

# Office of Public Health Practice

## Practicum Abstracts e-Book



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Spring 2007 e-Book (Vol.1)

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**Topic: Brain tumors**

**Title: Data collection for malignant glioma project**

**By David Yang**

**Public Health Significance**

Malignant gliomas comprise the most common type of central nervous system (CNS) neoplasms, frequently carrying a dismal prognosis despite surgical, chemotherapeutic and radiation intervention. In a recent population study, overall survival of patients with newly diagnosed glioblastoma multiforme (GBM) was 42.4% at 6 months, 17.7% at 1 year, and 3.3% at 2 years. Though research has increased significantly over the past decade, our knowledge of etiology and treatment is still quite limited, and hence survival has not dramatically increased. These primary CNS tumors arise in more than 41,000 people in the United States annually, and account for 1.35% of all cancers and 2.2% of all cancer-related deaths. Worldwide, approximately 176,000 cases of CNS cancer are diagnosed per year with an estimated annual mortality of 128,000.

**Approach**

Data to be collected was comprised of patient information that is inclusive of the following categories for each individual: demography, treatments, survival dates, pathology and histology. The bulk of the treatment data was attained from a pre-existing database in the Departments of Neurosurgery and Neuro-Oncology at M. D. Anderson. Missing data points were extracted through the M. D. Anderson ClinicStation. Pathology data was attained from pre-existing records through the Department of Pathology at M. D. Anderson, and missing data was filled through laboratory procedures such as immunohistochemical staining.

**Findings**

All collected data is to be analyzed for effects on overall survival of glioma patients seen at M.D. Anderson. To analyze survivorship data, Cox proportional hazard models will be used. Adjusting for potential confounding from known prognostic factors, the analysis will include age,

histology, extent of surgical resection, and Karnofsky Performance Scores (KPS) as covariates. Secondary analyses will include interactions between genetic molecular markers expressed in GBMs and correlated with histology and other appropriate clinical variables. Analysis and results have not yet concluded as of abstract deadline.

**Essential Services of Public Health**

This project addressed the preventative aspects of public health. In elucidating molecular markers of significance, interventions can be designed to help decrease the risks or identify more rapidly and therefore increase surveillance in more susceptible individuals.

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**Topic: Childhood obesity**

**Title: Childhood obesity practicum**

**By Kailly Harrell**

The prevalence of childhood obesity has been increasing at alarming rates for the past couple of decades. Obese children are at risk for developing many health complications. Furthermore, they are at an increased risk of becoming obese adults. It is estimated that approximately 22 million children under the age of 5 years old are overweight around the world. A majority of the interventions have created nutritional and physical education curriculum that are provided to school age children. With these programs being introduced into schools and communities, problems surrounding childhood obesity are becoming more public and political. Through tracking and summarizing bills introduced during the 80th Texas Legislative session, the importance of policy changes affecting childhood obesity will be identified. It will be important to understand the motivations behind the introduction of many of these bills and who supports them. Tracking these bills will provide the opportunity to learn about both public and private organizations which are stakeholders in these issues. Learning about these bills will also provide an opportunity to understand the impact of past and current policies that have affected childhood obesity in Texas and other states. Ultimately, addressing the impact of obesity on Texas youth will help to identify the most effective source of action that should be taken by Texas policy makers to help prevent childhood obesity.

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**Topic: Children with cancer**

**Title: This project was concerned with amassing a hospital-based population of controls for case control studies in children with cancer and to establish normative data for the mutagen sensitivity assay and COMET assay**

**By Joseph Nichols**

Each year, approximately 12,000 to 13,000 children and adolescents are diagnosed with cancer in the U.S. The etiology of many of these cases remains undetermined. Meanwhile, children with cancer have very different survival rates, even within the diagnostic category. Common factors – e.g., age at diagnosis, type of cancer, metastases and surgical resectability – do not explain all the differences that are observed in patient survival. Other indicators are needed. The mutagen sensitivity assay and COMET assay may aid in cancer prognostication; however normal values for these assays have not been established in non-cancer populations.

