New Visions
Scientific Research & World Health
presents

Public Health Poster Session

High school seniors from around the Capital District are pleased to present the results of their recent epidemiological studies

Friday, January 31, 2020
9:00 – 11:00 am
Cancer Research Center Lobby
SUNY Health Sciences Campus
1 Discovery Drive, Rensselaer, NY
Much of mankind’s future health depends upon the knowledge and capabilities of tomorrow’s researchers, practitioners, and health leaders. This New Visions program asks its future leaders from around the Capital District to examine compelling issues of present and future concern. Our students identify specific health concerns in the U.S. and global community and investigate the various biological, behavioral, environmental, and social factors that affect those issues. With this information, they pose ways to ameliorate these problems.

The New Visions Class of 2020 is proud to share their epidemiology projects with you!

**EPIDEMIOLOGICAL STUDIES OF CURRENT HEALTH ISSUES**

*Kerianne Bugbee*, Tamarac High School (nv20.Bugbee@gmail.com) presents:

**Advancing Age as a Risk Factor for Post-Treatment Lyme Disease Syndrome**

To assess the effects of advancing age on the prevalence of Post-Treatment Lyme Disease Syndrome (PTLDS), an epidemiological study was conducted. Research has shown that aging makes people more susceptible to many different illnesses. The best explanation for this is that aging often causes immune dysfunction and cell-mediated immunity (Yoshikawa, 2000). PTLDS is one of the illnesses that may be associated with age. People over the age of 45 have an increased susceptibility to PTLDS. Using the search engines, PubMed and Google Scholar, as well as Deepdyve, research was found that supports age as a risk factor for PTLDS. A survey was created using Qualtrics to bring in new data and compare it to previous work. The survey was distributed through social media, and by email blasts. The graph and data tables were made using the data from the survey. People over the age of 45 were found to have the highest prevalence of PTLDS. A high prevalence of PTLDS was found in younger males, however, the highest amount of people affected were over the age of 45. Lyme Disease has been shown to have a similar relationship with age. There is a lot of confusion surrounding PTLDS, which makes this topic difficult to research. Overall, the results of this epidemiological study suggest that people over the age of 45 may be at a larger risk for developing PTLDS, as the highest prevalence of people with this syndrome were over that age.

*Joshua Elfman*, Troy High School (nv20.Elfman@gmail.com) presents:

**Effects of EDC Ingestion Via Microplastics in Seafood on Incidence of Secondary Infertility**

The menace behind the degradation of plastics in the ocean is that they do not disappear. They crumble and dissociate into micro- and nano plastic polymers over time. Their small size causes them to be mistaken for food by microorganisms, allowing them to bioaccumulate across the food chain. These particles contain chemical additives, including known endocrine-disrupting chemicals (EDCs), which can leach into the body when consumed. The effects of these chemicals are well studied; however, it remains unknown whether the ingestion of microplastic through seafood can have endocrine-disrupting effects. To determine the risk of EDC ingestion through MPs, this study analyzes the relationship between secondary infertility rates in populations exposed to a high volume of MPs through seafood and the amount of fish and shellfish they consume annually per capita. The data shows a strong correlation between secondary infertility rates in communities more exposed to seafood. This suggests that infertility is affected by MP exposure. It proves that EDC exposure through seafood could have other possible endocrine-disrupting effects. GDP and amount of mismanaged plastic waste also appear to have a strong impact on the prevalence of secondary infertility. Because of the inherent flaws in this study, such as the probable presence of other factors that affect fertility in the studied populations, or other possible contaminants in seafood, future work is necessary to prove that microplastic ingestion can be a route of EDC exposure. Some future studies could include analysis of the mechanisms microplastics interfere with, or similar studies with a different measurable health outcome.
**Briana Figgs**, Columbia High School (nv20.Figgs@gmail.com) presents:

**An Analysis of Hypovitaminosis D and the Risk of Developing Schizophrenia**

Schizophrenia is a chronic mental illness that can impair one’s ability to think and behave clearly, leaving the patient to develop paranoid episodes that can be life threatening. While the direct cause is unknown, research has geared toward imbalances in essential nutrients such as vitamin D. Worldwide, about 1 billion people have low vitamin D levels. This study measured the prevalence of vitamin D deficiency in areas around the world. By separating these regions into the Northern and Southern Hemispheres, it was determined that there is a direct link between hypovitaminosis D and latitude. Relative schizophrenia rates were calculated by birth month, and it was determined that there is a correlation between lack of sunlight exposure and schizophrenia development. There was a significant increased risk of schizophrenia development based on birth month. February and March had higher rates of risk. Vitamin D levels were also determined to be dependent on which season the patient was born, linking hypovitaminosis D and schizophrenia risk to winter and spring births. Due to the exact correlation between birth months and rates of schizophrenia and hypovitaminosis D, it can be concluded that these issues are related.

