Initiation of Coverage
September 3, 2013
BIOTECHNOLOGY

Equity Research

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Heat Biologics, Inc. (HTBX-$9.99)

Rating: BUY

Target Price: $15.00

Making an ImPACT - Initiating with BUY and $15 Price Target

EPS	1Q	2Q	3Q	4Q
2012A	(0.47)A	(0.06)A	(0.51)A	(0.39)A
2013E	(1.66)A	(0.38)E	(0.15)E	(0.20)E
2014E	(0.38)E	(0.36)E	(0.41)E	(0.39)E

REV	1Q	2Q	3Q	4Q
2012A	0.0A	0.0A	0.0A	0.0A
2013E	0.0A	0.0E	0.0E	0.0E
2014E	0.0E	0.0E	0.0E	0.0E

FY	2012A	2013E	2014E
EPS	(3.03)A	(1.55)E	(1.53)E
P/E	(3.3)x	(6.4)x	(6.5)x
REV	0.0A	0.0E	0.0E

- **Initiating with BUY Rating.** We are initiating coverage of Heat Biologics ("Heat") with a BUY rating and a $15 price target. Our target price on the shares is based on our view that the company's enterprise value (EV) will expand as the pipeline advances through the current phase of clinical trials. The shares currently trade at a steep discount to a variety of peers (therapeutic, development stage and recent IPOs) and that suggests to us that opportunity for share price expansion exists.
- **Platform and Pipeline.** Heat Biologics is both a platform and pipeline play. The company's *ImPACT* technology serves as the basis for pipeline candidates, allowing for development in a wide variety of cancer indications. With gross proceeds of roughly $26 million raised from the company's recent initial public offering, Heat will advance HS-110 into Phase II testing for non small cell lung cancer (NCSLC) and HS-410 into Phase I for bladder cancer. There are additional candidates in other indications behind these two lead programs, and a potential application in infectious disease.
- **Unleashing gp96.** *ImPACT* is a truly unique technology that "unleashes" gp96, a heat shock protein, from inside the cell, utilizing existing cell lines to create factories of gp96 that continually secrete antigens that can be recognized by the immune system. This is a novel approach based on the work of Eckhard Podack, M.D., Ph.D, a leading immunologist.
- **Milestones to Drive Valuation Expansion.** A key component of our thesis that the shares can trade to $15 is our belief that milestone events will drive value into the shares. The company should initiate a two-stage Phase II trial of HS-110 in NSCLC this year, with the first stage of the study reading out within 9-12 months of initiation, providing a potential catalyst for the shares. The company will also initiate a Phase I study of HS-410 for bladder cancer in 2013. We think there are sufficient events over the next 12-24 months to allow for meaningful valuation expansion.
- **Cash Runway into 2015**. The company raised gross proceeds of $26 million in its recent initial public offering, which should provide sufficient cash to sustain Heat through 2015. Additional capital could come into the company should Heat partner its clinical assets or technology to another company. At present, Heat does not have partnerships, leaving upside for shareholders should a deal emerge.

Current Statistics

Market Cap ($Mil)	**$61.8**
Avg. Daily Trading Volume (3 mo.):	**NA**
Shares Out (Mil):	**6.187**
52 Wk. Range	**$11.23-$9.01**

The Disclosure Section may be found on pages 27 - 29.

Summary

Heat Biologics is a development stage company with a proof-of-concept study in non-small cell lung cancer (NSCLC) about to get underway. The company is working in the evolving field of therapeutic cancer vaccines with a unique approach that seeks to harness the immune provoking activity of the gp96 heat shock protein (HSP). This approach could offer broad cancer antigen coverage in a cost effective manner relative to other approaches in the field today. While the company is at an earlier stage of development versus others in the field, and this is reflected in the current valuation, we see opportunity for expansion based on clinical progress, which we think is likely. The company's technology is unique and has broad potential, in our opinion, and there is an actionable milestone catalyst calendar through 2015. We like Heat for its:

- **Broad Antigen Coverage Technology –** Heat Biologics' vaccines utilize Immune Pan Antigen Cytotoxic Therapy (*ImPACT*) technology, which is a method of engineering allogenic (not originating from the patient) "off the shelf" tumor cells to secrete antigens that stimulate the immune system. The technology allows the immune system to identify a variety of tumor-specific antigens, increasing the likelihood that tumor cells will be recognized and killed.

- **Actionable Milestones Within the Next 24 Months –** We expect Heat Biologics to begin clinical studies evaluating HS-110 and HS-410 in NSCLC and bladder cancer, respectively, by the end of 2013. While both studies are expected to be completed by late 2015/early 2016, they consist of multiple parts that provide interim data over the duration of the studies. The studies could therefore provide multiple catalysts for valuation expansion.
- **Targeting Areas of Unmet Need** – Heat Biologics will focus development on NSCLC and bladder cancer in the near term. We believe that the field of immunotherapy in cancer has evolved, learning from prior clinical failures that trials in the sickest of patients, with the highest of disease burdens, may be the least likely to derive benefit from treatment. Hence, in both NSCLC and bladder cancer, Heat Biologics is evaluating HS-110 and HS-410 in patients that have finished systemic treatment and presumably have a lower burden of disease.
- **Applications Outside of Cancer –** Heat's *ImPACT* technology stimulates a cytotoxic T-cell response, and this suggests potential utility in infectious diseases such as HIV. Early feasibility studies have been conducted, though this is not a focus for the company at this time.

Valuation

Because Heat's clinical programs have yet to complete Phase II testing, we explored enterprise value (EV) as a way to value the shares versus a more traditional approach of discounted forward sales or earnings. We examined three groups of peers:

- Development-stage companies working in cancer vaccines
- Oncology companies whose lead compound is in Phase II
- Recently completed biotechnology IPOs

Based on the current closing prices (as of August 30, 2013), Heat's EV is well below its peer groups (vaccine developers, Phase II oncology peers, and recent IPOs). This suggests that there is room for improvement in Heat's valuation, with the potential for milestone events to drive valuation as products advance in the clinic. We note that companies such as Coronado Bioscience and ImmunoCellular, both companies with platform technologies conducting proof of principle Phase II studies, have experienced valuation expansion consistent with clinical trial progress. With this in mind, we see value in the shares of $15 over the next 12 months, a substantive increase over the current share price.

Strong Immunology Pedigree

Company History

Heat Biologics originated as a commercial entity in 2008, and became a publicly listed company in July 2013 under the direction of Jeffrey Wolf, the current CEO and founder. The company's technology is licensed from the University of Miami, and sprang from the research interests of Eckhard Podack, M.D. Ph.D, the Chairman of Immunology at Miami, who discovered a method that allows allogeneic or "off-the-shelf" cancer cells to secrete gp96, a heat shock protein that is normally sequestered inside the cell but plays a role in immune response. Dr. Podack's discoveries led to the development of *ImPACT* technology, for which Heat Biologics retains development and commercial rights to all applications. Dr. Podack is also known as the discoverer of perforin, a protein secreted by cytotoxic T-cells that forms pores in target cell membranes, allowing proteins to enter the cell and cause apoptosis. Heat Biologics is currently based in Chapel Hill, North Carolina, but prior to mid-2011, was based in Florida, where Dr. Podack's lab is located.

Gp96 was found to be associated with an anti-tumor immunological response as early as 1986. However, the protein functions as a protein chaperone inside the cell, and it was not until 1999 that a process was invented to make it secretable. Normally, it is bound by a protein sequence to an intracellular compartment. Dr. Podack, with colleagues at the University of Miami, discovered a process that involved replacing the peptide that "chains" gp96 to an intracellular structure. Using this method, tumor cells could be transformed to secrete gp96 bound to tumor antigens.

Heat Biologics is the parent corporate entity, as the company previously established subsidiaries: in 2009; Heat Biologics I, Inc. and Heat Biologics II, Inc. These entities were incorporated in 2009 though Heat Biologics II was sold in 2012 and a roughly 8% stake of Heat Biologics I is owned by the University of Miami. In 2012, Heat formed two-wholly owned subsidiaries, Heat Biologics III, Inc. ("Heat III") and Heat Biologics, IV, Inc. ("Heat IV"), and a wholly-owned limited liability company, Heat Biologics GmbH ("Heat GmbH"), was established in Germany in 2012. There has been no activity in Heat III, Heat IV, or Heat GmbH since their inceptions.

Pushing the Boundaries of Immunotherapy

Industry Overview

Heat Biologics is a cancer immunotherapy company that is developing tumor vaccines. The idea of fighting cancer with the body's own immune system is not novel, but its realization has been less than straightforward. Immunotherapy, as it relates to cancer, can involve antibodies, which is now a multi-billion dollar industry; immune system modulators, fast becoming a billion dollar market; and cancer vaccines, which hold promise but have struggled clinically and commercially.

The first cancer vaccine – or therapeutic that teaches the body to attack cancer – was approved by the FDA in 2010 and has provided the investment community with a roller coaster ride. Dendreon developed and launched Provenge (sipuleucel-T), the first ever cancer vaccine to treat prostate cancer. The regulatory approval was rocked by controversy, as was the launch, with concern about commercial potential of this product. But despite the commercial disappointment of Provenge, the field remains wide open. We note that today there are over 100 trials (from preclinical to Phase III) examining immunotherapy in cancer (roughly 30% are later stage), and targeted approaches for cancers such as pancreatic, renal cell, glioma, prostate, melanoma and many others. Understanding the potential of immunotherapy overall involves understanding some basics of the human immune system and cancer.

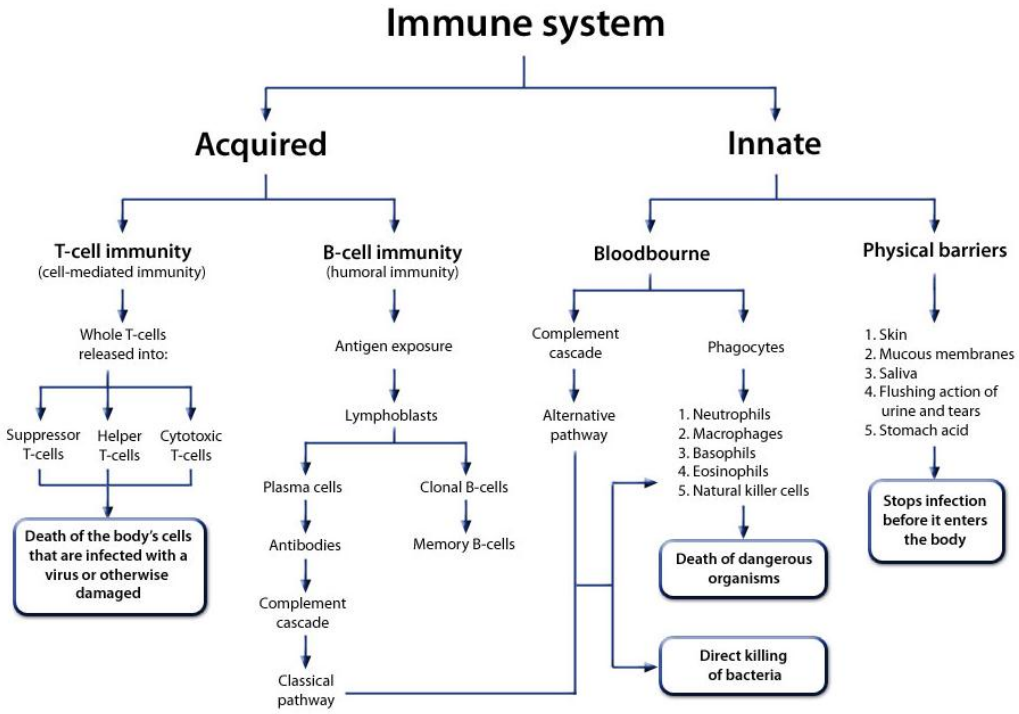
Cancer and the Immune System

While cancer cell growth may appear haphazard and sloppy, cancer cells have very sophisticated mechanisms for evading the human immune system. The body does recognize less mature cancer or tumor cells as a danger signal, but as cancer cells mature, so do their mechanisms for avoiding destruction by the immune system. Initially, cancer cells are able to "trick" the immune system by removing certain cell surface receptors that would otherwise signal danger to the immune system. And

although tumor cells express antigens that should signal the immune system into action, they more often than not do not express enough of them to raise alarm.

