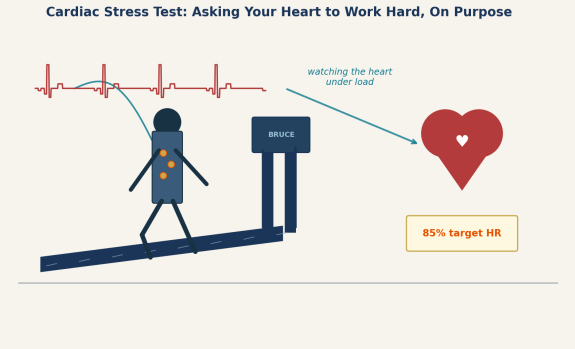
Cardiac Stress Testing

What the Test Is, Which Kind You May Get, How to Prepare, and How to Read the Result

A stress test asks your heart to work hard - on purpose - so we can watch how it responds. It is one of the most common tests in cardiology, and one of the safest.



Online: https://go.riasalimd.com/stress-test-guide

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Names & Terms You Will Hear

Term	Meaning
Cardiac stress test	Any test that watches the heart while it is being asked to work hard - usually by walking on a treadmill or by getting a medicine that mimics exercise.
Exercise stress test (treadmill ECG)	Walking on a treadmill while an ECG records the heart. The standard exercise protocol is the Bruce protocol - the speed and incline go up every 3 minutes.
Bruce protocol	The most common treadmill protocol. Seven stages, three minutes each, starting at 1.7 mph and 10% grade. How long you last is a measurement of your fitness as well as your heart.
Stress echocardiogram (stress echo)	An echo (ultrasound of the heart) done right before and right after stress. Looks at how the heart walls move - if a wall stops moving well under stress, it points to a blood-flow problem.
Pharmacologic stress test	A stress test for people who cannot walk well. A medicine is given through an IV that either makes the heart work harder (dobutamine) or opens the heart arteries (adenosine or regadenoson) - both mimic exercise.
Dobutamine stress echo	Pharmacologic stress echo using dobutamine, which speeds up and strengthens the heart. Side effects (palpitations, flushing) usually pass quickly.
Adenosine / regadenoson stress	Vasodilator stress used with nuclear or MRI imaging. Side effects (flushing, chest tightness, brief shortness of breath) are common and fade within minutes. Caffeine blocks these medicines - so you hold caffeine 12 to 24 hours before.
Nuclear stress test (SPECT MPI)	A small amount of a radioactive tracer is given through an IV and a camera takes pictures of where the blood goes in the heart muscle. Done at rest and again under stress.

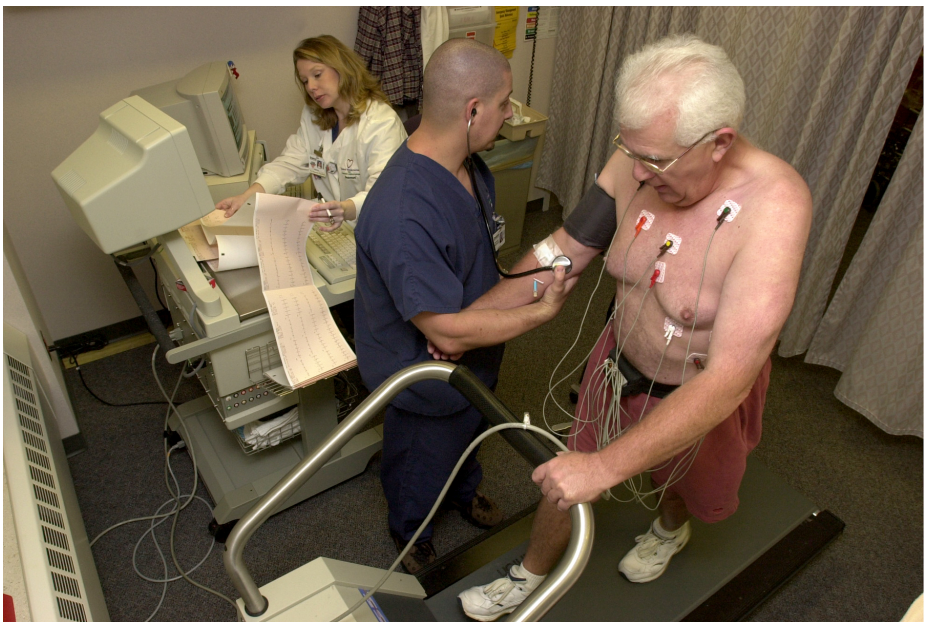
Term	Meaning
PET MPI	A newer kind of nuclear test that uses a different tracer (rubidium-82 or N-13 ammonia). Higher accuracy than SPECT and lower radiation, but only available at larger centers.
Stress cardiac MRI	MRI of the heart with a medicine (adenosine or regadenoson) that opens the arteries, plus a small dose of gadolinium contrast. No radiation.
METs (metabolic equivalents)	A way to measure how hard the heart is working. 1 MET is resting. Walking briskly is about 3-4 METs. Climbing stairs is about 5-7. Most stress protocols try to get patients above 5 METs.
Target heart rate	Roughly 220 minus your age, then times 0.85. The test usually aims for at least 85% of your age-predicted maximum heart rate - or until the team has the information they need.
Reversible perfusion defect	An area of the heart that gets less blood flow during stress but normal flow at rest. This is the nuclear or MRI fingerprint of a narrowed coronary artery.
Fixed defect	An area of low blood flow at both rest and stress. Usually points to old scar from a previous heart attack.
ST depression	A specific pattern on the ECG during exercise that suggests not enough blood flow to part of the heart. Reported in millimeters - 1 mm is mild; 2 mm or more is more concerning.
Positive stress test	A test that shows one or more of: new chest pain, ECG changes (ST depression), wall-motion problems on echo, or a perfusion defect on nuclear or MRI. Each of these suggests a blood-flow problem.
Negative stress test	A test where the heart did the work, no symptoms appeared, the ECG stayed normal, and the imaging looked normal. Reassuring but not a guarantee against every kind of heart problem.