**Approach**

This project was concerned with amassing a hospital-based population of controls for case control studies in children with cancer and to establish normative data for the above assays. Families on the inpatient floors of Texas Children’s Hospital were asked to complete a 45 minute questionnaire assessing exposure history for a number of factors of interest. Each patient was also asked to provide a blood or saliva sample.

**Findings**

A total of 35 consents were obtained over the course of this project. Biological samples were obtained from 25 patients.

**Essential Services of Public Health**

Essential services included: 1) diagnosis and investigation and 2) research.

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**Topic: Children’s health education**

**Title: Developing a health curriculum for teaching the students**

**By Cassie Robinson**

**Public Health Significance**

Children are the future of our community, and it is important to invest in their health. Teaching good health habits to children and adolescents can help improve the overall health status of our population in the future. It is important to encourage a safe and healthy lifestyle to middle school students as a way of preventing disease and injury.

**Approach**

I used a variety of fun, hands-on activities to get students excited and interested in learning about health. Each week we did several short activities that demonstrated the importance of leading a healthy lifestyle.

**Findings**

For our final project we are writing a “Medical Mystery” script that shows how investigations of disease outbreaks begin. Each student is also designing a poster promoting a health topic of their choice.

**Essential Public Health Services**

The two essential services that my project addressed primarily were to inform, educate, and empower individuals and the community about health issues and also to mobilize community partnerships to identify and solve health problems.

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**Topic: Disaster preparedness**

**Title: Dallas County Health and Human Services MRC Volunteer Training Development Plan (March 2007)**

**By Ernest Ochoa**

**Public Health Significance of Volunteerism:**

Disaster preparedness, citizen preparedness, volunteers training, and community participation is an old concept maturing as a modern idea. The realization - disaster preparedness is a community responsibility mandated by fact - disasters strike locally.

**Volunteering:**

What role can a community volunteer best fulfill in a time of crisis? 2) How vividly do public health officials and citizens understand the dynamics of a combined capacity and potential? 3) How best to maximizing the vast potential energy of a community, and how to nurture resources to maximum advantage?

**Facts:**

Disasters occur locally, the first persons on and at the scene, are those affected. Responsibly marshaling the pool of creativity, industriousness, caring, and the oldest of human impulses – to aid one’s neighbor during a critical time of need, is at the crux of the problem facing every community in crisis. Neglect, under-funding, and (federal) bureaucratic stranglehold on creativity has now charged an anemic public health system with this task. Volunteer and disaster preparedness in the Dallas, County and the United States is gaining momentum. Public health and private citizens are bonding in common effort. The constant element throughout - the need for communities to maximize their potential during crisis - calls for training citizen volunteers, providing a concise, purposeful, education, and pre-exposure, with a focus that clearly identifies the critical needs that trained citizens can perform and best fulfill during a local crisis. These efforts are center stage at Dallas County where an integral “Volunteer MRC Training and Development Program” is energetically and creatively being developed and refined. The specific model template incorporates the following ideals: 1.) to target and identify specific needs of disaster preparedness in Dallas, Texas. 2.) Identify which of these needs is best served by MRC trained citizen volunteers. 3.) Provide a cognitive and practical orientation and educational training capable of imparting to Dallas area citizens: 1.) Confidence 2.) A specific-needs function to fulfill during actual crisis activation. 3.) Impart familiarity with disaster preparedness and execution techniques that emphasize realistic individual, family, community, and organizational safety first. 4.) Stimulate a creative atmosphere of discussion, participation and innovation capable of self-analysis, refocusing, improving, and capable of the disciplined creativity

and dynamisms of recognizing and then maximizing Dallas community resources to greatest advantage. 5.) Capable of maximum and dynamic social diffusion of the core concepts of disaster management and preparedness, and the importance to and of individual citizens within the Dallas area community. 6.) Cultivate, maintain and dynamically convey the concepts and the relationships that foster a spirit of volunteerism in Dallas County.

7.) The plural capacity of / to interact with several volunteer organizations in Dallas County, that already participate in Disaster Preparedness. Possibly - a double exposure for MRC volunteers that would help them with the more global perspective.

