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VA'S MILLION VETERAN PROGRAM (MVP)

Current Studies

VA researchers are using MVP data to learn about a range of health conditions affecting Veterans. Below are descriptions of studies underway as of spring 2018.

Photo: Frank Curran

CANCER

Predicting breast cancer risk for women Veterans

Researchers are using MVP data to build a new screening strategy for breast cancer. The team is studying genetic and clinical markers to predict breast cancer risk. They will use this information to develop more personalized screening strategies for individual women, rather than relying, say, on age alone to plan screening. They are also looking at how military experience and race might affect breast cancer risk. Most current screening plans are based on studies of civilian, Caucasian women.

"PREDICTING THE BREAST CANCER RISK FOR WOMEN VETERANS."
Principal investigators: Shiuh-Wen Luoh, Sally Haskell, Cynthia Brandt; VA Portland Health Care System, VA Connecticut Healthcare System.

HPV-related cancer risk

Researchers are looking at variations in immune-related genes that may control how susceptible a person is to cancers caused by the human papilloma virus. The incidence of oropharynx cancer—a type of throat cancer—has sharply increased in recent years, primarily because of increased HPV exposure. The project is using MVP data to look for the specific genes that affect oropharynx cancer risk, as well as non-oropharynx cancers of the head and neck, which are usually related to tobacco and alcohol use.

"IMMUNOGENETIC DETERMINANTS OF HPV-RELATED HEAD AND NECK CANCER IN VETERANS."
Principal investigator: Andrew Sikora; Michael E. Debakey VA Medical Center (Houston).

Evaluating prostate cancer

This project focuses on prostate cancer. It seeks new ways to tell which tumors are deadly and require treatment and which are slow-growing and not life-threatening. The study is part of an initiative called the MVP Computational Health Analytics for Medical Precision to Improve Outcomes Now (CHAMPION). This partnership with the Department of Energy will maximize the impact of studies using MVP data.

"VA-DOE EXEMPLAR PROJECT ON CANCER"
Principal investigators: Amy Justice, Michael Gaziano, Francis Alexander; VA Connecticut Healthcare System, VA Boston Healthcare System, DOE Brookhaven National Laboratory.

Gene variation in lung cancer

Researchers are studying the gene variations connected with different tumor structures in patients with non-small cell lung cancer. They are also comparing treatments and outcomes of patients diagnosed with either early or late stage tumors. By combining this information with knowledge of mutations found in patients' blood and tumors, they hope to find patterns enabling earlier and more personalized treatments.

"CORRELATING CLINICAL DATA AND GENOMICS IN EARLY/LATE STAGE PRESENTATION OF LUNG CANCER."
Principal investigator: Andrew Zimolzak; VA Boston Healthcare System.

Genomics of multiple myeloma

This project is looking at genomic markers linked to disease progression and prognosis on multiple myeloma. Multiple myeloma is a cancer of the plasma cells in the bone marrow. It is preceded by two non-malignant stages of disease: monoclonal gammapathy of undetermined significance and smoldering multiple myeloma. Multiple myeloma is particularly common among Veterans. Understanding the genomic basis of progression could help researchers build models to more effectively monitor Veterans at high risk of developing the cancer, and to treat Veterans who are already diagnosed.

"PROGRESSION AND PROGNOSIS OF MULTIPLE MYELOMA IN U.S. VETERANS."

Principal investigators: Nikhil Munshi, Saiju Pyarajan; VA Boston Healthcare System.

CARDIOVASCULAR DISEASE

Heart disease risk factors

This research study is exploring the role of genetics in obesity, diabetes, and abnormal lipid levels as drivers of heart disease. The knowledge gained through this research may lead to new therapies that are safe, effective, and personalized. Heart disease is the No. 1 cause of death among Veterans.

"GENETICS OF CARDIO-METABOLIC DISEASES IN THE VA POPULATION."