Term	Meaning
Non-diagnostic stress test	A test where the heart did not work hard enough (could not reach target heart rate) or the pictures were not clear enough to call. A repeat with a different modality may be needed.

Two big things to know going in. First: a stress test is one of the safest tests in cardiology - serious events are on the order of 1 in 10,000. Second: a normal stress test is reassuring, but it is not a complete shield against future heart attacks - a non-blocking plaque can still rupture. We use the test together with your symptoms, risk factors, and other tests.

Cardiac Stress Testing?

- A cardiac stress test is a test we use to watch your heart while it is being asked to work harder than usual. We do this either by having you exercise on a treadmill or by giving a medicine that mimics exercise.
- The point is to see if the heart has trouble keeping up with the extra demand - which can be a sign that one or more of the heart arteries is narrowed.
- Most stress tests use a treadmill (the Bruce protocol). The speed and incline both go up every three minutes. You go as long as you can or until the team has the answer.
- If you cannot walk well - because of arthritis, lung disease, or recent surgery - a medicine is given through an IV instead. The medicine either speeds up the heart (dobutamine) or opens the arteries (adenosine, regadenoson).
- Some stress tests use only the ECG (the heart-rhythm tracing). Others add imaging - either an echo (ultrasound), a nuclear tracer, or a cardiac MRI. The right kind depends on the question and your body.
- A stress test usually takes about an hour from check-in to walking out. The exercise or medicine part itself is only about 5 to 15 minutes. The rest is preparation, monitoring, and post-stress imaging.



A real exercise stress test in progress. The treadmill, the ECG leads on the chest, and the monitor for the team to watch are the constants. The patient walks up an incline while we watch how the heart and the ECG respond.

Stress-Test Modalities Side by Side

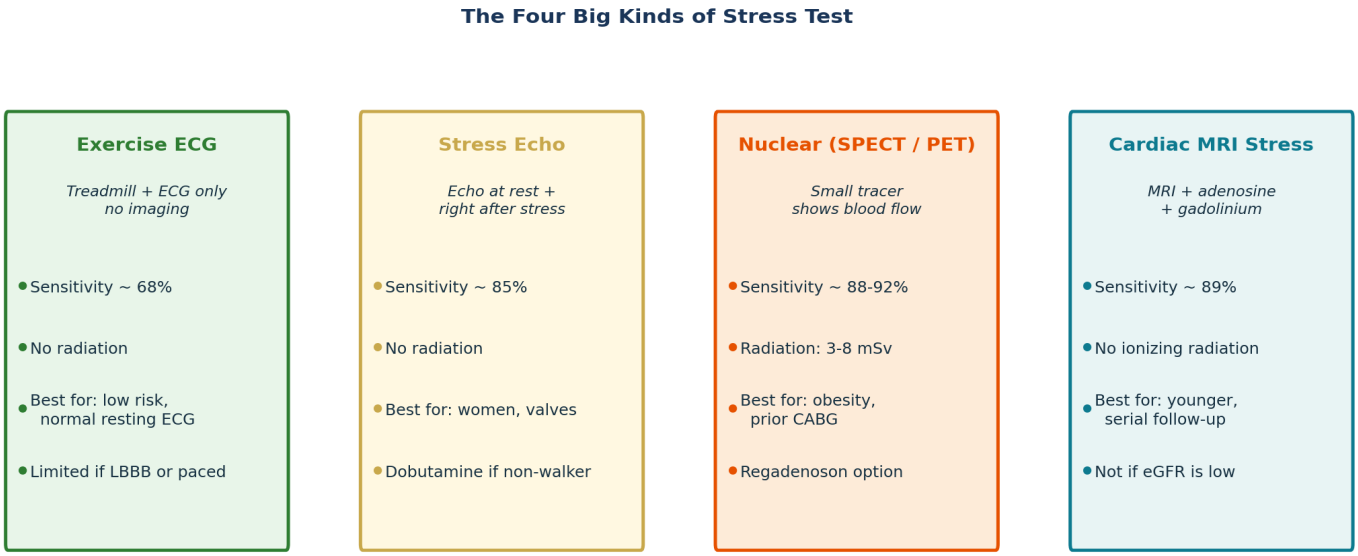
Modality	Sensitivity	Radiation	Best for
Exercise ECG (treadmill, no imaging)	~ 68%	None	Low pretest probability, normal resting ECG, can walk
Stress echo (treadmill or dobutamine + ultrasound)	~ 85%	None	Women, valve assessment alongside, no IV contrast needed
Nuclear SPECT MPI	~ 88%	~ 8 mSv	Prior CABG, obesity, larger perfusion defects
Nuclear PET MPI	~ 92%	~ 3 mSv	Higher accuracy, lower radiation, blood-flow quantification
Stress cardiac MRI	~ 89%	None	Younger patients, serial follow-up, scar assessment

