships whereby the strategic partner(s) co-fund(s) further human clinical trials of the drug that are needed to obtain regulatory approvals for commercial sale within and outside of the U.S. In parallel, the company intends to identify and begin initial human trials with additional actinium-225 drug candidates in other cancer indications. Actinium would possibly retain marketing rights for its later stage products in the U.S. whenever possible and out-license marketing rights to its partners for the rest of the world.

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Patent Protection

Actinium has 68 patents issued and pending including 17 in the U.S. and 51 internationally

Actinium has 68 patents issued and pending including 17 in the U.S. and 51 internationally. In addition to its own internally generated IP, Actinium in-licenses patents and patent applications from its research and development collaborators and other organizations. Platform technology patents are broad patents that cover use of alpha emitting isotopes Ac-225 and Bi-213 for treatment of patients with any type of cancer and the production of the Ac-225 isotope. These are the cornerstones of Actinium's IP portfolio. There are three key components of APIT based drugs: isotope (Ac-225 or Bi-213); chelator (DTPA or DOTA); and monoclonal antibodies (specific for each type of cancer). Therefore, these patents can be classified into three sub-groups: 1) Isotope production patents (cyclotron patents), 2) Chelator composition patents, and 3) Monoclonal antibody composition and production patents (in-licensed from partners). Method of treatment patents relate to specific methods of treatment related to APIT, such as methods to improve safety of treatment with APIT based drugs.

The company believes that several of its programs are likely eligible for "Orphan Drug Protection"

Additionally, the company believes that several of its programs are likely eligible for "Orphan Drug Protection" including its products intended for AML as well as bone marrow transplantation. Orphan Drug Protection in the U.S. refers to the protection provided by the 1983 Orphan Drug Act which provides seven years of market exclusivity to drugs developed to address diseases that affect fewer than 200,000 patients in the country. Similar protection exists in Europe and provides for 10 years of marketing exclusivity.

There is no patent protection on I-131 or the antibody used in Iomab-B, however, the sequence of the antibody has not been published and Actinium has a master cell bank for the antibody

Other barriers to competitors include know-how that includes knowledge of existing isotope supply chains and hands on experience and expertise of the company's key collaborators and consultants. Highly specialized, proprietary drug preparation methods are utilized to produce APIT based drugs. There is no patent protection on I-131 or the antibody used in Iomab-B, however, the sequence of the antibody has not been published and Actinium has a master cell bank for the antibody. Possession of the master cell bank offers significant protection for the drug, in our opinion. The dosing process could be a source of patent protection for Iomab-B as could method of use.

Actinium is continuously working on enhancing its IP portfolio, including most notably, initiatives to strengthen its intellectual property related to cyclotron based production of Ac-225.

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Figure 7: Patent Portfolio

Area	Claim	Expiration	Status
Platform Technology	Metastases larger than 1mm	2020	Allowed
Platform Technology	DOTA* labeling	2021	Issued
Drug Preparation Methods	Ac-225 labeling	2029	Pending
Drug Preparation Methods	Bi-213 labeling	2017/2020	Issued
Isotope Production Methods	Ac-225 cyclotron production	2023/2025	Pending/Allowed
mAb Composition and Production	Production of leukemia antibody	2015	Issued
Methods of Treatment	Protection of toxicity	2023	Pending

* DOTA is the name of the chelator (linker) that Actinium uses to attach the antibody to the α emitter.

Source: Company reports

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Market Opportunities

Iomab-B for Hematopoietic Stem Cell Transplant (HSCT)

Hematopoietic stem cells (HSCs) are blood cells that form all other types of blood cells. In particular, they are the precursor to red blood cells, white blood cells and platelet forming cells. HSCs are typically found in the bone marrow of adults, mostly in the pelvis, femur, ribs, vertebrae and sternum. Hematopoietic stem cell transplant (HSCT) is a medical procedure involving the transplantation of HSCs. The chemotherapy and irradiation given immediately prior to a transplant is called the conditioning regimen, the purpose of which is to help eradicate the patient's disease and the entire or most of the bone marrow (to suppress immune rejection of the transplant) prior to the infusion of HSC. The bone marrow can be ablated with dose-levels that cause less injury to other tissues. Usually these patients are given high doses of chemotherapy before receiving a stem cell transplant to keep their immune system from rejecting the donor stem cells and to kill any diseased cells that remain in the body. However, older patients with AML have a high risk of developing possibly life-threatening treatment-related side effects such as infections, damage to vital organs such as lungs, liver, kidney and heart, as well as graft versus host disease (GVHD).

50,417 hematopoietic stem cells transplants were performed worldwide in 2006, this number grew to about 60,000 in 2010

According to the Worldwide Network for Blood and Marrow Transplantation, 50,417 hematopoietic stem cells transplants were performed worldwide in 2006, this number grew to about 60,000 in 2010. HSCT was a $1.3 billion market in the U.S. in 2007, based on data collected by the U.S. government's Healthcare Cost and Utilization Project. According to a 2012 study, the global market for stem cell therapy was $3.8 billion in 2011 and is expected to reach $6.6 billion by 2016. Hematopoietic stem cells represent the most mature and largest market segment in the overall stem cell therapy market.

Hematopoietic stem cell transplants are classified into two categories: autologous and allogeneic. During autologous HSCT, hematopoietic stem cells are extracted from the patient. Then, in a process known as bone marrow ablation or conditioning, the patient is treated with chemotherapy (such as cyclophosphamide and busulfan) and total body radiotherapy to destroy malignant cells in the bone marrow and prevent the growth of new blood cells. Once the bone marrow has been ablated, the stem cells are transplanted back into the patient and it will continue to produce normal blood cells. During allogeneic HSCT, hematopoietic stem cells are extracted from a healthy compatible donor. The healthy stem cells are then transfused into the recipient. Allogeneic HSCT is the preferred method of treatment for Acute Myeloid Leukemia (AML), because it lowers the likelihood of cancer relapse and increases the chances of remission and cure. Allogeneic HSCT results in the lowest incidence of leukemic relapse, even when compared with HSCT from an identical twin.

While allogeneic hematopoietic stem cell transplantation (HSCT) may offer the best chance of cure for patients suffering from aggressive hematological

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malignancies such as acute myeloid leukemia, acute lymphoblastic leukemia, and myelodysplastic syndrome, successful outcomes for the subgroup of patients with high-risk disease remain disappointing and lag behind those of lower-risk patients. Because relatively high rates of relapse are an important contributor to these poor outcomes, efforts have been invested to explore approaches to increase the cytotoxic effects of treatment. Relapse rates have been shown to improve with the addition of increased doses of total body irradiation and/or the introduction of additional chemotherapy to a HSCT conditioning regimen. However, the increase in total body irradiation dose and/or additional chemotherapy has also been associated with a significant increase in life-threatening toxicities, resulting in no change in overall survival. Intense conditioning regimens are limited to patients who can tolerate substantial adverse effects that include pre-engraftment opportunistic infections secondary to loss of endogenous bone marrow function and organ failure caused by cytotoxic drugs. Radioimmunotherapy has been employed as an adjunct to HSCT where targeted delivery of radiation may allow for further escalation of therapy to reduce relapse with minimal toxicity.