Principal investigators: Philip Tsao, Kyong-Mi Chang; VA Palo Alto Health Care System, Corporal Michael J. Crescenz VA Medical Center (Philadelphia).
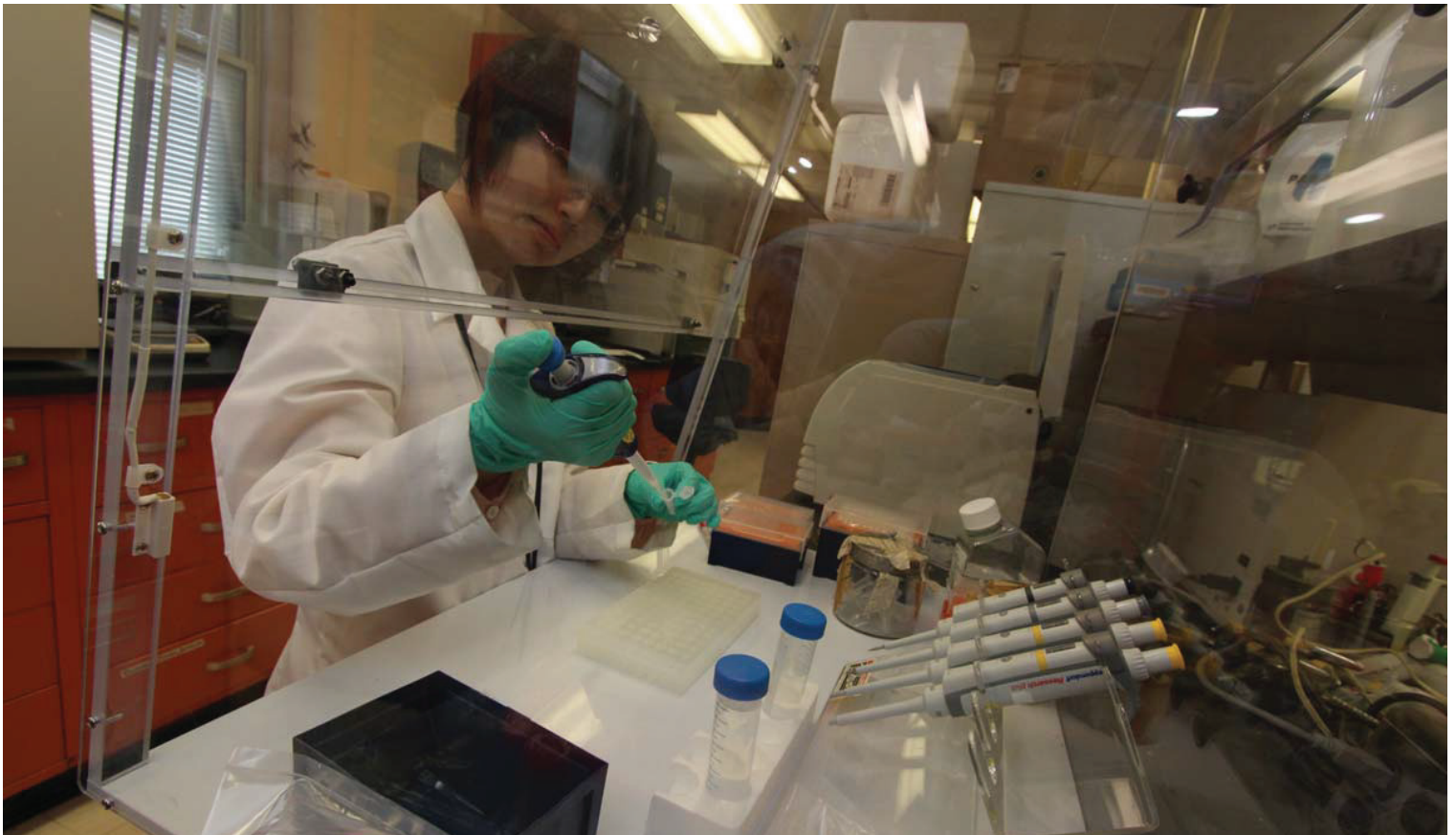
Genetics related to heart disease

Researchers are studying the genes that influence how obesity and lipid levels affect heart disease risk. Using MVP data, this study is looking at whether these genetic factors differ among African Americans and Hispanics. Most previous studies have looked mainly at Caucasians. The findings could help guide treatment and prevention efforts.

