*"**Antibiotic resistance is a global threat** that has the potential to wipe out many of the major health benefits that have occurred over the last century"*
Lindsay Baden, MD, Harvard Medical School, Infectious Disease Physician

*"A Novophage product that decreases antibiotic-resistance rates and improves patient outcomes would be **very exciting and useful to clinicians and hospitals**"*
Joel Katz, MD, Brigham & Women's Hospital, Infectious Disease Specialist

*"The ability to control hospital-based infections would **add tens of millions of dollars** straight to a medical center's bottom line."*
John Paul, recently retired CFO, University of Pittsburgh Medical Center

Business Plan
April 2009

1 Market Opportunity

The CDC estimates that nearly 2 million bacterial infections are acquired by patients each year in US hospitals, resulting in direct health care costs of $28-34 billion (2007 USD)[1]. Over $8 billion was spent in the US on antibiotic therapy in 2002[2]. Bacterial infections are becoming increasingly difficult to treat for two reasons: 1) the increasing prevalence of antibiotic-resistant bacteria such as methicillin (oxacillin)-resistant Staphylococcus aureus (MRSA); and 2) many years of under-investment in new therapeutic strategies.

In the mid-1980s, 1-5% of *S. aureus* isolates were methicillin-resistant, and today 60% to 70% of *S. aureus* strains found in hospitals are multidrug-resistant MRSA[3]. In 2005 over 94,000 cases of invasive MRSA infections alone occurred in the US with nearly 19,000 deaths[4].

Since the early 1980's only two new classes of antibiotics have been approved by the FDA[5], and in fact, many pharmaceutical companies abandoned or dramatically slowed discovery in the infectious diseases in the late 1980's and early 1990's[6]. Reflecting this decrease in investment, the global antibiotic market actually shrank from 2004 to 2006 due to a shift of sales from brand products to generic products following recent patent expirations (down 1.8% in 2006 to $22.6 billion from $23.4 billion in 2004)[7].

In short, "With increasing levels of antibiotic resistance, an insecure pipeline, and a dwindling number of companies investing in anti-infective agents, we have reached an unsettling impasse in medicine," according to Dr. Richard P. Wenzel, former President of the International Society for Infectious Disease and Chairman of the Department of Internal Medicine at Virginia Commonwealth University[8].

Novophage Therapeutics will introduce a new biological therapy that slows the onset of antibiotic resistance and increases the efficacy of current antibiotics based on knowledge and engineering from MIT, Boston University, and Harvard Medical School. Novophage Therapeutics will penetrate the antibiotic market by offering efficacious treatments for highly antibiotic-resistant bacterial infections. Infectious disease doctors can therefore better manage the fight against multidrug-resistant strains through co-administration of our engineered bacteriophages with current clinical standards-of-care.

Novophage will enter the market by focusing on MRSA complicated skin and skin structure infections (cSSSI) acquired in hospital settings such as abscesses, infected ulcers, infected wounds, and surgical site infections. Complicated SSSI accounts for almost 10% of all hospital admissions for infections in the US[9]. Additionally, out of 94,000 invasive MRSA cases in the US reported in 2005, approximately 40,200 cases were cSSSI[10]. While Novophage Therapeutics is currently focused on the US market (US is 35% of the

[1] CDC Report by R. Douglas Scott II. March 2009. The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention.
[2] Kalorama Information. April 2003 Market Report: World Market for Anti-Infectives. US represents only 35% of the global prescription antibiotic market.
[3] Science. 2008; 321: 356-361. From Henry Chambers, infectious disease specialist at the University of California, San Francisco.
[4] JAMA. 2007; 298 (15): 1763-1771.
[5] Oxazolidinones (linezolid) & cyclic lipopeptides (daptomycin)
[6] N Engl J Med. 2004; 351(6): 523-526.
[7] Kalorama Information. April 2007 Market Report: Anti Infectives, Vol II: Antibacterials.
[8] N Engl J Med. 2004; 351(6): 523-526.
[9] Centers for Disease Control. MMWR 2001; 50: 381–384.
[10] MRSA infections acquired in the community are approximately 15% of all MRSA infections with SSSI representing 75% of these infections. MRSA infections acquired related to health care delivery are approximately 85% of all MRSA infections with SSSI representing 37% of these infections. JAMA. 2003;290(22):2976-2984.

global prescription antibiotics market), *S. aureus* is also the main pathogen for SSSI in Latin American and Europe where MRSA resistance rates are 29% and 23%, respectively[11].

The entry strategy into the antibiotic market via cSSSI is similar to strategies used by the recently approved antibiotic drugs: 1) daptomycin known as Cubicin by Cubist Pharmaceuticals; and 2) tigecyclin known as Tygacil developed by Wyeth. Daptomycin was the first lipopeptide antibiotic and received its first approval for cSSSI in 2003. Two years post-approval, off-label use included vancomycin-resistant enterococcus (VRE), bacteremia, and endocarditis[12]. The 2008 net product sales of Daptomycin/Cubicin were $414 million. Tigecyclin was also a first in class antibiotic for glycylcyclines with its first approval for cSSSI, as well as complicated intra-abdominal infections (cIAI). Off-label use of tigecyclin was reported for ventilator associated pneumonia[13] and septic patients[14]. Q4 sales for Tygacil in 2008 were $60 million.

The cSSSI market is an appealing therapeutic entry point because the unmet need with MRSA is significant; the situation for identifying patients is controlled; and the patient population is significant. However, the market potential for Novophage Therapeutics is much larger as the therapeutic approach is applicable to many different areas of infectious diseases as indicated in Table 1

Therapeutic Indication	Global Market[15] (Millions USD 2006)	US Market[16] (Millions USD 2006)	US Market *MRSA*[17] (Millions USD 2006)
Skin and Skin Structure Infections (SSSI)	$2878	$1213	$220
Respiratory & ear Infections	$10,411	$4635	$155 (pneumonia only)
Urinary Tract Infections	$1226	$565	$32
Bloodstream Infections	Undetermined	Undetermined	$134

Table 1: Market sizes for various therapeutic indications.

The significant costs associated with hospital-acquired infections, combined with the rise in antibiotic resistance and the dearth of novel options, create a unique opportunity for Novophage to enter the market at price parity with the current proprietary treatment options. Treatment cost (wholesale) based on 2006 Red Book for Cubicin is $0.365/mg or approximately $720 per treatment course[18].

