



UNIVERSITI PUTRA MALAYSIA

**ROLE OF 18FLUORINE FLUORODEOXYGLUCOSE IN VULNERABLE PLAQUE
DETECTION FOR IDENTIFYING HIGH RISK PATIENTS**

SHAZREEN BINTI SHAHARUDDIN

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By

SHAZREEN BINTI SHAHARUDDIN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Master of Science.**

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Abstract of thesis presented to the Senate of University Putra Malaysia in fulfillment of the requirement for the degree Master of Science.

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OCTOBER 2013

Main Supervisor: Prof. Abdul.Jalil Nordin, PhD

Faculty: Medicine and Health Science

FDG-PET/CT is a combined functional and structural multi modality imaging tool that can be utilized to detect atherosclerotic plaques. This study observed the prevalence of active and calcified plaques in selected arteries during whole-body ¹⁸F-FDG PET-CT and correlate the findings with risk factors in coronary artery disease. Beside that, the relationship of active and calcified plaque activity with inflammatory biomarker were determine from the blood marker. The record of 47 patients, which were divided into 17 patients retrospectively and 30 patient prospectively alongside serum inflammatory marker (eg.IL-6 and CRP) and cholesterol (eg lipid profile) undergone whole body FDG PET-CT study in various oncology cases were reviewed. To evaluate the cutoff value for abnormal uptake, retrospective study was conducted to identify patient at risk of developing vascular disease. Mean age was 58±10.3 years old. The presence of ¹⁸F-FDG uptake and calcification in selected vascular walls were evaluated. The composition of plaque were recorded using CT value in Housfield unit (HU max). The intensity of ¹⁸F-FDG uptake was measured as maximum blood-normalized standardize uptake value (SUVmax). ¹⁸F-FDG uptake (SUVmax) and calcification (HUmax) was significantly highest in the carotid walls

with (1.91 ± 0.11) and (631.7 ± 215.5) respectively. There was significant relationship between high BMI (overweight) with ^{18}F FDG uptake, while calcified artery significant related with hyperlipidemia, diabetes mellitus and hypertension. However the blood marker (such as C-reactive protein) showed significant with high ^{18}F FDG uptake and high calcified artery. Beside that, calcified artery showed there was no significant and direct correlation with inflamed vascular wall (SUVmax). This study showed that ^{18}F -FDG PET-CT can be utilized in detecting focal high FDG uptake within vascular plaque in early recognition of high risk patients having coronary artery disease.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

PENGGUNAAN ¹⁸FLUORINE FLUORODEOXYGLUCOSE PADA PLAK YANG TIDAK STABIL DALAM MENDETEKSI PESAKIT YANG BERISIKO TINGGI.

Oleh

SHAZREEN SHAHARUDDIN

OKTOBER 2013

Pengerusi: Prof. Abdul.Jalil Nordin, PhD

Fakulti : Perubatan dan Kesihatan.

FDG PET/CT adalah gabungan fungsi dan struktural multimodaliti alat pengimejan yang boleh digunakan untuk mengesan plak-plak aterosklerosis. Dalam kajian ini, kelaziman aktif dan pengapuran plak dalam arteri yang dipilih menggunakan ¹⁸F-FDG PET CT dikaitkan dengan hasil penemuan faktor risiko terjadinya penyakit vaskular. Selain daripada itu, hubungan diantara aktiviti plak mudah terjejas dengan inflamasi parameter dari penanda darah direkod . Terdapat 47 pesakit, yang dibahagikan kepada 17 pesakit retrospektif dan 30 pesakit prospektif berserta pengambilan serum darah (contohnya IL-6 dan CRP) dan kolesterol (contohnya profil lipid) dimana setiap pesakit menjalani scan pada seluruh badan menggunakan FDG PET/CT dalam pelbagai kes onkologi. Untuk evaluasi nilai purata bagi abnormal plak, kajian retrospektif telah dijalankan bagi mengidentifikasi pesakit yang berisiko untuk mendapat penyakit vaskular. Purata umur adalah 58 ± 10.3 tahun. Pengambilan aktiviti ¹⁸F-FDG dan pengapuran pada dinding vaskular yang dipilih telah dinilai. Komposisi plak direkodkan menggunakan nilai CT dalam unit Housfield (HU max). Keamatan pengambilan aktiviti ¹⁸F-FDG telah disukat menggunakan unit 'Maximum blood-normalized standardize uptake value' (SUVmax). pengambilan aktiviti ¹⁸F-FDG (SUVmax) dan pengapuran (HUmax) menunjukkan nilai tertinggi dalam dinding karotid dengan purata (1.91 ± 0.11) dan (631.7 ± 215.5). Terdapat hubungan diantara BMI tinggi (melebihi paras normal) dengan pengambilan aktiviti FDG, sementara pengapuran arteri secara signifikan berkait dengan hiperlipidemia, diabetes melitus dan hipertensi. Manakala, penanda darah

(seperti protein C-reaktif) menunjukkan signifikansi dengan peningkatan pengambilan aktiviti FDG dan pengapuran arteri. Selain itu, pengapuran arteri menunjukkan tiada korelasi dengan inflamasi dinding arteri (SUVmax). Kesimpulannya menunjukkan bahawa ^{18}F -FDG PET CT boleh digunakan dalam mengesan peningkatan aktiviti FDG dalam plak vaskular bagi pencegahan supaya dapat mengurangkan risiko berlakunya penyakit arteri koronari.



