Student Biotech Expo 2008 COVER SHEET	CI_EC_Sonderman
Title of Project: Tuberculosis Grant	
Student Name: Mark Sonderman	

School:	Eastside Catholic		
Category:	Career/Industry		
Teacher Name:	Maloney	School Name:	EC
Grade Level:	11	Date:	4/15/08

☐ I have special AV or electrical needs for my project:
(Please describe your project AV/electrical needs. We will try to accommodate your request.)

Grant Request:

The Center for Disease Control is looking for an applicant who has a plan to monitor and improve the rates of multi-drug resistant tuberculosis. This program must focus on a specific region and population where there is a serious need for this type of program. The organization applying for this grant must either be an IRS 501 not-for-profit or a unit of government.

The application should include the following in their proposal narrative: why this population needs to be served, how this program will be executed, why the program will be effective, and what results will be expected. Lastly, the organization applying for this grant must demonstrate that they have the resources to complete this project in the approach that they describe.

Grant Application

Cover Sheet

Date Submitted: March 29, 2008

Application Submitted to: The Center for Contagious Diseases

Organization Information

Name of Organization: The University of Washington School of Public Health and Community Medicine

Address: 1959 NE Pacific Street, Seattle WA, 98195-7230

Phone: (206) 543-1144 **Fax:** (206) 543-3813 **Web Address:** sphcm.washington.edu

Name of Top Paid Staff: Patricia W. Wahl, Ph.D., Dean **Phone:** (206) 543-1144

E-Mail:pwahl@u.washington.edu

Contact Person: Mark Sonderman, Principle Investigator **Phone:** (425) 223-0791

E-Mail: mt_sonderman@hotmail.com

Is your organization an IRS 501© (3) not-for-profit? **___ Yes _✓_ No**

Is your organization a public agency/unit of Government? **_✓_ Yes ____ No**

Proposal Information

2-3 sentence summary of request: We will set up a direct monitoring system and treatment plan for those with tuberculosis. Under the supervision of someone else, patients will finish their antibiotic treatments. As a result, they will be cured and MDR TB will not be as widespread.

Population Served: Impoverished persons living in Durban.

Geographic Area Served: Durban, South Africa

Funds are being requested for (check one)

_✓__ General Operating Support ____Start-up Costs ____Capital

____ Project/Program Support ____ Technical Assistance ____ Other (explain)

Project Dates: January 2009-January 2011 **Fiscal Year End:** 2011

Budget

Dollar Amount Requested: **$**5,000,000

Total Annual Organization Budget: **$** 77,640,000

Total Project Budget: **$** 5,000,000

Authorization

Name of Contact Person _____Mark Sonderman_____

Signature _____

Proposal Narrative

I. Organization Information

a. The University of Washington School of Public Health and Community Medicine (UW SPHCM) was created in 1970 as a part of the University of Washington. SPHCM is the only school of its type in the Pacific Northwest. Ranked second by U.S. News and World Report among publicly funded graduate schools, it is considered one of the best graduate schools in the nation, as it was. The school receives some of the largest amounts of money in grants among the University of Washington schools; the money that is received funds research, training, and service within the organization and among the greater community. The School of Public Health and Medicine is made up of five different departments. The departments are Biostatistics, Environmental Health, Epidemiology, Health Services, and Pathobiology. We also support academic programs in International Health, Maternal and Child Health, Nutritional Sciences, and Public Health Genetics (University of Washington).

b. The official mission statement of the University of Washington SPHCM "is to promote population health, prevent illness, disability, and injury, and ensure efficient, effective, and equitable health care systems through education, research, and service" (University of Washington). Our goals as an organization are to educate knowledgeable medical researchers and professionals, research advances in public health, and create better public health standards through community partnership. We work to provide our students with experience in research and service in multicultural settings. SPHCM strives to educate the academic and general community of our research findings, and we will

work to put these findings into practice. We value a balance between scholastic research and public outreach that will provide benefits for the entire community.