[11] Diagnostic Microbiology and Infectious Disease. 2007;57:7-13. Incidence determined from data reported from 1998-2004.
[12] Drug Therapy Topics 2005; 34 (6): 29-31.
[13] Pharmacotherapy 2007;27(7):980–987).
[14] Journal of Antimicrobial Chemotherapy 2008 61(3):729-733.
[15] Kalorama Information. April 2007 Market Report: Anti Infectives, Vol II: Antibacterials. Some markets may be larger as market report had significant categories identified as "Other."
[16] Kalorama Information. April 2007 Market Report: Anti Infectives, Vol II: Antibacterials. Revenue for antibiotic class for a given therapeutic areas was weighted by US share of market for that antibiotic class.
[17] Prevention and Control of Healthcare-Associated Infections In Massachusetts. JSI Research and Training Institute, Inc. in Collaboration with the Massachusetts Department of Public Health. January 31, 2008.
[18] http://www.cubicin.com/cost-data/ at 4 mg/kg/day dose and 70 kg person for 7 days.

2 Novophage Solution

Problem

Antibiotic-resistant bacterial infections are a quickly rising worldwide problem. Significant under-investment in new ways to combat infection has resulted in a sparse therapeutic pipeline, limiting the number of options infectious disease doctors have to defeat infections. Patients with severe infections at best have longer stays in the hospital and at worst lose limbs or die.

Solution

Novophage Therapeutics offers a differentiated antibiotic adjuvant therapy with three unique characteristics:

1. It significantly slows the onset of antibiotic resistance by disrupting the mechanisms bacteria use to evolve resistance;
2. It increases the killing efficacy of antibiotics against bacteria in biofilms by producing enzymes to degrade biofilms; and
3. It potentiates killing of bacteria, directly by producing additional antimicrobial agents

Novophage's novel approach uses genetically-enhanced bacteriophages. Bacteriophages are viruses ubiquitous in the natural environment that selectively infect and destroy bacteria only. Novophage's scientific founders harnessed new knowledge and tools in molecular and genetic biology to selectively insert and modify genes in the bacteriophage genome to enhance the natural killing functions of bacteriophages such as self-replication and the ability to burst through bacterial cell walls. When the enhanced bacteriophages are used in combination with corresponding classes of antibiotics, the combination therapy is more effective at bacterial killing and slows the onset of antibiotic resistance relative to antibiotic therapy alone.

The figure below illustrates the action of antibiotics alongside the three different features of the engineered bacteriophage and how the bacteriophage uses the infected bacteria's own cellular machinery to produce agents that prevent resistance, that breakdown biofilms, and that directly enhance killing of bacteria.

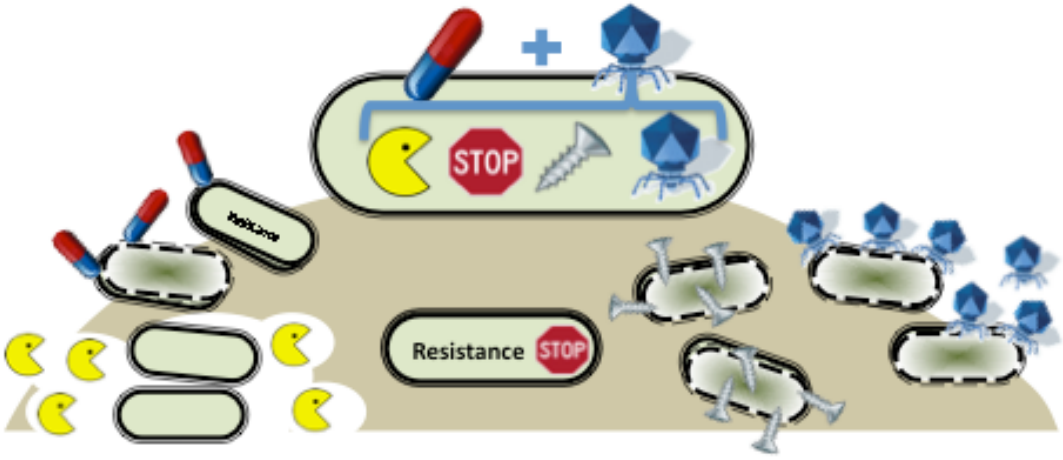


Figure 1: Mechanism of action of enhanced bacteriophages and antibiotics. The bacteriophages (blue) in combination with antibiotics (red and blue capsule) attack the bacterial cell. The bacteriophages infect the cell and force production of four entities: 1) more bacteriophages; 2) repressors of bacterial DNA damage repair mechanisms (stop sign); 3) biofilm-degrading enzymes (pac-man); and 4) broad-spectrum antimicrobial peptides (screw). The repressors slow the evolution of resistance

in bacterial cells, enabling antibiotics to work longer. The biofilm-degrading enzymes and the antimicrobial peptides are released upon bacterial cell lysing (destruction) by the natural action of the bacteriophages. The enzymes and antimicrobial peptides work extracellularly, degrading the biofilm to expose more bacterial cells in the biofilm to antibiotics and puncturing the membranes of other bacterial cells, respectively.

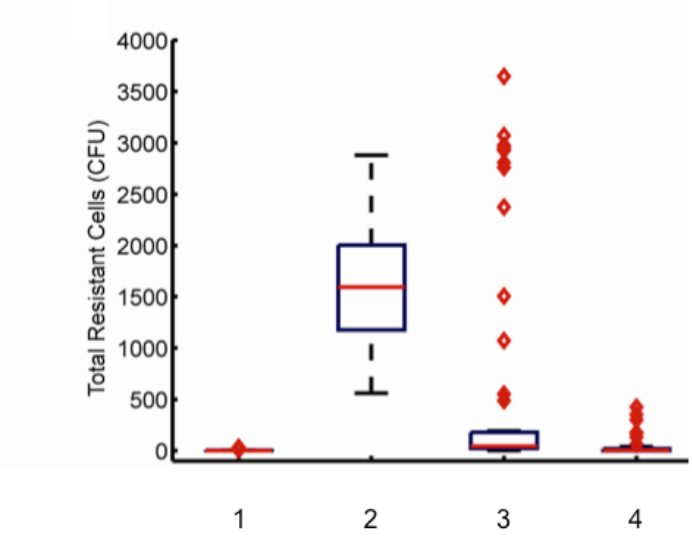
To enter the market, Novophage Therapeutics will develop a product for MRSA cSSSI. The product will be a two-part combination of an enhanced bacteriophage and a current standard of care antibiotic. Clinical outcomes are expected to be higher cure rates than the antibiotic alone based on suppression of antibiotic resistance and increased bacterial killing.

Scientific Evidence

Three different, useful modifications of natural bacteriophages have been demonstrated *in vitro,* and one of the three modifications has been tested *in vivo*. These proof-of-concept experiments used engineered bacteriophages targeting *E. coli* to suppress the evolution of bacterial resistance to antibiotics, to increase its activity on biofilms, and to widen the activity spectrum against a broader array of pathogens.