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SHAZREEN SHAHARUDDIN

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I certify that a Thesis Examination Committee has met on 3 Oktober 2013 to conduct the final examination of Shazreen Binti Shaharuddin on her thesis entitled " Role of ¹⁸Fluorine Fluorodeoxyglucose in vulnerable plaque detection for identifying high risk patients " in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or any other institution.

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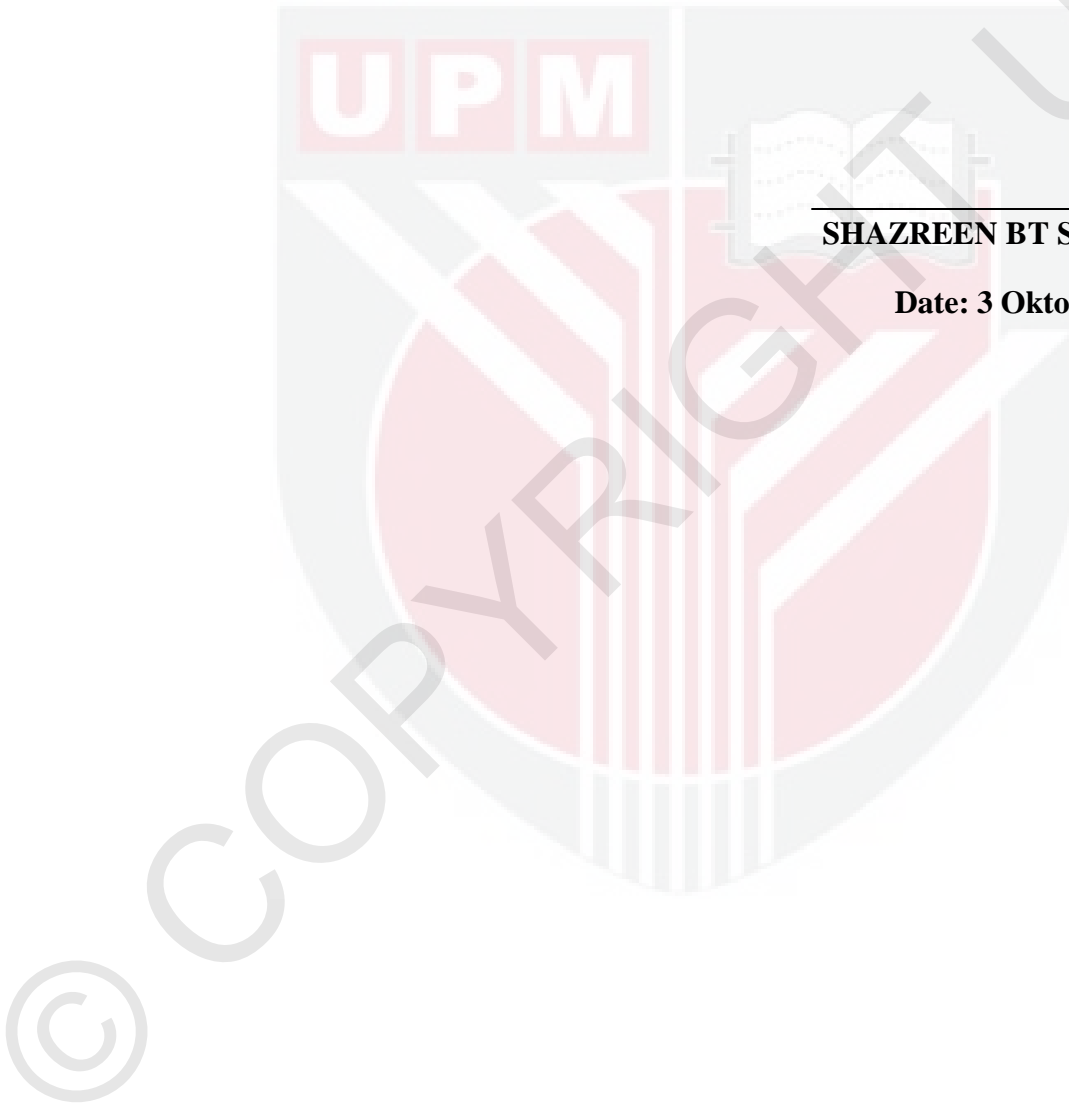


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