---

**Kira Fischer**, Berne Knox Westerlo High School (nv20.Fischer@gmail.com) presents:

**Gestational Exposure to Fine and Ultrafine Particles as a Risk Factor for Autism Spectrum Disorder**

The World Health Organization estimates that particulate matter (PM) air pollution contributes to approximately 800,000 premature deaths each year, ranking it the 13th leading cause of mortality worldwide. However, there is a severe lack of research on adverse health effects of PM smaller than 2.5µm. This study examined whether a correlation exists between gestational exposure to fine and ultrafine particles and development of Autism Spectrum Disorder. Methods employed included a review of literature, along with the collection, compilation, and comparison of relevant past studies. Included studies consistently yielded odds ratios greater than 1 for fine particulate matter and ASD, revealing a probable link. Available data on ultrafine particles and their implications on human and animal health revealed substantial toxicological evidence of ASD-related health effects. This study reiterates the often-overlooked harm of fine particle exposure and brings to light the current lack of epidemiological research on risks associated with ultrafine particle exposure. Future focus will be directed more exclusively toward ultrafine particles and their developmental implications.

---

**Lena Kiehl**, Averill Park High School (nv20.Kiehl@gmail.com) presents:

**The Effects of Arsenic Polluted Water on The Developing Brain**

Arsenic is a heavy metal, a water contaminant, and it is a known carcinogen. The effects of arsenic on adults is widely known, but there is less known about how arsenic affects childhood development. This study is looking at the possible correlation between arsenic in water and developmental delays. Our hypothesis is that higher levels of arsenic in drinking water will show a correlation to higher percentages of special education populations in schools. This study is conducted through the analysis of published literature and collection of public data. Literature results show IQ is negatively affected in children with higher Arsenic in Urine (UAs) levels. The data analysis in this study is not conclusive. There is adequate data to support more research into the effects of arsenic on childhood development. This study has made it clear that public water sources are not tested for contaminants on a regular basis, and the tests are not inclusive of all the major harmful pollutants.

---

**Ryan LaBarre**, Catskill High School (nv20.Labarre@gmail.com) presents:

**The Risks of Methotrexate-Induced Liver Damage in Juvenile Idiopathic Arthritis Patients**

Arthritis is often a problem seen in adults, typically starting around age 40, but it also affects children in any form with a prevalence of 40-150 per 100,000. In severe cases, young patients from ages 2 to 16 can be treated with methotrexate to stop the inflammation and growth of inflamed cells, in order to prevent further damage. With this treatment, however, several adverse effects become prevalent, such as moderate liver damage and other gastrointestinal issues. Upon review of several articles, and creating an anonymous survey, it has become apparent that younger children with weakened immune systems will be more likely to experience lasting liver damage.
Noah Mujalli, Rensselaer High School (nv20.Mujalli@gmail.com) presents:
The Pulmonary Health Effects Associated with Hydrogen Sulfide Emitted by the SA Dunn Landfill

The community in Rensselaer, New York is faced with a “rotten egg” stench. The rotten egg stench is hydrogen sulfide (H2S) being emitted from the SA Dunn Landfill. An uproar has begun due to many concerns such as the compound’s pulmonary health effects on the human body. There are risks with the association as the concentration of H2S increases, which raises a concern to the public because the landfill is located near Rensselaer Jr./Sr. High, Middle, and Elementary School. The City of Rensselaer and Rensselaer City School District has legal agreements for the landfill to continue its operations for at least thirteen years. The legal agreements are causing a political weakness, forcing the community to address this matter. A survey has been distributed to the students/faculty in RCSD to determine the pulmonary health risks associated with hydrogen sulfide emitted by the SA Dunn Landfill. The results of the study will educate the community and induce the citizens of Rensselaer, New York to take a stance against the operations of the SA Dunn Landfill.