c. The University of Washington School of Public Health and Community Medicine has currently been participating in several studies while also promoting practices for better health in the community. One study that we have been working on is the possible cultural causes of obesity. We are investigating how the differences in geographic and economic conditions affect a person's chances of becoming obese. We received a $1.5 million grant that will support a study of 2,000 adults in King County. We will investigate how their various environments affect their eating habits and weight. A program that SPHCM has put into action is the "EnhanceFitness" program at South Seattle Senior Center (University of Washington). This program leads seniors in various physical workouts for their overall health. This program was started because regular physical activity among seniors has shown to decrease the rates of depression, injuries, blood pressure, and other ailments that commonly afflict seniors.

d. Our organization currently works in harmony with many other organizations that have similar goals as us. These organizations that we work with include: other schools at the University of Washington, many public health organizations, and also private research groups such as Fred Hutchinson Cancer Research Center. We share research facilities with these centers and help provide researchers: we work jointly for the well-being of public health.

e. Our school is made up of 199 faculty members along with six department chairs. The office of the dean has seven employees who are in charge of various aspects of the

school such Finance and Development and Public Health Practice (University of Washington).

II. Purpose of Grant

a. Although our organization currently receives large amounts of money from private gifts ($710,000), state and local funding ($14,160,000), and grants and contracts ($62,700,00), this money is unable to be used for the program that we hope to begin (University of Washington). All of this money that we have already received has an intended purpose as prescribed by the donor. Therefore, the grants that we receive for this program will act as the sole funding for our mission. Our organization has the built-in infrastructure in order to provide the resources and working force for this plan; we simply need the funding in order to make our dream a possibility.

b. Our goals for the period in which we are asking for funds are to provide a positive impact on the state of tuberculosis in Durban, South Africa; specifically, we plan to decrease the rates of multidrug-resistant tuberculosis throughout a two year period. The funds that we are requesting will be able to cover all of our necessary costs for this program. Our school will be able to cover any unforeseen costs if they should arise for any reason.

c. Our program is based on the observation of the taking of medicine because that it is the only way that we can determine for sure that the tuberculosis infection is eradicated for good. The reason that multidrug-resistant tuberculosis is becoming so commonplace is that many people aren't completely finishing their treatment. This means that the *Mycobacterium tuberculosis* that remain can be resistant to any drugs that the person took during their treatment. Multidrug-resistant tuberculosis is troublesome to public health

officials because it is significantly harder to treat than normal tuberculosis, and it also has a mortality rate that is equivalent to that of lung cancer.

A similar program to ours is called Directly Observed Treatment or DOTS. DOTS is a program executed by World Health Organization, in an effort to combat tuberculosis and HIV. DOTS is usually preformed by WHO in partnership with the government where they have health care workers directly observe patients take their medication for at least the first two months. This program has had extremely promising results as it has lowered the morbidity rate of tuberculosis in the areas where it is performed. Our program will be run similarly to DOTS, but we will ensure that the patient will receive direct observation during the entire course of the treatment. We will also provide other support through our student "experts" for issues not related to the taking of medication.

Our plan will be executed will in Durban, South Africa and will make use of our study abroad program. South Africa has the highest rates of tuberculosis in the world (Fighting). Therefore, we can treat the highest number of people while staying in a fairly concentrated geographic area. We also felt that our relationship with the University of KwaZulu-Natal allowed us to execute this sort of program while our students are attending their school. While students are taking classes at the University of KwaZulu-Natal, they will have the option of participating in a course where they will receive credit in field studies. Funding for the transport, housing, and meals for these students will not have to come out of the money from the grant. This is because they will have all their expenses covered when they paid their tuition at the start of the semester. The students will live and take other courses at the University of Durban-Westville campus of the University of KwaZulu-Natal complex. For several hours a day, students will have the

opportunity to visit impoverished districts of Durban and offer free tuberculin skin tests. The tuberculin skin test will be preformed by injecting purified protein derivative tuberculin into the patient and then waiting two to three days. After this time period has passed, our students will measure the reaction, and its size determines the tuberculosis diagnosis. The students will provide incentive for these skin tests by offering various forms of scrip to those who take the test. These different types of scrip will include items such as bus passes, gift cards for grocery stores, and other necessities that these people often fail to receive. Once these people take their test, one of the students will record their contact information so they can be reached within 48 to 72 hours in order to analyze the reaction (Schiffman).

