

Nuclear Medicine

核子醫學



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Gleneagles
HONG KONG
港怡醫院

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What is Nuclear Medicine?

核子醫學是甚麼？

Nuclear Medicine is a medical specialty that uses minute quantities of radioactive material or radiopharmaceuticals (tracers) to diagnose or treat diseases. For imaging different organs and diseases, different radiopharmaceuticals are used.

核子醫學是以應用極微量放射性物質或放射性藥物（追蹤劑）診斷或治療疾病的醫學專科。針對不同器官和疾病，會使用不同的放射性藥物。

How do Radiopharmaceuticals (tracers) work?

放射性追蹤劑是如何運作的？

Radiopharmaceuticals (tracers) are introduced into the patient's body by injection, swallowing or inhalation. The amount given is very small. The medicine part of the tracer goes to a specific organ in the body where disease or abnormality is expected. The radioactive part of the tracer emits radiation, which is detected using a special camera called a gamma camera.

放射性追蹤劑通過注射、吞服或吸入進入病人體內，所用的量非常小。追蹤劑的醫學部分會去到特定的器官追蹤疾病或異常情況；而放射性的部分則會發出輻射訊號，利用特殊儀器「伽瑪照相機」作偵測。

Are Radiopharmaceuticals safe?

放射性追蹤劑安全嗎？

It is absolutely safe to use radiopharmaceuticals. The quantity of the pharmaceutical part of the tracer is very small, generally 1/10th of a millionth of an ounce. As a rough estimate, one teaspoon of sugar is sufficient to perform approximately 5 million scans. The risk of a reaction is 2-3 incidents per 100,000 injections, over 50% of which are rashes.

使用放射性追蹤劑是絕對安全。追蹤劑的藥理部份數量非常微小，約千萬分之一盎司。粗略估計，一小茶匙的糖足以執行約 500 萬次掃描。過敏反應的風險是十萬分之二至三，超過一半以上是皮疹。

Is radioactivity harmful?

輻射有害嗎？

A larger exposure to radioactivity is always harmful. However, the amount of radioactivity in tracer is carefully selected and safe. No reports have been made available, regarding any harmful human effects in diagnostic Nuclear Medicine procedures.

暴露於高劑量輻射是有害的。然而，放射性追蹤劑的劑量是經過精密計算和安全的。沒有任何文獻顯示核子醫學診斷檢查對人體有害。

Type of imaging techniques in Nuclear Medicine

Gamma imaging operates in different modes, PLANAR imaging and Single Photon Emission Computed Tomography (SPECT) imaging. In planar imaging, the gamma camera remains stationary. The resulting images are two-dimensional (2D) images of the part of organ being studied while in single photon emission computed tomography, or SPECT, produces three-dimensional (3D) images because the gamma camera rotates around the patient.

SPECT-CT is a revolutionary diagnostic modality which combines SPECT and CT. It enhances physicians' ability to detect tumors and cardiac diseases, by integrating the functional sensitivity of a SPECT gamma camera and detailed anatomical information provided by CT.

SPECT-CT captures both functional and anatomical information for precise lesion localisation in single examination. Nuclear medicine examinations are function-oriented, as opposed to CT procedures which is structure-oriented. Combining nuclear medicine technology with CT brings together the advantages of both procedures and significantly increase the diagnostic precision of SPECT. After the examination, the CT slice images are superimposed on the SPECT images, enabling the physician to detect the location of disease in the body with subcentimetre precision.

核子醫學造影技術的種類

核子醫學伽瑪射線掃描技術有平面掃描 (Planar) 及單光子發射斷層掃描 (SPECT) 兩種。在平面掃描，伽瑪照相機保持靜止不動，所產生的圖像是二維 (2D) 圖像；而在單光子放射斷層掃描，伽瑪照相機圍繞着病人轉動，產生三維 (3D) 圖像。

SPECT-CT 結合單光子發射斷層掃描和電腦掃描，是一種革命性的診斷方法。透過結合單光子發射斷層掃描在功能造影上的敏銳度和電腦掃描在結構造影上的精細度，它增強了醫生檢查腫瘤和心臟疾病能力。

SPECT-CT 可在單一檢查裏同時透過結構與功能資訊精確地獲取病發位置。核子醫學掃描是功能性主導，而電腦掃描是結構性主導。核子醫學技術結合電腦掃描，兩種技術的優點令 SPECT-CT 診斷精確度大大提升。檢查後，CT 圖像會疊加在 SPECT 圖像上，讓醫生可仔細地檢查小於一厘米的疾病及其在體內的位置。



Free Shuttle Service 免費專車服務

Gleneagles Hong Kong Hospital provides free shuttle bus service for public between MTR Ocean Park Station (Exit A) and the hospital (main entrance).