Cancer cells have a variety of other tools to trick the immune system. For instance, some tumors may lose expression of antigens that elicit immune response. Additionally, tumor cells do not express costimulators known as class II MHC molecules that are responsible for inducing an immune system attack through the activation of cytotoxic lymphocytes (CTLs), an immune system component. These are just some of the ways that cancer can evade the immune system. Thus, while the immune system is a powerful tool against invaders, it struggles to fend off attack from "self" cancer cells.

Exhibit 1: Types of Immune Responses



Source: Virtualmedicalcenter.com, Cantor Fitzgerald research

The CD8+ Response

The immune system is comprised of multiple cells taking on different roles to create a dynamic process that protects the human body from harm. One component of this process is the cytotoxic (CD8+) T-cell, which can be activated to recognize a specific antigen and then kill cells that express that antigen. CD8+ T-cells recognize antigens that are bound by class I major histocompatibility complex molecules (MHC I) to the cell surface. MHC molecules are proteins recognized by T cells that allow the body to distinguish between self and non-self. A self-MHC molecule provides a structure, or scaffolding, that can be recognized by T cells. MHC presents this scaffold with a foreign antigen to the T cell, which triggers an immune response to the antigen. In humans, MHC antigens are called human leukocyte antigens, or HLA.

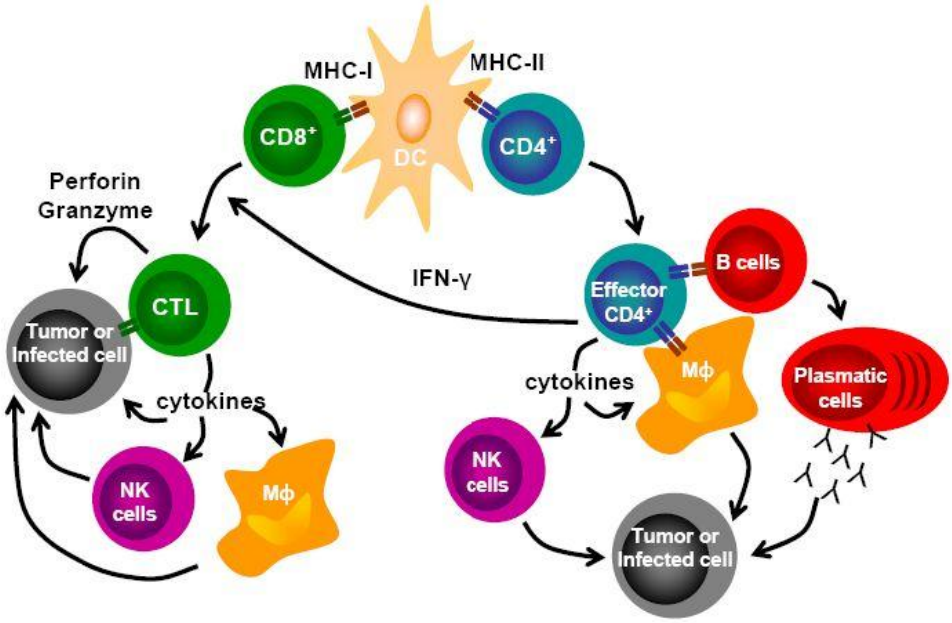
Once the CD8+ T-cell is activated, it can induce lysis of cells expressing the tumor antigen, or it can secrete cytokines. The CD8+ cell releases granules that include a protein called perforin onto the target cell membrane. The perforin pores inserted into the cell membrane by the CD8+ T-cell allow other CTL-produced proteins called granzymes to enter the target cell, which causes apoptosis (programmed cell death). Also, CD8+ cells can induce apoptosis through the FasL protein, which is expressed on the T-cell membrane. The FasL protein interacts with the Fas protein on the target cell,

causing apoptosis. CD8+ cells can also recruit other immune cells by secreting cytokines such as interferon-gamma (IFNγ) and tumor necrosis factor-α (TNFα).

Other molecules may also elicit an immune response. Heat shock proteins, or HSPs, are used as a signaling mechanism by the immune system to identify antigens, including those from tumor cells. Normally, HSPs operate by acting as a chaperone to:

- Facilitate proper protein folding.
- Enable proper function of toll-like receptors and the innate immune system.
- Carry irreparable proteins to intracellular garbage disposals to be degraded into peptides.

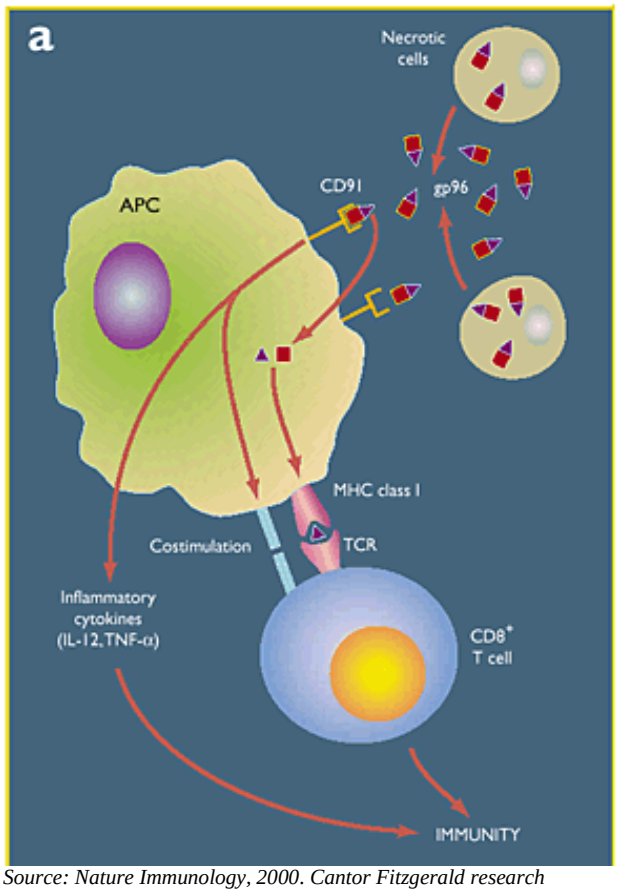
Exhibit 2: T-Cells in Action



Source: Biochemistry, Genetics and Molecular Biology, Cantor Fitzgerald research

HSPs are normally present **inside** cells, and are only released when cells die by necrosis or unnatural cell death. When the HSPs are released, they are bound to antigens and recognized by immune cells known as antigen-presenting cells (APCs) through a membrane receptor called CD91. The HSP-antigen complex is taken up and internalized, and the peptide chaperoned by the HSP is transported to the ER and loaded on MHC I of the APC. The APC then presents the MHC I complex to a CD8+ T-cell. The CD8+ T-cell is then activated and responds in the manner previously described. Gp96 is one of the most expressed HSPs and is known for stimulating this response. Exhibit 3 illustrates this process.

Exhibit 3: Gp96 Function in Immune Response

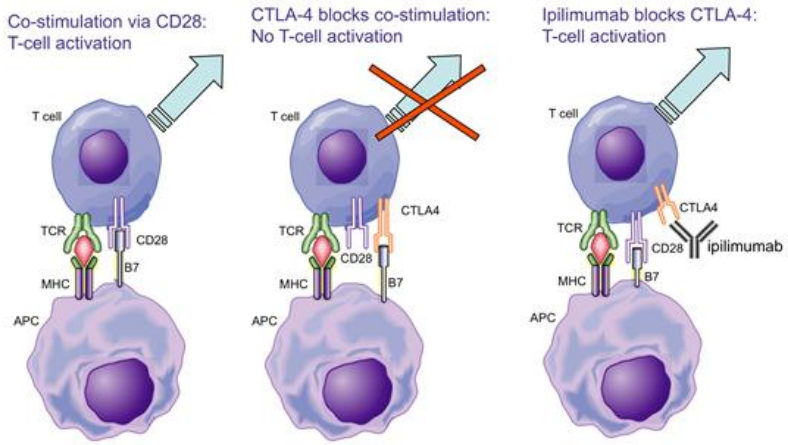


Source: Nature Immunology, 2000. Cantor Fitzgerald research

Why Immunotherapy Makes Sense

In its natural state, the human immune system struggles to overcome the destructive effect of cancer. Enter immunotherapy as a novel tool, teaching the immune system to recognize cancer cells so T cells can do what they do best – destroy cells that represent danger to the body. Immunotherapeutic treatment has evolved to represent several approaches. The most widespread therapy today is passive antibody transfer through the use of monoclonal antibodies (mABs). Over 20 mABs are FDA-approved to treat a variety of diseases, including cancer. In this scenario, the mAB essentially fortifies the immune system by honing in on antigens of cancer cells. Widely used mABs for cancer include Rituxan (rituximab), Erbitux (cetuximab) and Herceptin (trastuzumab). There are also mABs that enhance the body's anti-tumor immune response. Bristol Myers' Yervoy (ipilimumab) is a monoclonal antibody that was approved in March 2011 and targets cytotoxic T-cell antigen-4 (CTLA-4). CTLA-4 is an "immune checkpoint" found on the surface of T cells that turn off the T cell attack when stimulated. The Programmed Cell Death 1 protein (PD-1) and Programmed Cell Death 1 Ligand 1 (PD-L1) are other immune checkpoints that inhibit T-cell mediated immune responses. Bristol Myers, Roche, and Merck are developing antibodies that target these proteins and disinhibit the anti-tumor immune response.

Exhibit 4: Yervoy Mechanism of Action



Source: Lebbe et al. ESMO 2008, Cantor Fitzgerald research
APC=Antigen presenting cell TCR=T-cell receptor, CTLA-4=cytotoxic T-cell antigen-4 MHC=major histocompatibility complex,

Thus vaccines represent a novel approach because once the immune system is taught to recognize an antigen, it has the ability to forever remember that antigen and jump into action when needed. The entire system stands at the ready with B cells able to bind to antigens and T cells able to destroy foreign cells. But stimulating the immune system into a sustained, active response that produces a clinically meaningful outcome has been elusive. Provenge is the only such agent commercially available (for hormone refractory advanced prostate cancer), and this approach has been shown to have an impact on overall survival in men with advanced disease. Of note, immunotherapeutic approaches may be associated with better outcomes when used earlier in disease, potentially because of the time required to build an appropriate immune response. Additionally, the clinical landscape is evolving to the idea that these products are likely to have better efficacy if combined with conventional chemotherapy and/or "checkpoint" inhibitors. The combination approach could lead to quick cancer cell eradication while allowing the body time to build immunity against the cancer cells, thus enhancing overall survival by exhibiting a late treatment effect.