A conditioning regimen with busulfan plus cyclophosphamide (BuCy) is considered the standard myeloablative regimen for AML. This regimen, however, is associated with significant risks including regimen-related toxicity (RRT) as well as transplant related mortality (TRM). The introduction of intravenous busulfan has been associated with a decreased incidence of RRT. Interactions between busulfan and cyclophosphamide may result in increased liver toxicity. More recently, fludarabine, a strongly immunosuppressive purine analog with considerable anti-neoplastic and immunosuppressive activity, was selected to replace cyclophosphamide in myeloablative and non-myeloablative regimens. Myeloablative regimen based on busulfan and fludarabine (BuFlu) may be associated with limited extra-hematologic toxicities, sufficient anti-leukemic effects, better overall survival and disease free survival compared to BuCy for patients undergoing HSCT. Despite the benefits of BuFlu, some studies indicate that BuFlu is associated with an increased risk of relapse in comparison to the BuCy regimen. Additionally, a randomized comparison study showed that BuFlu regimen had significantly lower overall survival and disease free survival than BuCy for patients undergoing allogeneic HSCT for treatment of leukemia and myelodysplastic syndrome.

Reduced-intensity conditioning (RIC) refers to the pre-transplant use of lower doses or less intense regimens of cytotoxic drugs or radiation than are used in conventional full-dose myeloablative conditioning treatments. RIC includes all conditioning regimens intended to be non-myeloablative, as opposed to fully myeloablative regimens. With RIC, only patients in complete remission are eligible, this is less than 10% of AML patients that are over 50 years of age. The treatment of a patient with RIC costs about $80,000 in the first year. Typically, 50% survive two years among those in complete remission. The other over 90% of patients over 50 years of age that are not eligible for HSCT are treated with chemotherapy, experimental treatments or palliative care. Less than 10% survive one year and less than 1% survives two years. According to a recent study presented at the 54th ASH Annual Meeting and Exposition in December 2012, the direct cost of treatment range from ~$187,000 - ~$327,000 per patient. In Phase I and Phase II trials, Iomab-B has demonstrated the ability to successfully prepare patients over age 50 that are ineligible for HSCT.

The treatment of a patient with reduced-intensity conditioning costs about $80,000 in the first year

In 2006, a survey collected by 1,327 centers in 71 participating countries of the Worldwide Network for Blood and Marrow Transplantation reported a total of

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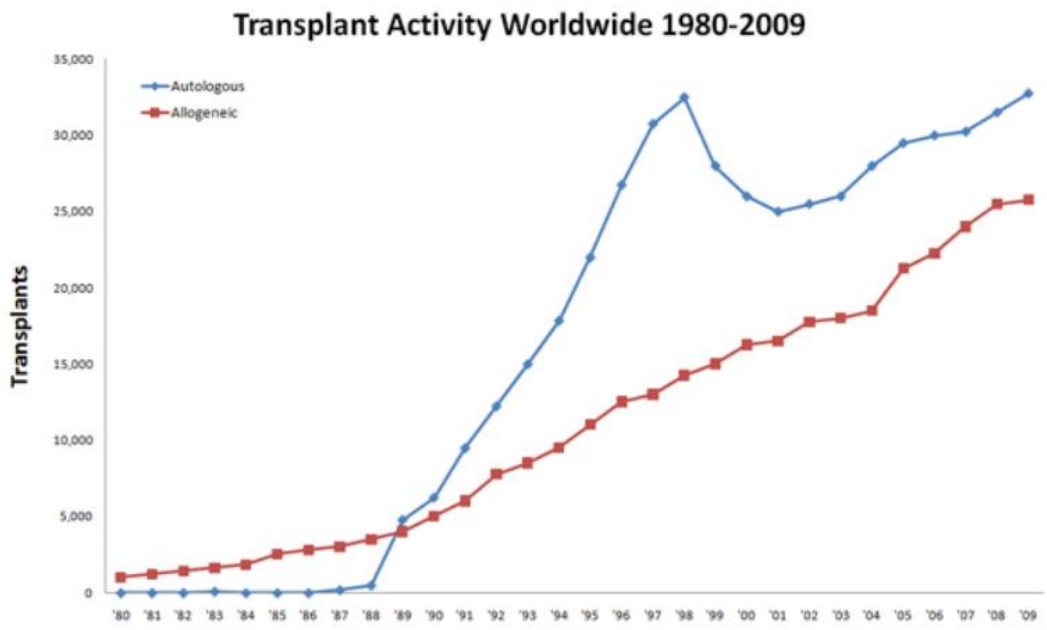
The most frequent malignant disease for allogeneic HSCT was acute myeloid leukemia (AML) with 33% (7,026) of total allogeneic HSCTs performed in 2006

We believe the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is about $800 million - $1 billion

50,417 HSCTs performed worldwide. 43% (21,516) were allogeneic and 57% (28,901) were autologous. Most of the HSCTs were performed in Europe with 48%, followed by the Americas with 36%, Asia with 14%, and the Eastern Mediterranean and Africa with 2%. Among the participating countries, the U.S. reported the greatest share of global HSCTs with 30% (15,082). The most frequent malignant disease for allogeneic HSCT was acute myeloid leukemia (AML) with 33% (7,026) of total allogeneic HSCTs performed in 2006. The U.S. Department of Health and Human Services reports 17,938 HSCTs were performed in the United States in 2011. Worldwide, there were about 60,000 HSCTs overall, about 34,000 autologous and 26,000 allogeneic in 2009 according to a study by the Center for International Blood & Bone Marrow Transplant Research (see Figure 8 below). An article in the September 2008 issue of "Biology of Blood and Marrow Transplantation" stated that the number of patients over the age of 50 receiving HSCT has been steadily increasing over the last decade and grew from 8% of procedures in 2000 to 21% in 2005 and 27% in 2007. We believe the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is about $800 million - $1 billion. We estimate the worldwide markets for Iomab-B in Myelodysplastic Syndrome and ALL are smaller than AML, but Non-Hodgkin's Lymphoma, Hodgkin's Disease and Multiple Myeloma markets are much larger than the HSCT market for AML.

Figure 8: Worldwide HSCT Activity 1980 - 2009



Source: Center for International Blood & Bone Marrow Transplant Research

Actimab-A in Acute Myeloid Leukemia

Acute myeloid leukemia (AML) is the most common form of leukemia among adults and results in the largest number of annual deaths from leukemia in the U.S. AML is a form of cancer characterized by the rapid growth of abnormal white blood cells arising from the myeloid line. Myeloid stem cells usually become a type of immature white blood cell called myeloblasts. In AML, the

myeloblasts are abnormal and do not become healthy white blood cells. The abnormal white blood cells accumulate in the bone marrow and prevent the production of normal blood cells. The replacement of normal bone marrow cells results in a drop in red blood cells, platelets, and normal white blood cells. Several risk factors for developing AML have been identified and include chemical exposure, radiation, and hereditary genetic abnormalities.

