EDISON

Actinium Pharmaceuticals

Initiation of coverage

Radiating potential

Pharma & biotech

Actinium Pharmaceuticals is developing a portfolio of radio-labelled antibodies to treat various cancers. Its lead product, Iomab-B, is due to start a pivotal Phase III trial in H115 for use as a conditioning agent before hematopoietic stem cell therapy (HSCT, bone marrow transplantation) in elderly relapsed/refractory acute myeloid leukaemia (AML) patients. Its other clinical product, Actimab-A, is in a Phase I/II trial in newly diagnosed AML in the elderly; interim data from this trial are due in Q414. We value Actinium Pharmaceuticals at $429m, or $15.23 per share (undiluted).

Year end	Revenue ($m)	PBT* ($m)	EPS* ($)	DPS ($)	P/E (x)	Yield (%)
12/12	0.0	(9.0)	(7.58)	0.0	N/A	N/A
12/13	0.0	(6.6)	(0.47)	0.0	N/A	N/A
12/14e	0.0	(17.4)	(0.84)	0.0	N/A	N/A
12/15e	0.0	(18.4)	(0.65)	0.0	N/A	N/A

Note: *PBT and EPS are normalised, excluding intangible amortisation, exceptional items and share-based payments.

Building a radiating pipeline

Actinium Pharmaceuticals is developing targeted radiation therapies that offer the potential of highly selective tumour cell killing with low damage to the surrounding normal tissue and limited side effects. Essentially, the company aims to combine the drug delivery capabilities of antibodies, as seen with antibody-drug conjugates (eg Seattle Genetics' Adcetris and Roche's Kadcyla), with the cell-killing effect of radiation observed with Bayer's Xofigo in prostate cancer with bone metastases.

Lead product Iomab-B due to enter Phase III in H115

Iomab-B is being developed as an alternative conditioning agent to chemotherapy or full body radiotherapy ahead of HSCT, used to treat many haematological cancers. A pivotal Phase III trial for HSCT in AML is due to be initiated in H115. A Phase I/II study suggested that the overall survival rate at one year of patients over 55 with AML could be increased from c 10% to c 30% with Iomab-B treatment.

Phase I/II interim data on Actimab-A due at ASH

Interim data from the ongoing Phase I/II trial in AML with Actimab-A in combination with low-dose cytarabine are expected to be presented at the ASH conference. Actimab-A is a second-generation product. The earlier compound showed promising anti-tumour activity in a Phase II trial. Actimab-A will not compete with Iomab-B and could help to enlarge the potential market for the latter.

Valuation: rNPV suggests $429m ($15.23 per share)

Our valuation of $429m ($15.23 per undiluted share, $11.30 per diluted share) is based on an rNPV model of the two clinical programmes. The main value driver is Iomab-B, which we estimate could have peak sales of $2.9bn across various indications. The company had a cash position of c $15.7m, after completing its $13.7m equity raise in July, which should allow it to operate until the end of Q315.

16 September 2014

Price	**US$5.99**
Market cap	**US$169m**

Pro forma net cash ($m) at 30 June 2014 (including July raise)	15.7
Shares in issue	28.2m
Free float	80%
Code	ATNM
Primary exchange	NYSE MKT
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	(8.5)	(48.1)	53.6
Rel (local)	(9.9)	(49.4)	30.7
52-week high/low		US$13.5	US$3.9

Business description

Actinium Pharmaceuticals Inc. is a clinical-stage biopharmaceutical company that develops drugs for the treatment of various cancers. Actimab-A is in Phase I/II clinical trials for acute myeloid leukaemia. Iomab-B is used for myeloconditioning for hematopoietic stem cell transplantation.

Next events

Potential orphan drug designation for Actimab-A	Q414
Interim data from Phase I/II trial with Actimab-A at ASH conference	6-9 December 2014
Start of Phase III study in AML with Iomab-B	H115

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Actinium Pharmaceuticals is a research client of Edison Investment Research Limited

Investment summary

Company description: Glowing prospects

Actinium Pharmaceuticals is a clinical-stage biopharmaceutical company that is developing a portfolio of targeted, radioactive drugs for the treatment of cancer. Its products are designed to deliver localised radiotherapy to tumour cells with limited side effects. Two programmes are in clinical development: Actimab-A, an antibody-drug construct that is in a Phase I/II clinical trial for the treatment of acute myeloid leukaemia; and Iomab-B, an antibody-drug construct that is used in myeloconditioning for hematopoietic stem cells transplantation in various indications. Actimab-A uses a proprietary platform, Alpha Particle Immunotherapy Technology (APIT), to combine an alpha radiation-emitting isotope with a selective cancer-targeting antibody. The company was founded in 2000, has only 10 full-time employees and uses a virtual business model, outsourcing its development activities to contract research organisations (CROs). It is based in New York and listed on NYSE MKT in March 2013 (ATNM), following the reverse acquisition of Cactus Ventures; in the process it successfully raised $5.1m. To date, it has raised approximately $100m in total.

Valuation: rNPV suggests a value of $429m ($15.23 per share)

Actinium Pharmaceuticals is a classic drug discovery play and we value it using our usual rNPV methodology with our standard discount rate of 12.5%. Our valuation of $429m equates to $15.23 per share (undiluted) and $11.30 per share (diluted). Our valuation only places a value on the company's clinical stage assets, Iomab-B and Actimab-A, and the former accounts for 83% of the valuation. Therefore, its preclinical pipeline and technology platform represent upside to our valuation.

The next catalysts for Actinium Pharmaceuticals' shares are expected to be interim data from the Phase I/II trial with Actimab-A in acute myeloid leukaemia (AML), due to be reported at the ASH conference in December 2014, and the start of the Phase III trial with Iomab-B in H115.

Financials: Funded through to the end of Q315

Actinium Pharmaceuticals had a pro forma cash position of $15.7m at 30 June 2014, after taking into account the proceeds from the $13.7m ($12.6m net) equity raise at $7.50 per share, which was completed in July. This should provide the company with sufficient capital to operate to the end of Q315. It could raise some funding from out-licensing the European rights to Iomab-B, but it is likely that Actinium Pharmaceuticals will return to the capital markets in the next nine months, so that it can complete its development plans for its pipeline.

Sensitivities: The usual smaller company risks apply

Actinium Pharmaceuticals is exposed to the sensitivities normally associated with drug development by a smaller company. These include the unpredictable outcomes of clinical trials (where the results are often highly binary in nature), the risks of development or regulatory delays (for instance, the FDA requiring additional clinical data), and unexpected changes in clinical practice (an example being due to competitor breakthrough products being developed). Specifically, Actinium Pharmaceuticals has a high reliance on the continued, and visible, progress in the two key late-stage clinical programmes, which, if positive, would lead to the need to establish worthwhile partnerships with a larger player to further develop and commercialise any eventual product. Its ability to realise a return from its pipeline is also dependent on being able to raise sufficient capital to complete the planned clinical trials.

Outlook: Radiating potential

Actinium Pharmaceuticals is focused on the development of radiation-emitting pharmaceuticals for the treatment of various forms of cancer. Its lead candidate Iomab-B, a β-emitter, should start a pivotal Phase III trial for use as a conditioning agent for hematopoietic stem cell transplantation (HSCT, bone marrow transplant) instead of chemotherapy and/or whole body radiation. Its other product in clinical development is Actimab-A, which emits α radiation and is in Phase I/II development in acute myeloid leukaemia (AML). Both of these products are primarily being developed for elderly patients, who cannot tolerate current therapies; data from clinical trials so far suggest that these radiolabelled antibodies have promising levels of efficacy with relatively limited side effects. We value Actinium Pharmaceuticals at $429m, or $15.23 per share (undiluted).

