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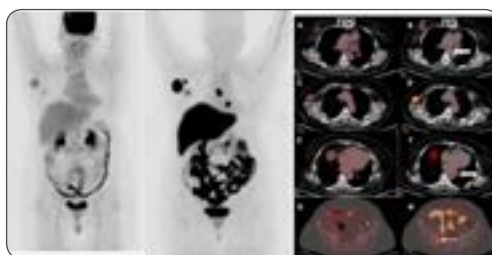
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Molecular imaging in precision management of breast cancer

Partha S Choudhury

Rajiv Gandhi Cancer Institute & Research Centre, India

In breast cancer, correct staging and early diagnosis is the key factor in patient management. Imaging in breast cancer has evolved from purely morphological imaging to molecular imaging in current times and this has had a significant impact on patient management. 18F fluoro-deoxy-glucose PET-CT (FDG) exploits the high glucose turnover in cancer cells as compared to normal cells and has become the standard of care in breast cancer staging, response evaluation, restaging and metastatic work-up. It must also be kept in mind that granulocytes and activated lymphocytes also exhibit significantly increased glucose uptake and in many occasions it creates a diagnostic dilemma in interpretation of FDG. In addition to this, fluoroestradiol labeled with F-18 (FES) has been found to bind ER with high affinity and PET imaging can be performed. This can evaluate ER expression in all disease sites, in both primary and metastatic disease. It has been contemplated that the FES PET examination combined with a FDG (which is a surrogate marker of glucose metabolism) PET examination in the same patient could potentially improve the predictive power of risk stratification and evaluating response in hormone positive breast cancer. FDG evaluates the glucose utilization by the tumor and can demonstrate tumor aggressiveness. In a recently published study from our group in which we have performed FES and FDG imaging both in staging and restaging of hormone positive breast cancer in the same patient. FES was also able to characterize 27.5% FDG indeterminate lesions, having an impact on the management in 20%. The receptor status plays an important role in predicting outcome as well as has a significant role in personalizing treatment protocols. With the background knowledge of tumor heterogeneity, a uniform expression of receptor in the breast tumor is an exception rather than a rule. At the same time, the expression in primary tumour and the metastatic sites may be of different intensity which may further prompt the need to use both of these imaging simultaneously. We were also able to demonstrate the migration from hormone positive status to hormone negative status leading to a change in the therapeutic approach and personalizing the treatment protocols. We have thus been able to prove the hypothesis that both FDG and FES study should be done routinely in ER positive breast cancer for guiding management strategies. FES PET can be used along with FDG PET in strongly ER expressing patients for better specificity, evaluation of disease extent and impact on management.



Recent Publications

1. Choudhury P S and Gupta M (2017) Personalized & precision medicine in cancer: A theranostic approach. *Curr Radiopharm.* 10(3):166-170. Doi: 10.2174/1874471010666170728094008.
2. Gupta M et al. (2017) Can 18F-fluoroestradiol positron emission tomography become a new imaging standard in the estrogen receptor-positive breast cancer patient: A prospective comparative study with 18F-fluorodeoxyglucose positron emission tomography? *World J. Nucl. Med.* 16(2):133-139. Doi:10.4103/1450-1147.203071.
3. Choudhury P S (2016) Developing a personalized treatment model based on molecular biomarkers and imaging in breast cancer: Has the time come? *Indian J. Nucl. Med.* 31(3):165. Doi:10.4103/0972-3919.183606.
4. Choudhury P S and Gupta M (2017) Dual target molecular imaging in precision management of breast cancer: The time has come. *Medical Research Archives.* 5(9):1-7.

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Biography

Partha S Choudhury is an internationally acclaimed leading Nuclear Medicine Physician of India with special interest in radionuclide therapy of various types of cancers. He has more than 25 years of experience in Nuclear Oncology. He currently heads the Department of Nuclear Medicine at Rajiv Gandhi Cancer Institute & Research Centre, New Delhi, India since 1998 and has been instrumental in its sustained growth over the last 20 years. He has introduced and standardized new procedures in the department both in terms of disease specific diagnostic and molecular imaging & molecular therapy. He is an Invited Speaker at several conferences and symposiums across many countries, the main ones being United Kingdom, Austria, South Africa and South America. He is an avid Clinical Researcher with publications in peer reviewed journals. He is a technical Co-Operation Consultant and participant of coordinated research projects of International Atomic Energy Agency (IAEA) Vienna, Austria.

pschoudhary@hotmail.com

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