Chemotherapy is usually the first-line treatment for AML and consists of induction therapy and post remission therapy. No standard regimen exists for the treatment of patients with relapsed acute myeloid leukemia (AML), particularly in patients with a first remission duration of less than 1 year. For patients with relapsed AML or with a high risk of relapse, HSCT is usually recommended (see the discussion of HSCT above and elsewhere earlier in this report). The NIH estimates that there will be 14,590 new cases of AML and 10,370 deaths associated with the disease in the U.S. in 2013. The median age of diagnosis is 67 years, with 54% of patients diagnosed at 65 years or older. As the population ages, the number of cases of AML is expected to rise. Nearly 9,000 deaths are caused by AML each year in the U.S. A review of The University of Texas MD Anderson Cancer Center's historical experience with front-line intensive induction chemotherapy for AML patients aged 70 years or older demonstrated that while 45% achieved a complete remission, median overall survival was only 4.6 months and was associated with a 4-week death rate of 26% and a 8-week death rate of 36%. In the new multicenter Phase I/II Actimab-A trial with fractionated doses, patients are eligible if they have previously untreated newly diagnosed acute myeloid leukemia, are age 60 years or older, and are unfit for or decline intensive chemotherapy, or are 70 years or older with newly diagnosed AML.

The NIH estimates that there will be 14,590 new cases of AML and 10,370 deaths associated with the disease in the U.S. in 2013

Advances in the treatment of AML have resulted in substantially improved complete remission (CR) rates. Treatment should be sufficiently aggressive to achieve CR because partial remission offers no substantial survival benefit. Approximately 60% - 70% of adults with AML can be expected to attain CR status following appropriate induction therapy. More than 25% of adults with AML (about 45% of those who attain CR) can be expected to survive three or more years and may be cured. Remission rates in adult AML are inversely related to age, with an expected remission rate of more than 65% for those younger than 60 years old. Data suggest that once attained, duration of remission may be shorter in older patients. Increased morbidity and mortality during induction appear to be directly related to age. Other adverse prognostic factors include central nervous system involvement with leukemia, systemic infection at diagnosis, elevated white blood cell count (>100,000/mm^3), treatment-induced AML, and history of myelodysplastic syndromes or another antecedent hematological disorder. Patients with leukemias that express the progenitor cell antigen CD34 and/or the P-glycoprotein (MDR1 gene product) have an inferior outcome. AML associated with an internal tandem duplication of the FLT3 gene (FLT3/ITD mutation) has an inferior outcome that is attributed to a higher relapse rate.

Remission rates in adult AML are inversely related to age

Successful treatment of acute myeloid leukemia (AML) requires the control of bone marrow and systemic disease and specific treatment of central nervous system (CNS) disease, if present. The cornerstone of this strategy includes systemically administered combination chemotherapy. Because only 5% of patients with AML develop CNS disease, prophylactic treatment is not indicated.

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Treatment is divided into two phases: remission induction (to attain remission) and post-remission (to maintain remission). Maintenance therapy for AML was previously administered for several years but is not included in most current treatment clinical trials in the U.S., other than for acute promyelocytic leukemia. Other studies have used more intensive post-remission therapy administered for a shorter duration of time after which treatment is discontinued. Although individual patients have been reported to have long disease-free survival (DFS) or cure with a single cycle of chemotherapy, post-remission therapy is always indicated in therapy that is planned with curative intent. Post-remission therapy appears to be effective when given immediately after remission is achieved.

Non-transplant post-remission therapy using cytarabine-containing regimens (cytarabine is a toxic synthetic nucleoside, $C_9H_{13}N_3O_5$) has treatment-related death rates that are usually less than 10% - 20% and have yielded reported long-term DFS rates from 20% to 50%. A large, randomized trial that compared three different cytarabine-containing post-remission therapy regimens showed a clear benefit in survival to patients younger than 60 years who received high-dose cytarabine. Intensification of cytarabine dose or duration of post-remission chemotherapy with conventionally dosed cytarabine did not improve DFS or overall survival (OS) in patients aged 60 years or older, as evidenced in the Medical Research Council trial. The duration of post-remission therapy has ranged from one cycle to four or more cycles. The optimal doses, schedules, and duration of post-remission chemotherapy have not been determined.

Intensification of cytarabine dose or duration of post-remission chemotherapy with conventionally dosed cytarabine did not improve DFS or overall survival in patients aged 60 years or older

Dose-intensive cytarabine-based chemotherapy can be complicated by severe neurologic and/or pulmonary toxic effects and should be administered by physicians experienced in these regimens at centers that are equipped to deal with potential complications. In a retrospective analysis of 256 patients who received high-dose bolus cytarabine at a single institution, the most powerful predictor of cytarabine neurotoxicity was renal insufficiency. The incidence of neurotoxicity was significantly greater in patients treated with twice daily doses of 3 g/m2/dose when compared with 2 g/m2/dose.

Allogeneic bone marrow transplantation (BMT) results in the lowest incidence of leukemic relapse

Allogeneic bone marrow transplantation (BMT) results in the lowest incidence of leukemic relapse, as discussed above. The improvement in freedom from relapse using allogeneic BMT as the primary post-remission therapy is offset, at least in part, by the increased morbidity and mortality caused by graft-versus-host disease, veno-occlusive disease of the liver, and interstitial pneumonitis. The DFS rates using allogeneic transplantation in first complete remission (CR) have ranged from 45% to 60%. The use of allogeneic BMT as primary post-remission therapy is limited by the need for a human leukocyte antigen (HLA)-matched sibling donor and the increased mortality from allogeneic BMT of patients who are older than 50 years. The mortality from allogeneic BMT that uses an HLA-matched sibling donor ranges from 20%-40%, depending on the series. The use of matched, unrelated donors for allogeneic BMT is being evaluated at many centers but has a very substantial rate of treatment-related mortality, with DFS rates less than 35%. Retrospective analysis of data from the International Bone Marrow Transplant Registry suggests that post-remission chemotherapy does not lead to an improvement in DFS or OS for patients in first remission undergoing allogeneic BMT from an HLA-identical sibling.

Because BMT can cure about 30% of patients who experience relapse following chemotherapy, some investigators suggested that allogeneic BMT can be reserved for early first relapse or second CR without compromising the number of patients who are ultimately cured; however, clinical and cytogenetic

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information can define certain subsets of patients with predictable better or worse prognoses using post-remission chemotherapy.

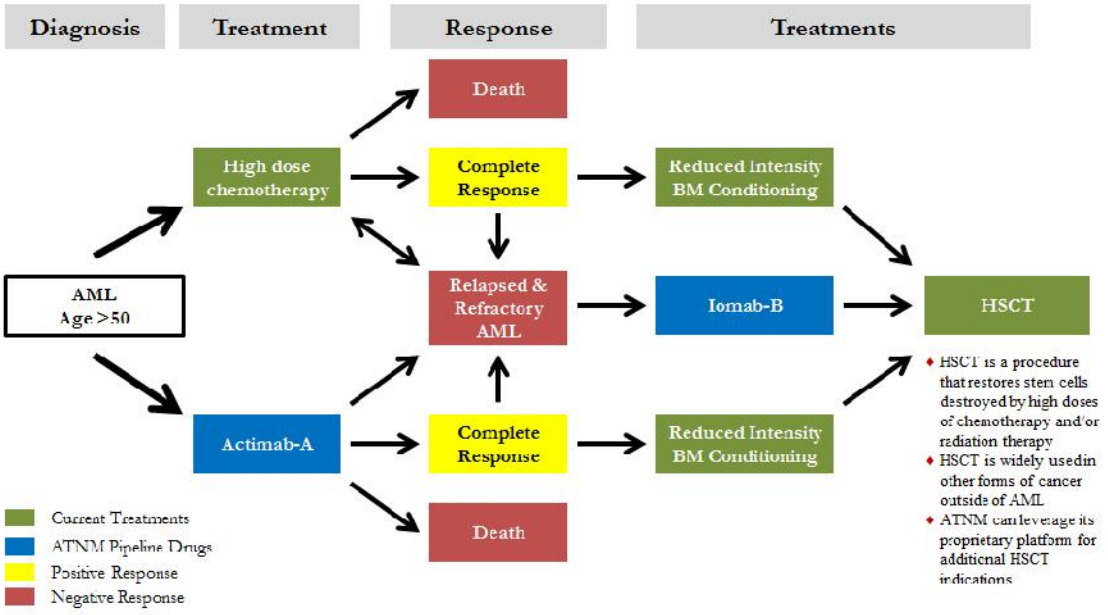
No standard regimen exists for the treatment of patients with relapsed acute myeloid leukemia (AML), particularly in patients with a first remission duration of less than 1 year. A number of agents have activity in recurrent AML. A combination of mitoxantrone and cytarabine was successful in 50% - 60% of patients who experienced relapse after initially obtaining a complete remission (CR). Other studies using idarubicin and cytarabine or high-dose etoposide and cyclophosphamide reported similar results. Mitoxantrone, etoposide, and cytarabine (MEC) demonstrated a CR induction rate of 55% in a population. Allogeneic BMT from an HLA-matched donor in early first relapse or in second CR provides a DFS rate of approximately 30%. Transplantation in early first relapse potentially avoids the toxic effects of reinduction chemotherapy. Allogeneic BMT can salvage some patients whose disease fails to go into remission with intensive chemotherapy (primary refractory leukemia).