Actinium Pharmaceuticals combines a radioactive particle with a monoclonal antibody, thereby delivering radiotherapy directly to the cancer cells where it is needed with limited damage to the surrounding healthy cells. The potential of targeted radiotherapy has been demonstrated by Bayer's Xofigo (radium Ra 223 dichloride, developed by Algeta), which is absorbed by bones and is used to treat bone metastases; in the pivotal Phase III study in metastatic castration resistant prostate cancer (mCRPC), median overall survival (OS) was 14.9 months compared to 11.3 months with placebo and there were very limited serious adverse events associated with therapy.

The potential of monoclonal antibodies as drug-delivery agents is also becoming apparent with the development of antibody drug conjugates. Seattle Genetics' Adcetris was approved in the US for the treatment of Hodgkin's lymphoma in 2011 and Roche's Kadcyla received US approval for HER2+ breast cancer in 2013. Both products have impressive efficacy, but there are significant side effects associated with the toxin conjugated with the antibody.

Actinium Pharmaceuticals is combining the drug delivery capabilities of antibodies with the therapeutic potential of radioactive isotopes. This is not a new concept; GSK's Bexxar and Spectrum Pharmaceuticals' Zevalin are approved radio-isotope labelled antibodies, but they had limited commercial success largely because of competition from Rituxan (rituximab), and then, related to this, reluctance from oncologists to refer patients to radiologists in medical centres, as this meant that they would lose a revenue stream. These should not be issues for Actinium Pharmaceuticals as neither Iomab-B nor Actimab-A are expected to face fierce competition if they reach the market, as the treatment options for elderly patients with AML and other haematological cancers are limited. Also, Actimab-A, if approved, could be delivered by oncologists within an out-patient setting as it is an α-emitter. The promising data seen to date suggest they could become valuable therapies, especially in patients too frail to undergo standard chemo- or radiotherapy.

Localising radiotherapy

Despite the huge advances made in pharmaceutics, cancer treatment remains dominated by three main therapeutic procedures: surgery, radiation and chemotherapy. If a cancer is detected early, when it is localised, surgery and/or radiation therapy could be adequate to control or eradicate disease. Radiation therapy typically involves focusing an external beam of radiation to the specific area of the body that has the tumour mass. Alternatively, radioactive "seeds", which will emit local radiation within the region, can be implanted into the tumour area (brachytherapy). Unfortunately, cancer is frequently detected after it has spread beyond the original tumour site to other tissues and organs (metastasis), so that a systemic approach is required.

Chemotherapy is the primary option for systemic therapy, with a wide and increasingly complex array of combinations of drug classes used. Antibodies have become a critical element of many such treatment regimens, with their high specificities and relatively tolerable side effect profiles improving patient outcomes materially. The same kind of antibodies can also be tagged with a radio-isotope and used to deliver radiation selectively to cancer cells. Combining a radioactive

particle with a specific monoclonal antibody allows radiation to be delivered directly to the tumour so limiting damage to the surrounding healthy cells. Since this delivers a high level of radiation localised to specific cells over a longer period of time it can be more effective than conventional high-dose external beam radiation while minimising side effects.

Exhibit 1: Therapeutic radionuclides commonly used for radioimmunotherapy

Radionuclide	Energy (MeV max)	Range (distance)	Half-life (time)
β emitters			
^{90}Yttrium	2.28	11.3mm	2.7 days
^{131}Iodine	0.61	2.3mm	8.0 days
^{177}Lutetium	0.50	1.8mm	6.7 days
^{188}Rhenium	2.12	10.4mm	0.7 days
^{67}Copper	0.58	2.1mm	2.6 days
α emitters			
^{213}Bismuth	8.3	60-85μm	0.8 hours
^{211}Astatine	6.8		7.2 hours
^{225}Actinium	5.9		10.0 days
^{223}Radium	6.0		11.4 days
^{227}Thorium	6.0		18.7 days
Auger-electron emitting			
^{125}Iodine	0.035	2-500nm	60.5 days

Source: Adapted from Immunotherapy. Mar 2011; 3(3): 349-370. Note: MeV max is the maximum range of particulate energy in tissue.

Radioimmunotherapy (RIT) has been an active field of research in oncology for 50 years, but interest has increased of late. This reflects the greater understanding of proteins associated with cancer and the improvement in targeting agents to deliver the radio-isotopes. This has spurred the belief that RIT can be effectively integrated into a multimodality approach to treating a number of blood and solid tumours. A highly efficient means of delivering these types of radionuclides more precisely is essential in order to increase the likelihood of specific cell killing.

Most of the therapeutic radionuclides evaluated are β-emitters. These tend to travel several millimetres in tissues (Exhibit 1), a distance that means the radionuclide could damage cells at a length equal to the diameter of up to 200 cells. β-emitters are generally preferred for killing visible tumours, but their range can also cause collateral damage to adjacent normal tissues and to blood-forming cells found in the bone marrow, which lowers blood counts in treated patients and limits the amount of radioactivity that can be given. However, they still result in less systemic damage than conventional radiotherapy.

In contrast, α-emitters, while they have a relatively short range (up to 10 cell diameters), are much more potent cell-killers than β-emitters. Therefore, they should have greater therapeutic potential, with enhanced efficacy and limited side effects. Because of their short range, α-emitters have most commonly been used to treat blood cancers, such as leukaemia, because they frequently are found as single cells or small cell clusters. These cancers are readily accessible to the radiolabelled antibody injected in the bloodstream. α-emitters are also being evaluated to treat cancers regionally, such as in ovarian and brain cancers.

Low-energy electron emitters have an even smaller range than α-emitters and are capable of killing mostly single cells, which further reduces damage to neighbouring cells although their therapeutic potential is more limited, but they are used for the treatment of prostate cancer using brachytherapy.

It is the greater mass of α particles (some 7,300 times that of a β particle) that confers the better cell-killing ability. The killing power of a radioactive particle is directly proportional to its energy and inversely proportional to its range. A single DNA hit from an α particle should be lethal for a cancer cell (by causing difficult-to-repair clustered DNA double strand breaks and highly reactive hydroxyl radicals). α-particle emitters have excellent properties as a treatment against micro-metastatic and disseminated cancers. To date, the ideal applications for targeted α-therapy are in treating

neoplastic cells in circulation or when cancer cells are present as free-floating cells or spread along compartment walls. In contrast to the experience in tumours of the blood system, radiation-tagged antibodies have been less effective when used to treat solid tumours, although the success of antibody-drug conjugates in treating solid tumours (eg Roche's Kadcyla [Ado-Trastuzumab Emtansine] with HER2+ breast cancer) suggests that antibodies linked to α-emitters could be effective treatments of solid tumours as well.

APIT Technology Platform opens up potential of α-emitters

Actinium Pharmaceuticals' lead product and currently most valuable asset uses ^{131}iodine, a β-emitter. This product uses a routine method to link covalently the iodine isotope to the antibody. However, the rest of its pipeline uses its proprietary APIT platform to link α-emitters to antibodies to open up the potential of this form of RIT.

The APIT platform was co-developed with the Memorial Sloan Kettering Cancer Center (MSKCC). It is based on using a linker (chelator) to attach powerful α-emitting radioisotopes, such as ^{225}Actinium or ^{213}Bismuth, to highly specific targeting agents, such as monoclonal antibodies (mAbs). The mAbs' high binding specificity brings the α emitters into very close proximity to the targeted tumour cells, where the α particle selectively kills the cell with limited collateral damage to surrounding healthy cells. The platform is very flexible and can be used to link a number of targeting compounds to a variety of radiation sources. Although α particles are viewed as an ideal payload for targeted cancer radiotherapy, the APIT platform can also be adapted to produce β-emitting compounds.