The first modification involves inserting a gene encoding a repressor of a bacteria's repair mechanism - the SOS response - into the bacteriophage[19]. When this enhanced bacteriophage infects harmful bacteria in the body, the harmful bacteria produce the repressor. The repressor then prevents the bacteria from repairing the damage inflicted by an antibiotic (e.g., a quinolone) that has simultaneously been administered with the enhanced-bacteriophage. The repressor gene encoded, *lexA3*, disables the SOS response that is induced upon bacterial DNA damage caused by antibiotics such as the quinolones, aminoglycosides, and penicillins, among others.

Data published in the *Proceedings of the National Academy of Sciences* by one of the scientific co-founders illustrates that enhanced bacteriophage combined with ofloxacin[20] yields a >30,000-fold improvement in the bacterial killing activity compared to ofloxacin alone in *E. coli*. The combination of enhanced bacteriophage plus gentamicin yields a 10,000-fold improvement and enhanced bacteriophage plus ampicillin yields a 100,000-fold improvement. Furthermore, the combination therapy reduces the evolution of antibiotic resistance by more than 600-fold relative to ofloxacin alone.



[19] Lu and Collins. PNAS. 2009; Electronic publication March 2009.
[20] Quinolone class of antibiotic

Figure 2: Novophage enhanced bacteriophage prevents emergence of antibiotic resistant bacteria. Lane 1 represents the control of no treatment; lane 2 is ofloxacin treatment where the median number of mutants is 1600; lane 3 is natural bacteriophage treatment plus ofloxacin; and lane 4 is l*exA3*-enhanced bacteriophage plus ofloxacin treatment. The number of resistant cells increases with antiobiotic treatment, but in the presence of the enhanced bacteriophage, the number of resistant cells remains low.

The most powerful demonstration of this proposed mechanism as a viable therapeutic strategy is in the results of a mouse *E. coli* bacteremia model. Ten mice per treatment group were infected intraperitoneally with pathogenic *E.coli* and after 1 hour were administered one of four treatments: 1) no antibiotic, 2) ofloxacin antibiotic only, 3) natural T7 bacteriophages, 4) combination of enhanced bacteriophage and ofloxacin antibiotic.

After 5 days of studies, only 10% of the mice that were not administered antibiotics survived, while 20% of the mice treated with the standard of care ofloxacin antibiotic survived. Mice treated with natural bacteriophage had a survival rate of 30%. However, 80% of the mice treated with our Novophage combination of genetically engineered bacteriophages and antibiotics survived the infection, thus showing a 4-fold improvement in survival over the current standard of care antibiotic treatment. No additional safety or toxicity issues were observed in the mice relative to enhanced bacteriophage administration.

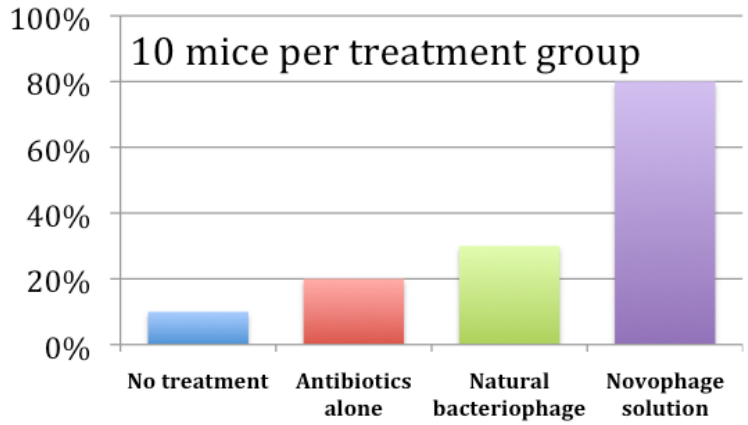


Figure 3: Novophage enhanced bacteriophage in combination with antibiotic increases survival of mice in a bacteremia model. Five day survival of mice in an intraperitoneal *E. coli* infection model. 10 mice per cohort were injected with E. coli and, after the onset of bacteremia, dosed with either placebo (no treatment), ofloxacin (antibiotics alone), natural bacteriophage (natural bacteriophage), or our combination therapy of enhanced bacteriophage and ofloxacin (Novophage solution).

A second modification to the bacteriophage is the addition of genes encoding biofilm-degrading enzymes[21]. As before, upon infection of harmful bacteria by enhanced bacteriophage, the bacteria produce biofilm-degrading enzymes. The enzymes then begin to disrupt the polysaccharides that provide structural integrity for the biofilm, degrading the biofilm matrix and permitting antibiotic access to the bacteria living in the biofilm. Data published in the *Proceedings of the National Academy of Sciences* by one of the scientific co-founders shows bacteriophage designed to produce the biofilm-degrading enzyme Dispersin B in infected bacteria led to a >10,000x destruction of the biofilm as measured by viable cell counts.

[21] Lu and Collins. PNAS. 2007;104 (27): 11197–11202.

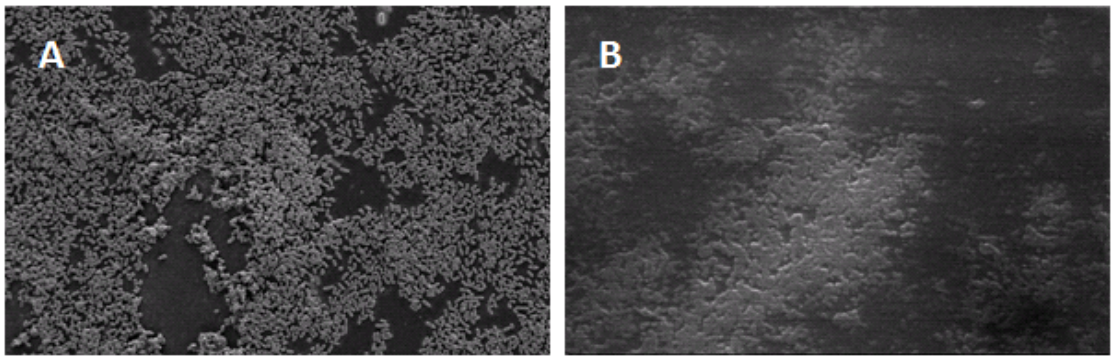


Figure 4: Enhanced bacteriophage treatment of biofilm reduces the number of live bacteria on and within the biofilm. A. Untreated biofilm of *E. coli* where only the top layers of cells are visible; the lower layers of cells are shielded. B. Biofilm treated with DispersinB –enhanced bacteriophage. No clear and defined E. coli cells are visible and very few viable cells were recovered; the residue is cellular debris.