Once the results are obtained, the students will send the patient to a doctor. These visits to the doctor and the subsequent treatment that they receive will be funded by the grant since all of the persons that we are assisting do not have health insurance. If someone tests negative for tuberculosis, they will be given the vaccine Bacillus Calmette-Guerin. This vaccine is used to prevent tuberculosis, and it has an 80% rate of effectiveness. This vaccine contains live bovine tuberculosis. Therefore, it will elicit a strong enough immune response so that the person will become immune to tuberculosis. Once the person has received the vaccination, they are no longer part of our monitoring system.

If a person tests positive for active tuberculosis, they will immediately be sent to a doctor in order to receive medication. The plan that they will undergo includes taking isoniazid, rifampicin, pyrazinamide, and ethambutol simultaneously for a two month period. Once they finish that, they will take rifampicin and isoniazid for the last four

months. We use the combination treatment with antibiotics because this treatment course has been shown to be the most effective. One reason is that each of the drugs has a different responsibility. Two of the drugs prevent the bacteria from replicating (osoniazid and ethambutol) while another kills the bacteria (rifampicin). Another reason is that the multiple drugs prevent the bacteria from becoming antibiotic resistant. Through random mutations a bacterium can become immune to the medication, but one of the other drugs that the patient is taking will then exterminate the bacteria with the combination treatment. If the patient tests negative for active TB yet is shown to have *Mycobacterium tuberculosis* (latent tuberculosis), he or she will undergo a treatment where they take isoniazid between six and nine months (Schiffman).

Once a person tests positive for either latent or active tuberculosis, they will be entered into the database that we will keep. This database will include the person's name, what form of tuberculosis they have, their work/home address, and a phone number where they can be reached at (if possible). The job of another group of students is to make sure that the patients complete their entire treatments. Therefore, each student will be responsible for about ten to twenty afflicted persons, and their sole job will be to ensure that the person takes their medicine each time they are prescribed to. Since all of the patient's information is in the database, the student will visit that person at their home or work each day to ensure that the correct medication is being taken the entire time. We will also educate our students on various aspects on the disease of tuberculosis. Then they will be able to provide support to the person that they are monitoring in case they should have any questions.

Once the individual finishes their entire treatment, they will be given a form of scrip again to serve as an incentive for finishing his or her treatment. The value of the scrip will be higher at this point because it will take much more persistence to finish the treatment than taking the skin test required. At this point (if the person tests negative), the person will be cleared from our agenda, and our program will be able to take on another individual.

We will limit the amount of people who we test and monitor in order to guarantee that we can provide each and every person with the personal attention that is needed. This number will depend on the amount of students that will participate in the program and the amount of funding that we receive. We will begin with 20 students, each responsible for around 15 patients. Therefore by the of the program, we will have treated around 300 persons.

d. Our initial time frame for this plan is two years. We hope that this will eventually turn into a long-term program that will eventually be much more widespread throughout other areas with high morbidity rates of tuberculosis, such as Southeast Asia and other parts of South Africa. The determining factors for whether or not we will continue this program after two years will be funding and the results that we will receive at the end of our two years. At the end of two years, we will conduct a study on the effectiveness of our program on the morbidity rates of tuberculosis in Durban. We will then take our results to various private foundations, the National Institute of Health, and the World Health Organization. These organizations will likely see the success of our program and provide further funding that will help us to spread our program into other areas of need. If we spread our program into other areas, we will also request volunteers from these

organizations since our students will be unable to cover as extensive of an area as we would like.

