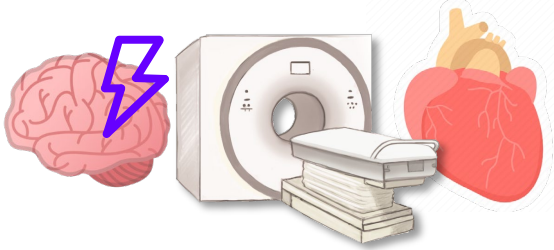


Multimodal profiling of stress-induced immune reprogramming in cardiovascular patients



A Research Study About How Mental Stress Affects the Immune System and the Risk of Heart Attacks

Background and Goals of the Study

- Mental stress is known to be associated with cardiovascular disease, the disease that can affect your blood vessels and leads to heart attack and stroke.
- How this “heart-brain axis” works and influences risk of heart attacks is not well understood.
- Previous studies have identified a link between mental stress, activation of the immune system that normally fights infections, and inflammation that can aggravate cardiovascular disease and increase the risk of heart attacks and stroke.
- This study aims to use advanced imaging of the brain, heart, and blood vessels, as well as blood tests, genetic tests, and information on lifestyle factors, to learn more about how mental stress can affect the immune system and the risk of heart attacks in the future.
- This study will recruit people with a moderate-to-high risk of heart attack and stroke in order to learn about the “heart-brain axis” in those who would benefit the most.

Who can participate

- The study aims to recruit 200 patients,
- Aged between 40 and 65 years old
- With borderline-to-high risk of cardiovascular disease represented by:

ASCVD* score \geq 5%, Or low-density lipoprotein cholesterol (LDL-C) $>$ 190 mg/dL, OR a calcium score $>$ 0 on a previous CT scan

- All tests will be done at Mount Sinai Hospital with additional at-home blood pressure monitoring.
- Monetary compensation up to \$200 is available for the time and effort required to participate.
- Participation in the study will not affect your ability to receive care from Mount Sinai.
- The Atherosclerosis and Cardiovascular Disease Risk Score (ASCVD) is a number based on simple blood pressure and blood tests to determine your risk of heart attack. To test your ASCVD score visit this website <https://tools.acc.org/ascvd-risk-estimator-plus>. For more help or to see if you qualify contact our study coordinator.

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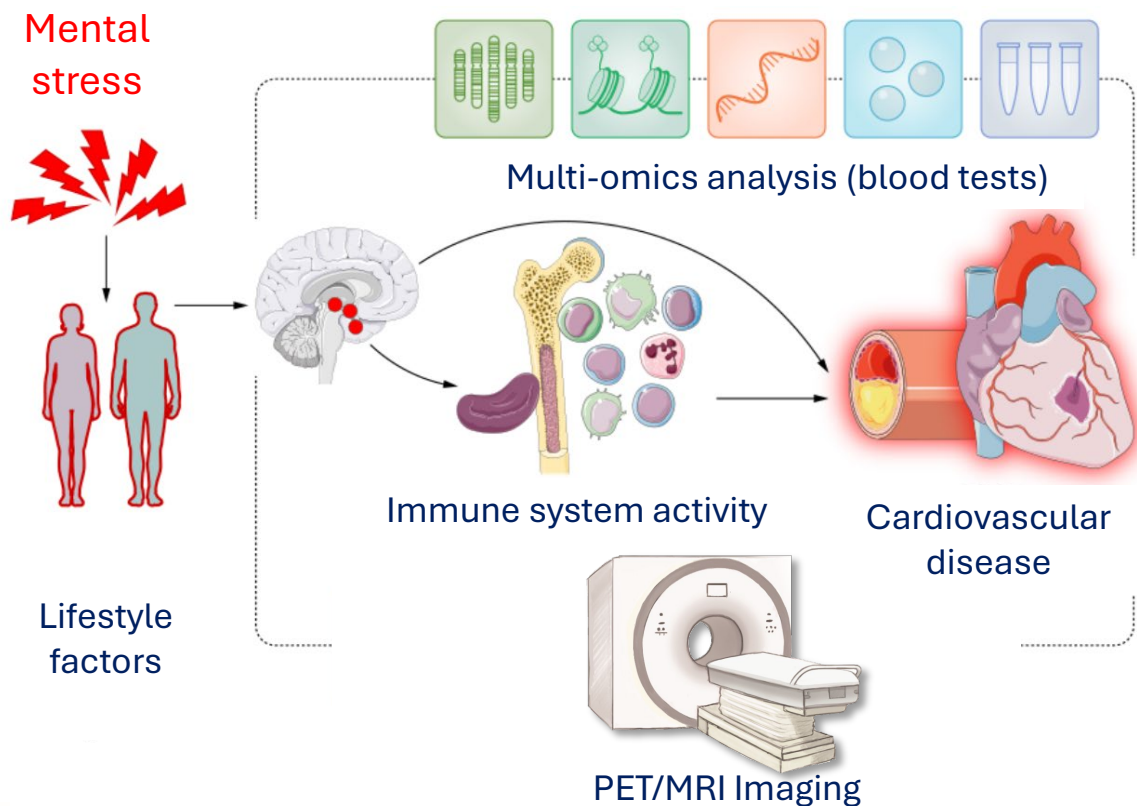
Study Contact:

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What Are the Aims of the Study and How is the Study Designed?

- The study will collect information on mental stress and cardiovascular health through multiple methods to gain a comprehensive picture of how mental stress affects the immune system and risk for heart attacks and stroke.
- Advanced PET/MRI imaging will look at how the brain responds to stress and the health of the blood vessels and the heart.
- Advanced blood tests – called multiomics analysis – will look at how active the immune system is in relation to stress and blood vessels.
- Questionnaires about lifestyle will collect information on how factors such as alcohol use, diet, and exercise impact the body's response to stress.
- All the data collected in the study will be analyzed together to determine the links between all the factors affecting mental stress, the immune system, and the health of your arteries.
- The goal is to investigate the pathway between stress and cardiovascular disease.