**Essential Services of Public Health Volunteer Service in Community**

The stark need for people to contemplate their community’s state of readiness and prepare for the unexpected disruption to family, neighborhood, community, and possibly beyond is real. This need calls for private citizen volunteers to be trained. The vision – is never completed, ever ongoing, and dynamically adjusting and re-accommodating to the larger needs of the Dallas County and citizens.

Concept:

Education:

**The objective** - to diffuse a non threatening message, capable of empowering citizens in a coordinated, combined, well organize and confident effort capable of meeting any number of emergent circumstances should they arise in the Dallas County area.

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**Topic: Foodborne surveillance of Salmonella**

**Title: Intern, Foodborne Surveillance Team, Houston Department of Health and Human Services (Bureau of Epidemiology)**

**By Emily Bettis**

**Public Health Significance**

My practicum focus, investigation of Salmonellosis in the City of Houston, is an important public health concern for several reasons. First, Salmonella infections are classified as reportable by the CDC, so it is the

responsibility of local health departments to gather information about the prevalence of Salmonellosis in their respective jurisdiction. Second, Salmonellosis has been estimated to have a cost (medical and loss of productivity) upwards of several billion dollars annually in the U.S. Third, these infections can cause mortality in the very young, the very old and the immunocompromised. The scope of my practicum involved investigating Salmonella infections in the City of Houston, analyzing data collected in 2005 for Salmonellosis, and responding to foodborne outbreaks in Houston.

### **Approach**

The approach taken in the investigation of current Salmonellosis cases in Houston is established protocol for the Bureau of Epidemiology. First, labs confirming Salmonella infection are received at the Bureau. Then it is up to investigators to contact the patients and do a thorough investigation of the case, in order to determine possible sources of infection, as well as epidemiological links and possible outbreaks. To analyze the 2005 Salmonellosis data, I was given the complete set of Houston cases and used a statistical software package to determine incidences, age and gender-specific rates, and other characteristics common to a descriptive epidemiological study. I produced charts, graphs, and a written report and presented my findings to the health department. In my investigation of foodborne outbreaks, I accompanied the Bureau of Epidemiology outbreak investigation team to sites in order to investigate possible infection sources and to interview patients to gain insight regarding causes and possible solutions to the outbreak. These data are compiled by the investigative team and presented to the bureau.

### **Findings**

Prior to my practicum experience, I was relatively unaware of the large impact that foodborne infections have on our public health system. During my practicum, there were several important outbreaks and discoveries (i.e. Salmonella-infected peanut butter recall) that shed some light on the public health burden caused by foodborne illnesses. I also learned a great deal about the function of the city health department. In my analysis of the Salmonellosis 2005 data, I found that the incidence and specific rates in Houston basically mirror those of the U.S. in general.

### **Essential Services of Public Health**

Monitor health status to identify community health problems  
Diagnose and investigate health problems and health hazards in the community

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**Topic: Health disparity**

**Title: To examine the differences in the hospital utilization between Hispanics and Non Hispanics in the Alamo Economic region of the Texas State**

**By Hari Sagiraju**

**Public Health Significance**

Well-documented disparities in health exist among members of racial and ethnic groups in US. Particularly troubling to policymakers are the problems with access to medical care that appear among minority groups. Income, insurance coverage, and need for care differentially influence members of racial and ethnic minority groups to seek medical care. To develop policies to reduce disparities in access, it is important to identify the characteristics most strongly associated with differences in access. The objective of this cross sectional study is to examine the differences in the hospital utilization between Hispanics and Non Hispanics in the Alamo Economic region of the Texas State.

**Approach**

Texas 2004 Hospital Discharge data was obtained from texas department of state health services. Study variables such as payment source, Source and type of admission, disease severity, length of stay, Ambulatory care sensitive conditions , patient status etc were identified. Statistical analysis of the data was done with help of SPSS software. Rates were calculated per 10,000 population.

**Findings**

With the exception of Newborns, Non Hispanics had higher rates than Hispanics of all admission types. Hispanics on Medicaid had higher percentages in all admission sources. Non Hispanics on Medicare tend to

have higher percentages in all study variables when compared to Hispanics. Hispanics also have shorter length of stay in hospitals than Non Hispanics.