The platform is covered by a number of overlapping patent estates. The intellectual property includes 35 patents (both issued and pending), of which there are seven issued and two pending US patents and 26 international patents. At the core are a number of broad patents that cover use of the α-emitting isotopes ^{225}Ac and ^{213}Bi for treatment of patients with any type of cancer. The individual components of APIT based drugs are covered by a variety of patent groups; for instance the isotope manufacturing (eg ^{225}Ac and ^{213}Bi), the chelator (such as DTPA or DOTA), and the mAbs (specific for each type of cancer) are all subject to varying degrees of protection. Additional patents cover the highly specialised methods employed to produce APIT based drugs (eg cyclotron patents) and others to specific methods of patient treatment related to APIT (for instance methods to improve safety of treatment with APIT based drugs). Further protection is in the form of the specialist know-how required, which includes knowledge of existing isotope supply chains and manufacturing expertise.

The APIT platform is currently being used with proven and well-characterised mAbs to produce compounds to address currently poorly serviced or unmet needs, with three novel mAbs projects being evaluated to address angiogenesis, prostate cancer and colorectal cancer. Management also intends to use the APIT platform to create second-generation drugs of currently marketed therapeutic mAbs drugs. As patent protection for many of these mAbs approaches expiration, the aim is to use the platform to construct superior drugs and give them new patent protection. Management terms these "bio-betters" and believes the prospect of extending an existing product franchise with an improved version offering better efficacy will be an appealing prospect for the current owners of these products.

Clinical pipeline products progressing through studies

Actinium Pharmaceuticals is actively progressing two compounds, Iomab-B and Actimab-A, through the clinic for the treatment of blood cancers, with a further three programmes in pre-clinical development. Both Iomab-B and Actimab-A have demonstrated promising results in early-stage clinical trials and are likely to qualify for Orphan Drug status in the US. The earlier pipeline includes a next-generation version of Iomab-B as well as constructs that target solid tumours such as breast, colorectal and prostate. Exhibit 2 details Actinium Pharmaceuticals' pipeline.

Exhibit 2: Actinium Pharmaceuticals' R&D pipeline

Product	Indication	Notes
Iomab-B	HSCT (Phase III ready)	Iomab-B is a ^{131}iodine based construct that has been tested in over 250 patients in various Phase I and II trials for HSCT (hematopoietic stem cells transplantation) including AML related bone marrow transplantation. The targeting part of the Iomab-B construct is a monoclonal antibody (BC8) that binds to CD45, an antigen widely expressed on hematopoietic cells but no other tissues. Other indications include Myelodysplastic Syndrome, Acute Lymphoblastic Leukaemia, Hodgkin's disease and non-Hodgkin lymphoma. The next step is a pivotal registration trial in AML refractory/relapsing patients to gain an expedited approval.
Actimab-A	AML (Phase I/II)	Actimab-A employs the same construct as Bismab-A but uses ^{225}Actinium as the α source. To date 18 patients (median age, 64 yrs; range, 45–80 yrs) with relapsed/refractory AML have been treated in Phase I dose escalation studies at Memorial Sloan Kettering Cancer Center. They received a single infusion at doses of 0.5, 1, 2, 3, or 4 µCi/kg (µCi – microCurie; total dose, 23–390 µCi). Actimab-A is being evaluated in a Phase I/II AML multi-centre study in 77 patients with two fractionated doses in combination with low-dose cytarabine. The aim of the first part of the study (n=24) is to determine the maximum tolerated dose (MTD) with low-dose cytarabine for use in the second stage (n=53), which will assess efficacy. Interim results are expected to be presented at ASH 2014.
Undisclosed antibody	Glioblastoma, breast cancer (preclinical)	^{225}Actinium appears particularly suitable for an anti-angiogenesis approach with breast cancer and glioblastoma models being evaluated. No details are disclosed other than the programmes are in late-stage pre-clinical development.
Actimab-B	HSCT (preclinical)	Actimab-B is a second-generation version of Iomab-B, with the ^{131}iodine element replaced with a ^{225}actinium construct. Actimab-B is progressing through pre-clinical testing.
Actimab-C	Colon cancer (preclinical)	Animal studies with an anti-A33 mAb – 225Ac construct that targets metastatic colon cancer have shown acceptable toxicity profiles and encouraging proof of principle efficacy in mouse models. The anti-A33 mAb has already been in clinical trials in its native form and coupled with beta-emitting isotopes.
Actimab-P	Prostate cancer (preclinical)	PSMA mAb-225Ac construct that is highly specific for cancerous prostate cells. Mouse models have shown encouraging proof of principle results.
Bismab-A	AML (Phase I/II completed, programme on hold)	Bismab-A was essentially the predecessor to Actimab-A, which proved the concept works. It consists of a ^{213}Bismuth element coupled with an antibody (HuM195/lintuzumab) targeting CD33 for AML (acute myeloid leukaemia). Lintuzumab was being developed by Seattle Genetics in AML and was well tolerated with cytarabine, but failed to improve overall survival advantage in a Phase IIb study. Bismab-A completed Phase I/II studies, with around 50 patients treated. However, supply, logistics and cost of production limited its commercial viability. As a result, development efforts were switched to Actimab-A.

Source: Actinium Pharmaceuticals and Edison Investment Research

Iomab-B in clinical studies for bone marrow transplant preparation

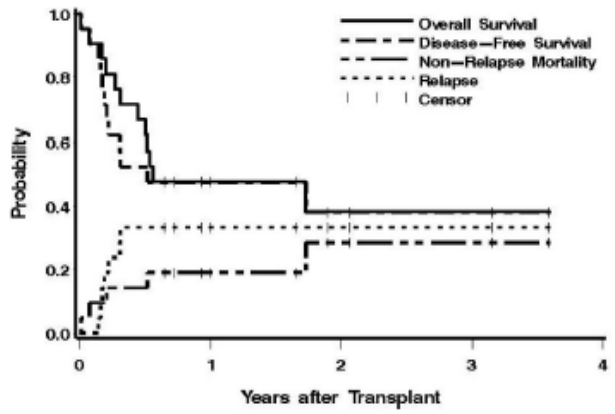
Iomab-B is a ^{131}iodine-BC8 construct that is being evaluated for use in the myeloconditioning and/or myeloablative phase of hematopoietic stem cell transplantation (HSCT), more commonly known as bone marrow transplant (BMT). Conditioning treatment before HSCT currently involves whole body radiotherapy and/or chemotherapy. Iomab-B has been tested in over 250 patients in five Phase I and II clinical studies, with the initial intended indication being those relapsed and refractory AML (acute myeloid leukaemia) patients who are over 55 years old. This patient group has few treatment options left, either being ineligible for myeloablative conditioning due to concomitant conditions or having a high burden and/or very resistant disease that makes reduced dose conditioning futile.

The BC8 antibody binds to cell-membrane protein CD45, which is expressed by most types of hematopoietic cell, except for red blood cells, and often at high levels in myeloid leukaemia cells and lymphomas. The antibody was in-licensed from the Fred Hutchinson Cancer Research Center (FHCRC, a renowned institution that has played a pivotal role in developing the entire field of bone marrow transplantation) in 2012 for funding of $150,000 for two years and c $0.3m for four years, a $1m milestone payment on approval of the first product, and 2% royalties (these are net of any prior milestones and payments). BC8 has been studied for over 10 years by FHCRC, which has run Phase I and Phase II trials, with unlabelled and labelled (with ^{90}yttrium and ^{131}iodine) antibodies in c 400 patients with a broad range of hematopoietic cancers.

