CLINCIAL POLICY

Nuclear Exercise Stress Test Policy

A. EFFECTIVE DATE :
April 7, 2021

B. PURPOSE :
To define purpose and protocols for performing nuclear exercise stress tests.

C. POLICY :
A Cardiology fellow, Physician's Assistant, Advanced Practice Registered Nurse, or Registered Nurse will supervise individual tests with oversight by a credentialed Cardiologist.

D. SCOPE :
Indications:

A nuclear exercise stress test is used to assist with diagnosis of coronary artery disease. The addition of radioisotope injections and nuclear imaging increases the accuracy of the results by adding images to the EKG data obtained with a regular exercise stress test.

CONTRAINDICATIONS:

Absolute

1. Acute myocardial infarction (within 2 days)
2. High-risk unstable angina*
3. Uncontrolled cardiac arrhythmias causing symptoms or hemodynamic compromise
4. Symptomatic severe aortic stenosis
5. Uncontrolled symptomatic heart failure
6. Acute pulmonary embolus or pulmonary infarction
7. Acute myocarditis or pericarditis
8. Acute aortic dissection

Relative

1. Left main coronary artery disease
2. Moderate stenotic valvular heart disease
3. Electrolyte abnormalities
4. Severe arterial hypertension
5. Tachyarrhythmias or bradyarrhythmias
6. Hypertrophic cardiomyopathy and or other forms of outflow tract obstruction
7. Mental or physical impairment leading to inability to exercise adequately
8. High-degree atrioventricular block

INDICATIONS FOR TERMINATING EXERCISE TESTING

Absolute:

1. Drop in systolic blood pressure of >10mmHg from baseline blood pressure despite an increase in workload, when accompanies by other evidence of ischemia
2. Moderate to severe angina
3. Increasing nervous system symptoms (e.g. ataxia, dizziness, or near-syncope)
4. Signs of poor perfusion (cyanosis or pallor)
5. Technical difficulties in monitoring ECG (electrocardiogram) or systolic blood pressure
6. Subject's desire to stop
7. Sustained ventricular tachycardia
8. ST elevation ($\geq$ 1.0mm) in leads without diagnostic Q-waves (other than V1 or a VR)

Relative

1. Drop in systolic blood pressure of $\geq$ 10mmHG from baseline blood pressure despite an increase in workload, in the absence of other evidence of ischemia
2. ST or QRS changes such as excessive ST depression (> 2mm of horizontal or downsloping ST-segment depression) or marked axis shift
3. Arrhythmias other than sustained ventricular tachycardia, including multifocal PVCs, triplets of PVCs (premature ventricular contractions), supraventricular tachycardia, heart block, or bradyarrythmias
4. Fatigue, shortness of breath, wheezing, leg cramps, or claudication
5. Development of bundle-branch block or IVCD (intraventricular conduction delay) that cannot be distinguished from ventricular tachycardia
6. Increasing chest pain
7. Hypertensive response (systolic blood pressure of > 250mmHG and/or a diastolic blood pressure of > 115mmHg)

MISCELLANEOUS

1. Except under unusual circumstances, all tests are maximal stress tests, that is symptom-limited: due to symptoms or concerning cardiovascular signs (see Indications for Terminating Exercise Testing)
2. Minimal standard for diagnostic test: symptom limited or 85% of MPHR (Maximal Predicated Heart Rate) and double product of 25K or greater.
3. Test supervisor will notify attending cardiologist of any critical end points.
4. Attending cardiologist will notify referring (ordering) physician within one hour of being notified of critical test results.
5. A patient's condition may require the need to be seen by attending cardiologist or have more definitive care in the Emergency Department for critical end points. The test supervisor will accompany the patient to the ED. The test supervisor will give a report to the ED nurse/physician with appropriate documentation and a copy of the EKG.
6. Critical Test results (defined by attached) will be communicated to referring (ordering) provider by supervising cardiology within one hour of interpretation and documented accordingly in formal final report.