**Essential Services of Public Health**

I think this project primarily addressed the first two of the Ten Essential Services of Public health. i.e

1. Monitor health status to identify and solve community health problems.
2. Diagnose and investigate health problems and health hazards in the community.

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**Topic: Health education**

**Title: Leadership Education in Adolescent Health (LEAH) Fellowship**

**By Aarika Florus**

**Public Health Significance**

LEAH, a fellowship program funded by the Maternal and Child Health Bureau (MCHB), trains and develops graduate and post-graduate level students in prevention and care coordination, public health interactions, research methodology, and skills such as expert clinical care of adolescents, communication, and teaching. This training creates advocates for adolescents and helps forge strong collaborative partnerships while fostering a respectful environment.

**Approach**

Progress was made through formal classroom work, mentored leadership experiences, oral and written presentations to both colleagues and community, and clinical experience. I received classroom training in leadership competencies, teaching procedures, and specific issues regarding adolescent health. I also shadowed our fellowship mentors in different community settings to see the effectiveness of community collaboration within a public health framework.

## Findings

Upon graduation, a process portfolio must be completed. This document contains the recorded work of the 2 semester program including the preparation of a professional curriculum vitae and specific clinical, public health, research, teaching, and administrative objectives.

## Essential Services of Public Health

The CDC recognizes 10 public health essentials (<http://www.cdc.gov/od/ocphp/nphpsp/EssentialPHServices.htm>).

From this list, I believe the LEAH fellowship incorporates all of these elements into their program and instills within each fellow the importance of being both a leader and a public health advocate.

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**Topic: Infection in cancer**

**Title: Prevalence of Cytomegalovirus (CMV) exposure prior to reactivation in patients with solid tumors.**

**By Santosh Hanmod**

### Public Health Significance

CMV is a member of the herpes virus family. It is a common virus that infects most people at some time during their lives but rarely causes obvious illness in immunocompetant persons. Although the virus is not highly communicable, it can be spread from person to person by direct contact and remains in the body throughout the lifetime. The virus reactivates itself once the immunity of the individual is compromised eg. AIDS, malignancy, bone marrow transplant, radiotherapy, chemotherapy etc. These patients may experience serious illness involving pneumonia, retinitis, encephalitis, hepatitis or disseminated disease. CMV infection as a cause of morbidity and mortality in patients with solid tumor has been sporadically described in the literatures. We are trying to determine the prevalence of CMV exposure prior to reactivation, risk factors for reactivation, and outcome of CMV infection (CMVI) and CMV disease

(CMVD) among patients with solid tumors. This will enable us to formulate the strategies to prevent CMV reactivation in these patients.

### **Approach**

We have screened around 1000 patient with positive CMV antigenemia to look for patients having solid tumors as the underlying malignancy. We are reviewing the records of patients with solid tumors with either CMVI or CMVD at UT-MDACC (January 1999- July 2004). CMVI and CMVD are defined as the presence of antigenemia and end organ disease, respectively. We describe the CMV exposure status prior to admission at MDACC, incidence, characteristics, treatment, and outcome of CMVI/CMVD in this population. Patients with either bone marrow transplantation or HIV infection are excluded.

### **Findings**

We found 40 such patients out of which we collected the data on 27 patients so far, 13 patients are yet to be studied. We are mainly looking for CMV exposure status of the patients prior to their admission to MDACC. Unfortunately, 18 patients did not have CMV serology done at the time of admission hence their exposure status is unknown. Out of the 7 patients who had CMV serology done at the time of admission, 4 patients had positive result and 3 were negative.

However, we are still screening more patients to include them into study. By the end of April we should have sufficient data based upon which we will be writing an abstract for presentation at the annual meeting of Infectious Disease Society of America (IDSA).

### **Essential Services of Public Health**

My project primarily address “Research” aspect of public health services which helps to provide new insights and innovative solutions to health problems.