III. Evaluation

a. The goal that we hope to achieve through this program is a decreased rate of tuberculosis in the area that we are working in, especially lower rates of multidrug-resistant tuberculosis. Our immediate goal is that each patient we treat will become cured of tuberculosis. The long-term effect that we hope to attain is the creation of a program that will end the trend of higher rates of tuberculosis in developing nations.

b. We will measure our success by comparing the rates of tuberculosis in Durban prior to our program and the rates after the first two years of our program. If the rates have dropped or even slowed compared to previous years, we will consider our program a success. We will compare the rates of tuberculosis through the results of our skin tests. Since our skin tests are random, the percentage change in positive results for tuberculosis over the two years will represent the percentage change in the population with a slight margin of error. The students will be directly responsible for the testing for these results, and therefore, the correct recording of these results. We will also work with the local government and compare their percentage change in reported cases over the two years to our results. We will then make our results available to the general public through medical journals and any publications that wish to carry our data. We will also provide our report to all those who provided grants to us, so they can see how their money was put to use. We hope that our study into the success of our program will provide insight into what worked and didn't work with our program. We should also learn whether our program is worthwhile to continue executing based on its usefulness in the community of Durban.

Mark Sonderman

Tuberculosis Background

Tuberculosis is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. Tuberculosis was originally discovered by Robert Koch who went on to receive the Nobel Prize for this finding. Tuberculosis (commonly referred as TB) most commonly affects the lungs, but it is capable of infecting any organ in the body. Tuberculosis has become a modern epidemic, as over 2 billion people are estimated to be carriers of the tuberculosis bacterium (Farrell).

Mycobacterium tuberculosis is a bacterium that relies on oxygen in order to undergo respiration, otherwise known as an obligate aerobe. This is why the bacterium often resides in areas with high amounts of oxygen such as the lungs. The bacterium lacks an outer cell membrane, yet exhibits the normal properties of a member of the Monera kingdom. This means that the bacterium has no membrane-bound organelles, but instead DNA in the form of a nucleoid and free-floating ribosomes in the cytoplasm. It is in the shape of a bacillus which resembles a rod-like structure. The bacterium also can survive when in the presence of some disinfectants, and it will also survive in dry conditions for weeks at a time.

Tuberculosis is spread when someone who is infected with tuberculosis expels sputum into the air through actions such as coughing, sneezing, or spitting. A person in close proximity to the infected person must then inhale the bacteria into their lungs. This is the only manner in which TB can be spread; it is improbable through physical contact or by using common items unless mucous is on the article. This spread of the disease is only possible by a person who is infected with an active infection of tuberculosis. Those

who are at high risk of becoming infected with tuberculosis are those who serve as health-care workers, immigrants and those living in poverty, and anyone who resides in areas with a high frequency of tuberculosis (Fact Sheet).

When a person intakes the tuberculosis bacilli, the bacteria are consumed by white blood cells called macrophages. Although macrophages kill the majority of the bacteria, *Mycobacterium tuberculosis* are able to survive and be carried around by the macrophages. They bacteria will often multiply here and cause a lung infection such as pneumonia. The bacteria can then spread throughout the body via the mobile macrophages to places such as the kidneys, brain, and spinal cord. Frequently, this is not what occurs. The body often isolates the bacteria once it enters the lungs. It does this by forming scar tissue around the bacteria. This prevents the spread of the infection throughout the body and to other persons. Someone who has contained tuberculosis (called latent TB) still has a chance of developing an active form of the disease. This occurs when the infected individual's immune system is weakened to the point where tuberculosis bacteria are able to break through the scar tissue and spread to other areas of the body.

When someone is initially infected with tuberculosis, the only symptoms that he or she will demonstrate will resemble that of someone who has the flu. The most serious symptoms of tuberculosis occur during the secondary infection which is when the bacteria break through the immune system and infects the afflicted party. The most common symptom of someone with a secondary infection is a persistent cough that will eventually lead to the expulsion of bloody sputum. Other symptoms that an infected

individual will experience are weight loss, fever, and constant fatigue (Schiffman). Internally, the bacteria work by causing tissue destruction and cell necrosis.