The results of the various studies show that the BC8 antibody is well tolerated. More specifically data from a 58-patient Phase I/II study with Iomab-B as a conditioning treatment for HSCT in relapsed/refractory AML and advanced MDS indicate that this form of conditioning has a promising safety and efficacy profile (Exhibit 3). The maximum tolerated dose was 24Gy to the liver with a

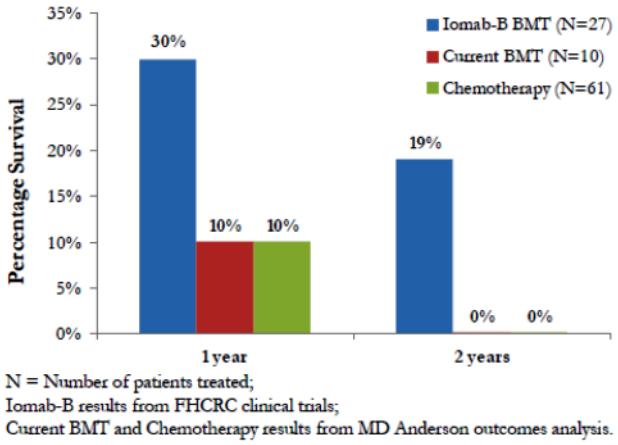
range of serious adverse events being observed, including pulmonary, renal and cardiac, but most adverse events were classed as Grade 2 or less (eg infusion site reactions, chills and nausea). The distribution of Iomab-B was essentially restricted to bone marrow, the spleen and liver, with little accumulating in the rest of the body. Finally, regarding the efficacy of Iomab-B treatment, 18 (31%) of the 58 patients were surviving after a median follow-up of 2.6 years and the overall survival (OS) rate after one year for those patients receiving the MTD of Iomab-B was 41% (Exhibit 3). This level of survival at one year is promising as median OS for patients over 55 with relapsed/refractory AML is normally three to four months and the OS rate at one year is only c 10% (Exhibit 4).

Exhibit 3: Estimated OS, DFS, non-relapse mortality and relapse with patients receiving MTD during Phase I/II trial with Iomab-B



Source: Pagel JM et al. Blood 2009; 114:5444-5453.

Exhibit 4: Meta-analysis comparing Iomab-B survival data from Phase I/II trial with other therapies for relapsed/refractory AML in patients over 50



Source: Actinium Pharmaceuticals

Following the results from the Phase I/II trial, the company had a meeting with the FDA to discuss the format of the pivotal Phase III trial design. As a consequence it will be an open-label, randomised and multi-centre study with two treatment arms of 75 patients each, a total of 150 patients, all aged 55 and over. The initial indication is bone marrow conditioning in relapsed and refractory AML, with the primary endpoint being complete response lasting six months and the secondary endpoint is overall survival at one year. Material for the trial and the logistics for the supply chain are being prepared during the remainder of 2014, with the regulatory IND scheduled for filing in Q115 and first patient recruitment expected in H115. Assuming a smooth path, the regulatory filing could be during H216 with approval in late-2017. Similar studies in other possible indications – including myelodysplastic syndrome (MDS), acute lymphoblastic leukaemia, Hodgkin's disease and non-Hodgkin's lymphoma – are not expected to be initiated until the preliminary results of this pivotal trial are known.

The same BC8 antibody has been used with ^{225}actinium replacing ^{131}iodine to create a second-generation drug that would potentially enable a significant expansion of use. This is known as Actimab-B and is undergoing pre-clinical studies. Clearly, the decision on progressing Iomab-B in other indications will also depend on the progress and results seen with Actimab-B. Theoretically, Actimab-B will be better tolerated and be more efficacious as a conditioning treatment ahead of HSCT than Iomab-B in certain indications.

Actimab-A is an improved construct being evaluated for AML

Actimab-A is a second-generation product that uses the same targeting and linking construct as Bismab-A but with the ^{213}bismuth α-emitting element replaced with ^{225}actinium. Bismab-A has shown promising clinical results in a proof-of-concept Phase II AML study; however, the complex manufacturing process (resulting in high COGS), coupled with a difficult onsite preparation ahead of administration, has seen the development of the related but superior Actimab-A. Pre-clinical results

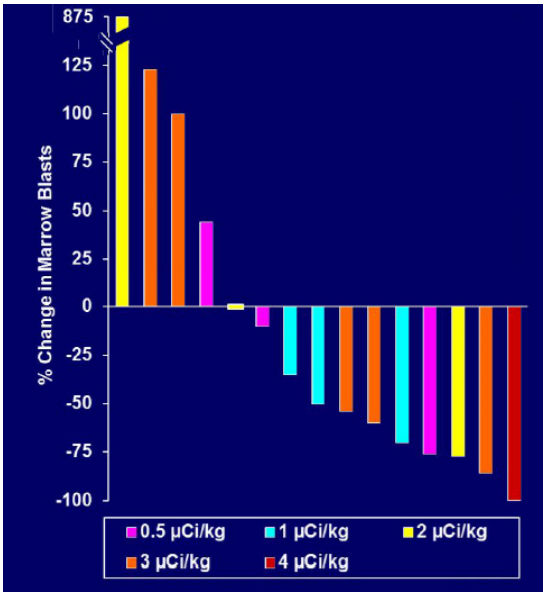
suggest that Actimab-A is around 500x more potent than Bismab-A, while the much simpler manufacturing process should result in a tenfold reduction in COGS.

The antibody used in Actimab-A is lintuzumab (HuM195), which was in-licensed in 2003 from Facet Biotech (acquired by Abbott Laboratories in 2010) in an $11m deal and 12% royalties. The antibody binds to the CD33 protein, expressed predominantly on the surface of myeloid cells. The un-labelled antibody was being developed by Seattle Genetics in MDS and AML, but it stopped development when no OS benefit was observed in a 211-patient Phase IIb in AML in combination with low-dose cytarabine. However, this study and several others with lintuzumab mean that the antibody is very well characterised and is known to be well tolerated. The lack of efficacy in the Phase IIb trial is not an issue for Actimab-A as the antibody is only the method of delivery, with activity coming from the ^{225}actinium.

Actimab-A was evaluated in a Phase I study as a monotherapy in collaboration with Memorial Sloan Kettering Cancer Center (MSKCC). This dose escalation trial looked at 18 patients (median age, 64 years; range, 45-80 years) with relapsed/refractory AML. Patients received a single infusion at doses of 0.5, 1, 2, 3, or 4µCi/kg (µCi – microCurie; total dose, 23-390 µCi). Dose limiting toxicity of suppression of the entire bone marrow lasting over 35 days (and consequent death due to sepsis) was seen in one patient treated with 3µCi/kg and in both patients receiving 4µCi/kg. Toxicities outside of the bone marrow (the target organ) were limited to transient grade 2/3 liver function abnormalities and no acute toxicities were seen. Follow-up from one to 24 months (median of two months) showed no evidence of damage to kidneys due to radiation.