Company Overview

Heat Biologics' product candidates incorporate Heat's proprietary Immune Pan Antigen Cytotoxic Therapy (*ImPACT*) technology, which is a novel mechanism that elicits an immune response against cancer antigens. This is a unique approach to sustaining and targeting immune system stimulation.

Making an *ImPACT*

The *ImPACT* technology is based on the role of gp96 in eliciting an immune response. Gp96 is a heat shock protein ("HSP") that is one of the most abundantly expressed proteins in the human body, found in all cells. It is normally retained within the endoplasmic reticulum ("ER"), where it facilitates the folding of newly synthesized proteins so that they may perform their various tasks properly. Gp96 is also important in the process of detecting antigens. Since it is present in all cell types, it is able to interact with all antigens. Gp96 may also enable proper function of toll-like receptors and carry irreparable proteins that will eventually be degraded into peptides. Outside of the cell, it could operate as a powerful adjuvant, meaning that it can enhance the immunological response to a foreign antigen.

Gp96 was found to be associated with tumor immunogenicity as early as 1986. In a *PNAS* study published in 1986 by Srivastava et al., the investigators isolated two mouse sarcoma cell lines, Meth A ascites and CMS5. They isolated each cell line into three components: cells, cytosol (fluid inside the cell), and plasma membrane. With the Meth A ascites cell line, mice were immunized with two injections of either cytosol or the plasma membrane one week apart, followed by injection of the tumor

cells. The investigators found that there was no tumor growth if the mice had been immunized with the plasma membrane previously. However, when the cytosol was fractionated further, no tumors grew in mice immunized with the isolate. Afterwards, this isolate was fractionated further and gp96 was the protein found to be associated with tumor resistance.

The immunogenicity of gp96 was confirmed in another 1994 study published in the Journal of Immunology by Udono et al. In this study, gp96 and two other HSPs (hsp70 and hsp90) were isolated from the Meth A ascites tumor. Mice were then immunized with each of the three HSPs before being challenged with an injection of Meth A ascites tumor cells. Hsp70 and gp96 were found to be equally immunogenic, while the immunogenicity of hsp90 was 10% of hsp70 and gp96. The gp96 isolated from the Meth A ascites tumor was found to inhibit tumor growth with increasing doses.

Exhibit 5: Tumor Inhibition in Relation to gp96 Dose and Quantity of Tumor Cells Used in Challenge

No. of Meth A cells Used for Challenge	Frequency of Tumor Take in			
	Naive Mice	Mice Immunized with Meth A-Derived gp96		
		3 μg	6 μg	9 μg
1×10^5	3/4	4/4	2/5	1/4
8×10^4	5/5	5/5	2/5	0/5
5×10^4	5/5	4/4	0/4	2/5
3×10^4	4/4	4/4	ND[b]	0/4

Source: Udono et al. Journal of Immunology, Volume 152, 1994, 152, Cantor Fitzgerald research

However, gp96 from normal cells did not inhibit tumor growth, as seen in Exhibit 6 showing that gp96 can elicit an immune response only when carrying the antigenic cargo from tumor cells.

Exhibit 6: Tumor Inhibition by gp96 (Normal Cells) Dose and Quantity of Tumor Cells Used in Challenge

No. of Meth A cells Used for Challenge	Frequency of Tumor Take in				
	Naive Mice	Mice Immunized with Meth A-Derived gp96	Mice Immunized with gp96 Derived from Normal Tissues		
		6 μg	3 μg	6 μg	9 μg
1×10^5	3/4	2/5	4/4	4/4	4/4
8×10^4	4/4	0/4	4/4	3/4	3/4
5×10^4	4/4	0/4	3/4	3/4	3/4

Source: Udono et al. Journal of Immunology, Volume 152, 1994, 152, Cantor Fitzgerald research

Creation of gp96-Ig

While studies have shown that gp96 is immunogenic, it is found inside the cell, where it has no exposure to cytotoxic T-cells. Normally, gp96 is "chained" to the ER by an amino acid sequence called KDEL (lysine, aspartic acid, glutamic acid, and leucine). In 1999, a group of researchers including Dr. Podack first discovered a method allowing gp96 to be secreted outside the cell. In this study, which was published in the *Journal of Immunology*, the KDEL sequence on gp96 was replaced with the CH2 and CH3 domains of murine IgG1. The DNA encoding the new protein (gp96-Ig) was inserted into selected human and murine cell lines. (SCLC-2, SCLC-7, B16F10, MC57, LLC, NIH3T3, EL4, E.G7, and P815). Key findings from the study included:

- **All cell lines secreted gp96-Ig**. The investigators found that gp96-Ig concentration in the culture supernatant increased with time. At the same time, the intracellular gp96-Ig was

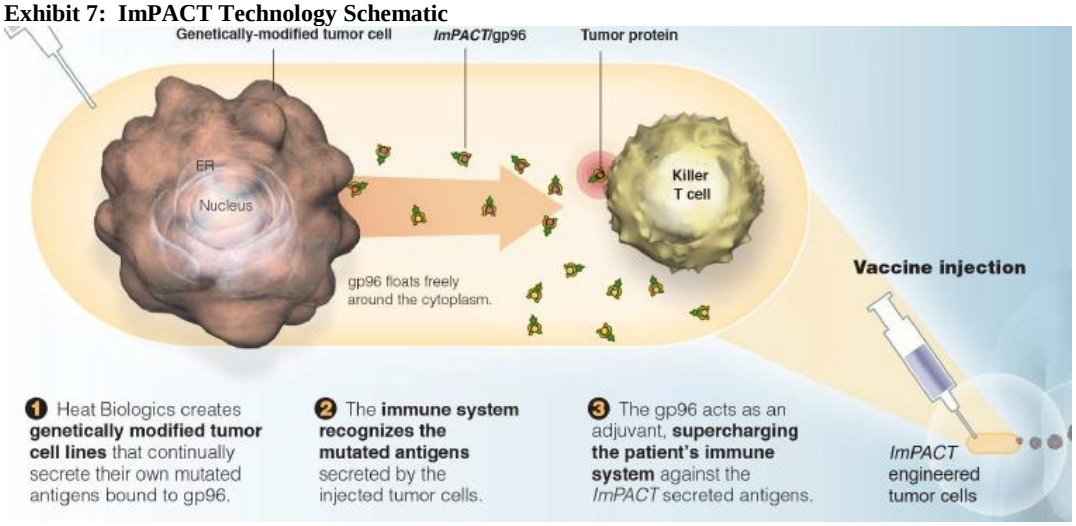
detected at a low and constant steady-state level in lysates of transfected cells. This indicated that the gp96-Ig did not accumulate in the cell.

- **Secretion of the gp96-Ig greatly reduced tumor growth**. Tumor growth in one transfected cell E.G7 was reduced 100x when compared with other untransfected E.G7 cells. Only 10% of mice inoculated with these cells had any tumor growth. Similar results were shown for another cell line, EL4.

- **CD8+ cytotoxic T cells are required for the immune response**. The investigators found that tumor rejection was blocked in mice that were injected with anti-CD8 antibody two days before to three days after or tumor inoculation. However, anti-CD4 antibodies had no effect on tumor rejection regardless of the time of injection. Lastly, mice that were deficient in CD4 were able to reject gp96-Ig secreted from E.G7 cells.

Heat Biologics was founded to commercialize treatments for cancer and infectious disease utilizing the *ImPACT* technology. This technology genetically engineers tumor cells to secrete gp96-tumor antigen conjugates, allowing gp96 to be active outside the cell, where it is normally only found once a cell has undergone necrosis. These genetically altered tumor cells are then injected into the patient where they can secrete gp96/tumor antigen conjugates. Gp96-Ig stimulates a CD8+ mediated cytotoxic T-cell response similar to the response established in the 1999 study. Exhibit 7 illustrates a diagram of how the *ImPACT* technology works.

Exhibit 7: ImPACT Technology Schematic



Source: Heat Biologic, Cantor Fitzgerald research

Potential Advantages over Other Vaccines

Developing a commercially viable cancer vaccine remains a challenge. Dendreon's Provenge is the only cancer vaccine available in the U.S., but many cancer vaccines have failed to get over the Phase III goal line. Heat's *ImPACT* technology has a few features that could prove advantageous over other vaccines.

- First, the *ImPACT* technology allows for an immune response against multiple tumor antigens. In a 2008 study by Nellers et al published in *Seminars in Immunology*, the investigators retrospectively examined data from 3444 patients in 173 published trials. These patients were enrolled in immunotherapy trials for a wide variety of cancers including melanoma, renal cell carcinoma, hepatocellular carcinoma, lung cancer, and pancreatic cancer. They found that 138/1711 (8.1%) patients achieved an objective response when they were given vaccines that used whole tumor or tumor extracts as antigens. However, only 63/1733 (3.6%) of patients given vaccines with molecularly defined antigens achieved an

objective response ($p<0.0001$). Exhibit 8 illustrates select cancer vaccines currently in development.

- The vaccine may have efficacy in certain immunocompromised patients. As the immunological response is mediated by CD8+ T-cells, patients with other immunodeficiencies such as agammaglobulinemia or CD4+ T-cell deficiency (HIV) could be able to respond to the vaccine. In addition, CD4+ helper cells are not required for the activity of the vaccine, which may prove advantageous in settings where the activity of these cells is dampened by the immunosuppressive effects of established tumors.

- Antigen plus adjuvant is presented in a single complex. This allows for the quick recognition of tumor antigen while at the same time ensuring that there will be a strong immune response.

- Heat products could have lower cost of goods (COGS) than autologous tumor vaccines. Dendreon's Provenge had COGS that was 70% of total revenues in 2012, and while this figure is likely to trend down as sales increase, this is far away from the 15% or so we expect for *ImPACT*.

Exhibit 8: Select Vaccines According to indication and Target Breadth

Company	Candidate	Indication	Description	Number of Targets	
				Single	Multiple
Aduro Biotech/Biosante	GVAX Pancreas	Pancreatic Cancer	Pancreatic Cancer cells genetically engineered to secrete GM-CSF		✓
Advaxis	Advaxis Technology	Head and Neck Cancer, Cervical Cancer, Anal Cancer, Prostate Cancer	Vaccines consist of a live attenuated strain of Listeria that includes a fusion protein sequence that includes the antigen of interest combined with listeriolysin O	✓	
Advaxis	Advaxis Technology	Head and Neck Cancer, Cervical Cancer, Anal Cancer, Prostate Cancer	Vaccines consist of a live attenuated strain of Listeria that includes a fusion protein sequence that includes the antigen of interest combined with listeriolysin O	✓	
Agenus	Prophage Series	Glioma/RCC/Melanoma	Consists of heat shock protein-peptide complexes (HSPPC) derived from patient's tumor		✓
Bavarian Nordic	ProstVac	Prostate Cancer	Vaccine consisting of virus vector that contains modified version of PSA and three co-stimulatory molecules (TRICOM)	✓	
Celldex	Rindopepimut	GBM	Vaccine consisting of EGFRv3-specific peptide sequence conjugated to the carrier protein Keyhole Limpet Hemocyanin (KLH).	✓	
Dendreon	Provenge	Hormone-refractory Prostate Cancer	Consists of autologous CD54+ cells activated with PAP-GM-CSF (Prostatic acid phosphatase)	✓	
Galena	NeuVax (nelipepimut-S)	Breast Cancer	Vaccine consisting of the E75 peptide derived from HER2 combined with GM-CSF. Stimulates cytotoxic (CD8+) T cells target cells expressing HER2.	✓	
Galena	FBP-39	Endometrial/Ovarian Cancer	Vaccine consisting of the E39 peptide derived from the folate binding protein combined with GM-CSF.	✓	
GSK	MAGE-A3	bladder/NSCLC/melanoma	Vaccine that incorporates a 25-amino acid sequence of the cancer-associated marker MUC-1 in a liposomal formulation	✓	
Heat Biologics	HS-110	NSCLC	Allogenic vaccine consisting of a lung cancer cell line genetically modified to "pump-out" cancer antigens bound to gp96, a heat shock protein		✓
Merck KGaA/Oncothyreon	LBLP25	NSCLC	Allogenic vaccine consisting of a cancer cell line genetically modified to express α-Gal	✓	
NewLink	HyperAcute	NSCLC/Pancreatic Cancer/Melanoma	Allogenic vaccine consisting of a cancer cell line genetically modified to express α-Gal		✓
Northwest Biotherapeutics	DCVax	Prostate/Brain Cancer	Consists of autologous dendritic cells activated with tumor antigens and adjuvant	✓	
NovaRx	Lucanix	NSCLC	Consists of allogenic cancer cells modifed to inhibit TGF-beta 2		✓