The treatment plan that physicians execute on patients with tuberculosis varies by whether the patient has latent or active TB. Patients with active forms of tuberculosis undergo a much more aggressive treatment than those with latent tuberculosis. Those with active tuberculosis will be treated by antibiotics over a six month period. For the first two months, the patient takes four drugs simultaneously (isoniazid, rifampicin, pyrazinamide, and ethambutol). The patient then proceeds to take both rifampicin and isoniazid for the final four months. This nearly always cures the patient of tuberculosis unless they have a drug-resistant strain. Latent patients undergo a longer treatment with fewer drugs. This treatment relies solely on the antibiotic isoniazid for anywhere between six and nine months (Schiffman).

The drugs are used in this manner of combination treatment due to the fact that scientists have found the combination works most effectively. The primary reason for the combination treatment is that it prevents random mutations from causing drug resistance. If a bacterium undergoes a mutation which allows it to be immune to one of the antibiotics, then one of the other antibiotics in the combination treatment will kill the bacterium. The multiple drugs are also effective since they carry out different tasks. For example, isoniazid and ethambutol work by preventing the bacteria from replicating while rifampicin actually kills the bacteria through the prevention of transcription.

The vaccine Bacillus Calmette-Guerin is used to prevent tuberculosis. The vaccine contains live bovine tuberculosis which does not pose a threat to humans after several years of being artificially cultured. The bacteria cause the body to produce a

strong enough immune response so that the person will then have immunity to tuberculosis. During the 15 years after the vaccine is given, there has been an 80% effectiveness rate in patients (Schiffman). Those who qualify for the vaccine are those who live in an environment with frequent exposure to TB (health-care workers, those living in Africa and Asia, infants that reside in close proximity to TB infected individual). The Bacillus Calmette-Guerin vaccine is considered one of the safest vaccines in the world due to its high rate of use and consistently safe performance.

The presence of tuberculosis can only be confirmed through a lengthy process. This requires the patient to produce their medical history and undergo a physical examination, an x-ray of the chest, a microbiological exam, and possibly a skin test (Schiffman). The medical history serves to inform the physician of the patient's history of symptoms and exposure to environments that contain TB. A culture from the patient will help the doctor decide a definite diagnosis since they will be able to view *Mycobacterium tuberculosis* bacilli. The tuberculin skin test is performed by injecting Purified protein derivative tuberculin and then waiting between 48 and 72 hours. After this time period has passed, the reaction on the person's skin is then measured by a health-care worker. The size of the reaction determines the person's exposure to *Mycobacterium tuberculosis*.

In the past century, the rates of tuberculosis have been on the decline in North America and Western Europe. This is because these areas have had improved environments following the industrial revolution and sanitation is also significantly improved. A rise has been seen in continents such as Africa, Asia, and South America. This is due to a lack of public health infrastructure as compared to many developed nations (Farrell).

Another reason for the increased rates in Africa and Asia is due to the impact of HIV. Since tuberculosis becomes active once the immune system is weakened, a patient with HIV will develop active tuberculosis. This is because HIV affects its host by severely weakening the immune system by attacking helper-T cells, macrophages, and other essential members of the immune response. The areas where tuberculosis is common are the exact same as those places with frequent occurrences of HIV (Farrell). These areas include southern Africa and the highly populous countries of Asia, such as India and China.

The HIV virus is most common in aggravating a latent strain of tuberculosis. Latent tuberculosis is when someone carries the tuberculosis bacterium, but they do not become ill with active tuberculosis. The bacteria still resides in the body yet it does not make its host ill. Over one-third of the world's population (2 billion) has been exposed to the bacteria while 8 million persons a year become sick with the disease (Farrell). A person who is healthy with latent tuberculosis can become ill with it once he or she becomes infected with HIV. The crossover of these two illnesses is so severe that TB is the leading cause of death in individuals with HIV.