What Happens During an Exercise Stress Test - Minute by Minute

- Check in: the team confirms your name, the test ordered, your medicines, and any held doses. Bring a list.
- Change into a hospital gown or comfortable two-piece clothing. Wear walking shoes.
- ECG electrodes are placed on the chest - the team will shave small spots if needed for good contact.
- Blood pressure cuff is placed on the arm. A baseline ECG is recorded; you may be asked to stand and walk in place briefly.
- You get on the treadmill. Stage 1 of the Bruce protocol is 1.7 mph at 10% grade - a brisk walk uphill.
- Every 3 minutes the speed and incline both go up. The team checks your blood pressure and watches the ECG continuously.
- Tell the team about any chest pain, shortness of breath, light-headedness, or leg fatigue. These are reasons to stop, not reasons to push through.
- Most adults exercise for 6 to 12 minutes. The team stops when you have reached the target heart rate, when symptoms appear, or when the ECG shows enough information.
- After exercise: you walk on the treadmill at a slow pace for 1 to 2 minutes (cooldown), then sit while the team watches the ECG return to baseline.
- If imaging is part of the test, pictures are captured right at peak heart rate and again as you recover.

Why It Matters

- A stress test is one of the main ways we look for blood-flow problems (ischemia) in the heart. It is most often used for new chest pain, shortness of breath, or known coronary artery disease.
- It also tells us about your functional capacity - how much work your heart and lungs can do. This is a strong predictor of long-term outcomes by itself, separate from anything we see on the ECG or images.
- Most stress tests are normal. That is reassuring information - it helps us tell which symptoms are coming from the heart and which ones are not.
- When a stress test is abnormal, we use the result to choose what comes next. Options include more medicines, a coronary CT or angiogram, or a heart procedure (stent or bypass).
- A stress test can also be used to check whether a treatment is working. After a stent, after starting heart-failure medicines, or after cardiac rehab, we can repeat the test and compare.



The four big kinds of stress test. Which one you get depends on whether you can walk, what your resting ECG looks like, your body habitus, and the specific question we are trying to answer.

Stress-Test Result Categories - What the Report Will Say

Negative (normal)	Equivocal (uncertain)	Positive (abnormal)	Strongly positive (high-risk)
• Heart did the work, no symptoms, ECG stayed normal	• Test did not reach target rate, or pictures unclear	• Symptoms reproduced with exercise, OR ST depression > 1 mm	• ST depression > 2 mm at low workload
• Imaging - if done - looked normal	• ECG findings borderline or limited by baseline	• Imaging shows a reversible perfusion defect or wall-motion problem	• Drop in systolic BP > 10 mmHg with exercise
• Reassuring, especially with good functional capacity	• Common reasons: medicines not held, anxiety, lung disease	• Suggests a narrowed coronary artery	• Sustained ventricular tachycardia or large reversible defect
• Does not rule out non-obstructive plaque or future heart attack	• Usually repeat with a different modality (echo, nuclear, MRI, or CTA)	• Next step: medical optimization + coronary CT or angiogram	• Same-day call from our office; usually invasive angiogram soon