"CARDIOVASCULAR DISEASE RISK FACTORS, PREVALENT CARDIOVASCULAR DISEASE AND GENETICS IN THE MILLION VETERAN PROGRAM."
Principal investigators: Peter Wilson, Kelly Cho; Atlanta VA Health Care System, VA Boston Healthcare System.

Predicting heart disease

This project will explore which sets of risk factors are the best predictors of certain forms of heart disease. It will help providers tailor treatment based on patients' individual genetic profiles. The study will leverage the Department of Energy's expertise and technologies in big data, artificial intelligence, and high-performance computing to identify trends related to cardiovascular disease subtype in VA patients.

"PHENOTYPIC AND GENOMIC ARCHITECTURE OF CARDIOVASCULAR DISEASE SUBTYPES."
Principal investigators: Scott Damrauer, Philip Tsao, Christopher O'Donnell, Ravi, Madduri; Corporal Michael J. Crescenz VA Medical Center (Philadelphia), VA Palo Alto Health Care System, VA Boston Healthcare System, DOE Argonne National Laboratory.

DIABETES

Genetics of diabetes

This study is identifying the genes that underlie the differences in risk for diabetic patients by combining gene information with the clinical experience of MVP participants. The team is studying eye disease, kidney disease, heart failure, and hypoglycemia in diabetic patients. They are also looking at how gene variants, glucose levels, and different diabetes drugs affect diabetes risk. The work may lead to a better understanding of diabetes and improve individualized care.

"DIABETIC COMPLICATIONS AND GENETIC VARIANTS IN THE MILLION VETERAN PROGRAM."
Principal investigator: Lawrence Phillips; Atlanta VA Medical Center.

Diabetes and cancer

This study focuses on the relationship of diabetes with pancreas and liver cancer. Diabetes is one of the most prevalent chronic diseases in the United States. The majority of pancreatic cancer patients have diabetes, and diabetes is one of the largest potential risk factors for liver cancer. Researchers will use the VA's electronic health records and MVP program to try to figure out how diabetes and cancer are linked. The results of the research may be used to better understand the causes of cancer.

"STUDYING THE ASSOCIATION OF GLYCEMIC DYSREGULATION WITH PANCREATIC AND LIVER CANCERS IN THE MILLION VETERAN PROGRAM (MVP)."
Principal investigator: Andrew Chang, Jennifer Lee; VA Palo Alto Health Care System.

GENE VARIATION

How gene variation relates to diseases

This project is examining how differences in people's genes affect gene expression (how the information in DNA is translated into actual physiological changes within the body). Studying changes in gene expression will help researchers understand the genetic risk factors of different diseases. The researchers are looking at numerous health conditions, such as PTSD, depression, diabetes, and heart disease. They will use the results to improve treatments and develop precision medicine—treatment customized to individual patients.

"LARGE-SCALE TRANSCRIPTOME AND EPIGENOME ASSOCIATION ANALYSIS ACROSS MULTIPLE TRAITS."
Principal investigator: Panagiotis Roussos; James J. Peters VA Medical Center (Bronx, New York).

Effect of genetic variation on medication dosing

Researchers are using MVP data to better understand how variations in patients' genes affect how they respond to a common anticoagulant, Warfarin. Past studies suggest that knowing a patient's genetic variation can help find the right Warfarin dose more quickly, leading to better control of blood clots. The large and diverse MVP patient population will allow researchers to conduct the largest study ever on the accuracy of dosing methods that use genetic information, and to better understand the strengths and weaknesses of those methods.

"USING MVP DATA TO ASSESS GENOTYPE-GUIDED WARFARIN DOSING ALGORITHMS."
Principal investigator: Steven Zeliadt; VA Puget Sound Health Care System.