We forecast the potential U.S. market for Actimab-A is about $450 million and the total worldwide market is about $900 million - $1 billion

Based on the current AML treatment landscape (supportive care ~$55,000 and high dose chemotherapy ~$100,000), we estimate a course of therapy with Actimab-A would be priced in the $60,000 area. We forecast the potential U.S. market for Actimab-A is about $450 million and the total worldwide market is about $900 million - $1 billion.

Actinium is positing Iomab-B and Actimab-A for the over age 50 AML market. Ultimately, Actinium intends to position Actimab-A as an alternative to the treatment of new patients with high dose chemotherapy. If patients from either treatment relapse or are refractory to treatment, Iomab-B will be positioned to treat those patients (see Figure 9 below)

Figure 9: Market Positioning for Iomab-B and Actimab-A



Source: Company reports

Financial Assumptions

Actinium had $5.7 million in cash and cash equivalents at the end of 2Q13, up slightly from $5.6 million at the end of December 31, 2012

As of June 30, 2013, Actinium had $5.7 million in cash and cash equivalents, up slightly from $5.6 million at the end of December 31, 2012. There are 25.7 million diluted shares outstanding, which includes stock issuable upon exercise of warrants. Actinium is a development stage company that has never generated revenue. As of June 30, 2013, Actinium had an accumulated deficit of $59.2 million. It incurred net losses of $3.5 million for the six months ended June 30, 2013. In 2Q13, Actinium reported G&A expenses of $1.0 million, R&D expenses of $0.5 million and a net loss of $2.8 million. EPS were a loss of $0.13. Currently, the company's cash burn is approximately $300,000 - $400,000 per month.

During 2011, the company raised a net amount of $5,379,367 by selling 7,891,141 shares of the company's stock and warrants to purchase 19,972,785 shares of the company's stock through an offering. In 2012, the company also raised $5,151,450 through an offering of 3,118,988 shares of its common stock and "A Warrants" to purchase 3,118,988 shares of the company's common stock and "B Warrants" to purchase 1,559,505 shares of the company's common stock. A net amount of $4,469,776 was received by the company. In 2Q13 Actinium issued shares of common stock pursuant to the exercise of "A Warrants" resulting in gross proceeds of $3,457,087 for the company. The proceeds from these exercised warrants will be used for the company's clinical and preclinical programs and for general working capital. According to a recent filing, for the balance of 2013 and in 2014, Actinium expects cash needs of up to $20,000,000 to finance research and development, which include material supply, manufacturing, clinical trials and pre-clinical trials and to cover ongoing working capital needs.

Actinium has expanded the number of patients and number of clinical centers in its Actimab-A AML clinical trial launched in 2012. This trial targets patients that have previously untreated newly diagnosed acute myeloid leukemia, are age 60 years or older and are unfit for or decline intensive chemotherapy, or are 70 years or older with newly diagnosed AML. Management estimates that the direct costs to completion of both parts of the ongoing Phase I/II trial will be approximately $7.5 million. The company is currently in talks with the FDA to discuss the design of a pivotal Phase III study for Iomab-B in HSCT. Management estimates the direct costs of such a trial to completion anticipated in 2016 will be approximately $15 million - $20 million. Year-to-date, G&A expenses were $1.9 million and R&D expenses were $1.6 million. We expect to see R&D costs increase dramatically in 2014 and 2015 as the company starts the Iomab-B Phase III trial, continues the Actimab-A trial and increases its manufacturing capabilities. We also project G&A expense increases as the company hires more support staff. We estimate R&D expense of $3.2 million in 2013, $13.4 million in 2014 and $14.5 million in 2015. We project G&A expense of $4.1 million, $5.6 million and $6.7 million in 2013, 2014 and 2015, respectively.

We estimate R&D expense of $3.2 million in 2013, $13.4 million in 2014 and $14.5 million in 2015

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Actinium is positing Iomab-B and Actimab-A for the over age 50 AML market. Ultimately, Actinium intends to position Actimab-A as an alternative to the treatment of new patients with high dose chemotherapy. If patients from either treatment relapse or are refractory to treatment, Iomab-B will be positioned to treat those patients We believe the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is in a range of $800 million - $1 billion, assuming the drug is priced at $85,000 per course of therapy. We estimate the worldwide markets for Iomab-B in MDS and ALL are smaller than AML, but Non-Hodgkin's Lymphoma, Hodgkin's Disease and Multiple Myeloma markets could be much larger than the HSCT market for AML. Based on the current AML treatment landscape, we estimate a course of therapy with Actimab-A would be priced in the $60,000 area. We forecast the potential U.S. market for Actimab-A is approximately $450 million and the total worldwide market is $900 million - $1 billion. We project Actinium will not generate any revenue in 2013, 2014 or 2015. YTD, Actinium has reported EPS of a loss of $0.16. We estimate 2013 EPS will be a loss of $0.33. We forecast the company will post an EPS loss of $0.81 in 2014 and an EPS loss of $0.84 in 2015.

We project Actinium will not generate any revenue in 2013, 2014 or 2015

Our risk-adjusted projections for total sales of Actinium's products are $24 million in 2018 growing to $465 million by 2023. We expect the company will raise $5 million in 4Q13 and $20 million in 2014 and 2015 from the capital markets to fund the development of its products. We expect the company will partner its products prior to commercial launch. We believe Actinium intends to potentially develop its most advanced clinical stage drug candidates through approval in the case of Iomab-B and up to and including a Phase II proof of concept human clinical trial in the case of Actimab-A. Outside of the U.S., the company will likely out-license the rights to develop and commercialize its products to a strategic partner, in our opinion.

We expect the company will raise $5 million in 4Q13 and $20 million in 2014 and 2015 from the capital markets to fund the development of its products

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Management/Scientific Advisory Board Profiles

Management Team

Kaushik J. Dave Ph.D.

