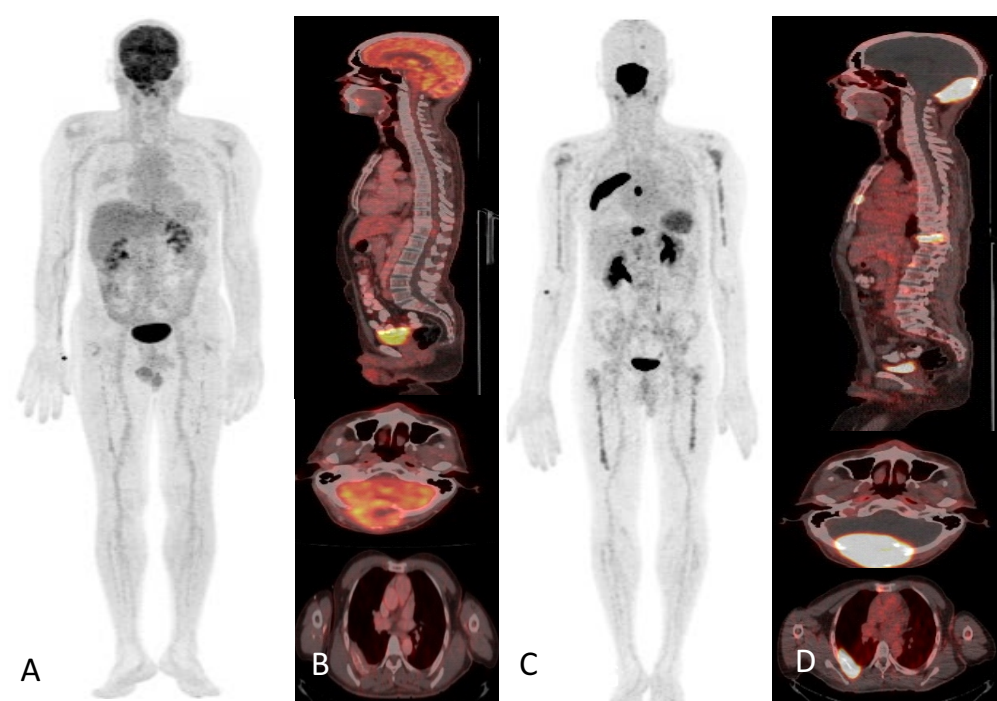


# NUCLEAR MEDICINE WEEK 2019



## NUCLEAR MEDICINE : THE BACKBONE OF EVIDENCE BASED MEDICINE

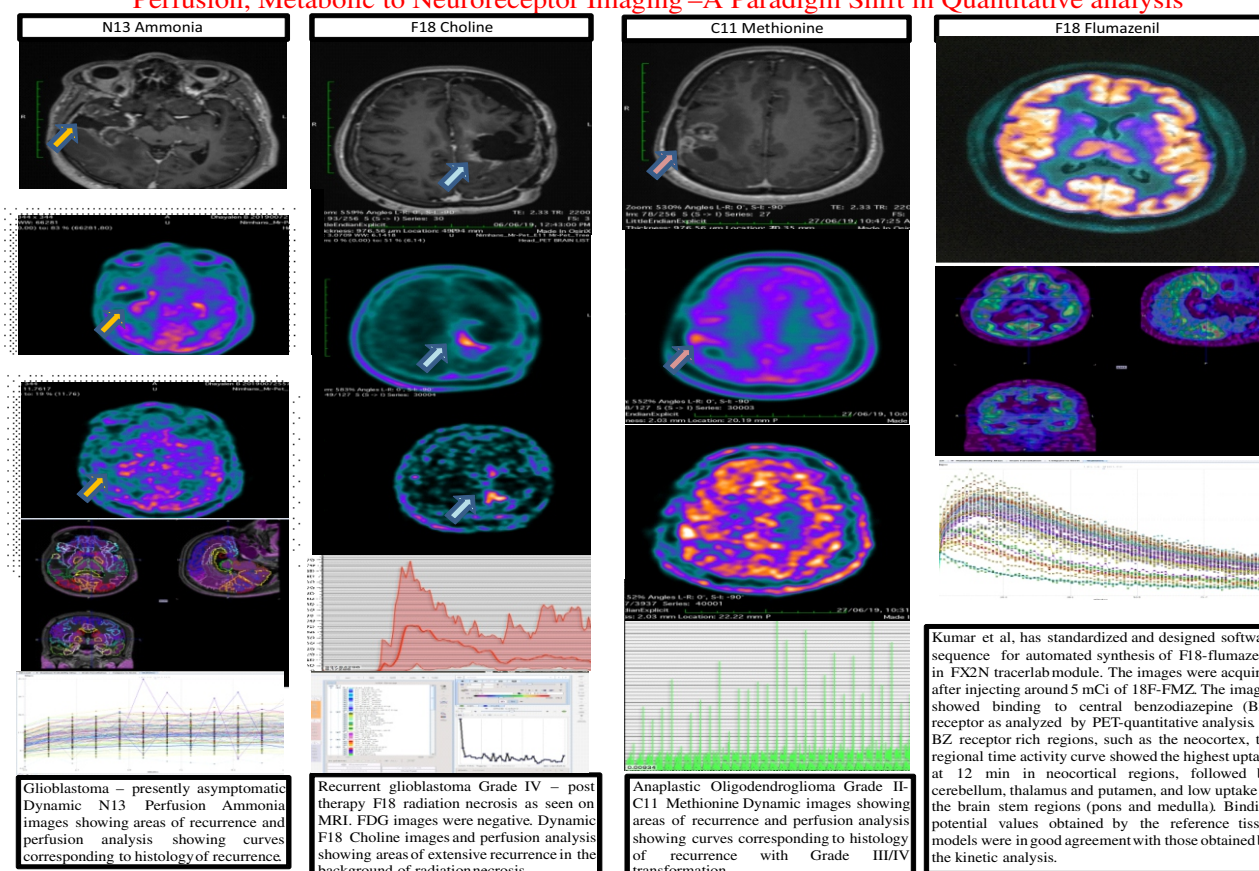
27th October- 2nd November 2019



**<sup>68</sup>Ga-Pentixafor: A Promising theranostic molecule in Multiple myeloma**  
A patient diagnosed with Multiple Myeloma underwent <sup>18</sup>F-FDG & <sup>68</sup>Ga-Pentixafor PET/CT scans for disease mapping. <sup>18</sup>F-FDG PET MIP and axial fused images (A,B) show faint uptake in appendicular skeleton & mild increased uptake in the occipital region, while <sup>68</sup>Ga-Pentixafor PET/CT (C, D) shows intense focal tracer uptake in multiple skeletal sites (occipital, right thoracic, dorsal vertebrae, sternum and appendicular skeleton). This case highlights diagnostic utility & High Lesion to background ratio in <sup>68</sup>Ga-Pentixafor PET which confers potential theranostic utility of this molecule in Multiple Myeloma.

