

LOCAL EXPERIENCE ON RADIONUCLIDE MYOCARDIAL IMAGING IN THE PHILIPPINES AT THE PHILIPPINE HEART CENTER FOR ASIA

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The Nuclear Medicine Department of the Philippine Heart Center was inaugurated and became fully operational 11 months ago. Imaging instruments include a 10 inch. gamma-camera interfaced to a data storage/retrieval system with area of interest selection and histogram capabilities, cardiac gating, multifformat film printer and whole body scanning table. Although a computerized data processor and a portable gamma-camera are available, these two instruments have been in-operative.

Since the department became operational, 547 cardiovascular procedures were performed out of a total of 2447 various procedures. Educational and informational campaigns^{1,2,3,4} to both doctors and public as well as analysis of

results in collaboration with the Research Division and other departments of the PHCA were launched since then. The cardiovascular procedures are availed of free-of-charge to registered PHCA patients excepting for the costly Tl-201 imaging.

Earliest analysis on myocardial imaging procedures was done on 15 out of 64 cases of coronary perfusion. A preliminary report was presented and published⁵ on the results. The procedure is performed during coronary arteriography by intracoronary injection of albumin particles labelled with Tc99m. Correlating the imaging findings with those of arteriography, the cases were grouped into the four combinations.

Group	Arteriogram/ Imaging	No. of Cases		
I	NA/NP	9	60%	Normal study
II	NA/ABP	1	6%	Further study needed
III	ABA/NP	3	20%	Candidate for bypass
IV	ABA/ABP	2	13%	Not candidate for bypass
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		15 Total		

Since coronary perfusion imaging evaluates perfusion at the precapillary and capillary levels, areas of decreased radioactivity are considered non-viable and unsuited for coronary bypass. Only areas adequately perfused though supplied by critically narrowed arteries are suitable for surgical bypass. Procedure is safe; no chest pain, ECG or BP changes occurred during the intracoro-

nary injection of the radioactive particles under controlled condition. Good quality images demonstrate deficient myocardial perfusion at the capillary and pre-capillary levels, therefore of considerable influence in the selection of cases for coronary bypass surgery. Coronary perfusion imaging should be an integral part of coronary arteriography.

The non-invasive evaluation of myocardial perfusion using Tl-201 has also been studied by the department. Tl-201 is expensive and not readily available. Fortunately, our studies have been supported by the National Research Council of the Philippines and the National Science Development Board. In the GXT room of the department, Tl-201 is intravenously ad-

ministered at the height of exercise done in a fasting state. Ten minutes after the exercise, imaging is then performed with a gamma-camera. If perfusion defect is present, delayed imaging after another 4 hours will serve as a resting state. Results on the analysis of 93 cases out of 171 performed were presented and reported in publications^{6,7,8}.

No. of Cases	GXT	Tl-201
47 Normal controls	(-)	(-)
26 Typical Angina	+ 69.2%	+ 92.3%
20 Old infarction	25	53.8% positive for ischemia
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93 Total		

Our experience shows better sensitivity of Tl-201 than exercise ECG for detection of ischemia. Tl-201 is also twice more sensitive than ECG for old infarction with co-existing ischemia when delayed imaging is obtained. Acute and old infarction can also be detected and distinguished from ischemia by delayed imaging; further, site and extent of the lesion are provided. However, its high cost limits its application to equivocal cases, for example, ischemic cases with abnormal resting ECG, positive GXT but asymptomatic cases and in ventricular arrhythmia during exercise but without significant S-T changes.

Another non-invasive procedure for the detection of acute infarction is the radionuclide imaging using a bone radiopharmaceutical, ^{99m}Tc pyrophosphate. Analysis of 40 out of 57 patients performed has been reported in two publications^{6,9}. Done within the first week of attack and an hour after the IV administration of ^{99m}Tc PYP, patient is transferred from the CCU to the Nuclear Medicine Dept. under the close supervision and ECG monitoring of a cardiologist. In majority of cases, positivity of the procedure begins as early as 12 hours and maximizes at 48 hours. Radioactivity begins to fade on the 7-8th day and usually to finally disappear on the 14th day.