Chief Executive Officer

Kaushik J. Dave, Ph.D., R.Ph., MBA was appointed CEO of Actinium on September 16, 2013. Prior to Actinium, Dr. Dave served as Senior Vice President of Product Development at Antares Pharma Inc. since July 2009. He was Vice President of Clinical and Regulatory Affairs of Antares, from March 2008 to July 2009. As part of the core leadership team at Antares, Dr. Dave was instrumental in setting strategy, vision, product portfolio development and business development for that company. He led the clinical and regulatory approval of Anturol and was also a key contributor to the change in company vision to combination products using Antares' medical device technology, which resulted in a robust pipeline that included development and New Drug Application (NDA) submission for Otrexup, which has an October 14, 2013 PDUFA date. During Dr. Dave's tenure, Antares market cap went from about $40 million to well over $500 million. When Dr. Dave left Antares, he had 192,185 non-vested options in the company and had 131,664 non-vested stock in the company, according to regulatory filings. Dr. Dave has over 25 years of pharmaceutical/biotechnology industry experience. His broad experience includes securing multiple product approvals from the U.S. Food and Drug Administration (FDA), European Medicines Agency (EMEA) and the Medicines Control Agency (MCA). Prior to Antares Pharma, Dr. Dave was employed by drug delivery company Transave Inc. From 2000-2006, he served as Vice President of Product Development and Quality Control at Palatin Technologies Inc. Dr. Dave also worked at Schering Plough and Merck & Co. where he was responsible for IND and NDA submissions for more than 20 products. Dr. Dave obtained his pharmacy degree from University of Bath, UK, a Ph.D. in Pharmaceutical Chemistry from the University of Kansas, and an MBA from the Wharton School, University of Pennsylvania.

Dragan Cicic, M.D.

Chief Operating Officer and Chief Medical Officer

Dr. Cicic joined the company in 2005 and previously held the position of Project Director of QED Technologies Inc., a life sciences strategic consulting and transactional group focused on emerging biotech, pharmaceuticals and medical devices companies. Dr. Cicic prepared business and strategic plans on behalf of those clients and assisted them in raising funding. He also represented corporate and private investors in identifying acquisition and/or investment targets and

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negotiating, structuring and consummating deals. Prior to joining QED Technologies, Dr. Cicic was an investment banker with SG Cowen Securities.

Dr. Cicic graduated as a Medical Doctor from the School of Medicine at The Belgrade University, and received his MBA from Wharton School at The University of Pennsylvania. He was also a Nieman Fellow at Harvard University.

Betsy C. King

Quality Assurance and Regulatory Affairs

Ms. King is the Quality Assurance and Regulatory Affairs consultant for Actinium. Ms. King has more than 35 years of senior level experience in quality assurance, quality control and regulatory affairs. Prior to being a consultant to Actinium, Ms. King served as VP of Quality Assurance for Mannatech Inc., Director of Quality and Regulatory Affairs for International Isotopes Inc., Department Manager for Quality Assurance at Pacific Northwest National Laboratory, and Manager of Quality and Compliance for DuPont Medical Products. In these positions Ms. King successfully established quality systems compliant with GMP drug, device and dietary supplement requirements. In addition, Ms. King has broad experience with U.S. FDA, EU Commission, Health Canada and Australian TGA submission requirements for drugs, devices and dietary supplements. Ms. King's technical experience includes hands-on research and testing experience in pharmaceuticals and radiopharmaceuticals. Her experience base includes FDA audit training, implementation of cGMP requirements, and preparation of NDA, DMF, IND and 510K submissions. Ms. King earned her undergraduate degree in Chemistry from the University of New York at Buffalo.

Gaylord King

Manufacturing

Mr. King provides radiological, environmental and pharmaceutical consulting to emerging and established firms in the health care industry, including Actinium. Mr. King has over 35 years of experience and a technical base that includes basic research, development, production under cGMP requirements, submissions for FDA approval, distribution and administration of products to patients. In addition, he has directed and developed environmental analytical testing laboratories that have received awards for efficiency. Mr. King's experience includes both the private sector and government organizations. He has worked with pharmaceuticals, radiopharmaceuticals and medical devices. Prior to establishing his consulting group, Mr. King was Vice–President of International Isotopes, Inc. with responsibilities for strategic planning, start-up operations, new product development, staffing, designing facilities and operations. Prior to joining International Isotopes, Mr. King directed environmental testing facilities for the Department of Energy where he had operational, strategic planning, regulatory compliance and contract negotiation responsibilities. Mr. King has also directed operations for radiopharmaceutical manufacturing for DuPont and Medi+Physics. Mr. King is a frequent speaker at industry meetings and he has published numerous technical publications. He

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earned his undergraduate degree in Chemistry from the University of Tennessee and a graduate degree in Management from the University of Vermont.

Clinical Advisory Board

Elihu Estey, M.D.

Dr. Estey is a Professor of Hematology at the University of Washington and a Member of Fred Hutchinson Cancer Research Center. Prior to that, he was Chief of the Section of Acute Leukemia in the MD Anderson Leukemia Department, where he also held the Hubert L. and Olive Stringer Professorship in Medical Oncology. Among his observations are that newly-diagnosed APL can be treated effectively without resort to chemotherapy and that response to anti-AML therapy may not be influenced by diagnosis (AML or high-risk MDS), a finding underlying the WHO's reclassification of AML. Together with collaborators in the Statistics Department, Dr. Estey has also introduced new, Bayesian methodology into the design and analysis of clinical trials. Examples include (1) a Phase I-II design that allows monitoring of both response and toxicity in early clinical trials, (2) a Phase II design that accounts for covariates and "borrows strength", and (3) adaptive randomization.

Hagop Kantarjian, M.D.

Prof. Hagop Kantarjian, serves as Clinical Consultant of Astex Therapeutics Limited. Dr. Kantarjian also serves as the Chairman of the Leukemia Department and a Professor of Medicine of the University of Texas, MD Anderson Cancer Center. He has been associated with MD Anderson Cancer Center since 1981. Dr. Kantarjian is a leading expert in the field of chronic and acute leukemia and was a key investigator in clinical trials that led to the approval of Gleevec as a treatment for chronic myeloid leukemia (CML). Dr. Kantarjian has been a Member of the Scientific Advisory Board (SAB) of ChemGenex Pharmaceuticals Ltd. (also known as AGT Biosciences) since October 13, 2004. He served as Clinical and Scientific Advisor of ChemGenex Therapeutics, Inc. He also served as Member of Scientific Advisory Board at Astex Therapeutics Limited. He has authored and contributed to over 560 medical publications, articles and abstracts and, for his accomplishments, has received awards, including a Leukemia Society of America Scholarship from 1989 to 1994 and a Leukemia Society of America Special Fellow Scholarship from 1982 to 1983. Dr. Kantarjian received his medical degree from the American University of Beirut and is board certified in internal medicine, medical oncology, and hematology.

Judith Karp, M.D.

Dr. Karp is professor of oncology and director, Adult Leukemia Program, Division of Hematologic Malignancies, at The Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins Hospital, Baltimore, MD. Dr. Karp’s primary clinical interest is the experimental therapeutics of acute leukemias. As the Director of the Leukemia Program within the Division of Hematologic

Malignancies, she is responsible for the clinical direction of the Heme 2 inpatient service. In the past year, Dr. Karp added 6 investigator-initiated, NCI U01-sponsored Phase I and II clinical trials of new agents with unique mechanisms of action to the SKCCCJH portfolio for adult acute leukemias and high-risk myelodysplasia (MDS). Dr. Karp is on the Executive Committee of The Lymphoma & Leukemia Society.