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**Topic: Multidrug-resistant infection**

**Title: Infection Control and Healthcare Epidemiology Practicum**

**By Carolina Espinoza**

A practicum in Infection Control and Healthcare Epidemiology addresses one of the most basic public health issues; controlling and preventing the spread of infectious diseases. Infections can affect everyone, they do not discriminate, and in many cases have adverse or even detrimental affects. While some infections have been commonly associated as being hospital acquired there has been a movement of certain infections into the community. For example, Methicillin-Resistant Staphylococcus Aureus (MRSA) infections were once thought to be only hospital acquired. However, the last 20-30 years have seen a shift in these infections and they are now being seen in the community. Community associated MRSA strains are also causing serious healthcare-associated infections in all ages. While patients in hospitals remain at highest risk for experiencing adverse affects from MRSA, a plan is needed to control its spread among all populations before it becomes a pandemic. The Center for Disease Control and Prevention (CDC) as well as the Society for Healthcare Epidemiology of America (SHEA) have recommended that hospitals implement a program of active surveillance cultures to identify colonized patients. They suggest that surveillance cultures are acquired at the time of hospital admission and that all medical staff use contact precautions (gowns, gloves, and masks) for care of colonized patients in order to prevent the spread of MRSA.

Through the collaboration of the UTHSC Medical School and Memorial Hermann Hospital, I am having the opportunity to work on a project was established to pilot the CDC and SHEA recommendation for active surveillance of MRSA in the adult Intensive Care Units from March 12, 2007 to June 12, 2007. The data collected will be used to determine the incidence of nosocomial MRSA cases in the adult Intensive Care Units from March 12 to June 12 of 2007. It will also be utilized to compare the incidence of nosocomial MRSA cases from March 12, 2007 thru June 12, 2007 to the baseline period of November 1, 2006 thru January 31, 2007. For the pilot project all patients admitted into the units will be placed on modified isolation (practice of wearing clear gowns and gloves). The pilot project procedures required that the bedside nurse swab any newly admitted patients. As an intern, I then collect the swabs and transport them to the laboratory for testing. The laboratory processes the samples using the IDI-MRSA rapid real-time PCR assay. Patients resulting positive for MRSA are placed on standard hospital MRSA isolation protocol. I will

create a database for the results and analyze the data at the end of the collection period.

Due to the fact that the pilot is currently being conducted there is no final data to present at this time. However, the final product will be an incidence for MRSA in the Houston community based on Intensive Care Unit admissions to Memorial Hermann Hospital and will help address the lack of incidence data for MRSA in the Houston adult population. Overall, a practicum in infection control and healthcare epidemiology has allowed me to use my Epidemiology education to educate others about infections, manage existing infections, and prevent future infections that can impair the lives of individuals and communities.

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**Topic: Pulmonary Rehabilitation**

**Title: Retrospective building of database for patients of M.D. Anderson Cancer Center undergoing pulmonary rehabilitation program at the department of pulmonary medicine.**

**By Sameer Gokhale, M.S.**

**Public health significance**

Most of the cancer patients at M. D. Anderson Cancer Center suffer from multiple co-morbidities. Pulmonary rehabilitation program helps cancer patients to improve their quality of life. This project will test the hypothesis whether pulmonary rehabilitation program helped cancer patients improve quality of life.

**Approach**

Retrospective data abstraction for patients undergoing pulmonary rehabilitation program. Data was abstracted for patients for this study who were part of this program from the year 2004. Demographic information, history of cancer, date of diagnosis, details of cancer treatment they received, hospitalization, history of smoking, details of pulmonary rehabilitation, details of co-morbidities, pre and post results for six minute walk test, pulmonary function test, exercise physiology test were abstracted from M. D. Anderson's clinic station portal.

## Findings

207 patients were included for this database. All available information was abstracted for these patients from M.D. Anderson's clinic station portal in MS excel spreadsheet. Data was cleaned and made compatible with software STATA corp. version 9.0. Frequency distributions and summary statistics tables were generated for different variables. Primary analysis will be conducted in the next half of the project.

## Essential services of public health

From the analyses of these patients, we will be able to understand:

- Advantages of undergoing pulmonary rehabilitation
- Is pulmonary rehabilitation program helps cancer patients improve their quality of life?