Multidrug-resistant tuberculosis (MDR TB) is an infection that is a great concern for public health officials worldwide. MDR TB is defined as tuberculosis that is resistant to both Isoniazid and Rifampicin. These are the two drugs that are used to treat all persons with tuberculosis. Extensively drug resistant tuberculosis (XDR TB) is an exaggerated version of MDR TB where the infection is resistant to both isoniazid and Rifampicin, a group of drugs called quinolones that are used to treat MDR-TB, and one of the injectable drugs (Fact Sheet).

Both MDR TB and XDR TB are worrisome to health officials since they leave them with significantly fewer options when treating patients. These alternative treatments are often much less affective than the common methods. Patients with MDR TB have mortality rate analogous to those with lung cancer whereas those with simply TB have significantly lower death rates (Farrell). Physicians have found solace in the fact the MDR TB and XDR TB are transmitted less frequently and successfully than TB.

Multi-drug resistant tuberculosis has become an issue due to the fact that many patients fail to finish their antibiotics. It can also arise when supplies of drugs are low or doctors fail to prescribe an extensive enough amount of drugs. When someone fails to finish their treatment, the TB still resides in their body yet it is resistant to all of the pharmaceuticals that the patient took. When the bacteria are spread to the next person, the TB that they have is already immune to the majority of drugs that a doctor would prescribe.

Tuberculosis has become a worldwide epidemic in the 20th century and rates will only continue to rise in the 21st century. Unless a solution is found to stop multi-drug resistant tuberculosis, it will continue to spread without a cure rivaling conditions such as HIV and cancer. In recent years, global health institutions such as the World Health Organization and research institutes have begun funding research for quicker tests and more efficient treatment of tuberculosis. This sort of focus is what can give the world a chance to stave off *Mycobacterium tuberculosis* and avoid an even more dire health crisis.

Interview with Kristi Gunn, March 20, 2008

- What kind of academic background do you need to go into the field of grant writing?

I'm a project manager, and part of my role is to assist my Principal Investigator in writing grants. For example, I write up the budget and might write the scientific background/significance, but the PI would write the specific scientific aims and methods. I have a Master's degree, and I think that's the minimal academic level I'd advise for grant writing.

- Are you mentored on the job, or are you expected to know what to do from day 1?

I'm new to project management, and did receive some mentorship from senior project managers at SBRI. However, each PM's role here depends on the needs/desires of their PI, so it was largely up to me and my PI to define my responsibilities. I did my graduate work with him, so we already had an established working relationship, which has made everything much easier.

- What is the general salary range of a grant writer? (don't answer if you're uncomfortable answering this)

I'm new enough to PM that I don't actually know the range, and I think it varies widely depending on setting (industry would be higher than academic).

- How do you find available grants (is there a database, do the foundations contact you, etc.)?

There are databases, and we're lucky enough to have an Advancement Department that specializes in finding sources of funding.

- Do you tend to focus on a single grant at a time, or do you work on several?

Depends on deadlines, but we try to focus on one at a time.

- What is the typical amount of time that a grant application takes you to write?

That depends a lot on the size of the grant (length and depth is usually proportionate to amount of money requested). I'd say the range is 3 weeks to 3 months (not full-time on one grant).

- Is it possible to work for several different companies (similar to being syndicated), or are you usually an employee of a single one?

I've never heard of that for project management, but I can't say it's not possible.

- Are there different levels of grant writers at companies or do all writers do the same job?

At SBRI each lab writes their own grants for scientific projects (primarily the PI, with the help of their project manager if they have one). We also have people in our Advancement Dept that write grants for the institution (for example, to request funding for institutionally-owned equipment, or for recruitment of a new lab). There are definitely different levels of experience, and in general everyone works on different grants, though some larger institutional grants might involve several writers.

- Do you need a high level of scientific knowledge in order to write grants?