Joseph G. Jurcic, M.D.

Dr. Jurcic is an Associate Attending Physician at Memorial Sloan-Kettering Cancer Center and Associate Professor of Medicine at the Weill Medical College of Cornell University. He was Acting Chief of the Leukemia Service from 2006-2010. He is the Chairman of the Actinium Pharmaceuticals Clinical Advisory Board. Dr. Jurcic is a medical oncologist and hematologist who specializes in the treatment of patients with leukemia. In particular, his research has focused on using antibodies to harness the body's immune system to kill leukemia cells and to deliver radiation treatment directly to leukemia cells. Dr. Jurcic continues to publish extensively. He has conducted 13 clinical trials investigating antibody-based therapies of leukemia and has been the principal investigator on all alpha-particle immunotherapy trials. He completed his residency at the Barnes Hospital, Washington University in St. Louis. Dr. Jurcic received his M.D. from the University of Pennsylvania and has Board Certifications in Internal Medicine, Medical Oncology and Hematology.

John Pagel, M.D., Ph.D.

Dr. Pagel is an Assistant Professor with the Department of Medicine, Division of Oncology at Fred Hutchinson Cancer Research Center and Seattle Cancer Care Alliance in Seattle, Washington. Dr. Pagel specializes in bone marrow transplant, leukemia and lymphoma. He is a member of American Association for Cancer Research, American Society of Hematology and other professional and scientific associations. Dr. Pagel received his medical degree from Boston University School of Medicine and went on to complete his residency in internal medicine at the University of California San Francisco. Dr. Pagel obtained his Ph.D. in Microbiology and Molecular Genetics as well as his BA in Biology from University of California.

Alexander Perl, M.D.

Dr. Perl received his Bachelor of Arts in psychology, cum laude from the University of Rochester in 1993 and his M.D. from the Mount Sinai School of Medicine in 1997, where he was elected to the medical honor society Alpha Omega Alpha. He then completed an internship and residency in Internal Medicine from the University of California, San Francisco followed by a Medical Oncology fellowship at the Johns Hopkins Hospital. While working in the laboratory of Donald Small, M.D., Ph.D. at Hopkins, Dr. Perl developed his research interests in targeted inhibition of signal transduction pathways in acute leukemia. Dr. Perl was subsequently recruited to the University of Pennsylvania in 2003 where he is currently an Assistant Professor of Medicine in the Division of Hematology/Oncology. His clinical and research interests are the

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development of novel therapeutics in AML and he serves as a principal or co-investigator for numerous clinical trials at Penn. He is actively involved in the education of the Heme/Onc fellows and won his division's best teaching award in 2005. Dr. Perl sees acute leukemia patients in the Abramson Cancer Center and attends on the hematologic malignancies and marrow transplantation service at the Hospital of the University of Pennsylvania. An active laboratory investigator, Dr. Perl's bench research focuses on targeted disruption of the PI3 kinase/AKT/mTOR pathway in AML. He also assists the management of Penn's Leukemia and Stem Cell Core tissue bank, which is among the nation's largest single institution leukemia research repositories. Dr. Perl has authored several publications and book chapters on acute leukemia that have been published in journals such as Blood, the Journal of Clinical Oncology, Bone Marrow Transplantation, and Leukemia and Lymphoma. Dr. Perl is the recipient of a Career Development Award from the Leukemia and Lymphoma Society. He has also received a research fellowship and training award from the Institute for Translational Medicine and Therapeutics at the University of Pennsylvania.

David Scheinberg, M.D., Ph.D.

Dr. Scheinberg is currently Vincent Astor Chair and Chairman, Molecular Pharmacology and Chemistry Program, Sloan-Kettering Institute; Chairman, Experimental Therapeutics Center, Memorial Sloan-Kettering Cancer Center. He is also Professor of Medicine and Pharmacology and Co-chair of the Pharmacology graduate program at the Weill-Cornell University Medical College and Professor in the Gerstner-Sloan Kettering Graduate School at MSKCC. From 1992 until 2003, he was Chief of the Leukemia Service at Memorial Hospital. His awards include the Doris Duke Distinguished Clinical Science Professorship, the Lucille P. Markey Scholarship, Leukemia and Lymphoma Society Translational Investigator Awards, CapCure Awards, and membership in the American Society of Clinical Investigation and the Interurban club. He is a Director of Progenics Pharmaceuticals, a public biotechnology company based in Tarrytown, NY, and Contrafect Pharmaceuticals. Dr. Scheinberg has been working in the area of a particle immunotherapy since 1982 and has been associated with Actinium Pharmaceuticals since 1995. Actinium Pharmaceutical's intellectual property is based to a significant degree on patents developed by Dr. Scheinberg's lab. Dr. Scheinberg is a physician-scientist, specializing in the care of patients with leukemia and also investigating new therapeutic approaches to cancer, both in the hospital and in the laboratory. The focus of his research is on the discovery and development of novel, specific immuno-therapeutic agents. This includes monoclonal antibodies that target the cell surface of cancers, targeted radiopharmaceuticals that deliver radioactive particles including alpha-particles or alpha-particle nanogenerators to tumor cells for selective cell kill, and therapeutic vaccines targeting the oncogene products that cause the cancers. Seven different therapeutic agents developed by Dr. Scheinberg in the laboratory have reached human clinical trials, which include the first humanized antibodies to treat acute leukemia, the first targeted alpha therapies and the first tumor specific fusion oncogene product vaccines. His laboratory is also investigating cellular resistance mechanisms to these agents. Dr. Scheinberg has published more than 200 papers, chapters, or books in these fields.

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Richard Wahl, M.D.

Dr. Wahl is Professor of Radiology and Oncology, Director of the Division of Nuclear Medicine, Associate Director for Clinical Research, the director of Nuclear Medicine and PET as well as the Vice-Chairman for technology and new business development of the Radiology Department of Johns Hopkins Medicine. He has performed both pre-clinical and clinical studies with radiolabeled monoclonal antibodies and is perhaps best known for his early work showing the value of monoclonal antibody fragments for imaging tumors and for his role in developing radio-immunotherapy of non-Hodgkin Lymphoma using anti CD-20 antibodies. Dr. Wahl is also well known for his work on developing PET imaging of cancer, being substantially responsible for establishing that PET imaging with FDG is useful in a wide range of cancers.

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Valuation

Our valuation for Actinium is based on the NPV of our probability-adjusted forecasts for Iomab-B and Actimab-A plus a small value for the company's preclinical pipeline. Any success with these other drugs could lead to potential upside to our price target. We believe that Iomab-B has significant potential, which is currently undervalued by the market. We estimate the potential addressable HSCT market in AML for Iomab-B in the U.S. is about $500 million and the total worldwide market is approximately $800 million - $1 billion, assuming the drug is priced at $85,000 per course of therapy. We forecast that the worldwide markets for Iomab-B in Myelodysplastic Syndrome and ALL are smaller than AML, but Non-Hodgkin's Lymphoma, Hodgkin's Disease and Multiple Myeloma markets could be much larger than the HSCT market for AML. Based on the current AML treatment landscape, we expect a course of therapy with Actimab-A would be priced in the $60,000 area. We project the potential U.S. market for Actimab-A is about $450 million and the total worldwide market is in the $900 million - $1 billion range. Our risk-adjusted projections for total sales of Actinium's products are $24 million in 2018 growing to $465 million by 2023.