E. DEFINITIONS :

None

F. MATERIAL(S) NEEDED :

Electrodes, treadmill, emergency med tote, crash cart, IV access, CASE machine

G. PROCEDURE :

1. Patient is properly identified via hospital policy for patient identification.
2. Informed consent should be signed and dated, with time for signing indicated.
3. A Heplock is inserted by licensed Nuclear Medicine technologist.
4. Per Nuclear Medicine protocols: a nuclear technologist administers the first dose of radioisotope for the rest scan. The patient waits the specified period of time for uptake of the isotope by the heart muscle. At the appropriate time, the nuclear technologist scans the patient.
5. The patient is brought into the stress testing laboratory. The test is explained, questions are answered, and informed consent for the test is signed.
6. After skin preparation, ten electrodes are placed on specific areas of the chest (RA, RL, LA, LL, V1-V6). Electrodes should be placed on patient while he/she is standing in order to standardize procedure.
7. Resting heart rate, blood pressure, and electrocardiogram are obtained, both supine and standing.
8. All data obtained during the test will be entered in the stress testing computer system.
9. An assessment is completed by the test supervisor which may include, but is not limited to: reason for testing, history of present illness, current medications and whether they were taken on the day of the test, past medical history, allergies to medication, presence of risk factors for cardiovascular disease, cardiac history, history of asthma or other pulmonary problems, presence of any orthopedic or neurological problems that may prohibit walking on the treadmill and how the patient is feeling on the day of the test.
10. A focused physical examination may be done which may include, but is not limited to: heart and lungs auscultation.
11. Appropriate lab data is reviewed on inpatients/ED patients to verify two (2) negative sets of cardiac enzymes.
12. The order is reviewed for completeness and appropriateness of test.
13. After evaluating the above data, the test supervisor determines whether to proceed with testing. If testing is determined inappropriate, unsafe, or clinically not indicated, the test supervisor will notify referring provider. The test supervisor may change an exercise stress test to a pharmacologic stress test per protocol if the patient is deemed to be mentally or physically unable to exercise or if the patient refuses to exercise.
14. Test supervisor chooses the appropriate protocol. Standard Bruce Protocol is recommended or, if indicated, modified Bruce protocol or Naughton protocol.
15. Patient exercises on the treadmill with the amount of exertion gradually increasing per protocol. Heart rate and heart rhythm, as well as subjecting and objective signs of test tolerance, are continuously monitored. Blood pressure is intermittently monitored.
16. If a patient is unable to achieve the target heart rate or is unable to continue exercising, the test supervisor may convert the test to a pharmacologic stress test per protocol.
17. Appropriately one (1) minute before stopping exercise, the nuclear technologist injects a second dose of radioisotope at a time designated by the test supervisor and the patient continues walking one minute to circulate the isotope.
18. The treadmill is stopped when the patient can no longer exercise, there are concerning symptoms that appear, or changes that occur in the EKG, heart rate, heart rhythm, or blood pressure (including hypotension: >20mmHg decrease compared to the previous stage in the setting of clinical evidence of ischemia).
19. There is a minimal five-minute recovery period where the heart rate and rhythm are continuously monitored and blood pressure is monitored minimally every two minutes.
20. The test is completed when the blood pressure, heart rate and rhythm are stable and any symptoms, EKG changes or arrhythmias have resolved.
21. Test supervisor will interpret the stress test, incorporating all clinical variables (workload, EKG changes, HR, and BP response) and prepare a preliminary report.

22. Critical test results, as defined under separate cover, are communicated to attending cardiologist. Attending cardiologist will notify ordering physician within one hour of test interpretation and document on final report.
23. The patient is disconnected from the stress testing equipment; all but three (3) precordial electrodes are removed.
24. The patient waits the specified period of time for uptake of the isotope by the heart muscle. At the appropriate time, the nuclear technologist scans the patient for the stress portion of the test. Upon completion of the stress scan, the nuclear technologist removed the Heplock, per Nuclear Medicine protocols.
25. Cardiology portion of the test is interpreted and dictated by the test supervisor or designated practitioner.
26. Nuclear portion of the test is interpreted and dictated by the Nuclear Medicine physician/radiologist.
27. Stress test results and report are reviewed by designated cardiologist before being posted to the patient's electronic record.

H. ATTACHMENTS :

None

I. REFERENCES :

Exercise, Stress Test, nuclear

J. SEARCH WORDS :

Exercise Testing

K. ENFORCEMENT:

Violations of this policy or associated procedures may result in appropriate disciplinary measures in accordance with University By-Laws, General Rules of Conduct for All University Employees, applicable collective bargaining agreements, the University of Connecticut Student Code, other applicable University Policies, or as outlined in any procedures document related to this policy.

L. STAKEHOLDER APPROVALS :

On File

M. COMMITTEE APPROVALS :

None

N. FINAL APPROVAL :

1. Andrew Agwunobi (Signed) 04/16/2021
Andrew Agwunobi, MD, MBA Date
UConn Health Chief Executive Officer

2. Anne Horbatuck (Signed) 04/16/2021
Anne D. Horbatuck, RN, BSN, MBA Date
Clinical Policy Committee Co-Chair

3. Scott Allen (Signed) 04/15/2021
Scott Allen, MD Date
Clinical Policy Committee Co-Chair

4. Caryl Ryan (Signed) 04/13/2021
Caryl Ryan, MS, BSN, RN Date
VP Quality and Patient Service & Chief Nursing Officer

O. REVISION HISTORY :

Date Issued: 1/2005
Date Revised: 12/2006, 1/2008, 1/2009, 10/2/2020, 4/2021
Date Reviewed: 1/2010, 9/2012, 10/2/2014, 2/6/2015