Source: Cantor Fitzgerald research and Company reports

Allogenic Manufacturing has Advantages

A critical success factor for Heat and *ImPACT* is the relatively straightforward, "off-the-shelf" approach to the manufacture of *ImPACT* products. Because *ImPACT* is allogeneic, it is not dependent on harvesting cells from patients, and that simplifies the manufacturing process. *ImPACT* uses a common master cell line to mass-produce a single vaccine product applicable to all patients for each particular cancer type. The manufacture of *ImPACT*-based products can vary depending on the therapeutic application (i.e., NSCLC, bladder, etc.), but the overall process could be quite streamlined, commercially appealing, and cost effective. Currently, *ImPACT* has an agreement with Lonza that lasts until 2019 to manufacture product for the NSCLC study (for part of Phase II and Phase III).

There are applications for at least five patent families that are associated with *ImPACT* technology. As seen in Exhibit 9, most of the patents have yet to be granted. If they are, *ImPACT* should be protected until 2031.

Exhibit 9: *ImPACT* Patents

File Date	Patent/Application Number	Title	Estimated Expiration	Status
Jul-07	11/878,460	Recombinant Cancer Cell Secreting Modified Heat Shock Protein-Antigenic Peptide Complex	2019	Granted: EU (2), JP (1), AU(1) Pending: US (1), CA (1), EU (1), JP (1)
Mar-08	61/033,425*	Allogeneic Cancer –Based Immunotherapy	2029	Granted: AU (1) Pending: US (1-Allowed), CA (1), China (1), EU (1), Israel (1), India (1), JP (1), South Korea (1)
Mar-09	PCT/2009/001330*	Allogeneic Cancer –Based Immunotherapy	2029	Granted: AU (1) Pending: US (1-Allowed), CA (1), China (1), EU (1), Israel (1), India (1), JP (1), South Korea (1)
Nov-08	61/116.971	HIV/SIV Vaccine for the Generation of Mucosal and Systemic Immunity	2029	Granted: Pending: US (1), CA (1), China (1), EU (1), Israel (1), India (1), JP (1), South Korea (1), Hong Kong (1)
Mar-09	PCT/ 2009/001727	Heat Shock Protein GP96 Vaccination and Methods of Using Same	2029	Pending: US (1), CA (1), China (1), EU (1), Israel (1), India (1), JP (1), South Korea (1), Hong Kong (1), AU (1), South Africa (1-Allowed), Philippines (1)
May-10	61/347,336	Cancer Treatment	2031	Pending: US (1), CA (1), China (1), EU (1), Israel (1), India (1), JP (1), South Korea (1), Hong Kong (1), AU (1)

EU=Europe CA=Canada JP=Japan AU=Australia; Status includes regions where patents are granted/pending and number of patents in parentheses
*Source: Heat Biologics, Cantor Fitzgerald research *same patent family*

Clinical Candidates Ready to Take Next Step

Heat has at least five different candidates using the *ImPACT* technology. The company's lead candidate is HS-110, which is in development for NSCLC, and should enter Phase II by 4Q:13. The company is also developing HS-410 for bladder cancer, which should enter a Phase I/II study in 4Q:13 as well.

Exhibit 10: Heat Biologics Pipeline

Candidate	Indication	Description	Phase of Development				Next Event	Timeframe
			PreClinical	Phase I	Phase II	Phase III		
HS-110	NSCLC	Allogenic vaccine consisting of a lung cancer cell line genetically modified to "pump-out" cancer antigens bound to gp96, a heat shock protein					Initiate Phase II study	4Q:13
HS-410	Bladder Cancer Adjuvant	Allogenic vaccine consisting of a bladder cancer cell line genetically modified to "pump-out" cancer antigens bound to gp96, a heat shock protein					Initiate Phase I/II study	4Q:13
HS-310	Ovarian Cancer	Allogenic vaccine consisting of an ovarian cancer cell line genetically modified to "pump-out" cancer antigens bound to gp96, a heat shock protein					Initiate Phase I/II study	2014
HS-510	Triple Negative Breast Cancer	Allogenic vaccine consisting of a breast cancer cell line genetically modified to "pump-out" cancer antigens bound to gp96, a heat shock protein					Initiate Phase I/II study	2014

Source: Heat Biologics, Cantor Fitzgerald research

HS-110 – Moving Forward in NSCLC

HS-110 is Heat's most advanced product, and will consume the bulk of development dollars over the next 24-30 months. HS-110 consists of a live AD-100 non-small cell lung cancer cell line modified via the *ImPACT* technology to secrete gp96-Ig bound to a wide array of lung cancer antigens. The gp96 complex stimulates the patient's immune system to activate a robust cytotoxic T-cell response against his/her own lung cancer tumor. Heat has completed a Phase I study, and in 4Q:13 expects to initiate a 120-patient Phase II trial in patients with advanced NSCLC. The study will be a maintenance therapy study in patients who have completed a first-line regimen consisting of a platinum doublet (carboplatin/cisplatin combined with docetaxel, paclitaxel, vinorelbine, or gemcitabine), and achieved at least stable disease. The study is powered at 80% to detect a two-month survival benefit. The Phase II study will be conducted at 15 sites across the U.S. with patients randomized to receive treatment HS-110 or placebo for 18 weeks after receiving the first-line regimen. The trial will occur in two stages:

- **First Stage**: A dose-finding study in which 30 patients will be randomized to either placebo treatment, low dose HS-110 (2×10^6 cells) or high dose HS-110 (1×10^7 cells) administered weekly for 18 doses.
- **Second Stage**: A proof-of-concept study in which 90 patients will be randomized to either placebo treatment or HS-110 at the dose determined to produce the optimal immune response in the first stage.

Heat plans to use up to $8.5 million from the net proceeds of the IPO to finance this trial, but this figure could be increased should the company receive grant funding to enable expansion of the study.

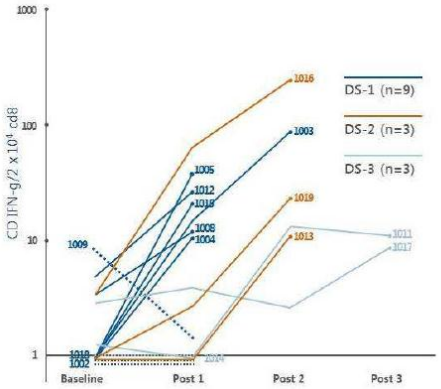
Phase I Results – Immune Responders

Eleven out of the 15 patients (73%) completing the first course of therapy with HS-110 had at least a doubling of CD8+ cells secreting interferon gamma (CD8-CTL IFN- γ) following vaccination with HS-110. In these immune responders, the median survival was 16.5 months. The median survival amongst the four non-immune responders and the published historical control group was 4.5 months.

There were no objective responses in the study, but the median and overall survival at one year was 8.1 months and 44%, respectively. Also, the median progression-free survival ("PFS") was 1.4 months. As of March 2013, two patients were alive with follow-up of over 3 and 4 years. One patient was in Arm 2 while the other was in Arm 1. Three of the patients were late stage lung cancer patients and died before their immune response could be evaluated.

The survival rates seen in the Phase I study are greater than those seen in similar patients in a 2003 study published in *Lung Cancer* by Massarelli et al. In this study, over 700 patient records from the MD Anderson Cancer Center between January 1993 and January 2000 were screened for patients that had stage IIIB/IV NSCLC and had received third- or fourth-line chemotherapy after two prior chemotherapy regimens that included platinum and docetaxel given concurrently or sequentially. Forty-three patients were selected that fulfilled the criteria, with the one-year survival and median survival after their last therapy being 5.5% and four months, respectively. There were no objective responses, but 39% (7 patients) completing the first course of therapy experienced disease control.

Exhibit 11: CD8+ Cells Secreting IFN- γ After Vaccination



Source: Heat Biologics, Cantor Fitzgerald research

Exhibit 12 summarizes the safety data. Overall, HS-110 was well tolerated with only one Grade 3 adverse event (fatigue). Also, there were no serious adverse events thought to be related to HS-110.

Exhibit 12: Safety Data from Phase I Study

Type of Event	Number of Events	Severity (Number)
Injection Site Reactions	166 (75.8%)	Grade 1 (166)
Respiratory System	9 (4.1%)	Grade 2 (5)
Body as a whole	8 (3.7%)	Grade 1 (4) Grade 2 (3) Grade 3 (1)*
Nervous System	8 (3.7%)	Grade 2 (1)
Musculoskeletal	7 (3.2%)	Grade 2 (5)
Digestive	7 (3.2%)	Grade 1 (7)
Metabolc and Nutrition	6 (2.7%)	Grade 1 (6)
Skin and Appendages (non-injection site reactions)	4 (1.8%)	Grade 2 (1)
Cardiovascular System	2 (0.9%)	Grade 2 (1)
Urogenital System	1 (0.5%)	Grade 1 (1)
Endocrine System	1 (0.5%)	Grade 2 (1)

Source: Heat Biologics, Cantor Fitzgerald research
**Fatigue*

HS-110 – Next Steps

HS-110 Phase II trial is expected to initiate enrollment in 4Q:13, and initial immune data from the dose exploration portion of the trial could be available 2H:14, with the entire trial completing in late 2015 or early 2016. A pivotal/registration study should follow the Phase II trial, and we anticipate results sometime in late 2019/early 2020.

There are roughly 250,000 individuals in the U.S. diagnosed with lung cancer, based on the American Cancer Society's surveillance research. Of the entire patient populations, 85% will have NSCLC, and a further 55% of the NSCLC patients will be diagnosed at stage IIIB or IV, which is the intended Phase II population for the HS-110 study. Treatment for the majority of these patients (≥75%) consists of platinum-based chemotherapy, of which approximately one-third of patients will obtain an objective response and another 20-40% will achieve temporary disease stabilization with median time to progression of 3.5–5 months, and median overall survival of 8-12 months. This is based on randomized controlled studies evaluating platinum doublet therapy that found that the rate of patients achieving at least stable disease was approximately 20-40 %. However, we note that a percentage of patients that do achieve at least stable disease may experience toxicities that prevent maintenance usage.