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## Topic: Stem cell cancer research

**Title:** To understand and prepare parts of a manuscript on chromosome 1 del 1p and a retrospective chart review protocol submission

**By Gaurav Parikh**

**Background:** Renal impairment is present at diagnosis in about 20% of patients with MM, and 2-3% patients are dialysis-dependent. Previous reports have shown the feasibility of HD melphalan and autoSCT in MM patients with renal failure. Here we report our experience with 48 patient who were transplanted in renal failure (creatinine >2 sustained for > 1 month).

**Methods:** 48 patients (15 females, 33 males) with renal failure underwent HDT and auto SCT at our institution between 8/1991 and 9/2006. 9/48 patients (19%) were dialysis dependent. Median age was 56 (29-72) years. Ig subtype was: light chain 25, IgG 14, others 9. Twenty-six patients (54%) had at least a PR to induction therapy, while 16 were primary refractory and 6 patients had relapsed disease. Median serum creatinine was 2.9 mg/dl (2.0 – 12.5) and CrCl at transplant was 33 ml/min (8.7 – 63). A

CrCl of <20 ml/min was seen in 15 patients (31%). PBSC mobilization was with G-CSF alone in 37 patients, chemo + G-CSF in 10, and data not available in 1 patient. Preparative regimens were; HD melphalan in 46 patients (31 patients received mel 200 m/2, 8 received 180 mg/m2, 3 received 140 mg/m2 and 1 received 160 mg/m2, dose unknown in 3), TBC in 1, other 1.

**Results:** Median F/U in surviving patients was 34 months (5-81). Complete responses were seen in 9 patients (19%) and 32(67%) achieved a CR + PR. Two patients died within 100 days with a 100-day TRM was 4% Median times to neutrophil and platelet engraftment were 10 (9-18) and 12 (8-81) days, respectively. Non-hematological toxicities included nausea, vomiting, diarrhea and dysphagia. 30 patients (62.5%) are still alive after a median F/U of 34 months, and 18 patients/ 48 total (37.5%) are alive and progression-free. Significant change in renal function is defined as change in GFR by 25% than baseline GFR at transplant. At 12 months after transplant, 17 patients showed improvement, 14 patients same renal function, 3 worsened function, 3 worsened to the extent of requiring dialysis within 1 year from transplant, 2 patients died within 3 months of follow up and none of the 9 dialysis-dependent patients became dialysis independent.

**Conclusions:**

Autotransplant after high-dose chemotherapy is safe and feasible in patients with multiple myeloma and renal failure. Approximately 35% of patients had a modest improvement in renal function post-transplant.

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**Topic: Tuberculosis**

**Title: Correlation between production of Trehalose Dimycolate and virulence in Mycobacterium tuberculosis**

**By Ranjana Arora**

**Public Health Significance**

Among infectious diseases tuberculosis is responsible for the greatest number of deaths. Each year, 54 million people are infected with the tubercle bacillus (*Mycobacterium tuberculosis*), 6.8 million develop clinical

disease and 2.4 million people die of tuberculosis. Tuberculosis is responsible for 5% of all deaths worldwide, and 9.6% of adult deaths in the 15-59 age groups. Until the mid-1980s, tuberculosis in the United States had been declining. Then starting in 1986 there was a dramatic rise in the number of new cases attributed to a number of factors, including deterioration in the public health infrastructure, rising numbers of homeless individuals and most importantly, the growing AIDS epidemic. In recent years explosive outbreaks of tuberculosis have devastated hospitals, prisons and schools, and new strains have emerged with increased transmissibility. The cost of multidrug resistant cases was found to be as high as \$250,000 per case (D. Snider, TB Eradication, CDC, MMWR 39:369-371,1990). The current cost of tuberculosis control in the US is estimated to be approximately \$700 million to \$1 billion per year (Brown RE et al, Arch Intern Med, 155:1595-1600, 1995). In spite of being on the oldest infections known to mankind, the pathogenesis and virulence are not well understood. There is tremendous research potential in understanding as well as developing simple methods to assess these mechanisms.

