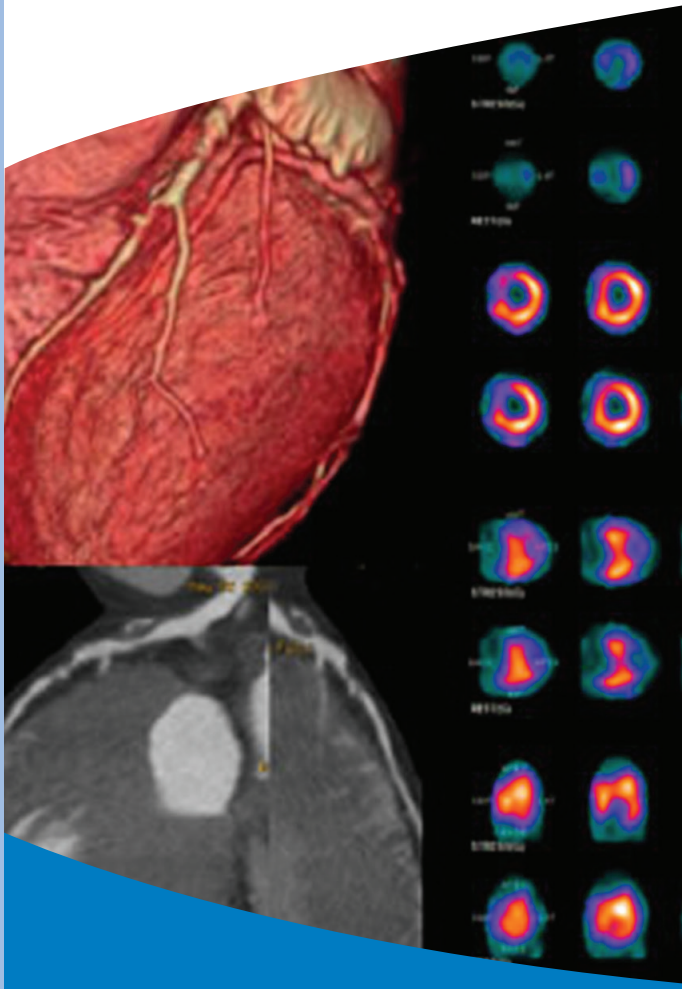
RUBIDIUM-82 CARDIAC POSITRON EMISSION TOMOGRAPHY (PET)

ParkwayHealth™ Radiology

Rubidium-82 Cardiac Positron Emission Tomography (PET)



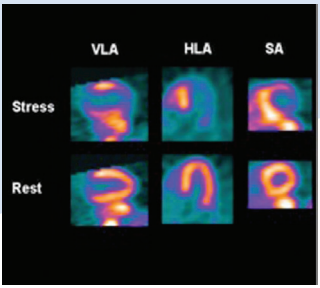
What is Positron Emission Tomography (PET) ?

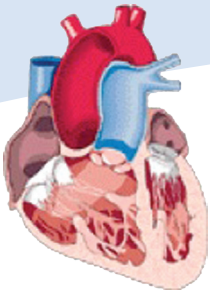
Positron emission tomography (PET) is a nuclear medicine imaging technique that produces a three-dimensional image of functional processes in the body by detecting pairs of gamma rays emitted indirectly by a positron emitting radiotracer.

What is the Positron Emission Tomographic (PET) Stress and Rest Myocardial Perfusion Scan ?

This is a non-invasive imaging technique that evaluates blood flow to the heart muscle. The blood flow to the heart muscle is reduced in the narrowed/disease coronary arteries. This will lead to reduction of oxygen supply to the involved heart muscle and producing symptoms like chest discomfort or shortness of breath.

Positron Emission Tomographic (PET) Stress and Rest Myocardial Perfusion Scan with Rubidium-82





Rb82 stress and rest scans

Rubidium-82(Rb-82)

Rubidium-82 is a positron emitting radiotracer with a physical half-life of 75 seconds. It is administered into the human body intravenously. Following intravenous administration, Rb-82 is an analog to potassium and rapidly taken up by heart muscle. In human studies, Rb-82 activity was noted in the heart within the first minute after injection. The uptake of Rb-82 by the heart muscle is related to the blood flow. Therefore, areas of the heart with adequate blood flow would have more Rb-82 activity in comparison to those areas with compromise blood flow. A PET scanning camera takes three dimensional images of Rb-82 uptake by the heart. Further analysis of these images helps to identify the location, severity and extent of reduced blood flow to the heart muscle (ischaemia).

How is PET myocardial perfusion scan with Rubidium-82 performed ?

There are 3 parts:

a) Imaging at rest after Rb-82 administration (Rest scan).
b) A pharmacological stress test of the heart. Rb-82 will be administered at the peak of the stress test.
c) Imaging after pharmacological cardiac stress test (Stress scan).