- at least 85% of lung cancer cases are NSCLC
- 55% of NSCLC cases are diagnosed as stage IIIB or stage IV
- 75% of diagnosed cases are treated with a platinum doublet chemotherapy regimen first-line
- 50-70% of patients taking chemotherapy achieve stable disease or better

Competitive Landscape Could Support Valuation Expansion

As seen in Exhibit 13, there are at least six other vaccines in Phase III for NSCLC, and data could come as early as 2014. Late-stage results, however, have been disappointing. For instance, Merck KGaA evaluated L-BLP25, licensed from Oncothyreon, in a Phase III study in stage III NSCLC after seeing results from a Phase II study evaluating the vaccine versus best supportive care achieving at least stable disease after receiving chemotherapy or chemoradiation therapy. In patients with stage IIIB disease, OS was 30.6 months amongst patients receiving L-BLP25 vs. 13.3 months for patients receiving BSC. Three-year survival was 49% amongst the stage IIIB patients who took L-BLP25 versus 27% in BSC patients. (HR 0.548, 95% CI 0.301–0.999, P = 0.070). The Phase III study enrolled over 1,200 patients and was 90% powered to detect a 6-month improvement in overall survival. The trial missed its endpoint as patients taking L-BLP25 had median OS of 25.6 months versus 22.3 months for patients on placebo, though subset analysis suggests efficacy in certain populations. The vaccine, however, was based on a single antigen and did not include an adjuvant, which may have contributed to the missed endpoint.

We expect the HS-110 Phase II study to provide potential catalysts over the next 18-24 months. The company expects to initiate the study in 4Q:13 and could have results from the first part of the trial during 2H:14. The second part of the trial could commence in 4Q:14 with enrollment ending in mid-2015, with a primary endpoint of PFS. Given the typically short time to relapse in patients with this stage of disease (6 months post treatment), data could be available by the end of 2015/early 2016.

Exhibit 13: Select NSCLC Vaccines in Development

Company	Product	Antigen	Adjuvant	Phase	Indication	Primary Endpoint	Comments
Center of Molecular Immunology (Cuba)	CimaVax (rHuEGF)	EGF	ISA51	Phase III	Stage IIIB/IV NSCLC	OS	Started Phase III in 1Q:12 in Europe, India, Southeast Asia, and Australia
GSK	MAGE-A3	MAGE-A3	AS15	Phase III	Resected Stage IB-IIIA	DFS	According to clinicaltrials.gov, data will be available in January 2014
Merck KGaA	L-BLP25	MUC1	Monophosphoryl lipid A	Phase III	Stage III NSCLC	OS	OS Primary Endpoint - L-BLP25 (25.6 months) vs placebo (22.3 months, adjusted HR 0.88, 95% CI 0.75-1.03, p=0.123). However, in patients receiving initial concurrent chemotherapy - OS: L-BLP25 (30.8 months) vs placebo (20.6 months, HR 0.78; 95% CI 0.64-0.95; p=0.0163).
NewLink	HyperAcute Lung	Multiple	α-GAL	Phase III	Progressive or Relapsed Stage IIIB/IV Cancer vs. docetaxel	OS	Data available in July 2015 according to clinicaltrials.gov. Phase II study was significant for 60% of patients having a ≥10x increasie in interferon-gamma response.
NovaRx	Lucanix (belagenpumatucel)	Multiple	TGF-beta antisense gene modification	Phase III	Stage III-IV	OS	Completed enrollment in June 2012
Transgene/Novartis	TG4010	MUC-1	IL-2 co-expressing viral vector	Phase IIb/III	Stage IIIB/IV NSCLC	OS	Phase IIB data due in 2H:2013 according to website. Previous Phase IIB evaluated vaccine in combination with cisplatin/gemcitabine vs. cisplatin/gemcitabine alone in stage IIIB/IV patients. 92% Stage IV. OS: 17.1 months (experimental arm) vs 11.3 months (control arm) in patients with normal levels of activated Natural Killer cells at baseline.

Source: Clinicaltrials.gov, Decoster, et al, Annals of Oncology, Volume 23: 6:2012; Cantor Fitzgerald research

HS-410 – Exploring an Unmet Need

HS-410 is in development for the treatment of bladder cancer. In this indication, bladder cancer cells are modified by Heat's *ImPACT* technology to secrete gp96-Ig bound to a wide array of bladder cancer antigens. The company anticipates IND activation in 4Q:13 and will start a 93-patient Phase I/II study that examines safety, tolerability, immune response and preliminary clinical activity of HS-410 in patients with high risk, superficial bladder cancer who have completed surgical resection and 3-6 weekly intravesical bacillus Calmet-Guerin (BCG) immunotherapy installation. The Phase I/IIa study will include 12-15 clinical sites with an enrollment period of 9 months for Phase 1 and 9-12 months for Phase 2a. The company plans to spend $5 million on the trial and will use $2 million of proceeds from its July IPO for funding.

The Phase I portion will involve dose exploration and will randomize 18 patients in 1:1 fashion to either a high or low dose group of HS-410. Patients will receive weekly intradermal injections of HS-410 for 18 weeks and immune response will be evaluated at baseline, week 6, week 12 and week 18. The first 4 patients in each dose group will be enrolled at 2 week intervals to allow opportunity to assess safety and tolerability of HS-410. At the completion of the Phase I portion of the study, the dose resulting in the optimal immune response will be advanced to Phase IIa. We expect the trial to finish enrollment during 1H:14, with readout during 2H:14.

The Phase II part of the trial could begin in late 2014, if Phase I immune results are positive. In this study, 75 patients with superficial bladder cancer at high risk for recurrence will be enrolled in 2:1 fashion to receive HS-410 or placebo. The primary endpoint will examine time to first recurrence of bladder cancer. Historically, in this population, 50-60% of patients relapse within 1-2 years. Other endpoints will include recurrence rate, progression-free survival and immune response. Depending on the results of this Phase I/II study and in consideration of the prevalence of the disease, the company may seek fast track designation of HS-410 for this indication.

Sizable Market, Few New Products

We view the U.S. opportunity to be significant, as well. There are approximately 73,000 new cases of bladder cancer annually with up to 50% of patients experiencing recurrence within 12 months. We believe that if there are positive results, Heat could actively seek a partner for Phase III development. However, HS-410 has not been evaluated in any clinical studies, so we are not including it in our estimates at this time.

More Candidates Potentially on the Way

As seen in Exhibit 10, the company has at least two other candidates (HS-310, HS-510) based on *ImPACT* technology being evaluated in ovarian cancer and triple-negative breast cancer. The company's current plans include developing HS-110 and HS-410, with a decision to initiate a clinical trial with either HS-310 for ovarian cancer or HS-510 for triple negative breast cancer in mid-2014.

Exhibit 14: Upcoming Milestones for Heat Pipeline

Date	Product	Indication	Milestone/Event
4Q:13	HS-410	Bladder Cancer	Start Phase I/II study
4Q:13	HS-110	NSCLC	Start Phase II study
1H:14	HS-410	Bladder Cancer	Possible Data to Phase I portion of I/II study
Mid-2014	HS-310	Ovarian Cancer	Possible Start to Phase I/II study
Mid-2014	HS-510	Triple Negative Breast Cancer	Possible Start to Phase I/II study
2H:14	HS-110	NSCLC	Immune Data from Dose Exploration portion of Phase II Study

Source: Heat Biologics, Cantor Fitzgerald research

Management

Jeffrey Wolf - Founder and CEO, Mr. Wolf was formerly the founder and managing director at Seed-One Ventures, a firm focused on the systematic formation and management of new biomedical companies based upon novel research breakthroughs. His start-ups include Avigen (co-founder and director), a San Francisco-based gene therapy company; TyRx Pharma (co-founder and Chairman), EluSys Therapeutics (founder and CEO); GenerationOne (founder and CEO), focused on mobile-based collaborative care; and most recently, Heat Biologics. Mr. Wolf received his M.B.A. from Stanford Business School, his J.D. from New York University School of Law, and his B.A. from the University of Chicago.

Eckhard R. Podack M.D., Ph.D - Dr. Podack is the inventor of the *ImPACT* technology and will serves as Chairman of its Heat's Scientific Advisory Board. Dr. Podack received his medical degree from the Johan Wolfgang Goethe University in Frankfurt in 1968 and his Medical License in 1970. He completed his Ph.D. in the field of Biochemistry at the Georg August University in Gottingen. From 1974-1984 he studied Immunology at the Scripps Clinic and Research Foundation in La Jolla, California, where he received an Established Investigatorship from the American Heart Association. Dr. Podack is the discoverer of perforin and a well-recognized figure in the field of pore forming proteins. Dr. Podack is the Sylvester Distinguished Professor of Microbiology & Immunology and Medicine and Chairman of the Department of Microbiology at the University of Miami, Miller School of Medicine.

Sandra Silberman, M.D., Ph.D – Dr. Silberman is the Chief Medical Officer. She began her career in clinical development at Pfizer, Inc., where she oversaw the introduction of Tarceva into clinical trials. She then served as Senior Director for Novartis Clinical Research, where she led the global development of Gleevec for chronic myelogenous leukemia. Following her position with Novartis, Dr. Silberman joined Eisai Medical Research as Global Therapeutic Area Head (Oncology), a role in which she advanced six novel compounds into Phases I through III in clinical development. Dr. Silberman earned her Ph.D. in Tumor Immunology from Johns Hopkins University and her M.D. from Cornell University Medical College. She completed a fellowship in hematology/oncology at the Brigham & Women's and the Dana Farber Cancer Institute in Boston.

Matthew Czajkowski – Mr. Czajkowski is the Chief Financial Officer. Over the last 15 years he has served as Chief Financial Officer for a variety of early stage and public companies. Mr. Czaijkowski served as the Chief Financial Officer of Pozen, Inc., guiding the company through its IPO and subsequent transition to a public reporting company. He also served as Chief Financial Officer of AAIPharma, Inc. Mr. Czajkowski is a graduate of Harvard College and Harvard Business School.

Jennifer Harris, PharmD – Vice President of Clinical and Regulatory Affairs. Dr. Harris is responsible for coordinating the clinical development and operational efforts at Heat Biologics. She has over 20 years of oncology-focused clinical trial experience within the pharmaceutical and biotechnology industries and academic clinical research settings. Prior to joining Heat Biologics, she served as a Medical Science Liaison for Dendreon Corporation where she was instrumental in coordinating Phase IV clinical trials with sipuleucel-T (Provenge), the first approved autologous cellular immune therapy to treat prostate cancer. While at GlaxoSmithKline and Novaquest, she led international, multi-disciplinary teams providing operational trial oversight of early-stage compounds, including protocol development, study report preparation, investigator brochure preparation, regulatory submissions, and recruitment of investigator sites and establishment of clinical trial budgets. Dr. Harris has also held positions at Celgene Corporation, Millennium Pharmaceuticals, Duke University and the National Institutes of Health, where she was involved with the conduct of multiple clinical trials. She has worked on over 20 IND programs from Phase I-III as well as several NDAs. She earned her Bachelor of Science degree and her Doctor of Pharmacy degrees at the University of North Carolina at Chapel Hill and has multiple clinical publications and meeting abstracts to her credit.

Financial Performance and Outlook

Heat Biologics is a development stage company and has only recognized losses through its history. The company has not recorded profit since its inception. In addition, its only source of revenues has been grant awards. The most recent grant award was a $244K grant coming from the Internal Revenue Service (IRS) reimbursement of qualified investments in a therapeutic discovery project under section 48 of the Internal Revenue Service Code. According to Heat's most recent S-1, the company plans to spend $8.35 million for completion of the Phase II clinical trials evaluating HS-110 in NSCLC. The company also plans to spend $100K to enhance the scope of and pay regulatory fees for the HS-110 lung cancer investigator-sponsored trial to test the use of HS-110. $1.0 million will go to funding the Phase I portion of the Phase I/II trial evaluating HS-410 in superficial bladder cancer. Lastly, the company plans to spend $1.5 million on other Phase I studies. Spending expectations suggest that funding from the company's IPO, assuming no additional sources of funds come into the company, will last into 2015.