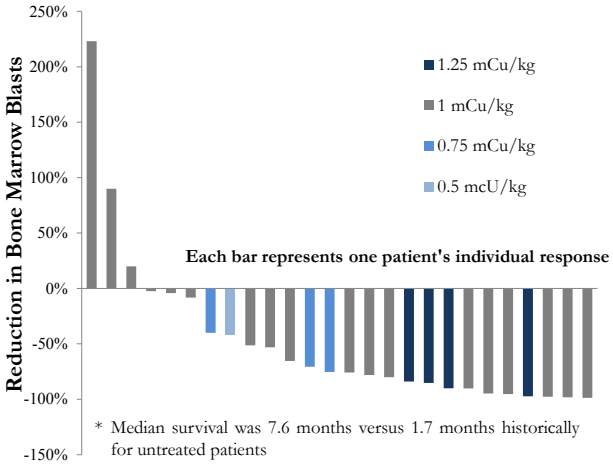
This Phase I study also gave initial indications that Actimab-A is an efficacious therapy. Peripheral blood blasts (leukaemia cells) were eliminated in 10 of 16 evaluable patients who received a full treatment dose. Bone marrow blast reductions of over 33% were seen in 10 of 15 evaluable patients at four weeks, including three patients with 5% or fewer blasts (Exhibit 5). These initial results from the dose escalation stage of the trial also suggest that Actimab-A is at least as efficacious as Bismab-A. Overall, the study concluded that Actimab-A is tolerable at doses less than 4µCi/kg and has anti-leukaemic activity.

Exhibit 5: Data from Phase I trial with Actimab-A in relapsed/refractory AML



Source: Actinium Pharmaceuticals

Exhibit 6: Data from Phase I/II trial with Bismab-A in high-risk AML



Source: Actinium Pharmaceuticals. Note: Median OS was 7.6 months compared to 1.7 months historically for untreated patients.

A Phase I/II multi-centre AML trial with fractionated doses of Actimab-A in combination with low-dose cytarabine is underway with five participating trial centres (MSKCC, Johns Hopkins Medicine,

University of Pennsylvania Health System, Fred Hutchinson Cancer Research Center and MD Anderson Cancer Center). The Phase I portion is evaluating up to 21 patients in dose escalating cohorts of three patients each with the goal of determining the maximum tolerated dose (MTD) with cytarabine, with a six-week interval between dose levels. Patients have previously untreated newly diagnosed acute myeloid leukaemia, 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 the relapsed and refractory patient cohorts who have formed most of the patients in the previous Actimab-A and Bismab-A trials. Once MTD has been determined, it will be used as the dose level for the Phase II portion of the trial, which will enrol up to 53 patients. Interim results of the Phase I portion of the Phase I/II study could be available in time for ASH 2014 (6-9 December).

Attractive landscape for targeted payload cancer therapeutics

The goal of developing radioimmunotherapy for the treatment of local or diffuse tumours appears to have finally come of age. Although targeted radio-labelled products have been around for over a decade (Spectrum Pharmaceuticals' Zevalin 2002 and GSK's Bexxar 2003), these have not been commercial successes. It has been the approvals of Kadcyla (ImmunoGen/Roche) and, in particular, the α-emitter Xofigo (Algeta/Bayer) that have stimulated industry and investor interest. Kadcyla is not a radioimmunotherapy since it consists of the Herceptin antibody conjugated with a cytotoxic agent, but it has drawn industry attention to the potential of using antibodies to deliver a targeted payload and extending the product life of existing monoclonal antibodies. Similarly, while Xofigo does not use a targeting agent it does provides a suitable parallel to highlight the potential of radiotherapies. It was the perceived value of Xofigo, and to a lesser degree the targeted thorium conjugates (TTC) in the early stages of development, that spurred Bayer to pay $2.9bn for Algeta in March 2014.

The market opportunities are sizeable

Radiolabelled antibody complexes are particularly suited to the treatment of blood cancers, where their high specificity can target the widely disseminated individual cancerous cells effectively. Both of Actinium Pharmaceuticals' lead programmes are in clinical trials for such indications, with the β-emitting Iomab-B being evaluated initially for bone marrow conditioning in relapsed and refractory AML, while the α-emitting Actimab-A is being studied as a treatment for AML in the elderly.

AML is the most common acute leukaemia affecting adults (yet it continues to have the lowest survival), and its incidence increases with age with around 18,900 in the US annually and about 42,000 worldwide. The prognosis in the elderly, for which Iomab-B and Actimab-A are being developed, is particularly poor. Although currently accounting for only around 1.2% of cancer deaths, this is expected to rise as the population ages (the median age at diagnosis is 63 years). Typically it progresses rapidly and is usually fatal within months if left untreated. First-line treatment is divided into two phases: induction and consolidation therapy. The aim of induction therapy is to achieve a complete remission by reducing the number of leukaemic cells to an undetectable level, while the goal of consolidation therapy is to eliminate any residual undetectable disease and achieve a cure. Complete remission is obtained in about 50-75% of newly diagnosed adults, and its length depends on the prognostic features of the original leukaemia, however all remissions will fail without additional consolidation therapy.

Exhibit 7 shows the main approved products and selected compounds known to be in company-funded clinical trials. There are a number of small trials underway, most notably in the US, that are investigator-led rather than company sponsored. These cover a wide range of oncology indications, with a variety of targeting vectors and toxic payloads.

Exhibit 7: Selected radioimmunotherapy and targeted payload cancer therapeutics

Product	Indication	Notes
Zevalin (ibritumomab/^{90}Yttrium) Spectrum Pharmaceuticals	Non-Hodgkin's lymphoma	Approved 2002 as third-line therapy. Antibody used to target CD20 with β radiation from ^{90}Yttrium. Limited commercial success, 2013 sales $29m.
Bexxar (tositumomab/^{131}Iodine) GlaxoSmithKline	Non-Hodgkin's lymphoma	Approved 2003 as third-line therapy, effectively discontinued 2010 and formally discontinued from February 2014 due to poor sales. The murine antibody targets CD20 antigens on B-lymphocytes, with β radiation from ^{131}iodine employed to improve cell death.
Adcetris (Brentuximab vedotin) Seattle Genetics	Anaplastic large cell lymphoma and Hodgkin's. Other indications being evaluated.	Approved August 2011 US and October 2012 Europe, marketed in collaboration with Takeda. cAC10 targets the cell-membrane protein CD30 and delivers the anti-mitotic agent monomethyl auristatin E (MMAE). 2013 sales of $144.7m, Q214 $44-8m.
Kadcyla (trastuzumab/ DM1) ImmunoGen/Genentech	HER2+ metastatic breast cancer (MBC)	Approved February 2013. Consists of Herceptin conjugated with the cytotoxic emtansine (DM1), which specifically binds to tubulin and promotes call apoptosis. Q214 sales of $140m.
Xofigo (^{223}Radium) Algeta/Bayer	Castration-resistant prostate cancer (CRPC)	Approved FDA May 2013, with Europe November 2013, for treatment of bone metastasis following strong survival benefit (14.9 months vs 11.3 months). No targeting agent is used, it simply exploits radium's similarities to calcium and is drawn to the areas of rapid bone deposition/formation sites that are associated with bone metastases.
Cotara (^{131}iodine) Peregrine	Glioblastoma multiforme (GMB)	Phase III set to start after protracted delays. Targets DNA H1 histone complex that is exposed by dying cells in the mass of the tumour to deliver β radiation from ^{131}iodine. Injected directly into tumour mass.
212Pb-TCMC-Trastuzumab Areva Med	HER2+ breast cancer metastasis	Phase I dose escalation for intra-abdominal HER2 positive metastatic breast cancer. Using Herceptin conjugated with ^{212}lead as the α source.
CLR1404-^{131}iodine Cellectar Biosciences (Novelos)	Solid tumours	Phase I dose escalation sturdy underway. I-131-CLR1404 is a small-molecule that uses a proprietary PLE (phospholipid ether analogues) acting as the targeting and retention vehicle, with ^{131}iodine as the β source.
Targeted thorium conjugates (^{227}Thorium) – Algeta/Bayer	Various cancers	Six programmes in late pre-clinical development for a range of oncology indications using monoclonal antibodies and Nanobodies as targeting agents.