Definitely. Either that or someone you can rely on heavily for scientific input.

- Is there a common layout to grant applications or does it differ based on what you're applying for?

Different funding sources have different requirements, but in general there's a summary, background, significance, preliminary results, specific aims, and methods.

- What does your typical workday consist of?

One of the things I love most about my job is that it's different everyday. I spend most of my time at my desk in front of a computer, and an hour or two in meetings. The day is peppered with interactions with my PI, people in the lab, and people in the finance or HR or IT departments.

- Is there any last statement that you would like to make about your job?

For me, project management is a perfect mix of science (research planning, coordination of activities among collaborators) and administrative tasks (budget reports, scientific progress reports, grant writing).

<u>Notes from Visit: Seattle Biomedical Research Institute, February 7, 2008, Toured by Jennifer Pang, employee of SBRI.</u>

- There is a high level of security around the labs. A security pass or password is necessary to enter any of the labs.
- The lab equipment appears familiar to what we use in high school labs, just significantly more upscale and advanced,
- The researchers have a thorough lab notebook where they record everything they perform and observe.
- My mentor was studying DNA by performing Gel Electrophoresis on it to determine the fragment lengths.
- MY mentor used viruses that mirrored tuberculosis' physical characteristics without posing as much of a health risk as Tuberculosis.
- There were varying levels of safety among the labs depending on what was being studied there.

- Places where they studied Ebola and other dangerous diseases were under heavy control. Where they studied organisms that posed very little risks, people cold walk through the labs without much worry.
- There is a type of lab bench where air is blown so that no materials inside the barrier of the air can escape into the outside world.

<u>TB notes from visit</u>

- Database (TB +, TB-)
    - home address/contact
- How would you get people to be tested?
    - maybe incentive
    - testing program
- TB + → therapy
    - refer to doctor
    - not involved in starting treatment
- After started treatment
    - enroll in study
    - monthly checkups in person
- Goal= Finish treatment
    - As a result- keep drug resistance from emerging
- TB drug
    - Active (6 months)
        - 2 months (4 drugs)/4 months (2 drugs, Rifampicin, Isoniazid)
    - Latent
        - 9 months, Isoniazid
- Who are you serving? Why?
- What's the goal of the program?
- How will the program accomplish its goal?

Mark Sonderman

Effort in Use of Resources

Among the numerous resources that I used throughout the completion of my project, the one that provided me with the most assistance was my advisor, Jennifer Pang. Jennifer helped me by providing me with advice while also providing feedback on my ideas. She helped me through personal meetings along with communication through e-mail (Jennifer.pang@sbri.org). Jennifer is a graduate student at the University of Washington in Molecular and Cellular Biology. She also works at Seattle Biomedical Research Institute (SBRI) as a researcher on Tuberculosis. We interacted through e-mail on numerous occasions (10/29, 11/7, 11/12, 11/28, 12/27, 12/31, 1/6, 1/7, 1/25, 2/4, 2/10, 2/11, 3/6, 3/7, and 3/28), and we also met twice in order to go over my project (11/29 at University of Washington and 2/7 at SBRI).

The purpose of our first meeting was to discuss what my initial plan was for this project. She then was able to tell me in which ways she would be able to assist me. We also discussed my site visit to SBRI. During my second meeting with her at SBRI, Jennifer gave me a tour of SBRI. This included a walkthrough of the labs, a tour of her workspace, and a more detailed discussion of what my grant would look like.

Since she works on Tuberculosis, she was able to provide me with a lot of information on the disease itself and the common treatments. Since I was unsure of what to work on initially, her expertise in the Tuberculosis field motivated me to investigate Tuberculosis and drug resistance. I was able to e-mail her whenever I came up with an idea, and she always promptly responded telling me what was effective about it and what

could be improved. She also, during our site visit, gave me an idea of what it is like to work in the field of biology and other scientific research.

