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Occupational Exposures in Relation to Alzheimer's Disease Mortality

College of Life Sciences
Public Health – Epidemiology
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Project Purpose:

Investigate the link between occupations that expose persons to chemicals, solvents, organic phosphates, pesticides etc. and neurological diseases that are likely caused by such compounds.

Project Importance:

With an increased knowledge of the negative health effects of certain chemicals in particular occupations more safety measures can be taken to prevent such exposures. There will also be an increase of health care coverage and warnings for the risks that employees would take accepting these positions. More information will be gained regarding the social determinants of health in that those with lower education levels are subjected to long-term careers in dangerous jobs with high chemical exposures. These issues are understudied and need to be publicized and researched further due to the large increase of diagnoses of Alzheimer's disease and the consequential increase in mortality. The Bureau of Labor Statistics state 200 million people are currently working in the United States. It is critical to evaluate their risks and their exposures to harmful agents and substances. With the mortality rates of Alzheimer's disease increasing rapidly, the United States has a new epidemic.[1]

Project Overview:

Alzheimer's disease is the 6th leading cause of death in the United States making it the most common neurological disease.[2] 5.7 million Americans are living with Alzheimer's. The

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[1] Schulte, P. A., Burnett, C. A., Boeniger, M. F., & Johnson, J. (1996). Neurodegenerative Diseases: Occupational Occurrence and Potential Risk Factors, 1982 through 1991. *American Journal of Public Health, 86*(9), 1281–1288. Retrieved from https://www.lib.byu.edu/cgi-bin/remoteauth.pl?url=http://search.ebscohost.com/login.aspx?direct=true&db=asn&AN=9610020120&site=ehost-live&scope=site

[2] Ten million baby boomers will develop Alzheimer's disease. (2008). *Brown University Geriatric Psychopharmacology Update, 12*(6), 1–7. Retrieved from https://www.lib.byu.edu/cgi-

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mortality rates are projected to double by 2050 to nearly 14 million. Every 65 seconds someone in the United States develops the disease. Parkinson's disease currently affects 1 million Americans while Multiple Sclerosis (MS) affects .5 million.

We will use a case-control study and use unconditional logistic regression to estimate the mortality odds ratio and 95% confidence interval associations between occupation exposures related to Alzheimer's disease. The Mortality odds ratio (MOR) will be adjusted for the possible confounders of age, sex, race, calendar year and education. Adjust for predisposition and health history of genetic

Occupational experts or industrial hygienists have created a sample of workers and a list of 7-14 tasks that included questions on how often a person was exposed to an agent and the duration of the exposure. The three items that we will be reviewing are:

1) Was this person exposed to a chemical agent? Yes /No

2) Number of job tasks that were a yes and the duration of said task

3) Frequency of exposure

O*net database will be used by searching key words for specific occupations identified from literature reviews. By searching job tasks that were completed by each person different occupations, we are identifying jobs that were likely involving these exposures to agents in high volumes.

Databases that include death certificates from 1985 until the present day will be accessed to connect the occupations the deceased held in his/her lifetime. According to the occupations held, there is another database that includes the level of exposures each career field had and with

named chemicals. Code that has been written will then sort through this data and give us our results such as the means, standard deviations, maximums, minimums, standard error, etc.

According to Meta analyses and literature reviews included there is a link in the use of solvents, pesticides, herbicides, organic phosphates and being diagnosed with a neurological disease, including Alzheimer's disease.[3] A study by P.A. Schulte, as mentioned previously, discussed the results showing "about one third (26/87) of the occupations hypothesized with neurodegenerative associations had statistically significant elevated mortality odds ratios (MOR) for the same outcome."[4]

Qualifications of Thesis Committee:

Dr. Len Novilla, - Honors Coordinator
MPH, University of Utah, 1999
M.D, University of the City of Manila, 1990
B.S. Public Health, University of the Philippines, Institute of Public Health, 1986

Dr. Len Novilla is a physician and has an expertise in pathology. Alzheimer's disease has been one of her main focuses in her research here at Brigham Young University.

Dr. Chantel Sloan – Faculty Reader
BS, Brigham Young University-Hawaii, 2004
PhD, Dartmouth College, 2009
Postdoctoral Fellow, Vanderbilt University Medical Center, 2010-2013
Postdoctoral Fellowship, SUNY Stony Brook, 2010-2010

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[3] Pancetti, F., Olmos, C., Dagnino-Subiabre, A., Rozas, C., & Morales, B. (2007). Noncholinesterase Effects Induced by Organophosphate Pesticides and their Relationship to Cognitive Processes: Implication for the Action of Acylpeptide Hydrolase. *Journal of Toxicology & Environmental Health: Part B, 10*(8), 623–630. https://doi.org/10.1080/10937400701436445

[4] Schulte, P. A., Burnett, C. A., Boeniger, M. F., & Johnson, J. (1996). Neurodegenerative Diseases: Occupational Occurrence and Potential Risk Factors, 1982 through 1991. *American Journal of Public Health, 86*(9), 1281–1288. Retrieved from https://www.lib.byu.edu/cgi-bin/remoteauth.pl?url=http://search.ebscohost.com/login.aspx?direct=true&db=asn&AN=9610020120&site=ehost-live&scope=site

Culminating Experience:

Funding will be requested later through another application for travel expenses for conference presentations. Conferences that are appropriate for this research include the Society for Epidemiologic Research (SER), which will be held in June 2019. Another conference would be the International Society for Environmental Epidemiology in the Netherlands and the deadline for this conference is February 2019.

Conclusion:

It is hypothesized that occupations with high exposures to these materials over long duration of time they are more likely to suffer from neurological diseases such as Alzheimer's. The goal is to find patterns in the length of exposures and to which chemicals and see the correlation of the severity of disease by the shorter life span or in other words, the time of death of the subject.