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ROLE OF PET-CT SCAN IN FIELD OF RADATION ONCOLOGY!

Radiation Oncology

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ABSTRACT

X-ray, CT Scan , MRI having being use since long but PET Scan emerged more than a decade ago , since PET promises to detect metabolic abnormalities in organ and tissues , while CT Scan provide anatomical abnormalities in organ and tissues , But combining PET –CT Images provide us complementary information based on tumor morphology as well as abnormal metabolic information , Both Anatomical image by CT Scan and Functional images by PET Scan can be acquired in single scanning session and both images accurately Co-registered and provide more accurate information about the tumor or target lesion.

KEYWORDS

CT Scan, PET Scan , PET-CT Scan .

DISCUSSION

PET Scan we use radiopharmaceuticals agent FDG Flourideoxy glucose labeled with F^{18} which is injected into patient vein, we know cancer cells metabolized sugar at faster rate for FDG with competitive fashion and enters in cells in lieu of normal glucose, By the help of Gamma camera we get PET images to see metabolic activities in tumor tissues, At the same time CT Scan generate digital pictures of internal 3D images of target lesion.

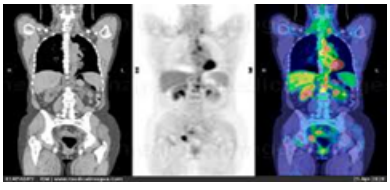

FIGURE -1-CT ALONE, PET SCAN ALONE AND PET-CT FUSION IMAGE

When both CT and PET Images co-registered together it provide information both morphology of tumor as well as metabolic activities of tumor tissue , Low metabolic areas considered as Necrotic lesion or normal tissue , and high metabolic areas considered as recurrent or residual tumor lesion.

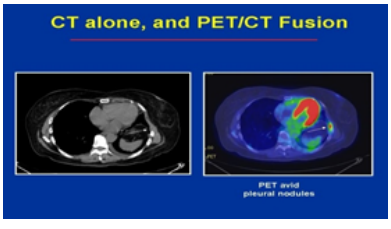

FIGURE-2

Gama camera works by detecting isotopes decay by positron emission, positron travels very short distance after that it combine with stray electron and produce two photons of each energy .51Mev at 180^0 degree this reaction is known as Annihilation radiation, The decay event at the site of origin of photon is achieved by taking the advantage of the fact that both photon travels at 180^0 degree directions thus two detectors are placed on opposite side of patient and connected to circuit.

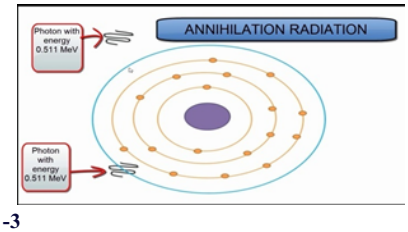

FIGURE -3

most commonly used radiotracers in PET Scanning F^{18} FDG which provide us hyper metabolic or hypo metabolic areas in target lesion, F^{18} FIMSO fluromisonidazole is a liphophilic compound that enters the target cells by passive diffusion method its basically used to find out hypoxic status of target lesion knowing the fact since hypoxic cells and tissues traps this FIMSO and Non hypoxic cells does not pick up this FIMSO .

3Deoxyflurothymidine F^{18} Use as marker of proliferation because thymidine use here competes with normal thymidine which is a building block for DNA synthesis thus its give us idea about cellular proliferation marker which is use in , Small cell carcinoma, Colorectal cancer, and other cancers .

Advantage of PET Scan – lower metabolic rate in parietal lobe of brain is associated with Alzheimers disease , Both CT Scan and MRI cannot differentiate that after radiotherapy for brain tumor weather left over abnormal area is due to radiation necrosis or its due to recurrence of lesion here PET Scan has a vital role to tell us recurrent lesion would be hyper metabolic lesion and hypo metabolic lesion would be due to radiation necrosis , However MRI Spectroscopy can assess choline level present in phospholipid membrane found subnormal in radiation necrosis and high choline levels tell us about a recurrent lesion in brain .

CONCLUSION

PET-CT Combine image improves tumor localization which is difficult at the time by PET or CT scan alone, some limitations such as low FDG uptake in certain tumors as well as substantial FDG uptake in inflammatory cells and lack of anatomical details overcome by PETCT Combination. henceforth its very useful tool for radiotherapy planning , response assessment and during follow up and to rule out recurrent and residual lesion after surgery or radiotherapy in cancer patients , PET-CT is very useful tool for the diagnosis of recurrent colon cancer specially when rise in value of CEA Blood level found but conventional CT Scan images are negative , PET Scan also very useful in Hodgkin's and Non Hodgkin's lymphomas to find out involved node required to be included in radiotherapy planning as well as also very vital for radiotherapy planning for NSCLC Lung cancer.

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