Source: clinicaltrials.gov and Edison Investment Research

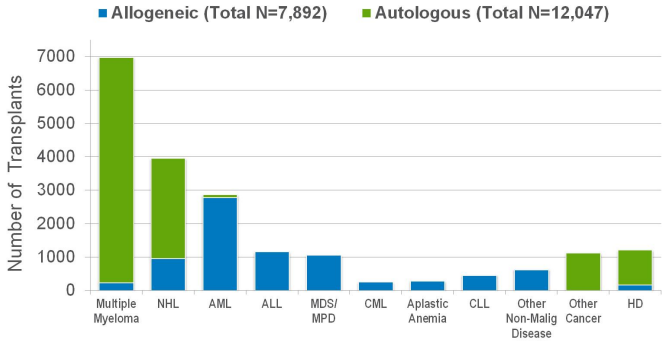
The most common induction regimen is known as "7+3" and consists of cytarabine (ara-C) for seven consecutive days followed by an anthracycline (usually daunorubicin) for three consecutive days. Up to 70% of patients will achieve a remission, however the toxic effects coupled with the increased risks of infection mean this regimen may not be suitable for more elderly or ill patients. In these cases the options are currently limited to sub-optimal but less intense chemotherapy or palliative care. For patients at high risk of or with relapsed and refractory AML, the only proven potentially curative therapy is a hematopoietic stem cell transplant, commonly known as a bone marrow transplant.

Hematopoietic stem cell transplantation (HSCT) may either be autologous (the stem cells are removed, stored and later given back to the same person) or allogenic (the cells are from a genetically non-identical donor). In both cases the existing bone marrow is destroyed (ablated) using chemotherapy and/or whole body radiation. These conditioning regimens are aggressive and many patients, notably the elderly or those with existing co-morbidities, are not suitable for treatment. Consequently, gentler conditioning regimens are being evaluated with a suitable trade-off between efficacy and side effects being sought. HSCT is also used to treat a range of hematopoietic cancers (Exhibit 8), which is why Iomab-B's potential is not restricted to AML.

Around 60,000 HSCT procedures are performed in total each year; of these approximately 57% were autologous and 43% were allogenic, with the US and Europe each accounting for around 21,000 and 28,000 respectively (Worldwide Network for Blood & Marrow Transplantation). The number of procedures is growing, reflecting the rising incidence of age-related leukaemias and greater confidence in the outcomes achieved. HSCT is viewed as a specialist procedure, with most transplants taking place within regional centres, for instance in the US around 30% of all bone marrow transplants are performed by the top 10 specialist centres. Assuming the encouraging results seen with Iomab-B in the early studies are sustained in the pivotal Phase III trials, then Iomab-B could arguably access between 50% and 80% of these procedures. Currently, the gentler

conditioning regimens cost around $80,000 (compared to $55,000 for palliative care), which acts as a suitable benchmark for the likely price Iomab-B could achieve.

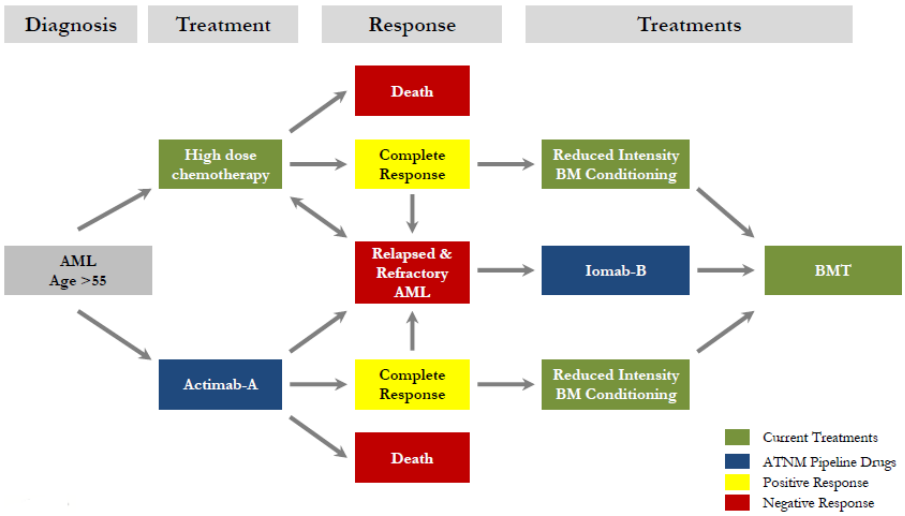
Exhibit 8: Indications for HSCT in the US in 2011



Source: CIBMTR

Unlike Iomab-B, Actimab-A is only expected to be developed in AML. But they are not expected to compete against each other directly, and in fact Actimab-A could enlarge the market for Iomab-B. It is being developed to be used earlier in the treatment cascade for AML and could lead to more patients being able to undergo HSCT (Exhibit 9). However, they are both being developed to treat elderly or ill patients who are unable to tolerate aggressive chemotherapy or radiotherapy. About 70% of AML patients (c 42,000 worldwide) are over the age of 55, suggesting that there is an available patient population of 29,000 to 30,000 worldwide for Actimab-A. Clearly the pricing proposition will depend on the efficacy seen in the later, and larger, Phase III trials, but the current promising indications of effect would suggest a treatment cost for Actimab-A of around $60,000 would be reasonable.

Exhibit 9: Market positioning for Actimab-A and Iomab-B in AML patients aged over 55



Source: Actinium Pharmaceuticals

Manufacturing is challenging but achievable

The production of radioactive pharmaceuticals in commercial quantities can pose significant obstacles that need to be overcome. The experience with Bismab-A highlights how the choice of isotope can result in insurmountable problems in terms of logistics (the short half-life of one hour meant transportation over any real distance was impractical) and costs of production (the required on-site manufacture was complex and time consuming) that effectively halted its viability as a pharmaceutical product. In contrast, ^{225}actinium's 10-day half life makes the supply chain much easier to optimise. Although ^{225}actinium can be harvested as part of the decay chain of ^{233}uranium,

it can also be made in sizeable quantities through accelerator-based methods (for instance, using cyclotrons to bombard ^{232}thorium or ^{226}radium).

Currently Actinium Pharmaceuticals has sufficient material to progress its clinical pipeline to completion. It has a renewable annual contract with Oak Ridge National Laboratory, which is part of the US Department of Energy, for a supply of ^{225}actinium. This material is sourced from the result of ^{229}thorium decay, which in turn forms part of the natural decay chain of ^{233}uranium. Actinium Pharmaceuticals has also established an accelerator-based method with the Technical University of Munich (Germany), which it has patented, that can produce high purity ^{225}actinium with sufficiently good yields to allow ^{225}actinium-based compounds to be viable as commercially available pharmaceutical products.

