

Autonomic Testing Information for Patients and Public

What is Autonomic Testing

The autonomic nervous system is the part of the brain, spinal cord and nerves that controls involuntary functions. The primary job of the autonomic nervous system is to maintain homeostasis, a state of balance in the body. Blood pressure, heart rate, urination, digestion and sweating are examples of bodily functions under autonomic nervous system control. Advances in research and technology now allow a noninvasive evaluation of autonomic nervous system functions.

Description of Testing

Cardiovascular autonomic tests assess autonomic control of heart rate and blood pressure. Your blood pressure will be measured using a standard blood pressure cuff on one arm, and a small device that measures blood pressure continuously on your finger. To measure your heart rate, you will have cardiac leads placed on your chest and attached to an EKG.

During the first test you will take slow deep breaths consecutively for a minute. Your heart rate and blood pressure will be measured and analyzed by a computer program. The purpose of the test is to measure your heart rate variability.

The next test will require you to blow into a mouthpiece against resistance. Again, your heart rate and blood pressure will be measured and analyzed by a computer program. This test is also designed to measure heart rate and blood pressure variability.

The third test is the tilt table test. During the tilt table test you will be on a motorized tilt table, which will take you slowly from a lying to a standing position. You will stand at a 70-degree angle for 20 to 40 minutes with your heart rate and blood pressure monitored and recorded. The purpose of the tilt table test is to determine whether you experience any changes in your heart rate or blood pressure upon a change in position. During the tilt table test some patients may faint, though we make every effort to prevent this from happening.

The cardiovascular autonomic tests generally take one and a half hours to complete.

Quantitative Sudomotor Axon Reflex Test (QSART) will test the function of your sweat glands, which are under autonomic control. The QSART is very useful in determining whether there is damage

to the small nerves that control your sweat glands, and whether that is contributing to an autonomic disorder. During the QSART, your sweat glands will be stimulated using a small electrical current. The electrical stimulation will allow acetylcholine, a chemical naturally found in your body, to reach and activate your sweat glands. Once stimulated, your sweat glands will sweat, and the amount of sweat produced will be analyzed with a computer program.

This test will be done on one side of your body in four sites, including your forearm, hand, leg and foot. Your shoe and sock on the appropriate leg will be removed and your skin will then be cleaned using acetone. Capsules designed to hold the acetylcholine will be snugly attached to you in the four appropriate locations. The current will then be turned on and will remain on for five minutes during which the sweat responses are measured. The total time for this test is approximately one half hour. During the test, you may experience a slight burning or tingling sensation where you are being stimulated.

Quantitative Sensory Test (QST) is used to assess your response to vibration and temperature sensations. The QST is helpful in assessing whether or not you have experienced nerve damage. The test will require you to remove your shoes and socks. A small device will then be used to administer a small vibration or temperature change. You must indicate whether or not you felt the stimulus. The QST uses a computer program to measure and analyze your responses. During the test you will feel mild vibrations and hot and cold sensations. You should experience little or no discomfort during this test. This set of testing usually takes approximately one hour.

Thermoregulatory Sweat Test (TST) is a test that evaluates your entire body's ability to sweat. The thermoregulatory sweat test is an important diagnostic tool for physicians in identifying and differentiating between many neurological disorders because it assesses your entire body's response to heat.

You will be required to wear a disposable bathing suit for this test. You will then lie on a table while the technician applies a powder to cover the entire front of your body. This powder is designed to change color when it becomes wet. After administration of the powder, four capsules will be snugly attached to your forearm, hand, leg and foot to collect the sweat you produce while you are in the heating box. You will then enter the heated glass box where you will remain for up to 30 minutes. During this time, your body temperature and sweat production will be closely observed.

During the test you will be monitored very closely. You may feel uncomfortable due to the powder and the heat. The powder on your skin will turn from an orange to a purple color when it becomes wet, indicating areas where you did or did not sweat. At the conclusion of the test, you will be slowly removed from the heating box, giving your body time to adjust to the changes in temperature. Your picture will then be taken as part of your medical record. This picture will be used to generate a report showing where you did or did not sweat. Following the test, you will take a shower to wash off the remaining powder. This test takes about two hours.

Complex Regional Pain Syndrome (CRPS) is used in patients who have experienced extended pain in an extremity. During this testing, the injured or affected extremity is compared to the uninjured or unaffected extremity in order to determine the difference between the two extremities. This screen involves three tests and takes approximately one and one half hours.

For the first part of the test your skin temperature will be measured in 15 sites on the injured or affected extremity and the same 15 sites on the uninjured or unaffected extremity. Your skin temperatures will be measured two times during this screen; both as the first step of the screen and again after you have exercised both extremities. Measuring the skin temperatures is noninvasive and should cause little or no discomfort.

The next part of this test is to perform the QSART (as described above). However, rather than performing the QSART on only one side of the body, the capsules will be placed on both sides of the body to compare the two extremities.

The final part of this test requires measuring your limb volume. Limb volume is measured using the displacement of water. Specialized equipment has been developed to perform this testing. You will place the injured or affected extremity into a specialized container of warm water. The amount of water displaced will be measured and noted. The procedure will then be repeated for the uninjured or unaffected extremity. The two volumes will be compared. Your limb volumes will be taken twice for each extremity. Once before exercising and again immediately following two minutes of exercising the limb. This process is very helpful in determining whether swelling is present in the injured extremity and whether swelling occurs following exercise.

24-Hour Blood Pressure monitoring requires you to wear a blood pressure cuff for 24 hours. The blood pressure cuff will inflate approximately every 15 minutes during your normal daytime hours, and only once per hour during your normal sleeping hours. This test allows us to monitor your blood pressure in your normal setting. You will also be asked to record if you have any symptoms in your blood pressure log. Your symptoms and blood pressures will be compared to see if there is a correlation between the two.

Patient Instructions

Many things affect the autonomic function that we are measuring. We therefore ask:

- No alcoholic drinks 14 hours before your study
- No nicotine (cigarettes) or caffeine (tea, coffee, chocolate, caffeinated soft drinks) three hours before the study
- No constrictive clothing such as Jobst stockings, corsets or binders when you come for testing
- Please eat and drink normally for 24 hours prior to testing (except for caffeine)
- Skin should be clean: no lotion, oil, cream or perfume. Makeup is fine (except for TST).
- If you have a pacemaker, please call our office for special arrangements
- Certain medications, if permitted by your physician, may need to be stopped prior to the study because they will affect the results of your study. If the medications are unsafe to stop, we will test you and take this into account when interpreting the study.

Where to go

Your testing will be performed in one of three places:

University Hospitals Case Medical Center

11100 Euclid Avenue
Cleveland, OH 44106

The Autonomic Laboratory is located in Bolwell 2700 (second floor). Parking is available in either the Cornell Road Parking Garage or Adelbert Parking Garage.

University Hospitals Westlake Health Center

960 Clague Road
Westlake, OH 44145

The Autonomic Laboratory is located in the Neurology Suite 3120 (third floor). Parking is available both in front of and behind the building.

University Hospitals Chagrin Highlands Health Center

3909 Orange Place
Orange Village, OH 44122

The Autonomic Laboratory is located in Suite 2000 (second floor). Parking is available both in front of and behind the building.

Scheduling appointments

To schedule an appointment, please call the main Autonomic Line at 216-844-3496.

Questions about tests

For questions about the testing procedures, you can call the number above. If you have more detailed questions or would like to speak to a technician, please call 216-844-7622.