HS-110 Opportunity

We believe NSCLC is a sizable opportunity for Heat. While we have not included revenues in our model, we note that HS-110 could be a significant opportunity with positive data. We expect data from the first part of the study to be ready by 2H:14 and for Heat to complete the entire trial by the end of 2015 or early 2016. Since the study is a proof-of-concept, we expect Heat to run at least one additional trial after seeing the Phase II data that will serve as a pivotal/registrational study. We anticipate data from this study to be available by 2019/20 with FDA filing soon after. We expect commercialization in late in 2020.

We are assuming that there will be a little fewer than 274,000 individuals in the U.S. diagnosed with lung cancer in 2020, based on the American Cancer Society's surveillance research. Of the entire patient populations, an estimated 85% will have NSCLC, and 55% of the NSCLC patients will be diagnosed at stage III or IV, which is the intended Phase II population. We expect 75% of those patients to be treated with chemotherapy. Also, we expect 75% of patients to experience at least stable disease and be eligible for vaccination. We looked at randomized controlled studies evaluating platinum doublet and Tarceva therapy and found that the rate of patients achieving at least stable disease was 67-78%.

Additional Financings Likely

Operating expenses have totaled $6.85 million since inception in 2008. We expect expenses to increase as the company funds larger and more advanced studies in NSCLC and bladder cancer. More specifically, we model Heat to spend $10 million in cash and non-cash expenses in 2014, with roughly

equivalent spending on R&D and G&A. We estimate the company to currently have $25 million in cash post-IPO. Should IPO proceeds be spent as planned, the company will likely need additional capital by the end of 2015, which we have incorporated into our financial model.

Valuation

In valuing Heat, we looked at a comparative analysis of enterprise value versus several peer groups (recent IPOs, similar stage of development, cancer vaccine developers and recent IPOs). Heat is currently valued at a steep discount to all of the peer groups. As seen in Exhibit 15, Heat trades at significant discounts to peers; cancer immunotherapy companies, companies with Phase II assets and recent IPOs. This discount could be a function of dependence on a single technology (*ImPACT*) or earlier stage of development versus immunotherapy peers. But we also believe that as Heat's candidates advance into clinical trials, greater value will accrue to the shares. Typical biotech valuations for Phase II candidates are in the $150-250 million range and $100 million for Phase I assets. Based on Heat's Phase II ready HS-110 and Phase I/II ready HS-410 programs, the shares could have compelling upside.

On the basis of advancing milestones, we think the company's EV could expand and drive share price gains. Based on enterprise value expansion observed for peer companies of upwards of 50%, we think the same can be experienced by Heat Biologics. On that basis, we believe Heat shares could trade to $15 based on the advancement of candidates in clinical trials.

Risks

Heat Biologics is a development stage company and investment is subject to risk. These risks include but are not limited to:

- HS-110 could fail to show an efficacy improvement in its Phase II study in NSCLC. The company uses an off-the-shelf supply of tumor cells and it is unclear whether or not these cells can stimulate an immune response against the patient's own tumor.
- HS-110 could also demonstrate a poor safety profile. HS-110 may secrete antigens that stimulate an immune response against normal cells.
- Heat may be unable to secure additional financing. We believe that the company has sufficient cash to fund development of HS-110 and HS-410 through initial stages of development, and additional fund raising may be dependent upon a positive clinical outcome from clinical trials.
- The clinical landscape is crowded with hundreds of oncology clinical trials, especially in NSCLC. It is possible that other technologies show greater benefit to patients than Heat's product candidates, thus rendering potential products obsolete or non-competitive.
- Heat will be switching the manufacturing process from the University of Miami to Lonza between the second and third portions of the Phase II trial evaluating HS-110 in NSCL. However, we cannot exclude the possibility that the switch may not be seamless.

Exhibit 15: Enterprise Value by Peer Group

Sub Sector	Company	Ticker	Price	S/O	Mkt Cap	Pfd Shares	Min Int.	Debt	Cash	EV	HTBX Premium (Discount)
Cancer Vaccine Developers	Advaxis	ADXSD	$2.70	4.77	$12.87	$0.00	$0.00	$3.34	$1.01	15.20	279.4%
	Agenus	AGEN	3.85	29.74	114.51	0.00	0.00	9.23	13.44	110.29	(47.7%)
	Celldex Therapeutics	CLDX	23.6	80.99	1,914.6	0.00	0.00	0.44	154.98	1,760.02	(96.7%)
	Galena Biopharma	GALE	2.37	84.43	200.10	0.00	0.00	9.74	26.81	183.04	(68.5%)
	Immunocellular	IMUC	3.04	54.60	165.97	0.00	0.00	0.00	25.45	140.52	(59.0%)
	Inovio	INO	1.72	189.90	326.63	0.00	0.47	0.00	23.46	303.65	(81.0%)
	Newlink Genetics	NLNK	18.11	25.70	465.45	0.00	0.00	7.32	59.29	413.47	(86.1%)
	Oncothyreon	ONTY	1.74	63.46	110.43	0.03	0.00	0.00	51.01	59.45	(3.0%)
	Average									**373.20**	**(84.6%)**
Phase II Development Stage	Clovis	CLVS	$69.10	30.2	$2,084.82	$0.00	$0.00	$0.00	$372.24	1,712.58	(96.6%)
	Cytrx	CYTR	2.37	30.49	72.26	0.00	0.00	0.00	27.98	44.28	30.2%
	Epizyme	EPZM	29.75	28.42	845.4	0.00	0.00	0.00	148.69	696.72	(91.7%)
	Infinity Pharma	INFI	19.73	47.98	946.70	0.00	0.00	0.00	276.68	670.02	(91.4%)
	Oncomed	OMED	17.40	27.07	470.93	0.00	0.00	0.00	60.22	410.71	(86.0%)
	Oncosec	ONCS	0.30	119.15	35.15	0.00	0.00	1.97	7.33	29.79	93.6%
	Verastem	VSTM	13.91	25.59	356.01	0.00	0.00	0.00	57.45	298.56	(80.7%)
	Coronado Biosciences	CNDO	8.59	33.32	286.25	0.00	0.00	14.77	67.89	233.14	(75.3%)
	Progenics	PGNX	5.21	60.82	316.89	0.00	0.00	0.00	79.22	237.67	(75.7%)
	Average									**481.50**	**(88.0%)**
Recent IPOs	Tesaro Inc.	TSRO	$33.92	32.62	1,106.47	0.00	0.00	0.00	178.09	928.38	(93.8%)
	Epizyme	EPZM	29.75	28.42	845.4	0.00	0.00	0.00	148.69	696.72	(91.7%)
	BlueBird Bio	BLUE	25.63	23.72	607.97	0.00	0.00	0.00	228.85	379.12	(84.8%)
	Merrimack Pharmaceuticals	MACK	3.63	102.21	371.02	0.00	(0.24)	40.56	62.24	349.10	(83.5%)
	Intercept Pharmaceuticals	ICPT	44.68	19.18	857.01	0.00	0.00	0.00	161.80	695.21	(91.7%)
	ChemoCentryx	CCXI	8.10	42.84	346.97	0.00	0.00	0.62	129.77	217.82	(73.5%)
	Regulus Therapeutics	RGLS	9.52	41.33	393.47	0.00	0.00	14.59	82.72	325.35	(82.3%)
	Receptos	RCPT	16.66	18.34	305.51	0.00	0.00	4.82	91.15	219.19	(73.7%)
	Stemline Therapeutics	STML	34.76	12.54	435.86	0.00	0.00	0.00	92.69	343.17	(83.2%)
	Enanta Pharmaceuticals	ENTA	18.67	17.91	334.42	0.00	0.00	0.00	94.55	239.87	(76.0%)
	Average									**$439.39**	**(86.9%)**
	Heat Biologics	**HTBX**	**$10.05**	**6.09**	**61.17**	**0.08**	**(0.10)**	**1.39**	**4.89**	**57.65**	

Source: Cantor Fitzgerald estimates, Company reports, Factset

Exhibit 16: Annual Sales and Earnings

Heat Biologics

All figures in millions	2018E	2017E	2016E	2015E	2014E	2013E
Revenue	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Product Sales	0.00	0.00	0.00	0.00	0.00	0.00
Grants	0.00	0.00	0.00	0.00	0.00	0.00
Cost of Goods Sold	0.00	0.00	0.00	0.00	0.00	0.00
Gross Profit	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Gross Profit Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Operating Expenses						
G&A	7.11	6.87	6.29	5.52	4.97	1.21
R&D	11.48	9.89	8.04	6.19	5.11	2.42
Total Operating Expenses	18.59	16.76	14.33	11.70	10.08	3.63
Profit (Loss) from Operations	**($18.59)**	**($16.76)**	**($14.33)**	**($11.70)**	**($10.08)**	**($3.63)**
Operating Profit Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Interest Income (Expense)	*($0.08)*	*($0.06)*	*(0.13)*	*(0.12)*	*(0.11)*	*(0.11)*
Other Income (Expense)	0.03	0.07	0.11	0.10	*0.09*	*0.09*
Income (Loss) from Continuing Operations	**($18.64)**	**($16.75)**	**($14.35)**	**($11.72)**	**($10.11)**	**($3.65)**
Pretax Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Income Tax Paid (Benefit)	0.00	0.00	0.00	0.00	0.00	0.00
Net Income (Loss)	**($18.64)**	**($16.75)**	**($14.35)**	**($11.72)**	**($10.11)**	**($3.65)**
Non-controlling Interest	($1.40)	($1.26)	($1.08)	($0.88)	($0.61)	($0.24)
Net Income to Heat Biologics	**($17.24)**	**($15.50)**	**($13.28)**	**($10.85)**	**($9.50)**	**($3.41)**
Beneficial Conversion Charge	$0.00	$0.00	$0.00	$0.00	$0.00	($2.30)
Net Attributable to Common Shareholders	**($17.24)**	**($15.50)**	**($13.28)**	**($10.85)**	**($9.50)**	**($5.71)**
Net Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Diluted Earnings (Net Loss) Per Share	***($1.62)***	***($1.81)***	***($1.61)***	***($1.68)***	***($1.53)***	***($1.55)***
Shares Outstanding	10.64	8.56	8.23	6.44	6.19	3.67