### **Approach**

Trehalose dimycolate (TDM), a glycolipid also known as cord factor, is present in the mycobacterial cell wall and is a known virulence factor. Correlation between amount of TDM produced in clinical isolates (assessed by running dilutions on Thin layer chromatography) and the severity of infections hasn't been studied. During my practicum, I studied the morphology on culture of several mycobacterial strains and then extracted TDM (using petroleum ether- a lipid solvent) from these strains. I assessed if there was any correlation between the type of morphology and amount of TDM produced. This involved laboratory as well as epidemiological work. I started with growing the organisms, separating the TDM, quantization of TDM (collection and collation of data) and then carried out the data analysis to look for correlation.

### **Findings**

I found that strains of mycobacteria that produce different amounts of TDM show different pellicle morphology. Knowing at an early stage that the strain in a patient or a community setting could be highly virulent just by looking at pellicle morphology would help us better plan the interventions.

## Essential Services of Public Health

The essential service of public health that my project focused on is “assessment”. Better understanding and predictability of virulence of mycobacterium will help us focus the resources in a better way. The other essential service of public health influenced by the findings is “policy development”. Public health authorities as well as hospitals can plan the interventions based on the severity or predicted level of virulence for effective control of the disease.

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**Topic: Tuberculosis**

**Title: Upregulation of IFN- $\gamma$  Production for Enhanced TB Detection in Vulnerable Populations**

**By Marsha Lynn Feske**

### Public Health Significance

It is estimated that 1/3 of the world’s population is infected with Mycobacterium tuberculosis (TB). TB is an airborne pathogen spread from human to human. There are 8 million new cases of TB every year, due in part to poor diagnostic outcomes resulting from the use of the century old skin test, or TST. Two different tests have recently been developed, QuantiFERON-TB Gold (QFT-G), and T-SPOT TB. Both are more specific and more sensitive than the TST, capturing more truly infected and contagious hosts. They detect T-cell Interferon- $\gamma$  (IFN- $\gamma$ ) production in response to antigens specific to M. tuberculosis. The problem lies in that although the FDA has approved the QFT-G, its approval is limited to use only in HIV negative adult populations. This limitation is a result of low IFN- $\gamma$  secretion in other populations and excludes its diagnostic use in two populations most vulnerable to TB infection: children and HIV-infected individuals. In summary, the more accurate, and therefore more ethical ways of testing for TB, are not being used for our most vulnerable and most likely to be treated populations. A study completed in 2001 reported treatments cost on average \$4,764 per person, while a more accurate test costs only a few hundred dollars and is less-invasive. Our goal is to improve TB detection in populations, by

examining cells of TB infected people and using cytokine addition to improve antigen specific responses.

### **Approach**

Outlined in the learning contract were the tasks of acquiring TB positive blood samples and performing lab work to test the hypothesis that IFN- $\gamma$  secretion could be upregulated by the use of a survival cytokine. During my time in Dr. Lewis Immunology lab at Baylor I learned how to isolate and stimulate Peripheral Blood Mononuclear Cells from whole blood, how to measure IFN- $\gamma$  secretion using a sandwich ELISA and the many public health benefits and applications of Flow Cytometry and bench work in general. I have experienced first hand the importance of being able to troubleshoot and find the missing pieces in the puzzle of research. Epidemiology and lab based research work most effectively hand in hand. Public health efforts have shown that HIV infected and pediatric populations are more vulnerable to active TB infections and research efforts are underway to eliminate this disparity.

### **Findings**

After collaborating among UT, Baylor, and health department staff, TB positive bloods were located for testing of a lab based hypothesis. Evidence was generated supporting the hypothesis that IFN- $\gamma$  secretion can be upregulated using a cytokine. However more data is needed to provide conclusive evidence whether or not the cytokines action was antigen specific.

### **Essential Services of Public Health**

This project addressed several essential services of public health. As has been explained, research was central to my practicum. The hypothesis was based on previous laboratory findings and through mobilization I was able to acquire TST and TB positive bloods to test the hypothesis. By meeting with TB professionals in Houston and surrounding communities I was able to open doors to acquiring bloods needed and open opportunities for further collaborative efforts in the future.

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