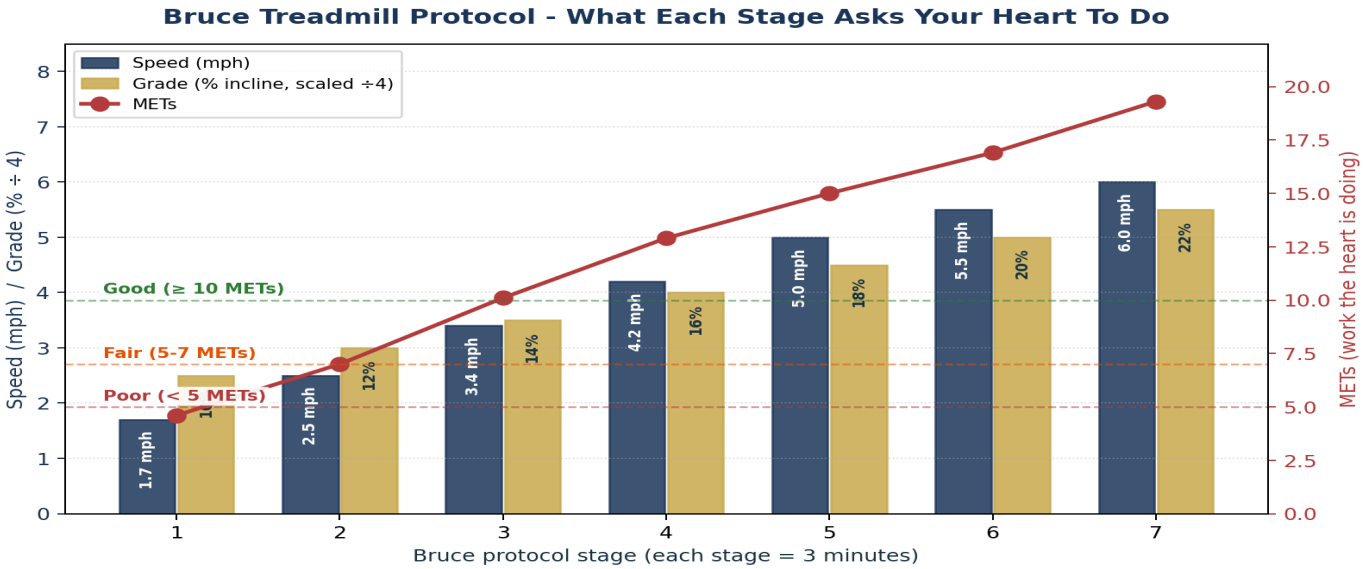
Risk Factors

Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

Risk Factor	Why It Increases Risk
Reasons your doctor may order a stress test	New chest pain or pressure, new shortness of breath with exertion, palpitations or fainting with exercise, known coronary artery disease that needs follow-up, before a major non-cardiac surgery in selected patients, or after a heart procedure to check the result.
Reasons to exercise instead of using a medicine	If you can walk well, exercise is preferred. It gives extra information (how long you can go, your blood pressure response, your symptoms). Most adults with reasonable mobility get an exercise test.
Reasons to use a pharmacologic test instead	Significant arthritis, recent leg or back surgery, severe lung disease, peripheral artery disease, or any condition that limits walking to less than 3-4 METs. Pharmacologic agents (dobutamine, adenosine, regadenoson) work through the IV.
Reasons to add imaging (echo, nuclear, MRI)	Resting ECG abnormalities that make the ECG hard to read during stress (LBBB, paced rhythm, baseline ST changes), prior stents or bypass, women (often added because exercise-ECG alone has lower accuracy), or anyone where the team needs to localize a problem to a specific artery.
Reasons NOT to do a stress test (and what we do instead)	Active chest pain at rest, very recent heart attack (within 2 days), uncontrolled arrhythmia, severe aortic stenosis with symptoms, decompensated heart failure, suspected dissection or large blood clot. In these cases, we usually go straight to a coronary CT or a heart catheterization.
Choice of test by body habitus and ECG	Patients with large body habitus, breast tissue, or diaphragm shadows may have noisier nuclear images. Stress echo or cardiac MRI may be chosen instead. Patients with a pacemaker or LBBB are usually steered to imaging stress (not exercise-ECG alone).

Treatment Options

- For an exercise stress test: wear walking shoes and loose, two-piece clothing. Eat a light meal 3 to 4 hours before - not right before, and not on an empty stomach.
- Some heart medicines may be held the day of the test - the team will tell you which. Beta-blockers, nitrates, and calcium-channel blockers can blunt the heart's response and hide a real result. Diabetes medicines may also need adjustment.
- For a pharmacologic stress test: nothing to eat or drink for 4 to 6 hours before. Skip caffeine - coffee, tea, soda, chocolate, decaf - for 12 to 24 hours before. Caffeine blocks adenosine and regadenoson and can make the test invalid.
- Tell the scheduler if you have asthma or COPD with active wheezing. Some vasodilator stress agents are not used in active bronchospasm - dobutamine or exercise is substituted.
- An IV is placed if imaging or pharmacologic stress is planned. ECG electrodes are placed on the chest. Blood pressure is checked at rest and at every stage of the test.
- During the test: walk as long as you can, or follow the team's instruction to stop. Tell the team about chest pain, severe shortness of breath, light-headedness, or leg pain - any of these can be a reason to stop early.
- If you get pharmacologic stress, the side effects (flushing, chest tightness, headache, brief shortness of breath) usually fade within 1 to 2 minutes after the medicine is stopped or reversed. A reversal medicine (aminophylline) can be used if needed.
- After the test: a short recovery period - usually 5 to 15 minutes - where the team watches your ECG and blood pressure. Most patients walk out within an hour and can go right back to their day.
- If you got a nuclear or MRI study, the imaging usually happens right before and right after stress. The total visit can be 2 to 4 hours because the tracer or contrast needs time to reach the heart.
- Your results are usually available within a day or two. Some findings (severe ST changes, a large perfusion defect, a low blood pressure response) get a same-day call from our office.



The Bruce protocol. Each stage is three minutes long; speed and incline both go up at every stage. METs - a measure of how hard the heart is working - climb quickly. Reaching about 7 METs is fair; 10 or more is good. How long you last is itself a measurement of your heart and lung fitness.

What Happens During a Pharmacologic (Medicine-Based) Stress Test

- NPO 4 to 6 hours before. No caffeine 12 to 24 hours before. An IV is placed in the arm.
- If the test uses dobutamine: the medicine is started at a low dose and increased every few minutes. Your heart rate climbs the way it would during exercise. The total infusion is about 12 to 15 minutes.
- If the test uses adenosine or regadenoson: the medicine is given through the IV over about 10 seconds (regadenoson) or 4 to 6 minutes (adenosine). These open the heart arteries - like opening every door at once.
- Side effects during the medicine are common: flushing, chest tightness, brief shortness of breath, a metallic taste, headache. These usually fade within 1 to 2 minutes after the medicine ends.
- If imaging is being done, the tracer or echo or MRI sequence is timed to peak medicine effect.
- After the medicine ends, the team watches your ECG and blood pressure for 15 to 30 minutes. A reversal medicine (aminophylline) can be used for adenosine/regadenoson side effects that do not pass.
- Most patients walk out the same day. No driving restrictions in most cases - but check with the team if sedation was used.