In PET myocardial perfusion scan with Rb-82, a pharmacological stress test with either intravenous Persantin or Adenosine is performed. As part of the stress test protocol, heart rate, blood pressure and ECG will be recorded during the test.

How long does the PET Stress and Rest Myocardial Perfusion Scan with Rubidium-82 take ?

The whole procedure including the rest /stress scans and the pharmacological stress test of the heart takes about 60 minutes.

How do you prepare for the procedure ?

Please arrive at 15 minutes prior to your appointment so that we can have adequate time to prepare to the Rb-82 and the medication for pharmacological stress test. If you are not able to come for the procedure, please inform us in advance.

Please take note of the following:

1. You can have a light meal 1 hour prior to the procedure.
2. 24 hours before the procedure, please **AVOID** the following:
   a) Any products that contain Caffeine, such as tea, coffee, cocoa and milo.
   b) Any products that contain Chocolates, including candies, frosting, cookies, and chocolates milk.
   c) Any soft drinks that contain Caffeine, such as Coke, and including those that labelled "Caffeine-free".
3. 48 hours before the procedure, you should not take **Persantin or Theophylline-contained medication.**
4. Please bring along a list of all your medications.
5. **ASTHMA- CAUTION.** The use of stress agent (Persantin) is generally avoided in patient with asthma. Please be sure and inform your physician and the staff if you have history of asthma, bronchitis or emphysema.

What are the advantages of PET myocardial perfusion scan with Rb-82 when compared with the conventional SPECT myocardial perfusion scan ?

1. The image quality of PET is better than conventional SPECT scan. PET has been shown to yield higher total image counts compared with SPECT. Moreover, PET provides reduced attenuation artifacts, which attributed to higher-energy photons and superior attenuation correction.
2. Due to the myocardial extraction fraction, tracer kinetics, and physical half-life of SPECT tracers, the stress images obtained using SPECT are actually post-stress. PET offers true stress data because the images are acquired while the myocardium is in a state of peak hyperemia.

3. For PET myocardial perfusion scan with Rb-82, the total body exposure to radiation is much lesser than the conventional SPECT scan due to short physical half-life of Rb-82, which is only 75 seconds.
4. For PET myocardial perfusion scan with Rb-82, the entire procedure takes about 30 to 45 minutes. While the procedure for the conventional SPECT myocardial perfusion scan would at least take 4 to 6 hours to complete.

What is the sensitivity and specificity of PET myocardial perfusion scan with Rb-82 ?

Studies performed in 855 patients have shown a high sensitivity of 95% and specificity of 95%[1,2].

What is the risk involved in the PET myocardial perfusion scan with Rb-82 ?

- Radiation exposure is minimal due to short half-life of Rb-82. However, this procedure should not be done on a pregnant woman. Please inform us if you think you are pregnant.
- No adverse reactions specifically attributable to Rb-82 have been reported.
- Adenosine / Persantin are agents that dilate blood vessels not only in the heart but also in the rest of the body. Therefore, it is common to feel hot, flushing and warm. Many people may have headache or abdominal pain, while few may feel nausea, particularly with Persantin. The effect of Persantin may last up to 30 minutes, while of adenosine subsides immediately due to short life of 10 seconds only. The side-effects of Adenosine (dipyridamole) can be reversed by aminophylline (an anti-asthma medication).
- The risk of an adverse event such as heart attack is approximately 1 in 10,000, but certain contraindications exist and this test should **NOT** be ordered for patients who have:

- Suffered a heart attack in the previous 2 days
- Unstable angina
- Uncontrolled arrhythmias, or abnormal heart rhythms
- Severe symptomatic aortic heart valve disease
- Uncontrolled heart failure
- Infection or inflammation of the heart
- Acute aortic dissection
- Acute pulmonary embolism

What happens after the procedure?

- Drink plenty of water to assist in the elimination of the radiotracer from your body
- You should resume your regular daily activities after the procedure. If you were asked to temporarily stop taking any medication prior to the procedure be sure to ask when you should resume taking your medications
- Your results will be given to your personal doctor after the nuclear medicine physician / cardiologist has reviewed your images and prepared a written report.

SERVICE IS AVAILABLE AT:

Nuclear Medicine and PET Centre
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www.parkwayhealthradiology.com.sg
BUSINESS REG NO 32871800M

***REFERENCES**: (1) Gould KL. Reversal of coronary atherosclerosis: clinical promise as the basis for noninvasive management of coronary artery disease. Circulation. 1994;90:1558-1571. (2) Di Carli MF, Dorbala S, Mishra R, et. al. Clinical myocardial perfusion PET/CT imaging with rubidium-82: initial experience in 94 patients. Abstract #322. Presented at the 51st Annual Meeting of the Society of Nuclear Medicine; June 19-23, 2004; Philadelphia, PA*

Version: PET(RB)/November 2018