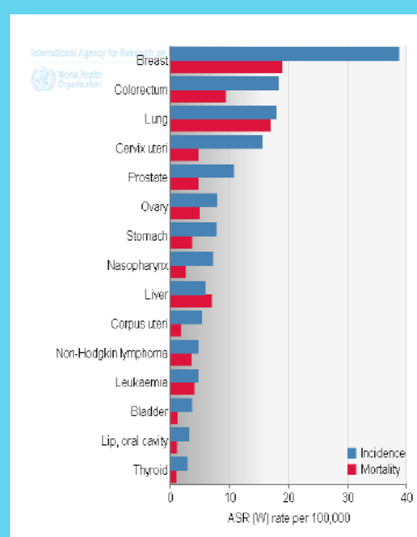
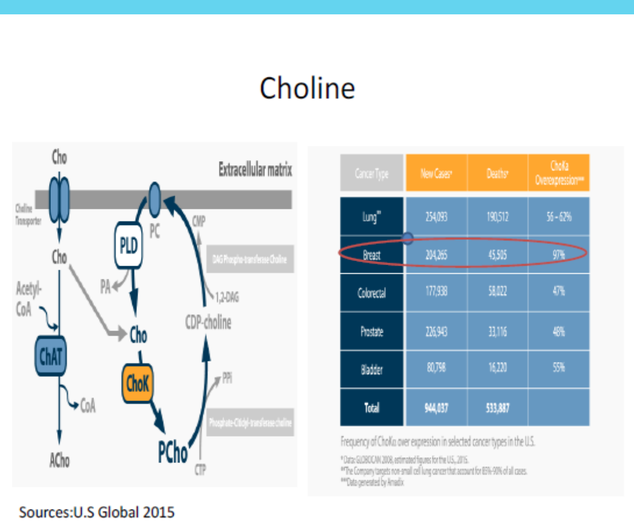
THE PHARMACOKINETICS OF F-18 FLUOROCHOLINE IN DETECTING BREAST CANCER PATIENTS

Shazreen, S.*, Hishar, H., Shahrun Niza, A.S., Farida Aimi M., Fathinul Fikri, A.S.

Background: The Abnormal Expression Of Choline (Cho) Metabolism Is One Of The Factors That May Contribute To The Development Of Breast Cancer. Earlier Studies Proved That Cho Uptakes Varied Among The Different Subtypes Of Breast Cancer. Apart From The Ubiquitous 18f-fluorodeoxyglucose (18F-FDG), The F-18 Fluorocholine (F-18 FCH) Has Also Been Proved To Be One Of The Oncologic Markers For PET Imaging Modality. However, It Has Never Been Tested On Breast Cancer Patients. Therefore, This Study Aims To Evaluate The Distribution Of F-18 FCH In Breast Cancer Patients.



Prevalence of breast cancer



Sources:U.S Global 2015

Mechanism of choline in breast cancer

Methods

PET/CT Protocol

Hot Lab

18F-FCH dose: 3 mci/subjects WB
18F-FDG dose: 8–10 mci/kg BW ro 296–370 5 Mbq/kg

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Preparation room

- FBS/oral contrast
- Blood taking

Injection radiotracer in the PET/CT room

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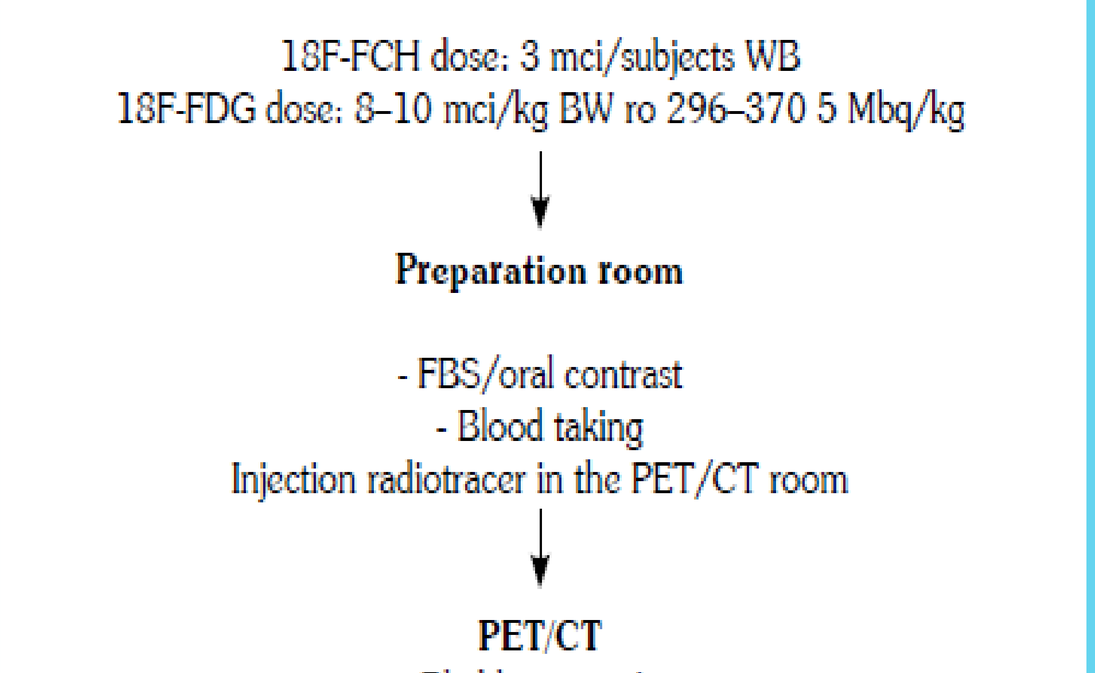
PET/CT