港怡醫院為市民提供免費專車服務往來港鐵海洋公園站 (A出口) 及醫院 (正門)。



Free Shuttle Schedule
免費專車服務時間表



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Beneficial types of disease
受惠疾病類型

- ▮ To determine adequate pump function of the heart (contraction), in coronary artery disease, valvular disease, cardiomyopathies and effect of chemotherapy.
- ▮ To diagnose functional significance of coronary artery disease.
- ▮ To assess risk of future cardiac events.
- ▮ To determine effectiveness of revascularization procedures (angioplasty, CABG).
- ▮ To assess blood flow to different parts of the brain in cancers, dementias etc.
- ▮ To evaluate kidney functions and any obstruction.
- ▮ To evaluate flow, function and rejection of transplanted kidney.
- ▮ To assess thyroid and its function and parathyroid cancers.
- ▮ To diagnose neuroendocrine, carcinoid tumors.
- ▮ To assess flow and function of the liver cells.
- ▮ To detect unknown site of gastrointestinal bleeding.
- ▮ To detect and stage different cancers, check for any metastasis and response for treatment.
- ▮ 可替患有在冠心病、瓣膜病、心肌病和接受化療的病人檢查心臟泵血功能（心房收縮時）。
- ▮ 診斷冠心病對身體功能的影響。
- ▮ 評估未來出現心臟毛病的風險。

- ▮ 預估血運重建（血管成形術、冠狀動脈旁路移植術）的成效。
- ▮ 評估癌症、癡呆症等病人其大腦不同部位的血流量。
- ▮ 評估腎功能和任何輸尿管道阻塞。
- ▮ 評估移植腎的流量、功能和排斥反應。
- ▮ 評估甲狀腺及其功能以及甲狀旁腺的腫瘤。
- ▮ 診斷神經內分泌腫瘤、類癌腫瘤。
- ▮ 評估肝細胞的功能及其流量。
- ▮ 檢查未知位置的胃腸道出血。
- ▮ 檢查及分期不同的癌症，檢視擴散和治療反應。

Preparation
掃描前準備

- ▮ No special preparation is required for scans involving the bones, inflammatory, lymphatics, renal and pulmonary systems.
- ▮ Scan involving the gastrointestinal system requires fasting of at least 4 hours. Some scans require premedication.
- ▮ Thyroid scan may require cessation of certain medication prior to the scan.
- ▮ 骨骼、炎症、淋巴管、腎臟和肺部等掃描無須作特別準備。
- ▮ 涉及胃腸道系統的掃描需要禁食最少 4 小時。某些掃描需要術前用藥。
- ▮ 甲狀腺掃描可能需要在檢查前停服某些藥物。

On the Day of the Examination
檢查當天的過程

Before the Examination 掃描前

A radiopharmaceutical will be given to you, either by injection into a vein, by mouth or through a breathing device. The radiopharmaceutical will concentrate in the particular part of your body under investigation.

Sometimes you may have to wait for a few hours or even a day or two after the radiopharmaceutical has been administered for the scan to be done. This is because it may take a while for the radiopharmaceutical to lodge in the part of your body to be examined.

Prior to scanning you may be asked to change into medical gown. During the scan, you will be asked to lie on the bed with the camera placed close to the part of the body being examined. It is important to remain still as movement would result in blurred images that are difficult to interpret. A delayed image may be necessary in selective cases. Should such a need arise, the technologist will inform you.

放射性追蹤劑會透過靜脈注射、吞服或吸入的方式進入您體內。放射性追蹤劑將集中在您身體的特定部分。

有時您可能要等待施藥後幾個小時甚至一、兩天才開始掃描。這是因為追蹤劑的信號可能要花一點時間才會出現在被檢查的身體部位。

在掃描前您可能要換上掃描服。掃描期間，您將被要求躺於掃描床，伽瑪照相機會移近要檢查的身體部位。您必須保持不動，稍一移動便會導致圖像模糊，難以作分析之用。某些情況下可能需要加照影像，放射技師屆時會通知您。

After the examination 完成檢查後

After most nuclear medicine procedures, you may resume your daily activities as per normal. It is generally best to drink a lot of fluids and urinate as frequently as you can. This will help to flush the remaining radioactivity out of your body.

完成核子醫學檢查後，大多數情況下您可以恢復正常的日常活動。一般情況下，多喝開水及多小便有助您的身體排出剩餘的放射性物質。

Results
檢查結果

When the exam is completed, the acquired data will be processed by the technologist and the nuclear medicine physician will review the image and provide a written report to your doctor.

檢查完畢後，影像數據將由放射技師作後期處理，核子醫學醫生將審視影像，並向您的主診醫生提供一份詳細的診斷報告。



Benefits and Risks
好處和風險

Benefits 好處

- ▮ Nuclear Medicine examinations provide functional information of the organs under study.
- ▮ Nuclear medicine scans provide information to your physician in making diagnosis or to determine appropriate treatment, if any.
- ▮ 核子醫學檢查可以提供器官功能的資訊。
- ▮ 核子醫學掃描提供資訊給您的主診醫生以作診斷及決定合適的治療。

Risks 風險

- ▮ Diagnostic nuclear medicine procedures have a very low radiation risk. However, as the doses of radiotracer administered are small, the potential benefits of the procedures may outweigh the radiation risk.
- ▮ Due to potential radiation risks, female patients should always inform their physician or staff of nuclear medicine department if they are pregnant, could be pregnant or are breastfeeding.
- ▮ Allergic reactions to radiopharmaceuticals are extremely rare and usually mild. Please inform our staff if you have any allergies.
- ▮ 核子醫學檢查只有很低的輻射風險，所使用的追蹤劑劑量很小，檢查的潛在好處或高於輻射風險。
- ▮ 由於有潛在輻射風險，女性病人如果懷孕或正在授乳，應及早告知醫生或職員。
- ▮ 放射性藥物過敏反應極為罕見，一般都比較輕微。如果您對任何物件過敏，請告知我們的職員。