Ryan Nowak, Taconic Hills High School (nv20.Nowak@gmail.com) presents:
Risks of E.coli Outbreaks in Agriculturally Contaminated Private Wells

Pathogenic strains of E. coli can cause adverse health effects, especially to those with weak immune systems. With the use of concentrated farming operations, high amounts of fecal matter are produced containing many strains of E. coli. Some of these strains can exhibit antibiotic resistance due to the overuse of antibiotics to keep livestock healthy. If agriculturally contaminated groundwater sources throughout Columbia County are not addressed, then there is a high risk for E. coli contamination of private wells resulting in a public health crisis. Through the assistance of Albany and Columbia County Health Departments information was gathered to see if the wells of Columbia County residents were at risk of contamination. Research papers from online were analyzed, as well as a personal survey sent through the Taconic Hills Central School District. Through the use of the personal survey, it was found that almost all Columbia County residents live near farms and agriculturally affected water sources. It was also found that nitrates could be a strong indicator that private wells are being contaminated from agricultural sources. Nitrates are produced naturally through plant matter decay however elevated levels in water sources, such as 10mg/L which is the EPA water quality standard, can show a well is being permeated by contaminates. In conclusion, Columbia County residents are at risk for potential contamination due to their proximity to farms. It also needs to be understood that E. coli poses a high health hazard not only by its direct health effects but also through its ability to exhibit horizontal gene transferability. Through the presence of antibiotic-resistant E. coli, horizontal gene transferability poses an even larger threat. Without knowing new emerging diseases could be being produced throughout our water sources. Water sources throughout Columbia County need to be tested to see if there is an imminent threat to drinking sources, or if cleanup programs and systems need to be put in place.

Natalie O’Loughlin, Shenendehowa High School (nv20.Oloughlin@gmail.com) presents:
Swimmers’ Propensity to Endure Lung Dysfunction

The purpose of this paper is to look at lung dysfunction in swimmers in upstate New York, specifically within a 25 mile radius of Albany, New York. A survey was used to determine how participants in water activities in an indoor pool have reacted to the chlorine used to keep the pool sanitary. The survey found that the more time swimmers spend in an indoor chlorinated pool, the worse lung dysfunction they seemed to have. Competitive swimmers generally had worse effects than recreational swimmers. In conclusion, swimmers within 25 miles of Albany, New York typically seem to portray lung dysfunction in direct proportion to the time they spend at a pool.
Madison Rifenberick, Troy High School (nv20.Rifenberick@gmail.com) presents:

Prolonged Mercury Exposure as a Risk for Parkinson’s Disease Development in Adults

Parkinson’s Disease (PD) is characterized by a gradual loss of dopaminergic neurons and affects over 10 million people worldwide. Characterized as an environmental neurotoxin, mercury is an element that is not naturally occurring in the body but has the capability to cross the blood-brain barrier. Exposure to mercury, even in small doses, leads to neurological damage of dopamine receptors and initiates early stages of Parkinson’s Disease. Some common methods of mercury exposure include: dental amalgams, unfiltered water, seafood, and burning of coal. A survey was distributed, analyzing these roots of exposure in those who have been affected by the disease (been diagnosed or know someone who has). Multiple peer-reviewed articles, clinical trials, and cohort studies were examined regarding the toxicity of mercury and the effects on neural pathways. The survey results yielded dental amalgams and unfiltered water as a common source for mercury exposure. Cohort studies also showed PD patients with a blood-mercury level 10 times the expected value. Based on the research conducted, there is a clear correlation between exposure to mercury and development of Parkinson’s Disease.

Mackenzie Roarke, Troy High School (nv20.Roarke@gmail.com) presents:

Beneficial Effects of Vegetable-Based Diets Attenuate the Incidence and Progression of Chronic Kidney Disease

It's believed that the Western-style diet, consisting of highly processed foods and red meat, plays a major role in the development of CKD. A higher vegetable or plant-based diet can have measurable benefits to the prevention and progression of CKD. A survey was designed to target a population of adults 40 years or older who do and do not have CKD and assess their dietary habits through a series of brief questions. The purpose of this study is to further demonstrate how a vegetable-based diet shows an impact on CKD. There will also be a literature search analyzing peer-reviewed articles. The results of the survey found that about a third of the population were diagnosed with hypertension and diabetes, and they all followed a diet consisting of meat and dairy. Previous studies have also shown emphasis on plant-based diets improving metabolic acidosis, phosphorus homeostasis, and gut microbiota. It’s also been found that dietary intake can influence urinary pH and net acid excretion. This leads to the conclusion that plant-based diets have beneficial outcomes in the prevention and progression of CKD. Lowering the consumption of red meat should be supervised in those with CKD, and the majority of their protein intake should come from non-animal proteins.