What Happens During a Nuclear Stress Test (SPECT or PET MPI)

- Two sets of pictures: one at rest and one at stress. The whole visit can be 2 to 4 hours.
- A small dose of a radioactive tracer (technetium-99m for SPECT; rubidium-82 or N-13 ammonia for PET) is given through the IV at rest.
- After a wait of 30 to 60 minutes (the tracer has to reach the heart muscle), the first set of pictures is taken in a camera that looks a lot like a CT scanner.
- Then the stress part: either exercise on the treadmill or a pharmacologic agent. A second dose of tracer is given at peak stress.
- After another short wait, the stress pictures are taken. The team compares rest with stress.
- A 'reversible defect' (low tracer at stress, normal at rest) points to a narrowed artery. A 'fixed defect' (low at both) usually means old scar.
- Radiation is comparable to a few months to a year of natural background. The tracer leaves the body in urine over a day or two.

What Happens During a Stress Cardiac MRI

- Total visit is about 60 to 90 minutes. You lie on a sliding table that goes into a wide tube. The scanner is loud - you get earplugs and headphones.
- An IV is placed for gadolinium contrast and for the stress medicine (usually regadenoson or adenosine).
- Rest images are captured first. Then the stress medicine is given, and stress images are captured while the medicine is working.
- Gadolinium is given through the IV. A 'late gadolinium enhancement' set of images is taken about 10 minutes later - this shows scar tissue.
- Stress MRI gives the highest-resolution pictures of the heart muscle, can quantify blood flow, and uses no radiation - useful for younger patients and serial follow-up.
- Cannot be used in claustrophobia without sedation, in some implanted devices (most modern pacemakers are MRI-conditional - the team will check), or in severe kidney disease (gadolinium is held).

The caffeine rule. If you are getting adenosine or regadenoson (the most common pharmacologic vasodilator stress agents), hold caffeine for 12 to 24 hours. That means coffee, tea, soda, chocolate, decaf, and some over-the-counter cold and headache medicines. Caffeine blocks the medicine and can make the test invalid - which means a repeat trip. The team gives a specific list when the test is scheduled.

Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

Option	Risks	Benefits	Alternatives
Exercise stress test vs pharmacologic stress	Exercise: very small chance of a serious event (about 1 in 10,000). Brief side effects (light-headedness, leg fatigue) are common. Pharmacologic: brief flushing, chest tightness, or palpitations are common and pass quickly. Serious events very rare.	Exercise gives the most information when you can walk - your fitness level itself is a strong predictor of outcomes, and we see how your blood pressure and symptoms respond. Pharmacologic is the right answer when you cannot walk far enough to push the heart.	If you cannot walk and cannot tolerate pharmacologic agents, a coronary CT angiogram or invasive angiography may be the right next step.
Exercise-ECG only vs adding imaging (echo, nuclear, MRI)	Exercise-ECG only: lowest cost, no radiation, no IV. Adding imaging adds time, sometimes radiation (nuclear), sometimes IV contrast (MRI). All have very small risks.	Exercise-ECG only has lower sensitivity (about 68%) and is most useful when pretest probability is low and the resting ECG is normal. Adding imaging raises sensitivity to about 85-92%, and tells us WHICH artery is involved.	A coronary CT angiogram looks directly at the arteries - good first option for younger patients and intermediate pretest risk. Invasive angiography is used when the answer needs to be definitive.

Option	Risks	Benefits	Alternatives
Functional stress test (looking for ischemia) vs coronary CT angiogram (anatomy)	Stress test risks are small. Coronary CTA uses contrast dye (small kidney risk) and radiation (about 3-10 mSv with modern protocols).	Stress test answers 'is there a blood-flow problem now?' CTA answers 'is there a narrowed or diseased artery?' For new stable chest pain in younger patients with intermediate pretest probability, CTA-first (per PROMISE / SCOT-HEART) is now often preferred.	For patients with prior stents, prior bypass, severe calcification, or known CAD, a functional stress test usually answers the question better than CTA.
Nuclear SPECT vs PET MPI	Both use a small dose of radioactive tracer. Modern SPECT is about 8 mSv; PET is about 3 mSv (lower because the tracer clears quickly).	PET is more accurate, has lower radiation, and lets us measure blood flow directly (myocardial blood flow reserve). SPECT is more widely available and is the standard at most hospitals.	Cardiac MRI stress uses no radiation. Coronary CTA looks at the arteries directly.
Cardiac MRI stress vs other imaging stress tests	Cardiac MRI uses gadolinium contrast (small allergic risk; not used if kidney function is very low). No ionizing radiation. The scanner is loud and the test is longer than echo or nuclear.	MRI gives the sharpest pictures of the heart muscle. It is most useful in younger patients (no radiation), for serial follow-up, and for questions about scar tissue.	Stress echo is faster and cheaper for many of the same questions. PET MPI is more available and pairs well with calcium-score CT.

Option	Risks	Benefits	Alternatives
Doing a stress test vs going straight to angiography	Stress test risks are very small. Invasive angiography has a small but real risk (about 1-2% combined for bleeding, vessel injury, contrast issues, stroke, or heart attack).	Most patients should have a stress test or coronary CT first. Going straight to angiography is reserved for high-risk presentations, ongoing chest pain at rest, or a strongly positive non-invasive test.	Coronary CT angiography is the middle ground - more anatomic detail than a stress test, less risk than catheterization.