Third, a gene encoding antimicrobial proteins has been inserted into the engineered bacteriophage to confer broad-spectrum bactericidal activity. These antimicrobial agents are short peptides of 15 – 25 amino acids in length that penetrate the membrane of bacteria thereby lysing them as well as attacking intracellular targets to decrease viability[22]. Preliminary, unpublished data demonstrates the efficacy of further enhancing bacteriophage to express these peptides in combination with the previously described engineered features.

Finally, based on the mechanism of action and initial *in vitro* results with *S. aureus* growth, this approach may work as broad spectrum therapy, that is, for both gram positive and gram negative bacterial infections.

Treatment & Efficacy for MRSA cSSSI Today

Treatments today that are approved for MRSA cSSSI include vancomycin, linezolid, daptomycin, and tigecycline. Vancomycin is the gold standard for MRSA cSSSI, a generic drug delivered intravenously (IV). However, vancomycin is highly toxic and poorly metabolized, leading to difficulties for the physician who must deal with administration. Cubist Pharmaceuticals' Daptomycin (Cubicin) has been shown to be equivalent to vancomycin in a once-per-day IV delivery. Pfizer's Linezolid (Zyvox) has been shown to be more effective than vancomycin even in an oral formulation in large Phase 3 trials. Whereas Wyeth's Tigecycline (Tygacil) is a broad spectrum (gram positive and gram negative) antibiotic that can also be used for vancomycin resistance enterrococci (VRE) and is less toxic than vancomycin. It is delivered IV and has been shown to be equivalent to vancomycin. Ofloxacin is a fluoroquinolone that belongs to an older class of drugs that has seen resurgence in use, particularly with community-acquired MRSA infections. While many of the above treatments are effective many patients with tolerable toxic side effects, Novophage's solution of combining antibiotic and enhanced bacteriophages promises to be more efficacious for similar side effects or less toxic by lowering the necessary dose of a toxic antibiotic such as vancomycin..

3 Competition

There are three main competitors in the antibiotic adjuvant space with programs in the clinical stage: MPEX Pharmaceuticals, Biocontrol Limited and Exponential Biotherapies.

[22] Brogden Nat. Rev. Microbio. (2005), Vol. 3 (3) pp. 238-50

MPEX Pharmaceuticals is a San Diego-based company in the antibiotic adjuvant space currently pursuing drug efflux pump inhibitors in gram negative bacteria. While this approach potentiates antibiotics against resistant bacteria including *Pseudomonas aeruginosa*, its efficacy is limited because it does not directly address the primary mode of resistance especially in gram positive infections in which efflux pumps are less of a concern. These compounds are in the early stages and have not entered human clinical trials.

Biocontrol Limited is a UK based company developing natural bacteriophage cocktails as human therapies targeting infections of the outer ear caused by *Pseudomonas aeruginosa*. Successful Phase I safety trials and more recently Phase II efficacy trials were completed for topical application of the bacteriophage cocktail with patients in London. Biocontrol Limited plans on addressing other indications as well including cystic fibrosis and infections of burn wounds. Independently, a bacteriophage cocktail to treat burn wound infections by *Pseudomonas* and *Staphylococcus* is currently being evaluated in Belgium.

Exponential Biotherapy is a Virginia-based company developing a natural bacteriophage cocktail therapy to treat vancomycin-resistant Enterococci (VRE) infections in the urinary tract. These infections are resistant to virtually all known antibiotics, yet Exponential Biotherapies obtained 100% healing rate in rodents after intravenous injection of the bacteriophage cocktail. After completing Phase I trials in 30 healthy humans to prove the non-toxicity of bacteriophages, they received FDA approval to proceed with Phase II trials.

While natural bacteriophage products such as those being pursued by Biocontrol and Exponential Biotherapy show potential as antimicrobial therapies and food antimicrobial products, the engineering approach Novophage has taken offers clear advantages over natural bacteriophages.

Our key advantages include:

- **Combating Resistance:** Bacteria are apt to develop resistance to natural bacteriophage treatment. Our engineered bacteriophages are able to overcome that limitation.
- **Biofilm Destruction:** Unlike natural bacteriophages that do not target biofilms, Novophage engineered the co-expression of biofilm busting enzymes to break down the extracellular “slime” matrix that protects harmful bacterial biofilms which colonize implantable devices and catheters. These same biofilms also form on food products and are particularly difficult to treat.
- **Novelty:** Natural bacteriophage companies patent the method by which natural bacteriophages are isolated, methods which can easily be circumvented by one skilled in the art. Novophage Therapeutics protects not only methodologies for developing our products but also the composition of our engineered bacteriophages through patent filings.

Since 2006, natural bacteriophages have entered the commercial space as antimicrobials in the food safety and agricultural industry through commercialization by three active companies. EBI Food Safety is a Dutch company offering an FDA approved bacteriophage food antimicrobial product to treat meat, poultry, vegetable and dairy products against *Listeria.* The company established an industrial-scale bacteriophage production facility in the Netherlands from which its products are distributed to major food companies in the EU and the US.

Intralytix and OmniLytics are two US companies offering FDA approved natural bacteriophages cocktails targeting *Listeria* and *E. coli*. Both companies are now developing natural bacteriophage cocktails as

human therapeutics targeting wounds caused by multidrug-resistant *S. aureus*, but are still in pre-clinical stages.

4 Intellectual Property

Novophage's core inventions for sequence modifications to bacteriophages, methods of creating modified bacteriophages, and related methods of treatment are protected by five patent applications jointly held by the Massachusetts Institute of Technology and Boston University.

Novophage has a verbal agreement with both Technology Development Offices at both institutions that exclusive licenses would be available to the company. Freedom to Operate analysis has been carried out and appears to be clear at this point. The team is continuing to advance technology development, to file patent applications on new discoveries, and to refine intellectual property strategies to protect likely business opportunities with the help of team mentors.

5 Risks and Mitigation

A primary means to address the risks outlined below is for the team to recruit relevant and experienced people to the company as consultants, advisors, and employees. The team is actively seeking and meeting with mentors, some of whom the team hopes to engage with in closer relationships over time and as the needs of the company become more apparent.

Lead Therapeutic Development

We propose to mitigate the risks associated with the development of our novel combination antimicrobial therapy through the following sets of experiments that will validate the viability of our approach, culminating in a pre-clinical assay of the technology in the relevant animal models. First, we are transferring our work from *E. coli* bacteriophage into *S. aureus* bacteriophage K. This includes the transfer of our modular engineered inserts into bacteriophage K and screening the initial recombinants for activity on *in vitro S. aureus* cultures.