GULF WAR ILLNESS

Gulf War illness risk factors

Researchers are studying how genes relate to Gulf War illness (GWI) in Gulf War-era Veterans. GWI is a chronic illness affecting many Veterans from that era. It can include fatigue, headaches, joint pain, indigestion, insomnia, dizziness, respiratory disorders, skin problems, and memory problems. The researchers are comparing men and women with GWI to those without the condition. They are also looking at how different genes and self-reported Gulf War environmental exposures relate to GWI rates. The findings could lead to better treatments to help these Veterans.

"GULF WAR ILLNESS (GWI) RISK FACTORS."
Principal investigators: Drew Helmer, Dawn Provenzale; VA New Jersey Health Care System Durham VA Medical Center.

photo: Frank Curran

INFORMATICS

New computer algorithm to search database

Researchers are testing how efficiently a new computer algorithm can automatically find data on people with specific diseases within the MVP database. The algorithm, called APHRODITE, will be used to link diseases to inherited DNA changes within participants. If the algorithm proves successful, it will allow researchers to quickly match data on diseases with related DNA characteristics. APHRODITE should be able to identify individuals with a condition in a fraction of the time it takes to search the database using current methods.

"EFFICIENT ELECTRONIC PHENOTYPING USING APHRODITE IN THE MILLION VETERAN PROGRAM."
Principal investigators: Jennifer Lee , Themistocles Assimes; VA Palo Alto Health Care System.

KIDNEY DISEASE

How genes affect kidney disease

This study is focusing on how genes affect the risk and progression of kidney disease, a condition common in people with diabetes. It is examining differences in how people with diabetes respond to the drug metformin (the most common treatment for diabetes) and what role genes play in these differences. The project is also looking at people with high blood pressure, a major risk factor for kidney disease, to determine whether genes play a role. The work may help doctors personalize kidney disease treatment.

"PHARMACOGENOMICS OF RISK FACTORS AND THERAPIES OUTCOMES FOR KIDNEY DISEASE."
Principal investigator: Adriana Hung; VA Tennessee Valley Healthcare System.

Genetics of acute kidney injury

This project is looking at the genetic basis for susceptibility to intrinsic acute kidney injury. This condition results in tissue damage and persistent loss of kidney function. Intrinsic acute kidney injury can have a number of different causes, so the researchers must first classify the most common and severe forms of the condition. They can then identify the genetic variants associated with different forms of intrinsic acute kidney injury.

"ADVANCING THE PHENOTYPING OF ACUTE KIDNEY INJURY FOR THE MILLION VETERAN PROGRAM."
Principal investigator: Edward Siew; VA Tennessee Valley Healthcare System.

MENTAL HEALTH

Genetics of schizophrenia and bipolar illness

This research project is studying what genes make it more likely for people to have schizophrenia or bipolar disorder. It is also looking at the problems with thinking and day-to-day function that come with these conditions. Researchers are comparing participants with the two conditions to those who do not have the condition in the MVP database. The findings could help Veterans and others with serious mental illnesses.

"FUNCTIONAL DISABILITY IN SCHIZOPHRENIA AND BIPOLAR ILLNESS."
Principal investigator: Philip Harvey; Miami VA Healthcare System.

Testosterone and Alzheimer's disease

Researchers are studying the impact of low testosterone, androgen deprivation therapy, and testosterone replacement therapy on the risk of mild cognitive impairment and Alzheimer's disease. They are also looking at how pre-existing genetic risk for Alzheimer's changes the impact of testosterone treatments on cognitive function. They hypothesize that higher genetic androgen sensitivity is connected to higher risk of Alzheimer's disease.

"CLINICAL MANIPULATION OF TESTOSTERONE AND ITS IMPACT ON DEMENTIA AND HEALTH."
Principal investigator: Richard Hauger; VA San Diego Healthcare System.

OSTEOARTHRITIS

Genetics of osteoarthritis

Researchers are exploring how genetics affect the prevalence and progression of osteoarthritis. They are looking for genetic predictors of the disease. The researchers believe that understanding how gene variance is related to knee and hip arthritis could lead to new treatments both before and after surgery. The study is also looking at how genetics aff ect the success of hip or knee joint replacement.