No. of Cases	ECG & Enzymes	^{99m} Tc PYP	
23 with Chest Pains	(-)	(-)	} 88.2% positivity
15 Acute Infarct	(+)	(+)	
12 transmural			
3 subendocardial			
2 Subendocardial	(+)	(-)	
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40 Total			

With the ECG and enzyme studies as the basis, 23 cases without acute infarction gave negative ^{99m}Tc PYP results, while the other 17 cases proven for acute infarction, the ^{99m}Tc PYP was able to pick up 88.2% of cases.

This is therefore a sensitive for the detection of acute infarction and can provide information as to the site and extent of the lesion as well. However, acute infarction is readily apparent from the clinical, ECG and enzyme

findings and therefore, Tc99m PYP has been relegated to equivocal cases. Other conditions which may cause Tc99m PYP accumulation in the myocardium are unstable or stable angina, aneurysm, valvular calcifications or other forms of myocardial injury such as in cardioverted cases.

In summary, coronary perfusion imaging should be an integral part of coronary arteriography. Barring the expensive cost of Tl-201, the non-invasive Tl-201 myocardial perfusion imaging is ideal for detection of coronary heart disease. Acute infarct imaging is a valuable adjunct to ECG and enzyme studies.

1. Villacorta, E., Radionuclide Applications in Cardiovascular Studies, presented in the Seminar on Nuclear Medicine, Cebu City, 24 April-4 May 1977.
2. Monzon, O., Radionuclide Estimation of Myocardial Damage, presented in the Seminar on Nuclear Medicine, Cebu City, 24 April-4 May 1977.
3. Torres, J., Monzon, O., and Villacorta, E., Radionuclide Estimation of Myocardial Damage, *Phil. J. of Cardiology*, VI; Aug.-Sept. 1977, presented in the *Astraphil Symposia in Cardiology, PICC, Manila, March 1977*.
4. Torres, J., Radioisotopic Imaging Techniques in the Diagnosis of Coronary Artery Disease, presented in the *Phil. Heart Asso. Convention, Cebu City, May 1977*.
5. Villacorta, E., Soto, R., Monzon, O., Garayblas, E., and Guzman, S., Preliminary Experience with Radionuclide Perfusion Study using ^{99m}Tc MAA as an integral part of the Coronary Study, *Phil. J. of Cardiology*, V; April-June, 1977; presented at the *Phil. Heart Asso. Convention, Iloilo City, May 1976*.
6. Villacorta, E., Bravo, P., Monzon, O., Torres, J., and Guzman, S., (66 cases) Studies on the Coronary Circulation in Patients With Coronary Heart Disease Utilizing Non-Invasive Radionuclide Techniques, *Phil. J. of Internal Medicine*, 15; July-Sept. 1977; presented at the *Phil. Col. of Physicians Convention, Manila, May 1977*.
7. Bravo, P., Villacorta, E., Monzon, O., Torres, J. and Guzman, S., (77 cases) Myocardial Perfusion Imaging During and After Exercise in Patients with Coronary Heart Disease, *Phil. J. of Cardiology*, VI; Aug.-Sept. 1977; presented at the *Phil. Heart Asso. Convention, Cebu City, May 1977*.
8. Guzman, S., Bravo, P., Monzon, O., Torres, J., and Villacorta, E., (93 cases) Thallium-201 Myocardial Imaging During and After Exercise in Patients with Coronary Heart Disease, for publication.
9. Monzon, O., Villacorta, E., Bravo, P., Torres, J., Reloza, A., and Guzman, S., Myocardial Infarct Imaging using Tc99m PYP, *Phil. J. of Cardiology*, VI; Aug.-Sept. 1977; Presented at the *Phil. Heart Asso. Convention, Cebu City, May 1977*.