Screening of LexA3/AMP/DspB combinations

We will construct and screen a combinatorial library of our modules[23] to find the most effective combination of the LexA3 SOS repressor, the Dispersin B and the six different AMPs[24] we want to combine. Our primary outcome will be bactericidal activity on a planktonic *S. aureus* culture, followed by the same in a biofilm assay. After these early tests, we will test the lead phages against heterogeneous biofilms to simulate the more clinically relevant scenario of a mixed-species biofilms. This work involves molecular biology and should be completed in 4 – 8 weeks.

Animal Models of Surgical Site Infections

We will approach our first indication – MRSA complicated skin and skin structure (cSSSIs) – using a validated animal model. We will treat the infection and the primary endpoint will be survival as compared to best-in-class treatment, linezolid.

[23] The module contains all three main components plus other components necessary for expression.
[24] Based on our initial *in vitro* screens against *E. coli* and *S. aureus* we selected the six most active AMPs.

Expansion of Product Line to MDR *Pseudomonas aeruginosa*

At the same time as we are developing the *S. aureus* bacteriophage, we will develop a bacteriophage to target multidrug-resistant (MDR) *Pseudomonas aeruginosa* in order to utilize our enhanced biofilm-degrading ability against cystic fibrosis (CF) infections. The effort needed in the early stages of the development of this therapeutic dovetails with the development of our lead candidate therapeutic, i.e. the *S. aureus* bacteriophage. The advantage of targeting *P. aeruginosa*, and specifically CF, is the highly motivated patient population and several high-profile players in the area such as the CF Foundation, which is keen on testing novel approaches for the treatment of CF. Our delivery and proposed combination with existing antibiotics makes that therapeutic an ideal candidate for co-administration in clinical trials.

Safety Profile

We will thoroughly test the safety of our engineered bacteriophages, specifically looking for issues related to pyrogenicity[25], cytotoxicity[26] and immunogenicity[27]. Based on clinical trial evidence to date using natural bacteriophages, no toxicities have been reported in Phase I human toxicity studies. For example, Exponential Biotherapies successfully completed a Phase I US-based clinical trial involving the use of natural bacteriophages in humans. Furthermore, in 2007, Biocontrol successfully completed a Phase II clinical trial in the UK for ear infections and reported positive results.

Additional preclinical testing will include further understanding of the bacteriophage clearance mechanism and timing as assessed through absorption, distribution, metabolism, and excretion studies. Evaluation of the likelihood of removal of benign bacteria in the body and possible related adverse events will also be tested. In addition, the therapeutic window will be evaluated in preclinical studies by determining minimum inhibition concentrations and maximum tolerated doses relative to adverse effects.

Manufacturing

Quality control endpoints in the manufacturing process will include testing of the pH, sterility, pyrogenicity, and cytotoxicity of pre-production batches of enhanced bacteriophage. Initially all batches will be tested for viral morphology by transmission electron microscopy (TEM) as well as sequenced to guarantee homogeneity.

Endotoxin-Removal From Bacteriophage Batches

A major hurdle for bacteriophage therapy to overcome is assuring that final product batches are free of contamination that would lead to adverse reactions in the patient. These contaminations are mainly bacterial endotoxins[28] that are necessarily present in the manufacturing process through the use of bacteria in the process. We plan to test several ways of cost-effectively removing endotoxins from batches using both commercially available kits as well as custom

[25] For endotoxin testing, the Limulus Amoebocyte Lysate (LAL) assay is the first line regulatory test but the phages may interfere with this test. A second test is the rabbit pyrogenicity test used when there is interference with the endotoxin test. Merabishvili et al, PLoS ONE (2009), Vol. 4 (3) pp. e4944.

[26] Cytotoxicity will be assessed in a cell survival assay using a human primary keratinocyte tissue culture assay. Based on literature and clinical trials, we do not expect to see any negative effect on survival rates following bacteriophage treatment.

[27] Immunogenic response will be assessed by the serum-response of guinea pigs. Hartman et al., Inf. Imm. (1991), Vol. 59 (11) pp. 4075-83. Repeat dosing with high doses of bacteriophage will be assessed through measuring the level of antibody reponse. In addition, adverse immunogenic reactions to proteins purposely released by the phage such as Dispersin B will be determined. Based on our experience and current literature. We do not anticipate adverse immunological reactions in vertebrates. Ramasubbu et al., JMB (2005), Vol. 349, pp. 475-486. Purified Dispersin B to treat diabetic foot ulcers is in preclinical development by Kane Biotech (summer of 2009).

[28] Endotoxins are a class of cellular debris composed of fragments of the bacterial cell wall that elicit a strong immune reaction in humans.

purification systems. The main principles of purification are successive steps of ultra-filtration[29] followed by adsorption of the remaining endotoxins to a column of high affinity binding partner. The primary drivers of cost in this purification scheme are the membranes and resins for ion exchange chromatography.

Assessing Genetic Drift

Another concern in manufacturing enhanced bacteriophages is genetic drift, i.e. changes in the genome of the bacteriophage leading to challenges in the ability to manufacture reproducible batches. We plan to minimize this risk by using bacteriophages that do not integrate into the bacterial genome, called non-temperate phages. This non-integration reduces the transfer of bacterial genetic material between successive rounds of viral replication and cuts down the transfer of pathogenicity islands[30]. Additionally, we will screen our bacteriophage genome for regions sensitive to mutation and modify these regions as necessary. If necessary, a further step to lock the bacteriophage genome is to replace the native viral DNA polymerases, with high-fidelity polymerases that reduce the mutation rate by more than 2 orders of magnitude.

Regulatory

Facing mounting pressure from the public and healthcare sectors due to the rapid spread of drug-resistant bacteria and the lack of new antibiotics, the FDA has become more accepting of alternative therapies, including the use of bacteriophages. We do not minimize the challenges of the FDA approval process but believe it is a manageable risk, based on recent go-aheads by the FDA for both Phase I and Phase II trials for cocktails of natural bacteriophages. The team plans to engage the FDA in the early stages of preclinical testing to understand if the experiments and data to be generated fit FDA expectation and guidelines.

Adoption by Infectious Disease Physicians

We plan to closely cooperate with infectious disease physicians and clinical laboratory leaders to understand their concerns regarding our therapeutic approach as we are developing our lead therapeutic. To this end we will convene a panel of the key opinion leaders in the field and local specialists. Going forward we will closely collaborate with Brigham and Women's Hospital clinical leaders to design clinical trials.

6 Business Development Opportunities

The antibiotic products of six large pharmaceutical companies account for $10 billion in global sales. Loss of patent protection is a significant threat faced by these companies. Pfizer's Zithromax patents expired in 2005, and several more blockbuster antibiotics are facing patent expiration including Avelox ($580 million 2007 sales; expiration 2009) and Levaquin ($1.4 billion 2007 sales; expiration 2010). Novophage's product can effectively extend the patent lifetimes of antibiotics. Through a partnership agreements, Novophage can leverage its novel products to gain access to distribution and manufacturing expertise.