"GENETICS OF OSTEOARTHRITIS AND JOINT REPLACEMENT RECOVERY: KEY TO PRECISION REHABILITATION."
Principal investigator: Marcas Bamman; Birmingham VA Medical Center.

MACULAR DEGENERATION

Genetic risk for macular degeneration

Past studies have shown that macular degeneration (an eye condition that causes vision loss) is related to specific genes. However, these studies have included mostly Caucasian volunteers. VA researchers are now looking at whether similar genes are carried by African Americans. This study will help to develop better treatments to slow or stop vision loss.

"GENETIC RISK FOR AMD IN DIVERSE VETERAN POPULATIONS."
Principal investigators: Eric Konicki, Neal Peachey; Louis Stokes Cleveland VA Medical Center.

PARKINSON'S DISEASE

Parkinson's disease genetic risk factors

Researchers are using MVP data to identify genetic risk factors for Parkinson's disease. Gene-by-gene comparison will let researchers identify which gene variants are associated with the disease. They are also looking at whether genetic risks factors for Parkinson's identified in those with European ancestry also occur in Hispanic and African American patients. The researchers hope that this study will reveal new information on the biology of Parkinson's disease, possibly leading to targets for new treatments.

"SINGLE NUCLEOTIDE AND COPY NUMBER VARIANTS ASSOCIATED WITH PARKINSON DISEASE."

*Principal investigator: James Ashe; Minneapolis VA Health Care System.*

POSTTRAUMATIC STRESS DISORDER

Posttraumatic stress disorder (PTSD) risk factors

Researchers are using MVP data to learn about the genes that may affect whether combat Veterans develop PTSD. The team hopes to gain new insight into the effects of PTSD on the brain so that new and improved treatments can be explored. This will be one of the largest genomic studies on PTSD ever done.

"POSTTRAUMATIC STRESS DISORDER (PTSD) RISK FACTORS."

Principal investigators: Murray Stein, Joel Gelernter; VA San Diego Healthcare System, VA Connecticut Healthcare System.
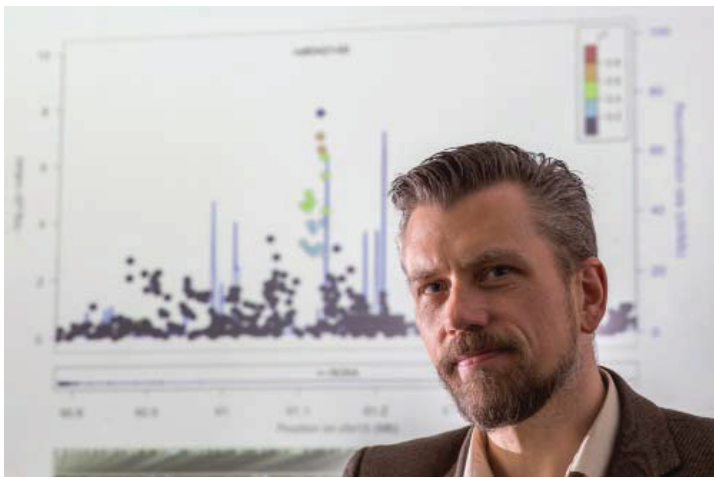
Possible link between Alzheimer's and PTSD genetic risk

This project looks at the link between Alzheimer's disease genetic risks and PTSD symptoms. Researchers are looking at how gene variants already shown to increase Alzheimer's may also affect the risk of PTSD, and also how these risk factors interact with environmental factors such as traumatic brain injury and combat stress. They hypothesize that those at higher genetic risk for Alzheimer's may also have a higher risk of developing PTSD when exposed to trauma.

"EARLY COGNITIVE IMPAIRMENT AS A FUNCTION OF ALZHEIMER'S DISEASE GENES AND TRAUMA."

Principal investigator: Mark Logue; VA Boston Healthcare System.

SUBSTANCE USE DISORDERS

Genetic vulnerability to substance abuse

Researchers are studying genetic risk factors for chronic alcohol, tobacco, and opioid use. Past studies have suggested genes play a role in these unhealthy habits. The team hopes to use the findings to advance screening, diagnosis, and treatment of alcohol, tobacco, and opioid abuse.