Source: Heat Biologics, Cantor Fitzgerald research

Exhibit 17: Sales and Earnings by Quarter

Heat Biologics

All figures in millions	2014E	4Q14E	9Mos14E	3Q14E	6Mos14E	2Q14E	1Q14E	CY2013E	4Q2013E	9Mos13E	3Q13E	6Mos13E	2Q13E	1Q13A
Revenue	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Product Sales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cost of Goods Sold	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross Profit	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gross Profit Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Operating Expenses														
SG&A	4.97	1.20	3.77	1.39	2.38	1.16	1.22	1.21	0.35	0.86	0.31	0.55	0.28	0.27
R&D	5.11	1.47	3.64	1.34	2.30	1.19	1.11	2.42	1.00	1.42	0.46	0.96	0.46	0.50
Total Operating Expenses	10.08	2.67	7.41	2.73	4.68	2.35	2.33	3.63	1.35	2.28	0.77	1.51	0.74	0.77
Profit (Loss) from Operations	**($10.08)**	**($2.67)**	**($7.41)**	**($2.73)**	**($4.68)**	**($2.35)**	**($2.33)**	**($3.63)**	**($1.35)**	**($2.28)**	**($0.77)**	**($1.51)**	**($0.74)**	**($0.77)**
Operating Profit Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Interest Income (Expense)	(0.11)	(0.03)	(0.09)	(0.03)	(0.06)	(0.03)	(0.03)	(0.11)	(0.03)	(0.09)	(0.03)	(0.06)	(0.03)	(0.03)
Other Income (Expense)	0.09	0.04	0.05	0.03	0.02	0.01	0.01	0.09	0.04	0.05	0.03	0.02	0.01	0.01
Income (Loss) from Continuing Operations	**($10.11)**	**($2.66)**	**($7.44)**	**($2.73)**	**($4.72)**	**($2.37)**	**($2.35)**	**($3.65)**	**($1.34)**	**($2.31)**	**($0.77)**	**($1.54)**	**($0.76)**	**($0.79)**
Pretax Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Income Tax Paid (Benefit)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income (Loss)	***($10.11)***	***($2.66)***	***($7.44)***	***($2.73)***	***($4.72)***	***($2.37)***	***($2.35)***	***($3.65)***	***($1.34)***	***($2.31)***	***($0.77)***	***($1.54)***	***($0.76)***	***($0.79)***
Non-controlling Interest	***($0.61)***	***($0.20)***	***($0.41)***	***($0.20)***	***($0.20)***	***($0.18)***	***($0.02)***	***($0.24)***	***($0.10)***	***($0.14)***	***($0.06)***	***($0.08)***	***($0.06)***	***($0.02)***
Net Income to Heat Biologics (Loss)	***($9.50)***	***($2.46)***	***($7.04)***	***($2.52)***	***($4.51)***	***($2.19)***	***($2.32)***	***($3.41)***	***($1.24)***	***($2.17)***	***($0.71)***	***($1.46)***	***($0.70)***	***($0.76)***
Beneficial Conversion Charge	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	($2.30)	$0.00	($2.30)	$0.00	($2.30)	$0.00	($2.30)
Net Attributable to Common Shareholders	***($9.50)***	***($2.46)***	***($7.04)***	***($2.52)***	***($4.51)***	***($2.19)***	***($2.32)***	***($5.71)***	***($1.2)***	***($4.47)***	***($0.7)***	***($3.76)***	***($0.7)***	***($3.1)***
Net Margin	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*	*NM*
Basic & Diluted Net Loss Per Share	***($1.53)***	***($0.39)***	***($1.14)***	***($0.41)***	***($0.74)***	***($0.36)***	***($0.38)***	***($1.55)***	***($0.20)***	***($1.56)***	***($0.15)***	***($2.02)***	***($0.38)***	***($1.66)***
Shares Outstanding	*6.19*	*6.29*	*6.16*	*6.22*	*6.13*	*6.14*	*6.11*	*3.67*	*6.08*	*2.87*	*4.90*	*1.86*	*1.86*	*1.86*

Year/Year Percent Change	CY14/ CY13	4Q14/ 4Q13	9Mos14/ 9Mos13	3Q14/ 3Q13	6Mos14/ 6Mos13	2Q14/ 2Q13	1Q14/ 1Q13	CY13/ CY12	4Q13/ 4Q12	9Mos13/ 9Mos12	3Q13/ 3Q12	6Mos13/ 6Mos12	2Q13/ 2Q12	1Q13/ 1Q12
SG&A	*311.4*	*242.9*	*339.3*	*348.4*	*334.2*	*314.3*	*355.0*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
R&D	*111.3*	*47.4*	*156.3*	*191.3*	*139.6*	*158.7*	*122.0*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Total Operating Expenses	*177.9*	*98.1*	*225.3*	*254.5*	*210.3*	*217.6*	*203.3*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Shares Outstanding	*68.4*	*3.4*	*114.4*	*27.1*	*229.3*	*230.1*	*228.5*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Source: Heat Biologics, Cantor Fitzgerald research

Exhibit 18: Balance Sheet

Heat Biologics

Assets	1Q13A	2012A	2011A
Cash & cash equivalents	$4.89	$0.01	$0.10
Releated Party Receivable	0.00	0.01	0.00
Stock Subscription Receivable	0.04	0.00	0.00
Miscellaneous Receivable	0.01	0.00	0.00
Prepaid expenses & other	0.17	0.06	0.01
Total current assets	**$5.10**	**$0.07**	**$0.10**
Property & equipment, net	0.01	0.01	0.01
Debt Issuance Costs, net	0.03	0.03	0.06
Restricted Cash	0.03	0.03	0.00
Deposits	0.01	0.01	0.01
Total assets	**$5.18**	**$0.15**	**$0.18**
Liabiilty & Shareholder Equity			
Accounts payable	$0.86	$0.51	$0.35
Accrued expenses	0.17	0.13	0.03
Accrued Interest	0.03	0.01	0.00
Related party payables	0.00	0.00	0.01
Liabilities related to discontinued operations	0.00	0.00	0.06
Notes payable - Current portion	0.31	0.07	0.00
Total current liabilities	**$1.37**	**$0.72**	**$0.45**
Related party payables	0.00	0.00	0.01
Notes payable - Current portion	0.62	0.66	0.00
Convertible Notes payable	0.47	0.20	0.00
Preferred stock warrants liability	0.08	0.09	0.06
Total liabilities	**$2.53**	**$1.66**	**$0.52**
Series 1 preferred stock	0.00	0.00	0.00
Series A preferred stock	0.00	0.00	0.00
Series B-1 preferred stock	0.00	0.00	0.00
Common stock	0.00	0.00	0.00
Additional paid-in capital	9.44	4.50	3.21
Accumulated deficit	(6.70)	(5.94)	(3.52)
Stockholders' equity	2.74	(1.44)	(0.31)
Non-Controlling Interest	(0.10)	(0.08)	(0.03)
Total liabilities & stockholders' equity	**$5.18**	**$0.15**	**$0.18**

Source: Heat Biologics, Cantor Fitzgerald research

Exhibit 19: Select Biotechnology Stocks (all market capitalization ranges)

Biotechnology — **Mara Goldstein - 212.610.2215**
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Mkt Cap. Range	Company (a)	Ticker	Rating	Price 8/29/13	Market Cap. (mil)	52-Week High	52-Week Low	Performance YTD	Performance QTD	Performance 1-Year	EPS (b) 2012A	EPS (b) 2013E	EPS (b) 2014E	Revenue Per Share (b) 2012A	Revenue Per Share (b) 2013E	Revenue Per Share (b) 2014E	Per Share Cash (b)	EV (b) (mil)	Short Interest
Small Cap	Agenus	AGEN	NC	$3.66	$108.9	$5.40	$3.23	-13.7%	-4.2%	-22.9%	($0.51)	($1.30)	($0.76)	$0.54	$0.13	$0.25	$0.45	$104.6	1,630,079
	Agios	AGIO	NC	24.87	749.3	33.45	22.34	NA	NA	NA	(1.11)	(1.26)	(1.06)	0.83	0.83	1.15	3.84	749.5	529,769
	Astex	ASTX	NC	6.87	652.3	6.99	2.14	136.1%	57.9%	132.1%	0.08	(0.29)	(0.69)	0.88	0.64	0.32	1.41	518.3	6,027,358
	Cleveland BioLabs	CBLI	BUY	1.79	80.6	2.95	1.23	32.6%	18.5%	9.8%	(0.69)	(0.51)	(0.52)	0.10	0.17	0.31	0.30	79.3	1,941,497
	Curis	CRIS	NC	4.57	373.3	4.63	2.66	24.9%	33.6%	5.5%	(0.21)	(0.16)	(0.26)	0.21	0.18	0.21	0.70	346.6	6,190,967
	Endocyte	ECYT	NC	15.19	547.6	19.00	7.50	59.9%	10.2%	63.2%	(0.48)	(0.73)	(0.37)	0.96	1.76	3.11	3.07	436.9	2,481,960
	Epizyme	EPZM	NC	28.86	820.1	45.72	18.60	NA	-3.6%	NA	(0.72)	(1.52)	(0.65)	1.59	1.50	2.00	5.23	671.4	659,702
	Galena Biopharma	GALE	BUY	2.23	188.3	3.00	1.23	40.3%	0.9%	28.9%	(0.53)	(0.53)	(0.53)	0.00	0.00	0.00	0.27	165.3	14,066,296
	Heat Biologics	HTBX	BUY	9.97	60.7	11.23	9.01	NA	NA	NA	(3.03)	(1.55)	(1.53)	0.00	0.00	0.00	3.78	37.7	2,318
	Merrimack Pharmaceut	MACK	NC	3.36	343.4	11.11	3.26	-46.1%	-51.4%	-56.3%	(1.28)	(1.20)	(1.11)	0.48	0.63	0.66	0.61	321.5	11,933,462
	NewLink Genetics	NLNK	BUY	17.72	455.4	23.67	10.60	48.8%	-12.1%	23.9%	(1.12)	(1.42)	(2.13)	0.07	0.04	0.18	2.31	403.4	3,355,520
	Oncothyreon	ONTY	BUY	1.68	106.7	6.24	1.55	-17.2%	3.1%	-69.3%	(0.53)	(0.59)	(0.65)	0.00	0.00	0.00	0.80	55.7	5,930,905
	Sunesis Pharma	SNSS	BUY	4.93	254.9	6.85	2.30	17.7%	-10.4%	49.4%	(0.91)	(0.86)	(0.71)	0.07	0.10	0.15	1.19	227.2	7,078,396
	Verastem	VSTM	BUY	14.04	359.3	18.82	6.25	41.8%	-0.8%	59.9%	(1.70)	(1.78)	(2.03)	0.00	0.00	0.00	2.24	301.9	903,193
	Average				**$364.3**			**29.5%**	**3.5%**	**20.4%**	**($0.91)**	**($0.98)**	**($0.93)**	**$0.41**	**$0.43**	**$0.60**	**$1.87**	**$315.7**	**$4,480,815.9**
Mid Cap	Ariad	ARIA	NC	$18.63	$3,448.54	$25.40	$15.35	-7.3%	-4.6%	-9.1%	($1.34)	($1.62)	($1.30)	$0.00	$0.34	$0.94	$1.90	$3,153.3	17,804,182
	Celldex	CLDX	BUY	22.41	1,814.9	23.99	5.02	220.1%	37.0%	326.0%	(1.01)	(1.04)	(0.99)	0.14	0.05	0.01	2.28	1660.4	7,873,169
	Dendreon	DNDN	HOLD	2.91	458.92	7.22	2.69	-50.0%	-32.3%	-39.5%	(2.65)	(1.64)	(0.77)	2.06	2.19	2.27	2.19	843.4	53,892,764
	Exelixis	EXEL	NC	5.16	949.12	5.56	4.26	6.7%	10.6%	12.3%	(0.92)	(1.32)	(1.36)	0.26	0.18	0.21	1.98	921.1	40,334,705
	Immunogen (c)	IMGN	HOLD	16.29	1,386.4	20.25	10.85	20.8%	-5.2%	13.6%	(0.95)	(0.90)	(0.71)	0.19	0.43	0.65	2.01	1,191.5	8,822,513
	Incyte	INCY	NC	34.24	5,240.8	37.46	15.43	101.4%	49.4%	69.5%	(0.34)	(0.28)	0.32	1.94	2.28	3.38	2.76	5,096.3	11,572,933
	Medivation	MDVN	NC	56.57	4,254.7	59.86	41.89	9.8%	8.7%	15.4%	(0.56)	(0.87)	0.40	0.80	2.42	3.23	3.27	4,210.4	3,311,684
	ONYX Pharma	ONXX	NC	123.60	9,075.9	136.87	68.12	59.9%	-5.9%	71.9%	(2.50)	(1.68)	0.56	6.09	4.93	8.66	10.22	8,506.2	4,181,735
	Pharmacyclics	PCYC	NC	114.74	8,393.1	119.77	44.91	86.8%	34.4%	73.3%	0.17	(0.41)	0.48	0.11	1.12	1.91	6.90	7,888.1	970,807
	Seattle Genetics	SGEN	SELL	43.36	5,283.2	44.33	21.05	79.6%	32.6%	62.1%	(0.46)	(0.93)	0.02	1.16	1.70	1.55	2.87	4,945.1	16,165,773
	Spectrum Pharm	SPPI	NC	7.76	491.3	13.52	6.92	-33.4%	-1.0%	-35.3%	1.46	(0.35)	(0.07)	3.05	4.23	2.45	1.97	417.0	20,202,401
	Average				**$3,708.8**			**44.9%**	**11.2%**	**50.9%**	**($0.83)**	**($1.00)**	**($0.31)**	**$1.44**	**$1.81**	**$2.30**	**$3.49**	**$3,530.3**	**16,830,242**
Large Cap	Alexion	ALXN	NC	$109.30	$21,374.5	$125.65	$81.82	9.2%	14.0%	2.6%	$2.13	$3.02	$3.32	$5.80	$7.82	$9.77	$5.72	$20,392.1	2,866,564
	Amgen	AMGN	NC	108.86	82,010.3	116.25	80.60	22.1%	11.7%	30.0%	6.51	7.33	8.16	22.92	24.27	25.32	29.23	83,907.3	8,374,397
	Biogen Idec	BIIB	NC	214.13	50,892.7	242.64	134.00	42.8%	-1.7%	46.8%	6.53	8.53	10.81	23.21	28.61	33.41	2.81	50,955.2	2,661,623
	Celgene	CELG	BUY	142.58	58,639.7	149.92	70.42	75.8%	19.9%	99.1%	4.91	5.95	7.43	13.15	14.81	17.61	9.92	58,176.5	3,990,494
	Gilead	GILD	NC	60.93	93,261.0	64.04	28.51	62.4%	18.0%	111.0%	1.95	1.96	3.02	6.34	7.04	8.82	1.49	98,562.8	58,251,214
	Regeneron	REGN	NC	243.58	23,556.6	283.99	136.13	34.4%	5.8%	67.4%	6.75	7.02	8.89	14.25	19.99	25.66	5.56	23,492.4	3,352,740
	Vertex	VRTX	NC	77.25	17,984.7	89.96	38.44	77.0%	-4.0%	44.9%	(0.50)	(2.29)	(1.73)	6.56	5.06	4.22	6.40	17,119.8	3,487,139
	Average				**$49,674.2**			**46.2%**	**9.1%**	**57.4%**	**$4.04**	**$4.50**	**$5.70**	**$13.18**	**$15.37**	**$17.83**	**$8.73**	**$36,149.9**	**11,854,882**
Indices	S&P 500	SP50	NA	1,638.2		1,709.67	1,343.35	12.0%	1.4%	16.1%	NM	109.9	122.0	NM	1,148.4	1,199.1			
	Dow Jones Ind	DJII	NA	14,841.0		15,658.43	12,438.44	10.6%	-0.9%	13.2%	NM	1,105.8	1,196.2	NM	11,120.1	11,600.1			
	NASDAQ Comp	COMP	NA	3,620.3		3,694.19	2,810.80	16.3%	5.4%	17.5%	NM	185.3	214.0	NM	1,961.9	2,094.7			
	Amex Biotech Index	BTK	NA	2,085.8		2,194.75	1,391.58	30.1%	4.1%	41.3%	NM	69.0	90.9	NM	284.4	323.7			
	NASDAQ Biotech	NBI	NA	2,044.3		2,102.62	1,329.03	38.3%	9.7%	44.4%	NM	48.9	71.8	NM	298.8	340.7			