In the food safety sector, Novophage has an opportunity to generate an early revenue stream by licensing our technology to established players that already utilize natural bacteriophages in their business. The US food antimicrobials market is valued at $200 million and is growing at 4% annually. Four million foodborne pathogen cases each year are directly due to bacterial contamination during the

[29] Ultra-filtration through polysulfone membranes with a pore size of <30nm.
[30] Chen and Novick, Science (2009), Vol. 323 (5910), pp. 139-41

industrial preparation process. These contaminations create an enormous social and economic strain on society, estimated at upwards of $35 billion annually in medical costs and lost productivity. The food industry itself is losing more than $400 million annually due to recalls, overhauls and stock market value reductions. Novophage provides familiar, yet more efficacious biological solutions for foodborne infections by using engineered bacteriophages to treat pathogenic bacteria in food products. Potential partners may include EBI Food Safety, OmniLytics and Intralytix.

7 Management Team

The Novophage team includes MIT, Boston University, and Howard Hughes Medical Institute researchers, experienced entrepreneurs, and prominent advisory board members (SAB) engaged in scientific research, pharmaceutical development and financing from both academia and industry.

Tanguy Chau is a Presidential Fellow at MIT and a Ph.D. candidate in Chemical Engineering. He developed Novophage's core technology during his thesis research on the design of new antimicrobial agents while co-advised by Professors Robert Langer and Gregory Stephanopoulos. Previously, Tanguy worked as a technology consultant for Novartis's drug supply and clinical development unit. He also worked for two years in Shanghai as an engineer for Accelergy Corp and as a business analyst for Fusion Consulting. He graduated with Highest Honors from UC Berkeley where he was one of five finalists among 7,000 seniors for the University Medal. He is now completing his Ph.D. research (expected in 2010) and will lead Novophage's technology development.

Ann DeWitt, Ph.D. is a 2009 MBA Candidate at Harvard Business School. Previously, she worked for 5 years at 3M Company as a researcher and technical manager and won an individual 3M Technical Circle of Excellence award for 3M Pharmaceuticals. She worked for 1 year at the University of Minnesota Venture Center evaluating technologies and writing a business plan for an ophthalmology medical device company. In the summer of 2008, she was an entrepreneur in the Summer@Highland Capital program incubating a biopharmaceutical company with researchers from Harvard Medical School. She earned her doctoral degree from MIT in Chemical Engineering. Ann will focus on business development and fundraising during the seed phase.

Michael Koeris is a Ph.D. candidate with the Howard Hughes Medical Institute in the Biomedical Engineering Department at Boston University working on network approaches to combating antibiotic-tolerant bacteria with Professor James Collins. Mike graduated second in his class with a M.S. in Biochemistry from the Free University of Berlin. Mike was a fellow in the German Academic Exchange Fellowship at MIT. In addition to his scientific work, Mike also previously worked at KPMG Consulting and McKinsey & Company in Germany. Currently, Mike is completing his Ph.D. in the summer of 2009 and will provide executive leadership and drive the development of Novophage's first product to market during the seed phase.

Timothy Lu, Ph.D. is a 3rd year M.D. student at Harvard Medical School in the Health Sciences and Technology (HST) track. He was awarded the 2008 Lemelson-MIT Student Prize and the 2008 National Inventors Hall of Fame's Collegiate Inventors Competition Grand Prize for his work on engineered bacteriophages for the treatment of intractable bacterial infections that comprises Novophage's core technologies. In addition to his scientific work, Tim participated in several software and biomedical startup companies. Tim graduated from MIT with an S.B. and an M.Eng. in Electrical Engineering and Computer Science and with a Ph.D. from the Harvard-MIT Health Sciences and Technology Program in

Electrical and Biomedical Engineering. He will continue with the core technology development of Novophage's technologies in close collaboration with the company's SAB.

8 Scientific Advisors

James Collins, Ph.D. is an Investigator at the Howard Hughes Medical Institute, a University Professor at Boston University, and a co-principal investigator on the design of engineered bacteriophages used in Novophage's technology. Jim is a pioneer in the fields of synthetic biology and systems biology and is a co-founder of several companies. In 1999, he was selected for Technology Review's inaugural TR100.

Robert Langer, Ph.D. is an Institute Professor at MIT and a co-principal investigator on the design of Novophage's technology. A pioneer in drug delivery, Bob holds over 600 patents licensed to over 100 companies and has founded many highly successful companies.

Gregory Stephanopoulos, Ph.D. is a Professor at MIT and co-principal investigator on the design of bacteriophage used in Novophage's technology. Greg is an expert in metabolic engineering and bioinformatics and supervised the creation of Novophage's antimicrobial design methodology.

Robert Rubin, MD is the Director of the Center for Experimental Pharmacology and Therapeutics, Harvard-MIT Division of Health Sciences and Technology, and Associate Director of the Division of Infectious Disease at Brigham and Women's Hospital. He is also a Professor of Medicine at Harvard Medical School. Bob has been a pioneer in the treatment of infection in immunocompromised patients. His book, *Clinical Approach to Infection in the Compromised Host*, is recognized as the standard text in the field.

9 Team Guidance

Jeff Elton, Ph.D. M.B.A. is Senior Vice President of Strategy and Global Chief Operating Officer (COO) at the Novartis Institutes for BioMedical Research (NIBR). Prior to joining NIBR, Jeff had 15 years of experience as a consultant to the pharmaceutical industry, most recently as a partner in McKinsey & Company's Boston Office for four-and-a-half years, where he co-led that firm's global R&D Operations and Intellectual Property Strategy & Management practices in the pharmaceutical and biotechnology industries.

Mark Leuchtenberger, M.B.A. is the former President & Chief Executive Officer of Targanta Therapeutics Corporation since September 2006 and led the company's successful IPO in 2007. He joined Targanta from Therion Biologics Corporation, a privately held cancer vaccine company, where he served as President and Chief Executive Officer from 2002 to 2006. Under his leadership, Therion filed its first IND, progressed through Phase 3 trials, completed the buildup of its commercial manufacturing capabilities, and raised over $120 million in three rounds of private financings. Prior to joining Therion, Mr. Leuchtenberger was a senior officer at Biogen, where he served as Vice President, International from 1999-2002. He subsequently served as Vice President of Sales, Marketing and Business Development. Prior to Biogen, Mr. Leuchtenberger worked as a Senior Consultant at Bain and Company specializing in healthcare products and services.