Our price target for Actinium is $18, which is based on our risk-adjusted values for the company's product pipeline

Our price target for Actinium is $18.00, is based on our risk-adjusted values for the company's product pipeline. Actinium currently has a market cap that is much less that other oncology development stage biotech companies such as Ambit Biosciences (AMBI), ImmunoCellular Therapeutics (IMUC), TG Therapeutics (TGTX) Stemline Therapeutics (STML) and MEI Pharma (MEIP), which have drugs no farther along in development than Actinium. The average market capitalization of these five development stage companies is over $246.5 million. Actinium's current market cap is just $63.6 million. We note that three of these five companies' lead product is in Phase II for AML.

Algeta has a market cap of NOK10.5 billion, or about $1.8 billion. As we mentioned in this report, Algeta's first drug to market is Xofigo, an alpha-pharmaceutical, and its preclinical pipeline contains six drugs that are monoclonal antibodies attached to an alpha-emitter. Algeta signed a $800 million licensing deal with Bayer in September 2009 for Xofigo. While Algeta is not a direct comparable company to Actinium as it already has a marketed product, we believe it does illustrate the potential success that radiopharmaceutical companies have in the equity market. Additionally, we note that all of Algeta's conjugated alpha-pharmaceuticals are in preclinical stages.

We are initiating coverage on Actinium with a BUY rating and $18 price target. We note that this recommendation is speculative in nature due to the fact that the company currently has a market capitalization below $100 million, does not have any marketed products and that future catalysts (the reporting of data from clinical trials and the submission of and potential approval of drugs) are binary events that could cause large fluctuations in the company's stock price.

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Risks to Owning the Stock

There are many standard risks for development stage biotechnology companies that hold true for the entire industry. There are development risks associated with preclinical and clinical studies, and potential delays in the start of trials. There is regulatory risk that the company will be unable to receive regulatory approvals for drugs or that regulatory approval may be delayed. Manufacturing risks are associated with the upgrading of facilities from clinical study production to commercial production. There is also commercial risk for a company to successfully market and sell its drug or drugs. Other risks include financing risk, currency risk, potential governmental price controls, and IP (generic) risks. The stock of biotechnology companies, like all publically traded companies, is subject to market volatility and liquidity risks if there are small trading floats. Actinium is susceptible to all of these risks.

Downside risks specific to Actinium include the likelihood of the need to sell more stock to raise capital for the continuation of the company's clinical trials. However, we believe investors already assume that the company will have to raise funds for the continued development of the company's products. We expect the company will have to raise capital in each of the next two years and have included those assumptions in our models. The near-term value of the stock is hinged on a binary events, including the success of the Phase I/II trial for Actimab-A in AML and the start of the Phase III trial for Iomab-B HSCT in refractory/relapsed older AML patients in 2014. The longer-term value for the company is based on the timing of regulatory submission and approval, the ultimate market potential and expectations for the company's drugs, and the successful commercialization of these drugs.

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Figure 10: Income Statement

Actinium Pharmaceuticals *Income Statement (000s, except per share data)*	FY 2013E Q1_13 Mar	 Q2_13 Jun	 Q3_13E Sept	 Q4_13E Dec	FY 2014E Q1_14E Mar	 Q2_14E Jun	 Q3_14E Sept	 Q4_14E Dec	FY_11 Dec	FY_12 Dec	FY_13E Dec	FY_14E Dec	FY_15E Dec
Revenue	-								-				
										-	-	-	-
Cost of sales	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Profit	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating expenses:													
Selling, general and administrative	933.1	966.4	1,034.0	1,156.4	1,229.8	1,314.7	1,415.0	1,591.1	2,959.2	4,506.2	4,089.9	5,550.6	6,661.6
Research and development	1,085.7	509.3	662.0	960.7	3,000.0	3,200.0	3,500.0	3,700.0	323.8	3,440.5	3,217.7	13,400.0	14,500.0
Depreciation and amortization	-	-	-	-	-	-	-	-	0.6	0.6	-	-	-
Loss on disposition of equipment	4.1	-	-	-	-	-	-		-	-	4.1	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Expenses	**2,023.0**	**1,475.6**	**1,696.1**	**2,117.0**	**4,229.8**	**4,514.7**	**4,915.0**	**5,291.1**	**3,283.7**	**7,947.3**	**7,307.6**	**18,950.6**	**21,161.6**
Operating Income/(loss)	**(2,023.0)**	**(1,475.6)**	**(1,696.1)**	**(2,117.0)**	**(4,229.8)**	**(4,514.7)**	**(4,915.0)**	**(5,291.1)**	**(3,283.7)**	**(7,947.3)**	**(7,307.6)**	**(18,950.6)**	**(21,161.6)**
Other Income:													
Interest income (expense)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(175.1)	(1,099.3)	(2.5)	(2.5)	(2.5)
Gain on change in fair value of derivative liabilities	1,334.5	(1,307.7)	-	-	-	-	-	-	14.0	685.4	26.8	-	-
Income (loss) before provision for income taxes	**(689.0)**	**(2,784.0)**	**(1,696.7)**	**(2,117.7)**	**(4,230.4)**	**(4,515.3)**	**(4,915.7)**	**(5,291.7)**	**(3,444.8)**	**(8,361.2)**	**(7,283.3)**	**(18,953.1)**	**(21,164.1)**
Tax: (%) non-GAAP	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Income tax	-	-	-	-	-	-	-	-	-	-	-	-	-
Net income (loss)	**(689.0)**	**(2,784.0)**	**(1,696.7)**	**(2,117.7)**	**(4,230.4)**	**(4,515.3)**	**(4,915.7)**	**(5,291.7)**	**(3,444.8)**	**(8,361.2)**	**(7,283.3)**	**(18,953.1)**	**(21,164.1)**
Diluted EPS (GAAP)	**(0.03)**	**(0.13)**	**(0.08)**	**(0.09)**	**(0.18)**	**(0.19)**	**(0.21)**	**(0.20)**	**(4.30)**	**(7.58)**	**(0.33)**	**(0.81)**	**(0.84)**
Weighted Diluted Shares outstanding	21,391.7	22,178.6	22,178.6	23,428.6	23,428.6	23,428.6	23,428.6	26,762.0	801.8	1,103.5	22,294.4	23,452.1	25,118.7
Non-GAAP Weighted Diluted Shares YOY change (%)	*56.1%*	*30.3%*	*NA*	*NA*	*9.5%*	*5.6%*	*5.6%*	*14.2%*		*37.6%*	*NM*	*5.2%*	*7.1%*