Sensitivities

Actinium Pharmaceuticals is subject to the usual risks and sensitivities associated with drug discovery and development, ie clinical trial failure, patent litigation, and regulatory and commercial risks. Specific sensitivities, both on the upside and downside, are:

- **Reliance on third parties for development and commercialisation:** management intends to out-license the European rights to its programmes after the key Phase II (proof of concept) trials or during Phase III and timelines may be affected by the time taken to secure partner(s), with licensees then controlling the continuing development process. The company's virtual business model also means that its success is dependent on efficiently managing the various manufacturers, CROs and other service providers.
- **Future licensing/collaboration deals:** our financial and valuation models exclude potential upfront/milestones from future deals (owing to the limited visibility on potential timelines and terms of any such deals) and assume likely royalty rates (actual rates varying significantly may have a material effect on our valuation). The likelihood of a partnering deal with Actimab-A in Europe, from which Actinium Pharmaceuticals could make a favourable return, could be limited by the terms of the in-licensing deal for lintuzumab from Facet Biotech (acquired by Abbott Laboratories), unless they are renegotiated, as Actinium is potentially obliged to pay future Abbott milestones totalling $7.0m and royalties of up to 12% of net sales for 12.5 years after first commercial launch. There are no onerous payments required to the FHCRC for Iomab-B or Actimab-B ($1m for approval of first product and royalties of 2%)
- **New internal candidates from discovery work:** a broader pipeline should boost the valuation and mitigate the impact of the inevitable programme attrition. The company has a scalable discovery platform, with plentiful product opportunities, and the funds to achieve this.
- **IP position:** there is a multi-layer IP strategy in place covering the actinium-based products, having filed patents covering the pipeline (some in the process of being granted) that expire between 2015 and 2029, and there should also be a benefit from data exclusivity. Nonetheless, litigation risk and potential for off-label use may remain. There is no patent protection for Iomab-B, although it could benefit from orphan drug designation (seven years' data protection in the US and 10 years in Europe), and competition from a biosimilar is not certain because of the complexities of generating an antibody with similar activity combined with the supply chain issues of radio-labelling the antibody.
- **Manufacturing and supply chain:** producing commercial quantities of therapeutic radioisotopes to GMP standards is harder than the manufacture of other biological drugs, with consequent effects on product consistency, security of supply and COGS. The supply chain is also more complicated than for most biotechnology companies because of the radioactive nature of its products, such as customs clearance for moving radioactive material between

different countries. For the US, Actinium Pharmaceuticals' Iomab-B and Actimab-A will be manufactured in the US.

- **Fragmented shareholder base:** Actinium Pharmaceuticals' only major shareholder, with a holding of 20% of the shares, is Actinium Holdings Ltd (wholly owned by MSKCC); all other shareholders have a holding of less than 2.5% each; and management hold c 2% (including restricted stock and options) following the recent capital raise. If MSKCC seeks to exit its holding, the share price could be adversely affected. The absence of financial investors with significant holdings in the company means that capital raising could be challenging; however, there should be better liquidity in the shares compared to similar biotechnology companies.

Valuation

Actinium Pharmaceuticals is a classic drug discovery and development play that is best valued using a discounted cash flow method, with the rNPV of the individual clinical programmes (adjusted for the likely success probabilities). On this basis, with cash flows until 2032, we value the company at $429m (Exhibit 10). Peak sales have been calculated based on the number of patients diagnosed in each region with each indication and estimated levels of penetration (Exhibit 11). The success probabilities of each project are based on standard industry criteria for each stage of the clinical development process but are flexed to reflect the inherent risks of the individual compound and the indication targeted. Understandably, it follows that it is the later-stage products that have a higher current value, with the step change occurring typically at Phase II when the proof of concept is usually established. We use a 12.5% discount rate, which is our standard rate for such drug development companies. Assuming even a relatively modest success within this element of the development pipeline could see a material uplift in our rNPV model.

Exhibit 10: Actinium Pharmaceuticals DCF valuation

	Indication	Launch timing	Peak sales ($m)	Operating margin/ royalty rate[1]	Success probability	rNPV ($m)	rNPV ($/share)
Iomab-B	HSCT for r/r AML patients >55 in US	2017	297	35%	50%	206.2	7.32
	HSCT for MDS in US	2020	151	35%	40%	51.5	1.83
	HSCT for ALL in US	2020	96	35%	30%	24.7	0.88
	HSCT for NHL in US	2021	566	35%	20%	80.9	2.88
	HSCT for MM in US	2022	480	35%	20%	56.9	2.02
	HSCT for r/r AML patients >55 in Europe	2019	265	20%	30%	45.8	1.63
	HSCT for MDS in Europe	2022	134	20%	30%	13.6	0.48
	HSCT for ALL in Europe	2022	86	20%	25%	7.3	0.26
	HSCT for NHL in Europe	2023	473	20%	20%	26.2	0.93
	HSCT for MM in Europe	2024	501	20%	20%	22.3	0.79
Actimab-A	AML in US	2019	226	25%	40%	64.6	2.29
	AML in Europe	2021	202	10%	30%	12.2	0.43
R&D + G&A costs						(49.7)	(1.76)
Tax						(149.6)	(5.31)
Net cash[2]						15.7	0.56
Total						**428.6**	**15.23**

Source: Edison Investment Research. Note: 1. In the US, this is the estimated operating margin as the company plans to market the products itself in this territory; in Europe, this is the royalty rate after payments to Abbott or FHCRC and including a margin on the manufacturing of the products, as the company plans to out-license European marketing rights; 2. Pro forma cash at 30 June 2014, including July capital raise.

We are using lower success probabilities for the products in Europe; because partners are needed, there is more regulatory uncertainty as trials are yet to start in this region, and the supply chain issues with so many countries in Europe are more complex. We have assumed that the company will market the products by itself in the US and will find a partner in Europe when the products are in Phase III development.

On an undiluted basis, our valuation of Actinium Pharmaceuticals is $15.23 per share. After taking into account the 9.2m warrants (weighted average exercise price of $1.16) and 3.0m options (weighted average exercise price of $5.45), our valuation on a diluted basis is $11.30 per share.

Exhibit 11: Estimated market sizes, levels of penetration and peak sales by indication and product

Product	Indication	Number of patients	Total market size ($m)	Penetration	Peak sales ($m)
Iomab-B	HSCT for r/r AML patients >55 in US	7,430	590	50%	297
	HSCT for MDS in US	62,870	5,030	3%	151
	HSCT for ALL in US	6,020	480	20%	96
	HSCT for NHL in US	70,800	5,660	10%	566
	HSCT for MM in US	24,020	1,920	25%	480
	HSCT for r/r AML patients >55 in Europe	8,820	530	50%	265
	HSCT for MDS in Europe	74,690	4,480	3%	134
	HSCT for ALL in Europe	7,150	430	20%	86
	HSCT for NHL in Europe	78,770	4,730	10%	473
	HSCT for MM in Europe	33,420	2010	25%	501
Actimab-A	AML in US	18,860	1,130	20%	226
	AML in Europe	22,410	1,010	20%	202

Source: Edison Investment Research; American Cancer Society; Ferlay et al, European Journal of Cancer (2013) 1374-1403. Note: Pricing assumptions – Iomab-B costs $80,000 per course in the US and Actimab-A costs $60,000 per course and prices in Europe 25% lower than those in the US. Different penetration rates reflect the heterogeneity of the indications and the use of HSCT to treat them.

We have only valued the two programmes in clinical development and the potential launch dates for Iomab-B are based on Actinium Pharmaceuticals' current development programme for the product. It should be noted that the company might decide to develop Actimab-B for indications such as HSCT for non-Hodgkin's lymphoma (NHL) or multiple myeloma (MM); if this occurs the launch of a product in these indications would probably be delayed, but the peak sales could be higher and product life longer. We have also only valued the potential of Iomab-B in HSCT for AML in the relapsed/refractory setting in patients aged over 55, so there is upside should the product be used more broadly in HSCT for AML.

The company has three products in preclinical development, other than Actimab-B and excluding Bismab-A; these have not been included in our valuation and represent an upside. The R&D spending only relates to the development of Iomab-B and Actimab-A; all other programmes are assumed to have an NPV of zero.

The next catalysts for the shares are expected to be interim data from the Phase I/II study with Actimab-A in AML and the start of the pivotal Phase III trial with Iomab-B for HSCT in AML patients in H115.