Mkt Cap. Range	Company	Ticker	Rating	Price Change From High	Price Change From Low	P/E 2012A	P/E 2013E	P/E 2014E	Price/Sales 2012A	Price/Sales 2013E	Price/Sales 2014E	Price/ Cash	Price/ Debt	Price/ BV	EV/ EBITDA	EV/ Net Inc.	EV/ FCF	EV/ Sales	EV/ BV
Mid	Spectrum Pharm	SPPI	NC	-42.6%	12.1%	5.3	(22.1)	(105.0)	2.55	1.84	3.16	NA	NM	$1.64	4.4	(18.7)	6.7	1.6	1.4
Large	Alexion	ALXN	NC	-13.0%	33.6%	51.3	36.1	32.9	18.85	13.97	11.19	19.09	NM	10.80	49.6	34.5	52.5	18.0	10.3
Large	Amgen	AMGN	NC	-6.4%	35.1%	16.7	14.9	13.3	4.75	4.49	4.30	3.72	3.43	4.32	11.8	15.2	20.6	4.9	4.4
Large	Biogen Idec	BIIB	NC	-11.7%	59.8%	32.8	25.1	19.8	9.23	7.49	6.41	76.22	69.76	7.28	23.5	25.1	31.4	9.2	7.3
Large	Celgene	CELG	BUY	-4.9%	102.5%	29.1	24.0	19.2	10.84	9.63	8.10	14.37	16.21	10.51	27.5	23.8	30.5	10.6	10.4
Large	Gilead	GILD	NC	-4.9%	113.7%	31.2	31.2	20.1	9.61	8.66	6.91	40.77	NA	9.94	23.5	32.9	35.2	10.2	10.5
Large	Regeneron	REGN	NC	-14.2%	78.9%	36.1	34.7	27.4	17.09	12.19	9.49	43.83	49.77	19.03	NM	34.6	NM	17.0	19.0
Large	Vertex	VRTX	NC	-14.1%	101.0%	(154.5)	NM	NM	11.78	15.26	18.31	12.08	45.20	16.80	404.1	(32.1)	87.0	11.2	15.99
	Large Cap Only (d)					6.1	27.7	19.0	11.7	10.2	9.2	$30.01	$36.87	$11.24	90.0	19.2	42.9	11.6	11.1

(a) All companies listed on NASDAQ

(b) All figures consensus estimates except for rated companies. Rated companies are Cantor Fitzgerald estimates. EPS and revenue per share exclude option expense and other one-time items, when available, otherwise EPS actual and estimates reflect non GAAP format.

(c) ImmunoGen CY estimates represent fiscal year-end (June) figures.

(d) Excludes Spectrum Pharmaceuticals (SPPI)

Source: Cantor Fitzgerald research, FactSet

Company Description

Heat Biologics is a development-stage company focused on therapeutic cancer vaccines employing the company's proprietary technology that harnesses the immune-provoking ability of gp96, a heat shock protein, in an allogenic, "off the shelf", vaccine.

Companies Mentioned:

Advaxis, Inc. (ADXS - OTC BB): NC
Agenus Inc. (AGEN - NASDAQ): NC
Agios Pharmaceuticals, Inc. (AGIO - NASDAQ): NC
Alexion Pharmaceuticals Inc. (ALXN - NASDAQ): NC
Amgen Inc. (AMGN - NASDAQ): NC
Ariad Pharmaceuticals Inc. (ARIA - NASDAQ): NC
Astex Pharmaceuticals Inc. (ASTX - NASDAQ): NC
Bavarian Nordic (BAVA - CSE): NC
Biogen Idec (BIIB - NASDAQ): NC
bluebird bio, Inc. (BLUE - NASDAQ): NC
Bristol-Myers Squibb Company (BMY - NYSE): NC
Celgene Corporation (CELG - NASDAQ): BUY
Celldex Therapeutics, Inc. (CLDX - NASDAQ): BUY
ChemoCentryx Inc. (CCXI - NASDAQ): NC
Cleveland BioLabs, Inc. (CBLI - NASDAQ): BUY
Clovis Oncology Inc. (CLVS - NASDAQ): NC
Coronado Biosciences Inc. (CNDO - NASDAQ): NC
Curis Inc. (CRIS - NASDAQ): NC
CytRx Corporation (CYTR - NASDAQ): NC
Dendreon Corporation (DNDN - NASDAQ): HOLD
Enanta Pharmaceuticals, Inc. (ENTA - NASDAQ): NC
Endocyte Inc. (ECYT - NASDAQ): NC
Epizyme, Inc. (EPZM - NASDAQ): NC
Exelixis Inc. (EXEL - NASDAQ): NC
Galena Biopharma (GALE - NASDAQ): BUY
Gilead Sciences Inc. (GILD - NASDAQ): NC
GlaxoSmithKline plc (GSK - NYSE): NC
Heat Biologics, Inc. (HTBX - NASDAQ): BUY
ImmunoCellular Therapeutics Ltd. (IMUC - NASDAQ): NC
ImmunoGen, Inc. (IMGN - NASDAQ): HOLD
Incyte Corporation (INCY - NASDAQ): NC
Infinity Pharmaceuticals, Inc. (INFI - NASDAQ): NC
Inovio Pharmaceuticals, Inc. (INO - NYSE): NC
Intercept Pharmaceuticals, Inc. (ICPT - NASDAQ): NC
Medivation Inc. (MDVN - NASDAQ): NC
Merck & Co., Inc. (MRK - NYSE): NC
Merck KGaA (MRK.DE - XETRA): NC
Merrimack Pharmaceuticals Inc. (MACK - NASDAQ): NC
NewLink Genetics Corporation (NLNK - NASDAQ): BUY
Northwest Biotherapeutics Inc. (NWBO - NASDAQ): NC
Novartis AG (NVS - NYSE): NC
OncoMed Pharmaceuticals, Inc. (OMED - NASDAQ): NC
OncoSec Medical Inc. (ONCS - NASDAQ): NC
Oncothyreon Inc. (ONTY - NASDAQ): BUY
ONYX Pharmaceuticals Inc. (ONXX - NASDAQ): NC
Pharmacyclics Inc. (PCYC - NASDAQ): NC
Progenics Pharmaceuticals, Inc. (PGNX - NASDAQ): NC
Receptos, Inc. (RCPT - NASDAQ): NC
Regeneron Pharmaceuticals Inc. (REGN - NASDAQ): NC
Regulus Therapeutics Inc. (RGLS - NASDAQ): NC
Roche Holdings (ROG.VX - SWX): NC
Seattle Genetics, Inc. (SGEN - NASDAQ): SELL
Spectrum Pharmaceuticals Inc. (SPPI - NASDAQ): NC
Stemline Therapeutics, Inc. (STML - NASDAQ): NC
Sunesis Pharmaceuticals, Inc. (SNSS - NASDAQ): BUY
Tesaro, Inc. (TSRO - NASDAQ): NC
Transgene (TNG.PA - NXT PA): NC
Verastem, Inc. (VSTM - NASDAQ): BUY

Vertex Pharmaceuticals Inc. (VRTX - NASDAQ): NC
Aduro Biotech (private)
Biosante (private)
Lonza (private)
NovaRx (private)

Disclosures Appendix

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			IB Serv./Past 12 Mos.	
Rating	Count	Percent	Count	Percent
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HOLD [H]	47	35.34	4	8.51
SELL [S]	13	9.77	2	15.38