"GENETIC VULNERABILITY OF SUSTAINED MULTI-SUBSTANCE USE IN MVP."

Principal investigators: Daniel Federman, Amy Justice, Henry Kranzler; VA Connecticut Healthcare System, Corporal Michael J. Crescenz VA Medical Center (Philadelphia).

Genetics of opioid sensitivity

This study aims to identify genetic predictors of opioid sensitivity. This will allow researchers to better predict the effectiveness of the opioid drug buprenorphine for maintenance treatment of opioid addiction, and better determine effective opioid dosing for pain treatment. They are running separate analyses for different classes of opioids. The results could help prescribers avoid over- or under-prescribing of opioids, as well as maximize the effectiveness of buprenorphine as a replacement for more dangerous opioids.

"PHARMACOGENETIC STUDY OF OPIOID AGONIST TREATMENTS IN MVP."
Principal investigator: Kyle Kampman;
Corporal Michael J. Crescenz VA Medical Center (Philadelphia).

SUICIDE PREVENTION

Predicting suicide risk

This project is a collaboration between VA and the Department of Energy. It will combine VA's electronic health records and MVP data with DoE's big-data expertise and high-performance computing capacity to develop a computer algorithm to predict the risk of suicide in patients. Researchers will look at whether common genetic variants are related to suicide risk. By combining data on gene-based risk factors with non-genetic risk factors—such as demographics, medical conditions, and stressful life events—the researchers hope to better understand and predict suicidal behavior.

"USING 'BIG DATA' AND PRECISION MEDICINE TO ASSESS AND MANAGE SUICIDE RISK IN U.S. VETERANS."
Principal investigators: David Oslin, Philip Harvey, Benjamin McMahon; VA Connecticut Healthcare System, Corporal Michael J. Crescenz VA Medical Center (Philadelphia), Miami VA Medical Center, DOE Los Alamos National Laboratory.

Genetic risk for suicide

As part of the larger "big data" study mentioned above, this research project is studying genetic variants that increase Veterans' risk for both suicide attempts and suicidal thoughts. Past studies have suggested that some people are at higher risk of suicidal behavior because of their genes. Suicide ideation and suicidal acts may have different genetic risks. The researchers hope that this study will lead to improved approaches to suicide prevention by finding new ways to identify Veterans at high risk for suicide.

"GENOME-WIDE ASSOCIATION STUDY OF SUICIDAL BEHAVIOR IN THE MILLION VETERAN PROGRAM."
Principal investigators: Jean Beckham, Nathan Kimbrel; Durham VA Health Care System.

Subtypes of suicidal behavior

Past studies have identified genetic biomarkers related to suicidal behavior. This study is using statistical and machine-learning methods to classify subtypes of suicidal behavior, ranging from low-lethality, low-intent impulsive acts to high-lethality, high-intent suicidal acts. The researchers will then do a genomic analysis of these subtypes in order to develop a diagnostic tool to assess the risk of suicidal behavior.

"IDENTIFYING BIO-SIGNATURES OF SUICIDAL SUBTYPES IN VETERANS."
Principal investigator: Fatemeh Haghighi; James J. Peters VA Medical Center (Bronx, New York).

TINNITUS

Genes related to tinnitus

Researchers are studying how genes relate to tinnitus. Tinnitus is ringing in the ears with no external source. It has been the No. 1 disability for Veterans for more than a decade, being reported in more than 30 percent of VA population. The study aims to identify genes associated with tinnitus from different causes, such as noise, blast, traumatic brain injury, and age. Identifying these genes will direct research into ways to measure tinnitus and new drug treatments.

"GENOME-WIDE ASSOCIATION STUDY OF TINNITUS IN THE MILLION VETERAN PROGRAM WITH EMPHASIS ON TRAUMATIC BRAIN INJURY."
Principal investigator: Allen Ryan; VA San Diego Healthcare System.

Visit our website to stay up to date on the latest MVP news and ongoing studies.

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