Financials

The equity raise in June/July 2014 netted $12.6m ($13.7m gross) after it issued 1.83m shares at $7.50 per share. This gave Actinium Pharmaceuticals a pro forma cash position at Q214 of $15.7m, which we estimate will allow it to operate until the end of Q315 with its current R&D plans. In this time, there should be interim data from the Phase I/II trial with Actimab-A and the Phase III study with Iomab-B should be started. The company's cash runway could be extended if it is able to partner Iomab-B for Europe, but it is likely that the company will return to the capital markets in the coming nine months so that it can execute its development programme.

We forecast that Actinium Pharmaceuticals will have a cash burn of $11.3m in FY14 and $12.9m in FY15. The main cash expense is R&D; we currently estimate that the company will invest $8.6m and $9.1m respectively during the next two years. If the company is successful in raising a significant amount of capital, we would expect it to increase its investment in R&D to accelerate the development of Iomab-B and Actimab-A.

Exhibit 12: Financial summary

$000s	2011	2012	2013	2014e	2015e
Year end 31 December	US GAAP	US GAAP	US GAAP	US GAAP	US GAAP
PROFIT & LOSS					
Revenue	0	0	0	0	0
Cost of Sales	0	0	0	0	0
Gross Profit	0	0	0	0	0
EBITDA	(3,283)	(7,947)	(6,586)	(17,415)	(18,391)
Operating Profit (before GW and except.)	(3,284)	(7,947)	(6,588)	(17,437)	(18,417)
Intangible Amortisation	0	0	0	0	0
Exceptionals	0	0	(4)	0	0
Operating Profit	(3,284)	(7,947)	(6,592)	(17,437)	(18,417)
Net Interest	(175)	(1,099)	(3)	0	0
Other financial income	14	685	(4,179)	(4,621)	0
Profit Before Tax (norm)	(3,459)	(9,047)	(6,590)	(17,437)	(18,417)
Profit Before Tax (FRS 3)	(3,445)	(8,361)	(10,774)	(22,059)	(18,417)
Tax	0	0	0	0	0
Discontinued operations	0	0	0	0	0
Profit After Tax (norm)	(3,445)	(8,361)	(10,770)	(22,059)	(18,417)
Profit After Tax (FRS 3)	(3,445)	(8,361)	(10,774)	(22,059)	(18,417)
Average Number of Shares Outstanding (m)	0.8	1.1	22.8	26.2	28.2
EPS – normalised ($)	(4.30)	(7.58)	(0.47)	(0.84)	(0.65)
EPS – FRS 3 ($)	(4.30)	(7.58)	(0.47)	(0.84)	(0.65)
Dividend per share ($)	0.00	0.00	0.00	0.00	0.00
Gross Margin (%)	N/A	N/A	N/A	N/A	N/A
EBITDA Margin (%)	N/A	N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)	N/A	N/A	N/A	N/A	N/A
BALANCE SHEET					
Fixed Assets	1	3	14	168	168
Intangible Assets	0	0	0	0	0
Tangible Assets	1	3	14	133	134
Other	0	0	0	35	35
Current Assets	6,199	5,786	5,752	10,285	7,428
Stocks	0	0	0	0	0
Debtors	0	0	0	0	0
Cash	5,704	5,619	5,533	9,677	6,820
Other	495	167	218	608	608
Current Liabilities	(5,208)	(4,643)	(7,325)	(11,117)	(21,117)
Creditors	(645)	(928)	(460)	(1,235)	(1,235)
Short term borrowings	(124)	(140)	(158)	(55)	(10,055)
Other	(4,440)	(3,575)	(6,707)	(9,827)	(9,827)
Long Term Liabilities	0	0	0	0	0
Long term borrowings	0	0	0	0	0
Other long term liabilities	0	0	0	0	0
Net Assets	992	1,146	(1,560)	(664)	(13,520)
CASH FLOW					
Operating Cash Flow	(518)	(5,213)	(6,292)	(11,143)	(12,830)
Net Interest	0	0	0	0	0
Tax	0	0	0	0	0
Capex	0	(2)	(17)	(142)	(27)
Acquisitions/disposals	0	0	0	0	0
Financing	5,379	5,130	6,364	15,531	0
Dividends	0	0	0	0	0
Other	0	0	0	0	0
Net Cash Flow	4,862	(85)	55	4,246	(12,857)
Opening net debt/(cash)	0	(5,579)	(5,479)	(5,376)	(9,622)
HP finance leases initiated	0	0	0	0	0
Other	718	(16)	(158)	(0)	0
Closing net debt/(cash)	(5,579)	(5,479)	(5,376)	(9,622)	3,235

Source: Edison Investment Research, company accounts. Note: The increase in short-term borrowings in FY15 is indicative of the funding requirement for the company in FY15.

Contact details	Revenue by geography
Actinium Pharmaceuticals 546 Fifth Avenue New York, NY 10036 +1 646 840 5442 www.actiniumpharma.com	N/A

CAGR metrics		Profitability metrics		Balance sheet metrics		Sensitivities evaluation	
EPS 14-15e	N/A	ROCE 14	N/A	Gearing 14	N/A	Litigation/regulatory	●
EPS 14-17e	N/A	Avg ROCE 14-17e	N/A	Interest cover 14	N/A	Pensions	○
EBITDA 14-15e	N/A	ROE 14	N/A	CA/CL 14	N/A	Currency	◖
EBITDA 14-17e	N/A	Gross margin 14	N/A	Stock days 14	N/A	Stock overhang	○
Sales 14.15e	N/A	Operating margin 14	N/A	Debtor days 14	N/A	Interest rates	○
Sales 14-17e	N/A	Gr mgn / Op mgn 14	N/A	Creditor days 14	N/A	Oil/commodity prices	○

Management team

Executive Chairman: Sandesh Seth	President and CEO: Dr Kaushik J Dave
Sandesh Seth is head of healthcare investment banking at Laidlaw & Co (UK) Ltd. He has previous experience with Cowen & Co, Bear Stearns, Commonwealth Associates, Pfizer, Warner-Lambert and SmithKline. Mr Seth has an MBA in finance from New York University, an MS in pharmaceutical sciences from the University of Oklahoma Health Center and a BSc in chemistry from Bombay University.	Kaushik J Dave joined the company in September 2013. Previously he was EVP of product development at Antares Pharmaceuticals Inc (2008-13). Before this, he was VP product development at Palatin Technologies Inc, and was also employed at Schering-Plough Inc and Merck & Co Inc. Dr Dave has a pharmacy degree from the University of Bath, UK, a PhD in pharmaceutical chemistry from the University of Kansas, and an MBA from the Wharton School of the University of Pennsylvania.
COO and CMO: Dr Dragan Cicic	**Senior vice president of clinical operations: Dennis Earle**
Dragan Cicic joined in 2005 as medical director from being project director of QED Technologies Inc. Previously he was an investment banker with SG Cowen Securities. He graduated as a medical doctor from the School of Medicine at The Belgrade University, and received his MBA from Wharton School of the University of Pennsylvania. He was also a Nieman Fellow at Harvard University.	Dennis Earle was VP clinical operations and project management at Onconova Therapeutics, head of programme management and strategic planning at Adolor and VP of clinical operations and programme management at Intercept Pharmaceuticals. From 1998 to 2006, he was executive director, clinical affairs at Palatin Technologies. Mr Earle has an MBA from Saint Joseph's University, an MS in biotechnology from Johns Hopkins University and a BA in biochemistry and English from Rutgers University.

Principal shareholders	(%)
Actinium Holdings Ltd (MSKCC)	20.3

Companies named in this report

Bayer (GR:BAYA); GSK (LON:GSK); Seattle Genetics (NASDAQ:SGEN); Immunogen (NASDAQ:IMGN); Spectrum Pharmaceuticals (NASDAQ:SPPI)

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