George A. Eldridge, M.B.A. is the former Senior Vice President Finance & Administration and Chief

Financial Officer of Targanta Therapeutics since September 2006. He was previously at Therion Biologics, a privately held cancer vaccines company, where he served as Senior Vice President and Chief Financial Officer. Prior to joining Therion in 2002, Mr. Eldridge served as Vice President of Finance and Chief Financial Officer of Curis (three-way merger among Creative BioMolecules, Ontogeny, and Reprogenesis) from 1996-2002. Prior to joining Ontogeny in 1996, Mr. Eldridge was Chief Financial Officer for Boston Life Sciences, Inc.

John Hebert, M.B.A. is a business development manager at Genzyme. Prior to working at Genzyme John was Technology Manager at Andersen Consulting in Paris, a co-founder of SmartCells – winner of the MIT 50K business plan – and business development associate at Hydra Biosciences. John holds an M.B.A. from MIT's Sloan School of Business and a B.A. from Boston College.

Radhika Tripuraneni, M.D. is an Associate Director of business development at Genzyme as well as a General Surgeon. Prior to working at Genzyme, Radhika was a research fellow at the NIH, surgical resident at Beth Israel Deaconess Medical Center and then Chief Medical Officer at Summer Street Research Partners. Radhika received both her undergraduate as well as medical degree from the University of Missouri-Kansas City.

Jason Fuller, Ph.D. is a senior associate at Third Rock Ventures, a Boston based venture firm focusing on building early stage life science companies. Prior to Third Rock, Jason completed his Ph.D. in Chemical Engineering at MIT under Robert Langer. While at MIT he was a member of the 2007 MIT $100K runner up team, ImmuneXcite. He was co-president of the MIT $100K during 2005-2006. Prior to MIT, Jason was a Churchill Scholar at Cambridge University where he earned an M.Phil. in Engineering. He holds a B.S. in Chemical Engineering from Michigan State University.

10 Milestones and Financials

Company information

Novophage Therapeutics was incorporated as a Delaware-based C corporation in March 2009. The founding equity holders will be Tanguy Chau, Ann DeWitt, Mike Koeris, Tim Lu, Jim Collins, Greg Stephanopoulos and Bob Langer.

The goal for the next 12 months is to demonstrate in a MRSA cSSSI animal model that a *S. aureus*-targeted enhanced bacteriophage improves survival above the current standard of care with minimal safety and toxicity issues. Additionally, the company will identify the best antibiotic-enhanced bacteriophage combination for the first product to treat MRSA cSSSI. Finally, the team will determine the COGS associated with manufacturing the product. The company expects these activities to require approximately $500,000.

The goal for 12-24 months is to more fully characterize the first product opportunity from *in vitro* and *in vivo* drug metabolism/pharmacokinetics and pathology/toxicology viewpoints. In addition, the company will conduct a pre- investigational new drug (IND) meeting with FDA to review the data to be generated and submitted for approval to enter phase I clinical trials. Further disease animal studies are expected to prepare for an IND filing with FDA. The team expects these activities to require approximately $8,000,000.

Beyond this time frame, the company expects to complete the *in vivo* studies referenced above and to then enter GLP/GMP studies in preparation of an IND filing to enter phase 1 human trials. The team

expects to begin ramping up preclinical work on a second product development program. These activities may require approximately $10,000,000.

Profit & Loss

		2009 Year 0	2010 Year 1	2011 Year 2	2012 Year 3	2013 Year 4	2014 Year 5	2015 Year 6	2016 Year 7	2017 Year 8	2018 Year 9	2019 Year 10
Sales												
	S. aureus phage	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$31,337,150.00	$188,022,900.00	$501,394,400.00
	Out-licensing	$0.00	$50,000.00	$100,000.00	$290,495.10	$421,149.08	$832,190.59	$1,275,441.57	$1,752,821.13	$2,266,350.35	$2,818,157.39	$3,410,482.83
	Total Sales	$0.00	$50,000.00	$100,000.00	$290,495.10	$421,149.08	$832,190.59	$1,275,441.57	$1,752,821.13	$33,603,500.35	$190,841,057.39	$504,804,882.83
COGS	55%	$0.00	$27,500.00	$55,000.00	$159,772.31	$231,631.99	$457,704.82	$701,492.86	$964,051.62	$18,481,925.19	$104,962,581.56	$277,642,685.56
Gross Margin	45%											
Net Revenue		$0.00	$22,500.00	$45,000.00	$130,722.80	$189,517.09	$374,485.76	$573,948.71	$788,769.51	$15,121,575.16	$85,878,475.82	$227,162,197.27
Expenses												
	R & D											
	Salaries & Benefits	$200,000.00	$550,000.00	$670,000.00	$730,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00
	Research Costs	$250,000.00	$825,000.00	$712,500.00	$1,068,750.00	$1,603,125.00	$2,244,375.00	$2,917,687.50	$3,501,225.00	$3,851,347.50	$4,043,914.88	$4,043,914.88
	Other											
	Total	$450,000.00	$1,375,000.00	$1,382,500.00	$1,798,750.00	$2,533,125.00	$3,174,375.00	$3,847,687.50	$4,431,225.00	$4,781,347.50	$4,973,914.88	$4,973,914.88
	Regulatory											
	Salaries & Benefits	$0.00	$125,000.00	$125,000.00	$190,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00
	Clinical Trials	$0.00	$0.00	$0.00	$0.00	$0.00	$800,000.00	$1,500,000.00	$17,500,000.00	$0.00	$0.00	$0.00
	Other	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Total	$0.00	$125,000.00	$125,000.00	$190,000.00	$315,000.00	$1,115,000.00	$1,815,000.00	$17,815,000.00	$315,000.00	$315,000.00	$315,000.00
	Marketing											
	Salaries & Benefits	$0.00	$0.00	$220,000.00	$220,000.00	$220,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00
	PR/Literature	$0.00	$0.00	$10,000.00	$15,000.00	$20,000.00	$30,000.00	$40,000.00	$50,000.00	$60,000.00	$70,000.00	$80,000.00
	Trade Shows	$0.00	$1,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
	Misc/Other											
	Total	$0.00	$1,000.00	$240,000.00	$245,000.00	$250,000.00	$355,000.00	$365,000.00	$375,000.00	$385,000.00	$395,000.00	$405,000.00
	Sales											
	Salaries & Benefits	$0.00	$0.00	$605,000.00	$605,000.00	$955,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00
	Travel	$0.00	$0.00	$15,000.00	$15,000.00	$30,000.00	$45,000.00	$45,000.00	$45,000.00	$45,000.00	$45,000.00	$45,000.00
	Misc/Other											
	Total	$0.00	$0.00	$620,000.00	$620,000.00	$985,000.00	$1,470,000.00	$1,470,000.00	$1,470,000.00	$1,470,000.00	$1,470,000.00	$1,470,000.00
	G&A											
	Salaries & Benefits	$0.00	$470,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00	$570,000.00
	Rent	$0.00	$60,000.00	$60,000.00	$60,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00
	Telecom/Postage	$0.00	$10,000.00	$10,000.00	$10,000.00	$75,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00	$25,000.00
	Legal	$50,000.00	$10,000.00	$10,000.00	$10,000.00	$1,000,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
	Rent	$0.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00	$60,000.00
	Total	$50,000.00	$610,000.00	$710,000.00	$710,000.00	$2,705,000.00	$1,665,000.00	$1,665,000.00	$1,665,000.00	$1,665,000.00	$1,665,000.00	$1,665,000.00
	Operating Expenses	$500,000.00	$2,111,000.00	$3,077,500.00	$3,563,750.00	$6,788,125.00	$7,779,375.00	$9,162,687.50	$25,756,225.00	$8,616,347.50	$8,818,914.88	$8,828,914.88
Operating Profit		($500,000.00)	($2,088,500.00)	($3,032,500.00)	($3,433,027.20)	($6,598,607.91)	($7,404,889.24)	($8,588,738.79)	($24,967,455.49)	$6,505,227.66	$77,059,560.95	$218,333,282.40