Source: Bloomberg LP; Company reports; Laidlaw & Company estimates

Figure 11: Balance Sheet

Actinium Pharmaceuticals	FY 2013E								
	Q1_13	Q2_13	Q3_13E	Q4_13E	FY_11	FY_12	FY_13E	FY_14E	FY_15E
Balance Sheet ($ 000s, except per share data)	Mar	Jun	Sept	Dec	Dec	Dec	Dec	Dec	Dec
Assets:									
Cash and cash equivalents	3,239.9	5,650.3	4,141.0	7,367.0	5,703.8	5,618.7	7,367.0	10,467.4	10,022.6
R&D reimbursement receivable	-	-	-	-	237.8	-	-	-	-
Prepaid expenses and other current assets	117.1	84.3	96.9	120.9	5.4	167.1	120.9	313.5	350.1
Deferred financing costs, net of accumulated amortization	-	-	-	-	252.2	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total Current Assets	**3,357.0**	**5,734.6**	**4,237.9**	**7,487.9**	**6,199.3**	**5,785.8**	**7,487.9**	**10,780.9**	**10,372.7**
Property and equipment, net	-	-	1.0	2.0	1.2	3.0	2.0	5.3	8.7
	-	-	-	-	-	-	-	-	-
Total Assets	**3,357.0**	**5,734.6**	**4,238.9**	**7,489.9**	**6,200.5**	**5,788.8**	**7,489.9**	**10,786.2**	**10,381.4**
Liabilities & Shareholders' Equity:									
Accounts payable and accured expenses	459.9	793.6	912.2	1,138.6	644.5	897.0	1,138.6	2,952.7	3,297.2
Accounts payable and accured expenses - related party	31.2	31.2	31.2	31.2	-	31.2	31.2	80.9	90.3
Note payable	74.7	37.0	-	-	-	140.0	-	-	-
Derivative liabilities	2,240.4	2,958.0	2,958.0	2,958.0	124.4	3,575.0	2,958.0	2,958.0	2,958.0
Other current liabilities	-	-	-	-	4,439.6	-	-	-	-
Total Current Liabilities	**2,806.2**	**3,819.7**	**3,901.3**	**4,127.8**	**5,208.5**	**4,643.2**	**4,127.8**	**5,991.6**	**6,345.5**
Total Liabilities	**2,806.2**	**3,819.7**	**3,901.3**	**4,127.8**	**5,208.5**	**4,643.2**	**4,127.8**	**5,991.6**	**6,345.5**
Stockholders' Equity	**550.8**	**1,914.9**	**337.5**	**3,362.1**	**992.0**	**1,145.6**	**3,362.1**	**4,794.7**	**4,035.9**
Total Liabilities & Equity	**3,357.0**	**5,734.6**	**4,238.9**	**7,489.9**	**6,200.5**	**5,788.8**	**7,489.9**	**10,786.2**	**10,381.4**

Source: Bloomberg LP; Company reports; Laidlaw & Company estimate

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Figure 12: Cash flow Statement

Actinium Pharmaceuticals *Non-GAAP Cash Flow Cont. Ops.($ 000s, except per share data)*	**FY_11** Dec	**FY_12** Dec	**FY_13E** Dec	**FY_14E** Dec	**FY_15E** Dec
Cash flows from operating activities:					
Net income (loss)	(3,444.8)	(8,361.2)	(7,287.4)	(18,953.1)	(21,164.1)
Adjustments to reconcile net income to net cash provided by operating activities:					
Stock-based compensation expense	2,173.4	2,223.9	376.8	395.6	415.4
Depreciation expense	0.6	0.6	-	-	-
Loss on disposition of equipment	-	-	4.1	-	-
Amortization of debt discount	124.4	775.6	-	-	-
Amortization of deferred financing costs	40.4	252.2	-	-	-
Gain on extinguishment of liability	-	-	-	-	-
Gain on change in fair value of derivative liabilities	(14.0)	(685.4)	(26.8)	-	-
Other	-	-	-	-	-
Changes in assets and liabilities:					
R&D reimbursement receivable	41.6	234.1	(2.1)	-	-
Prepaid expenses and other current assets	4.8	(18.0)	121.6	(192.6)	(36.6)
Accounts payable and accrued expenses	556.0	334.3	241.6	1,814.1	344.5
Accounts payable and accrued expenses - related parties	-	31.2	-	49.7	9.4
Net cash provided by (used in) operating activities	(517.6)	(5,212.7)	**(6,572.2)**	**(16,886.3)**	**(20,431.4)**
Cash flow from investing activities:					
Payment made for patent rights	-	-	-	-	-
		-	-	-	-
Purchases of property and equipment	-	(2.4)	(3.1)	(3.3)	(3.4)
Cash provided by investing activities	**-**	**(2.4)**	**(3.1)**	**(3.3)**	**(3.4)**
Cash flows from financing activities:					
Borrowings on convertible debt, net of offering costs	645.9	-	-	-	-
Sales of stock, net of offering costs	5,379.4	5,129.9	5,000.0	20,000.0	20,000.0
Payments on note payable		-	(140.0)	-	-
Proceeds from the exercise of warrant for cash		-	3,463.6	-	-
Cash (used in) provided by financing activities	**6,025.3**	**5,129.9**	**8,323.6**	**20,000.0**	**20,000.0**
Effect of exchange rates on cash	-	-	-	-	-
Net (decrease) increase in cash and cash equivalents	5,507.7	(85.1)	1,748.3	3,110.4	(434.8)
Cash and cash equivalents at beginning of the period	196.1	5,703.8	5,618.7	7,367.0	10,477.4
Cash and cash equivanlents at end of period -	**5,703.8**	**5,618.7**	**7,367.0**	**10,477.4**	**10,042.6**

Source: Bloomberg LP; Company reports; Laidlaw & Company estimates

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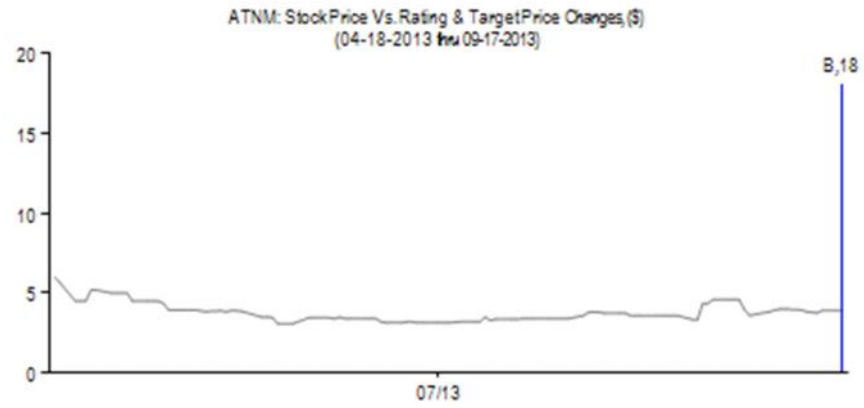
Rating and Price Target Change History



3 Year Rating Change History

Date	Rating	Closing Price ($)
09/17/2013	Buy (B)	3.90*

3 Year Price Change History

Date	Target Price ($)	Closing Price, ($)
09/17/2013	18.00	3.90*

** Previous Close9/16/2013*

Source: Laidlaw & Company **Created by: http://Blue-Compass.net**

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Ambit Biosciences (AMBI, Not Rated)

Antares Pharma (ATRS, Not Rated)
Bayer AG (BAYN.GR, Not Rated)
GlaxoSmithKline plc. ADR (GSK, Not Rated)
ImmunoCellular Therapeutics (IMUC, Not Rated)
Immunogen (IMGN, Not Rated)
MEI Pharma (MEIP, Not Rated)
Merck (MRK, Not Rated)
Novelos Therapeutics (NVLT, Not Rated)
Palatin Technologies (PTN, Not Rated)
Peregrine Pharmaceuticals (PPHM, Not Rated)
Roche Holdings LTD ADR (RHHBY, Not Rated)
Seattle Genetics (SGEN, Not Rated)
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