When to Hold Which Medicine Before a Stress Test

Medicine class	Hold the day of?	Why
Beta-blocker (metoprolol, atenolol, carvedilol)	Often yes (for exercise tests)	Blunts the heart-rate response and can make a real ischemic finding harder to see
Calcium-channel blocker (diltiazem, verapamil, amlodipine)	Sometimes yes	Slows the heart and lowers blood pressure - can blunt the response. Team will specify
Long-acting nitrate (isosorbide)	Often yes (24 hours before)	Opens coronary arteries - can prevent ischemia from showing
Caffeine (coffee, tea, soda, chocolate, decaf)	YES if you are getting adenosine or regadenoson - hold 12 to 24 hours	Caffeine blocks the medicine and makes the test invalid. Doesn't matter much for exercise-only
Insulin / diabetes medicines	Adjust per the team's plan	Fasting plus exercise can cause low blood sugar - dose is usually reduced
Aspirin, statin, blood pressure medicine (most others)	Continue as usual unless told otherwise	These do not interfere with the test

How to Read Your Stress-Test Report - a Walk Through the Sections

- Header: the date, the type of stress (exercise / dobutamine / regadenoson) and the imaging used (none / echo / SPECT / PET / MRI).
- Exercise details: stages completed, peak heart rate, peak blood pressure, METs achieved, reasons for stopping.
- ECG findings: rest ECG, ECG changes with stress (ST depression / elevation), arrhythmias.
- Symptoms during stress: chest pain, shortness of breath, light-headedness - were they reproduced?
- Imaging findings (if any): wall-motion at rest and stress (echo); perfusion at rest and stress (nuclear); scar (MRI).
- Overall interpretation: negative / equivocal / positive / strongly positive - and a localization if abnormal.
- Recommendations: medical management, repeat testing, coronary CT, or angiography.
- Conclusion / impression: the cardiologist's short summary. If you read only one section, read that one. Bring it to your next visit.

Common Misconceptions

Myth	Reality
A normal stress test means I cannot have a heart attack.	A normal stress test is reassuring. But heart attacks often come from a plaque that was not blocking enough blood flow to show up on the test. A 40 or 50% plaque can still rupture and cause a heart attack. A normal stress test is one part of your risk picture - not a complete shield.
Stress tests are dangerous - they cause heart attacks.	Serious events during a stress test are very rare - on the order of 1 in 10,000. The team is in the room, an ECG is running, and a defibrillator is at the bedside. Walking through your symptoms in the office is much safer than ignoring them at home.
If my stress test is abnormal, I should not exercise anymore.	Almost the opposite. After an abnormal stress test, we adjust your medicines and your risk factors and most patients should keep exercising - often through cardiac rehab, which is a supervised program. Inactivity makes the underlying problem worse, not better.
Nuclear stress tests give you a huge dose of radiation.	Modern protocols use much less radiation than the protocols of 20 years ago. A current SPECT is about 8 millisieverts. PET MPI is about 3. A chest CT is about 7. Average annual natural background is about 3. The information from one well-chosen stress test is well worth the dose.
Caffeine is fine before a stress test - it is just coffee.	For exercise tests, caffeine is mostly fine. For pharmacologic vasodilator stress (adenosine, regadenoson) caffeine blocks the medicine and can ruin the test. Decaf coffee, chocolate, some over-the-counter cold and headache medicines, and even some sodas contain enough to interfere. The team will give you a specific list.

Myth	Reality
If the test is negative I do not need to take my medicines.	A negative stress test does not change why you are on a statin, a blood-pressure medicine, or a blood thinner. Those treat your underlying risk factors. Talk to us before stopping anything.
Stress echo and stress nuclear test the same thing the same way.	Both look for blood-flow problems. Stress echo watches how the heart walls move - a wall that stops moving well under stress is the abnormal finding. Nuclear watches where the tracer goes - an area with less tracer at stress is the abnormal finding. They can be used to confirm each other when one is unclear.
I can take my heart medicines exactly as usual on the day of the test.	Sometimes yes, sometimes no. Beta-blockers, calcium-channel blockers, and long-acting nitrates can blunt the heart's response and hide a real result on an exercise test. The team gives a personalized list for the day of the test - always follow it.

Functional capacity matters. How long you last on the treadmill - and how many METs you reach - is a strong predictor of long-term outcomes ALL BY ITSELF. A patient who reaches 10 METs with no symptoms has a very low risk of a cardiac event over the next year, almost regardless of what the ECG and the pictures show. This is part of why exercise is preferred over pharmacologic stress whenever you can walk.

Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

Where / What	What Can Happen
Arrhythmia (irregular heartbeat) during exercise	Brief abnormal rhythms can happen during peak exercise. Most pass on their own when the exercise stops. The team is in the room with an ECG running and a defibrillator at the bedside.
A heart attack during the test	Very rare - on the order of 1 in 10,000 tests. If it happens, the test team starts treatment immediately. Walking through your symptoms in a monitored test is safer than ignoring them at home.
Dobutamine side effects	Palpitations, headache, brief abnormal heart rhythms, or a flushed feeling are common and pass quickly. Serious events are rare. The medicine can be stopped or reversed (esmolol) if needed.
Adenosine / regadenoson side effects	Flushing, chest tightness, headache, brief shortness of breath, and a metallic taste are common and fade within 1 to 2 minutes after the medicine is given. A reversal medicine (aminophylline) is available.
Bronchospasm (wheezing)	Adenosine and regadenoson can trigger wheezing in patients with asthma or COPD. The team asks about lung disease beforehand. If active wheezing is present, the medicine is changed - or exercise or dobutamine is used instead.
Low blood pressure during exercise	Some patients drop their systolic blood pressure as they exercise. A drop of more than 10 mmHg below baseline is one of the criteria to stop the test - and it is also a finding that gets a careful follow-up.
Allergic reaction to contrast (nuclear tracer, gadolinium)	Very rare. Mild reactions (rash, flushing) are most common. Serious reactions (wheezing, swelling, low blood pressure) are very rare but possible. The team has medicines ready.