Cash Flow Projections

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Beginning Cash	$0.00	$0.00	$2,911,500.00	($121,000.00)	$31,445,972.80	$24,847,364.88	$17,442,475.65	$8,853,736.85	($16,113,718.64)	($9,608,490.98)	$67,451,069.97
Cash from Operations	($500,000.00)	($2,088,500.00)	($3,032,500.00)	($3,433,027.20)	($6,598,607.91)	($7,404,889.24)	($8,588,738.79)	($24,967,455.49)	$6,505,227.66	$77,059,560.95	$218,333,282.40
Cash from Investing	$500,000.00	$5,000,000.00	$0.00	$35,000,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Capital Expense	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Change in Cash	$0.00	$2,911,500.00	($3,032,500.00)	$31,566,972.80	($6,598,607.91)	($7,404,889.24)	($8,588,738.79)	($24,967,455.49)	$6,505,227.66	$77,059,560.95	$218,333,282.40
Ending Balance	$0.00	$2,911,500.00	($121,000.00)	$31,445,972.80	$24,847,364.88	$17,442,475.65	$8,853,736.85	($16,113,718.64)	($9,608,490.98)	$67,451,069.97	$285,784,352.37

OFFSET	Grants	Series A	Series B
Investment rounds	Amount		
Grants	$500,000.00		
Series A	$5,000,000.00		
Series B	$35,000,000.00		

Staffing Plan

	0	1	2	3	4	5	6	7	8	9	10
R&D											
CTO	0	1	1	1	1	1	1	1	1	1	1
Scientists	2	2	2	2	4	4	4	4	4	4	4
Technicians	0	2	4	5	5	5	5	5	5	5	5
Consultant	0	1	1	1	1	1	1	1	1	1	1
Total	2	6	8	9	11	11	11	11	11	11	11
Regulatory											
Regulatory Affairs	0	1	1	1	2	2	2	2	2	2	2
Consultant	0	0	0	1	1	1	1	1	1	1	1
Total	0	1	1	2	3	3	3	3	3	3	3
Marketing											
VP Marketing	0	0	1	1	1	1	1	1	1	1	1
Product Manager	0	0	1	1	1	2	2	2	2	2	2
Other	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	2	2	2	3	3	3	3	3	3
Sales											
VP Sales	0	0	1	1	1	1	1	1	1	1	1
Regional Sales	0	0	5	5	10	15	15	15	15	15	15
Support	0	0	2	2	2	5	5	5	5	5	5
Consultant	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	8	8	13	21	21	21	21	21	21
General & Admin.											
CEO	0	1	1	1	1	1	1	1	1	1	1
VP Finance	0	1	1	1	1	1	1	1	1	1	1
VP Business Dev.	0	1	1	1	1	1	1	1	1	1	1
Accounting	0	0	1	1	1	1	1	1	1	1	1
Admin. Staff	0	0	1	1	1	1	1	1	1	1	1
Total	0	3	5	5	5	5	5	5	5	5	5
Grand Total	2	10	24	26	34	43	43	43	43	43	43

Annual Salary	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$150,000.00	$0.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00
$100,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$400,000.00	$400,000.00	$400,000.00	$400,000.00	$400,000.00	$400,000.00	$400,000.00
$60,000.00	$0.00	$120,000.00	$240,000.00	$300,000.00	$300,000.00	$300,000.00	$300,000.00	$300,000.00	$300,000.00	$300,000.00	$300,000.00
$80,000.00	$0.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00	$80,000.00
$390,000.00	$200,000.00	$550,000.00	$670,000.00	$730,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00	$930,000.00
$125,000.00	$0.00	$125,000.00	$125,000.00	$125,000.00	$250,000.00	$250,000.00	$250,000.00	$250,000.00	$250,000.00	$250,000.00	$250,000.00
$65,000.00	$0.00	$0.00	$0.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00
$190,000.00	$0.00	$125,000.00	$125,000.00	$190,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00
$125,000.00	$0.00	$0.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00	$125,000.00
$95,000.00	$0.00	$0.00	$95,000.00	$95,000.00	$95,000.00	$190,000.00	$190,000.00	$190,000.00	$190,000.00	$190,000.00	$190,000.00
$80,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
$300,000.00	$0.00	$0.00	$220,000.00	$220,000.00	$220,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00	$315,000.00
$175,000.00	$0.00	$0.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00	$175,000.00
$70,000.00	$0.00	$0.00	$350,000.00	$350,000.00	$700,000.00	$1,050,000.00	$1,050,000.00	$1,050,000.00	$1,050,000.00	$1,050,000.00	$1,050,000.00
$40,000.00	$0.00	$0.00	$80,000.00	$80,000.00	$80,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00
$80,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
$365,000.00	$0.00	$0.00	$605,000.00	$605,000.00	$955,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00	$1,425,000.00
$200,000.00	$0.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00	$200,000.00
$150,000.00	$0.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00	$150,000.00
$120,000.00	$0.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00
$50,000.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00
$50,000.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00	$50,000.00
$570,000.00	0	470000	570000	570000	570000	570000	570000	570000	570000	570000	570000
$1,815,000.00	$200,000.00	$1,145,000.00	$2,190,000.00	$2,315,000.00	$2,990,000.00	$3,555,000.00	$3,555,000.00	$3,555,000.00	$3,555,000.00	$3,555,000.00	$3,555,000.00