Although she had no experience in writing grants, Jennifer was able to set me up with an interview with her co-worker Kristi Gunn, a grant writer at SBRI. Kristi Gunn, in our interview, gave me an idea of what the career of a grant writer is composed of. After this, I didn't just know what a grant looked like but also what it takes to create one.

Overall, my experience with my advisor, Jennifer Pang, was extremely positive. She was an invaluable resource on tuberculosis, and she also gave me insight into the biomedical industry. Without her, my project would most likely be much less developed and far more difficult to complete.

Mark Sonderman

Annotated Bibliography

"Fact Sheet." Centers for Disease Control and Prevention. 22 Jan. 2008. Centers for Disease Control. 21 Feb. 2008 <http://www.cdc.gov/tb/pubs/tbfactsheets/mdrtb.htm>.

The Centers for Disease Control are controlled by the United States Government, and they provide information for the public's safety. This site provided information on Multi-Drug Resistant Tuberculosis.

Farrell, Jeanette. "Tuberculosis: the Return of the Slow Killer." Invisible Enemies: Stories of Infectious Disease. Douglas & McIntyre Group, 1998. 100-136.

Jeanette Farrell has an MD, and *Invisible Enemies* was a young *Scientific American* Young Readers Book Award winner. This excerpt helped to provide the history of Tuberculosis, a global perspective, and how it's being treated.

"Fighting Against the TB Superbug". Faculty of Health Sciences, Stellenbosch University. 26 Mar. 2008 <http://academic.sun.ac.za/Health/support_services/research/ news_tb.htm>.

Stellenbosch is an internationally renowned University in South Africa. This site helped me to learn about the high occurrence rate of tuberculosis in South Africa.

Lederer, Edith M. "UN Chief Urges Global Fight Against TB." The Seattle Times 26 Mar. 2008. 29 Mar. 2008 <http://seattletimes.nwsource.com/html/home/index.html>.

The Seattle Times, winner of seven Pulitzer Prizes, is respected across the globe for its in-depth, quality reporting. This article gave me a current perspective on the global fight against Tuberculosis.

"Minnesota Common Grant Application Form." Minnesota Council of Foundations. Dec. 2000. 26 Feb. 2008 <www.mcf.org/mcf/grant/mncommongrant.doc>.

The Minnesota Council of Foundations is a group of grantmakers who work to improve philanthropy. This form helped to give me the format of what a grant should look like.

"Multi-Drug Resistant Tuberculosis." New York City Health. New York City Department of Health and Mental Hygiene. 26 Feb. 2008 <http://www.nyc.gov/html/doh/html/tb/tb4c.shtml>.

The New York City Department of Health serves to inform its citizens about important health issues locally and nationally. This site provided an extensive fact sheet on multidrug-resistant Tuberculosis.

Narita, Masa, and Eyal Oren. Seattle-King County Annual Tuberculosis Report. Seattle & King County Public Health. Seattle, 2004. 1-34.

Masa Narita is an Associate Professor at the University of Washington, and he has his MD from Keio University. This publication provided me with Tuberculosis information from King County.

Schiffman, George. "Tuberculosis (TB)." Medicine Net. 17 Jan. 2008. WebMD. 12 Feb. 2008 <http://www.medicinenet.com/tuberculosis/article.htm>.

Medicine Net is a member of the WebMD medical community with contributions from over 70 U.S. Board Certified Physicians. This site provided the basics of TB and the ways in which it is spread.

"Tuberculosis." Health Encyclopedia. USA Today. 24 Feb. 2008 <http://www.healthscout.com/ency/68/123/main.html#TreatmentofTuberculosis>.

USA Today is a national, daily newspaper with the highest circulation in the entire United States. This site addressed the symptoms and methods of treatment for Tuberculosis.

University of Washington School of Public Health and Community Medicine. University of Washington. 12 Mar. 2008 <http://sphcm.washington.edu/>.

The University of Washington is national leader among accredited schools in public health and community medicine. This website gave me information on statistics about the school and the way in which it is run.