Madison Shumpert, Shenendehowa High School (nv20.Shumpert@gmail.com) presents:

THC Exposure in Adolescence Risks the Development of Schizophrenia

Exposure to THC in adolescent brains may result in the later development of schizophrenia in people who are genetically predisposed. This study addresses correlation quantitatively and qualitatively. With the recent legalization of cannabis in many states, it is crucial to understand the health risks associated with its use. Schizophrenia is among the top ten leading causes of disease-related disability in the world (Isger et al. 2015). Dopamine is an inhibitory neurotransmitter involved in the pathology of schizophrenia (Brisch et al. 2014). Abnormalities and alterations in dopamine and dopamine receptors (D1, D2, and CB1R) play a major part in many psychological and neurological diseases and conditions, like schizophrenia. Delta-9-tetrahydrocannabinol (THC) stimulates mesolimbic dopamine release, as well as interfering with normal function of dopamine receptors in the brain. A two-sample t test was performed to see if there is a correlation between legality of cannabis and DALY rate of schizophrenia by country. Interviews with clinicians were also performed to better draw conclusions. A p value of 0.0995 was found with an alpha at 0.10 showing statistical significance. With the statistical conclusion that has been reached and the background information, it is well justified to further research this topic.
Olivia Smith, Hoosic Valley High School (nv20.Smith@gmail.com) presents: 
Continuous Low-dose Benzene Exposure 
and Risk of Developing Childhood Leukemia

To assess the effects of low-dose benzene exposure on the development of childhood cancer, an epidemiological study was conducted. Benzene is a known human carcinogen. Carcinogens are substances that cause carcinogenesis, or the development of cancer. Leukemia is a cancer of the blood and bone barrow. Leukemia accounts for 30% of childhood cancers and has no known causes. Articles were collected from the University at Albany, Hudson Valley Community College’s online libraries and Google Scholar. These papers addressed the topic from a variety of perspectives to determine the level of benzene exposure in ug/m^3 and if there is an increased odd in developing childhood leukemia. Children who are heavily exposed are considered over 10 ug/m^3 (annual average) and intermediate exposure is considered 0.1-10 ug/m^3 (annual average). Occupational exposure, 2.4 x 10^7 ug/m^3 (2.4x 10^4 ppm), has been proven to cause cancer over extended periods of time. After reviewing the articles and data collected in prior studies it is clear that personal exposure is more severe than environmental exposure. Personal exposure includes living in the home of someone who smoke and riding in automobiles. Environmental exposure includes one’s distance to areas of heavy traffic and air pollutants that accompany this. Increased benzene, due to both environmental and personal exposure levels in utero and early childhood have a positive correlation with the development of childhood leukemia.

Abigail Wyman, Columbia High School (nv20.Wyman@gmail.com) presents: 
Exposure to Endocrine Disruptors within Living Environments and the Risk of Developing Animal Dander Allergies

An epidemiology study was performed to assess the risk of developing an animal dander allergy due to exposure to endocrine disruptors in living environments. Approximately 65% of American families own pets, and the allergen can be found in public areas. Therefore, it is necessary to know if EDCs can lead to an increased risk of developing an animal dander allergy. This study focuses on the link between urban, suburban and rural living areas in relation to developing an animal dander allergy. Although EDCs are ubiquitous within the environment, higher concentration in urban areas could lead to a higher risk of developing an animal dander allergy. A survey was sent out through a social media platform to collect data. The data was then analyzed to see the percentage of people in each living environment that have or did not have the allergy. In all living environments the potential of developing an animal dander allergy were lower than the probability of not developing one. A solid conclusion about the higher risk of developing the allergy in urban areas cannot be drawn due to the lack of responses from both urban and rural areas. In future studies a higher and more evenly proportioned number of respondents from each living environment is mandatory.

Special thanks to the parents of: 
Kerianne Bugbee, Joshua Elfman, Briana Figgs, Kira Fischer, Lena Kiehl, Ryan LaBarre, 
Noah Mujalli, Ryan Nowak, Natalie O’Loughlin, Madison Rifenberick, Mackenzie Roarke, 
Madison Shumpert, Olivia Smith, Abigail Wyman

Questar III New Visions Scientific Research & World Health Class of 2020 
Ruth S. Russell, MPhil Pathobiology & Molecular Medicine 
New Visions Scientific Research and World Health Instructor 
(rrussell@questar.org)  518-526-4146