Where / What	What Can Happen
Radiation	Modern SPECT MPI is about 8 mSv; PET MPI is about 3 mSv. The dose is comparable to a few months to a year of natural background radiation. Cardiac MRI and stress echo use no radiation.
Non-diagnostic result	If the heart did not reach target rate, or if the pictures were not clear, the test may be 'non-diagnostic'. A repeat test with a different modality - or a coronary CT or invasive angiogram - may be needed.
Anxiety	A stress test can feel intimidating. The room is bright, you are wired up, and the team is watching closely. That is by design - it is one of the most carefully monitored tests in cardiology. Tell the team if you are anxious; they can talk you through it.

Rest vs Stress Perfusion - Why a Stress Test Can Catch What a Resting Test Misses

Green = normal flow • Orange = mildly reduced • Red = clearly reduced

Why a stress test can find a blockage a resting test misses. At rest, even a narrowed artery can supply enough blood. Under stress, the muscle downstream of the narrowed artery falls behind - and the test sees the gap.

Points to Know

If you remember nothing else, remember these key points.

- For an exercise test: wear walking shoes, a light meal 3-4 hours before, and follow the team's instructions on which medicines to hold.
- For a pharmacologic test: NPO 4 to 6 hours before, no caffeine for 12 to 24 hours (coffee, tea, soda, chocolate, decaf - the team will give a list).
- An IV is placed if imaging or pharmacologic stress is planned. ECG electrodes are placed on the chest. Blood pressure is checked at rest and during the test.
- The exercise or medicine part of the test is brief - 5 to 15 minutes. Total visit time can be 1 to 4 hours depending on the type of imaging.
- Side effects from pharmacologic stress (flushing, chest tightness, headache, brief shortness of breath) fade within 1 to 2 minutes after the medicine is stopped. A reversal medicine is available.
- Most patients walk out the same day and go back to normal. Driving is fine after an exercise test. After moderate sedation - which is uncommon for stress tests - you need a ride home.
- Results are usually in MyChart within a day or two. A clearly abnormal result will get a same-day call from our office.
- A stress test is one piece of your heart picture - not the whole picture. We use it together with your symptoms, your risk factors, your other tests, and our exam.

When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- Chest pain or pressure that comes on while you are waiting for a scheduled stress test, especially if it lasts more than a few minutes or comes at rest - call us the same day. Severe or prolonged chest pain or pressure - call 911.
- New shortness of breath at rest, fainting, or a fast irregular heartbeat before a scheduled test - call us the same day.
- After a pharmacologic stress test: persistent chest pain, severe shortness of breath, severe headache, or fast irregular heartbeat that does not pass after 10 to 15 minutes - call us right away or come to the ED.
- After contrast (nuclear tracer, MRI gadolinium): rash, hives, wheezing, or swelling of the face or tongue - call 911. These reactions are very rare but possible.
- After an abnormal stress test: do not delay your follow-up visit. If you have new chest pain, new shortness of breath, or new fainting while you are waiting - call us or come to the ED. The follow-up plan is the most important step.
- Questions about your stress-test report - new words, new numbers, a finding that worries you - call us. A short conversation is much more useful than a worried week.
- Sudden weakness, drooping face, or trouble speaking - call 911. (Stroke risk and heart-artery disease often travel together; the emergency comes first.)

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A Stress Test Is One Piece of the Picture - Where to Read Next

- A stress test answers 'is the heart having trouble getting blood under load?' Other tests look at the arteries, the structure, the rhythm, and the symptoms.
- For new chest pain or pressure: see the Chest Pain guide.
- For chest pain that is predictable with exertion (chronic, stable): see the Stable Angina guide.
- For chest pain at rest or a possible heart attack: see the Heart Attack (ACS) guide.
- For the underlying disease: see the Coronary Artery Disease guide.
- For an anatomy-first alternative (looks directly at the arteries): see the Coronary CT Angiography guide.
- For the test that pairs with stress echo or that answers structural questions: see the Echocardiogram guide.
- For what happens when stress + CTA point toward a procedure: see the Angioplasty and Stents guide.
- For chest pain with normal arteries (spasm): see the Coronary Vasospasm guide.
- For symptoms that are about the pump rather than the arteries: see the HFrEF guide or the HFpEF guide.

Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- American Heart Association - Stress Tests - Plain-language AHA overview of why a stress test is done, what to expect, and how to prepare.
- Cleveland Clinic - Cardiac Stress Test - Patient-friendly overview of exercise vs pharmacologic stress, what each kind of imaging shows, and how to prepare.
- Mayo Clinic - Stress Test - Symptom-focused overview of the stress-test experience and side effects from pharmacologic agents.
- NHLBI - Cardiac Stress Tests - Federal NHLBI overview of the major modalities and what positive vs negative results mean.
- MedlinePlus - Exercise Stress Test - US National Library of Medicine consumer-health page on stress-test preparation, what to expect, and risks.
- American College of Cardiology - Patient Resources - ACC's patient-facing site with simple explainers and decision aids for choosing between modalities.

Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain (Gulati et al., Circulation 2021; PMID 34709879) *[Guideline]*
  Primary framework for which stress test (exercise ECG vs stress echo vs nuclear MPI vs cardiac MRI vs coronary CTA) for which patient. Drives the RBA section and the modality-comparison table.
- 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease (Virani et al., Circulation 2023; PMID 37471501) *[Guideline]*
  Indications for stress testing in patients with known or suspected chronic coronary disease; choice of test by pre-test probability, body habitus, and ECG interpretability.
- ASNC Imaging Guidelines for SPECT Nuclear Cardiology Procedures (Henzlova et al., J Nucl Cardiol 2016; PMID 27392594) *[Guideline]*
  Stress protocols for SPECT MPI, patient preparation (caffeine and methylxanthine hold for pharmacologic vasodilator stress), and effective radiation dose for modern technetium-based protocols.
- ASE Guidelines for the Performance, Interpretation, and Application of Stress Echocardiography (Pellikka et al., J Am Soc Echocardiogr 2020; PMID 31753403) *[Guideline]*
  Exercise vs dobutamine stress echo protocols, patient preparation, expected side effects, and interpretation framework. Drives the 'stress echo' rows of the modality table.
- Society for Cardiovascular Magnetic Resonance Standardized Protocols (Kramer et al., J Cardiovasc Magn Reson 2020; PMID 32160979) *[Guideline]*
  Adenosine / regadenoson stress cardiac MRI protocols, gadolinium safety, and the no-radiation advantage for younger patients and serial follow-up.
- ISCHEMIA Trial: Initial Invasive or Conservative Strategy for Stable Coronary Disease (Maron et al., NEJM 2020; PMID 32227755) *[Clinical Study]*
  Pivotal evidence informing how stress test results are interpreted in stable CCD - a moderate-to-large reversible defect was the trial's entry criterion, but invasive vs medical strategy did not change hard outcomes. Frames the 'what does positive mean for me?' discussion.
- PROMISE Trial: Outcomes of Anatomical Versus Functional Testing for Coronary Artery Disease (Douglas et al., NEJM 2015; PMID 25773919) *[Clinical Study]*
  Direct comparison of coronary CTA (anatomy) vs functional stress testing (ischemia) as the first test in patients with new stable chest pain. Underpins the RBA framing of 'CT first vs stress first'.
- SCOT-HEART Trial: CT Coronary Angiography in Patients with Suspected Angina due to Coronary Heart Disease (SCOT-HEART Investigators, Lancet 2015; NEJM 5-year follow-up 2018; PMID 25788230) *[Clinical Study]*
  Comparison of CTA-guided vs standard-care (mostly stress testing) management; informs the modality-choice discussion for new-onset stable chest pain.
- Bruce Treadmill Protocol (Bruce, Am Heart J 1973; PMID 4632728) *[Clinical Concept]*
  Original three-minute-stage incremental treadmill protocol still used for exercise stress testing. Underlies the Bruce-stage diagram and the workload-vs-stage explainer.

- American Heart Association - Stress Tests *[Patient Education]*
  Plain-language patient-voice overview of why a stress test is done, what to expect, and how to prepare. Used for framing only; clinical numbers re-verified against guideline sources.
- Cleveland Clinic - Stress Test *[Patient Education]*
  Patient-friendly overview of exercise vs pharmacologic stress, what each modality (ECG vs echo vs nuclear vs MRI) shows, and how to prepare. Used for plain-English framing and patient-voice cues.
- Mayo Clinic - Stress Test *[Patient Education]*
  Symptom-focused patient overview of the stress test experience, common side effects from pharmacologic agents, and post-test guidance.
- NHLBI - Cardiac Stress Tests *[Patient Education]*
  US National Heart, Lung, and Blood Institute overview of why stress tests are done, the four major modalities, and what positive vs negative results mean.
- MedlinePlus - Exercise Stress Test *[Patient Education]*
  US National Library of Medicine overview of the exercise stress test experience, preparation, and risks.
- Radiation Doses in Cardiovascular Imaging (Einstein et al., JACC 2018; PMID 30527689) *[Clinical Study]*
  Modern effective radiation doses for SPECT MPI (technetium-99m), PET MPI (rubidium-82, N-13 ammonia), and coronary CTA. Underpins the misconception 'stress test radiation is huge' - modern protocols are typically 3-10 mSv, comparable to a few months of background.
- Cardiac Stress Test - StatPearls (Coylewright et al., NCBI Bookshelf 2023) *[Reference]*
  Open-access reference for indications, contraindications, and absolute/relative endpoints for stopping an exercise stress test (chest pain, ST depression > 2 mm, sustained ventricular tachycardia, drop in systolic BP > 10 mmHg).

About This Guide

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Reviewer note: Reviewed against the AHA stress-test page, Cleveland Clinic's cardiac stress test overview, Mayo Clinic's stress test page, and the NHLBI cardiac stress tests page. Ours adds: a four-modality side-by-side (exercise ECG / stress echo / nuclear / cardiac MRI), a Bruce-protocol-stage chart with METs reference lines, a rest-vs-stress perfusion concept diagram, result-category grade cards (negative / equivocal / positive / strongly positive), an RBA table covering CT-first vs stress-first and exercise vs pharmacologic, and explicit cross-links into the chest pain, stable angina, ACS, CAD, CTA, echo, and angioplasty guides.

Disclaimer

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Scan or visit: https://go.riasalimd.com/stress-test-guide

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