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End Date: 6/30/2026

What's Involved and When?

Pre-Screening



- Before enrollment, a member of the study team will reach out to check your medical history, latest lab tests and your blood pressure.
- You can check yourself ASCVD Score by going to this website: <https://tools.acc.org/ascvd-risk-estimator-plus>
- They will also ask some questions about your mental health to ensure you are likely to qualify for the study.

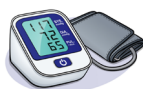


Screening visit



- At screening, you will have a blood pressure measurement and provide a blood sample to confirm your lipid scores.
- You will also complete a number of mental health questionnaires. To be able to look at mental stress on its own, people with mental health issues will not be able to participate.
- Finally, you will complete comprehensive clinical history and lifestyle questionnaires.
- The screening visit will take 1-2 hours.

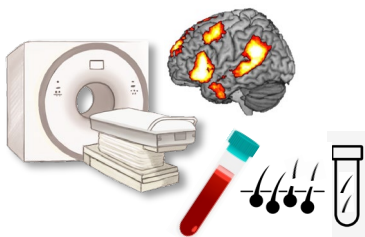
At-home tests



- After the screening visit, you will take a blood pressure monitor home to record you blood pressure twice a day for 2 weeks.





Study visit




- Within 8 weeks from your screening visit you will come to Mount Sinai to undergo the study visit.
- This will include PET/MRI imaging. You will also provide a blood sample and hair sample.
- The study visit will take 4-5 hours.

Special considerations:

- Most tests will be completed at the hospital  and some at home 
- PET imaging involves a small amount of radiation exposure, about the same as background radiation in 1 year. You can not participate if you are pregnant or nursing.
- PET imaging requires fasting for 6 hrs prior to the study, and consumption of a high fat/protein and low carbohydrate diet prior to that



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 \$50 will be provided after completion of the screening visit and \$150 after completion of the imaging visit to compensate participants for time and effort

What Are the Study Tests?

PET/MRI imaging



Positron Emission Tomography (PET) is a type of scan that produces detailed pictures of the inside of the body using a radioactive tracer that is injected into the bloodstream. MRI uses a magnetic field and radio waves to produce detailed pictures of the body's organs and structures. In this study the MRI scanner is part of the same machine as the PET scanner (PET/MRI). Both PET and MRI imaging are safe, painless, and non-invasive tests. PET and MRI are used daily by hospitals around the world to image the brain, heart, and blood vessels.

In this study the scanner will take pictures of your brain, heart, blood vessels in your chest and abdomen.

Before the PET scan, a small amount of radioactive tracer (^{18}F -FDG) is given through a vein (IV). The needle is most often inserted on the inside of your elbow. The tracer travels through your blood and collects in organs and tissues. This helps the radiologist see certain areas more clearly. You will need to wait as the tracer is absorbed by your body. This takes about 30 minutes. Then, you will lie on a narrow table that slides into a large tunnel-shaped scanner while the scanner makes 3D pictures of the body.

The radiation from the test is about the same as from background radiation in one year. Those who are pregnant or nursing can not participate.

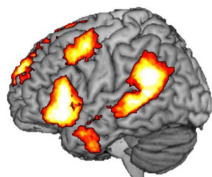
For MRI a different tracer called Gadolinium is injected during the scan to help make pictures of the heart. Electrical pads will be placed on your chest to help make pictures of the beating heart.

You must lie still during the test. Too much movement can blur images and cause errors. For some of the MRI pictures you will be asked to hold your breath for 8-12 seconds at a time while the scanner takes a picture of your heart. The technologist will coach you through the procedure.

PET/MRI imaging will take about 2 ½ hours. There will be an opportunity to have a short break during the scan to ensure you are comfortable throughout.

For PET imaging, it is necessary for you to follow a special high fat/protein low-carbohydrate diet for 12-24 hours prior to the scan, and for you to fast for 6 hours prior to the scan. Additional guidance will be provided.

fMRI brain imaging



fMRI, or functional MRI, is a special type of MRI that enables the researchers to see how active your brain is in response to certain visual prompts. During the scan, a special set of goggles will be placed on your head to show you pictures. While the scanner is taking pictures you will be asked to press a button on a key pad in response to the pictures.



What Are the Study Tests?

Lifestyle questionnaires



You will be asked to complete several questionnaires about your clinical history and lifestyle, such as diet, exercise, and alcohol consumption, to provide a comprehensive set of data to compare to the imaging results. Questionnaires will be completed on a tablet during a study visits or at home on the internet.

At home blood pressure measurements



You will be asked to measure your blood pressure twice a day, at a set time each day, and to record the values and bring back the record to the study visit. You will be provided an at-home blood pressure monitor which you can keep.

Blood tests



During the screening visit, blood will be collected to test for cholesterol levels to check you qualify for the study. During the study visit, blood will be collected to test for specific enzymes related to stress and cardiovascular disease. Genetic tests will also be done to check for links to stress and cardiovascular disease. About 50 ml (10 tbsp) of blood will be taken. Some blood will be stored for additional tests related to inflammation or that are relevant to stress and cardiovascular disease.

Hair sample collection



Cortisol – often called the stress hormone – collects in the hair, leaving a record of the stress you have experienced over the last several months. A small sample of hair, approximately 10-20 strands, will be taken. Care will be taken to remove the hair so it is not noticeable.



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