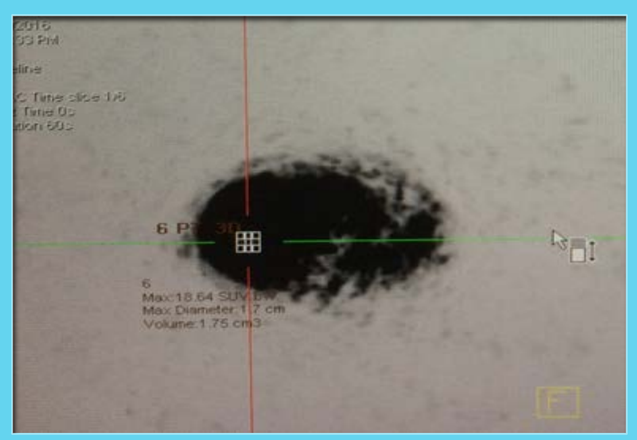
- Bladder emptying
- Non contrasted CT
- PET: (3 mm slice thickness)
  6 phase: 1 frame/min x6
- Static scan: After 30 mins uptake
  Base of skull to proximal thigh



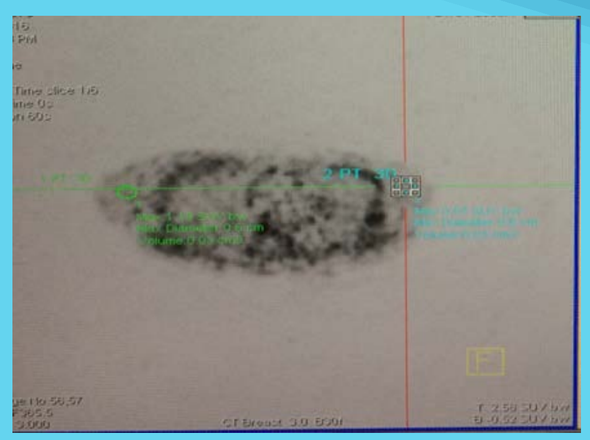
Method for PET/CT scan

^{18}F-Flurocholine PET Showing Normal Uptake

Results:

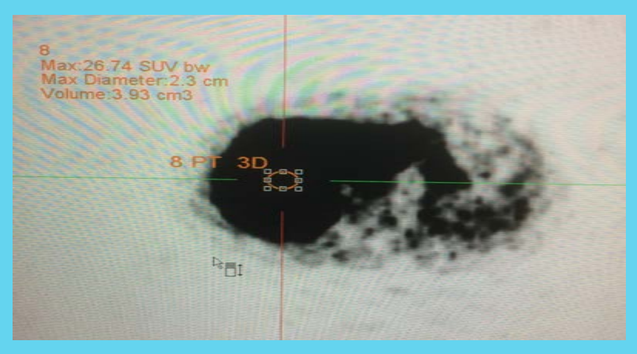


(a)

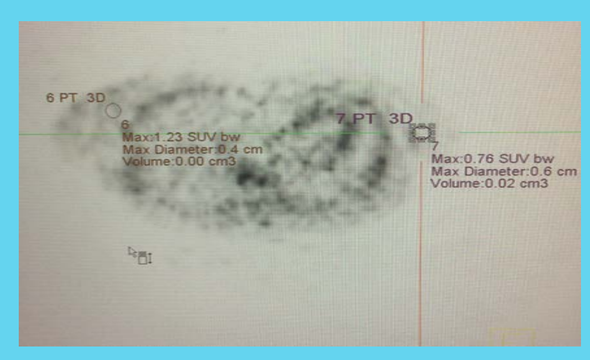


(b)

a)Image of F-18 FCH at 1 minutes in liver with SUVmax:10.54g/dl.(b) Image of 18F-FCH at 1 minutes in lesion breast with SUVmax 1.19g/dl and normal tissue breast with SUVmax:0.67g/dl.



(d)



(c)

(c)Image of F-18 FCH at 5 minutes in liver with SUVmax:26.74 g/dl.(d) Image of F-18 FCH at 5 minutes in lesion breast with SUVmax 1.23g/dl and normal tissue breast with SUVmax:0.76g/dl.

Table 1. The difference means of breast lesion, normal breast and liver in malignant and benign breast cancer

Variables	Group	
	Malignant	Benign
Breast lesion (g/dl)	1.66±0.26	0.56±0.14
Normal breast (g/dl)	0.24±0.18	0.08±0.17
Liver (g/dl)	17.3±0.52	17.1±0.58
P-value (independent t-test)	**0.007**	0.063

Discussion

The F-18 FCH uptake in the malignant tissues was distinguished compared to the uptake in the surrounding normal tissue, but much lower than in the liver as the time increases. The 18F-FCH showed a significant difference with high uptake in malignant breast cancer as compared to benign breast cancer with 18F-FCH uptake of (1.66±0.26 vs. 0.56±0.14 (p=0.007). A recent study showed that there are significant interactions between the metabolic of choline and oncogenic pathways.It is believed that the high glucose and choline concentration is sufficient to trigger the activation of oncogenic pathway and induce a malignant-like phenotype in mammary epithelial cells.

Conclusion:

Although F-18 FCH has never been tested on breast cancer patients on PET imaging, the results showed higher SUVmax uptake in the malignant breast tissue as the time increases.Therefore F-18 FCH dynamic imaging protocol can be used to guide future diagnostic in patients with breast cancer.

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