Image Contributed by: Amit Shekhawat, Ankit Watts, Baljinder Singh, Rajender Kumar, Harmandeep Singh, B R Mittal, PGIMER, Chandigarh

**Perfusion, Metabolic to Neuroreceptor Imaging – A Paradigm Shift in Quantitative analysis**



**Glioblastoma – presently asymptomatic**  
Dynamic <sup>13</sup>N Ammonia Perfusion Anatomical MRI images showing areas of recurrence and perfusion analysis showing curves corresponding to histology of recurrence.

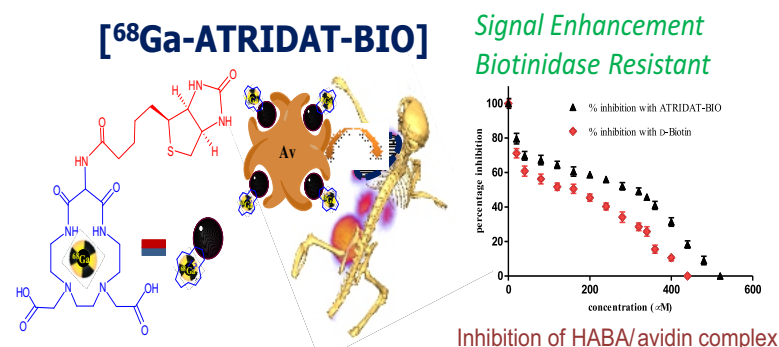
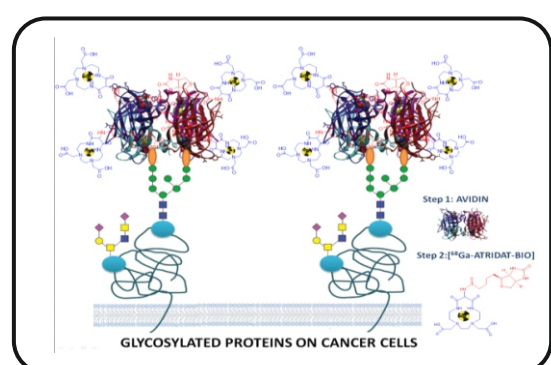
**Recurrent glioblastoma Grade IV – post therapy F18 radiation necrosis**  
As seen on MRI FDG images were negative. Dynamic F18 Choline images and perfusion analysis showing curves corresponding to histology of recurrence in the background of radiation necrosis.

**Amplified Oligodendrogloma Grade II**  
C11 Methionine Dynamic images showing areas of recurrence and perfusion analysis showing curves corresponding to histology of recurrence with Grade II/IV transformation.

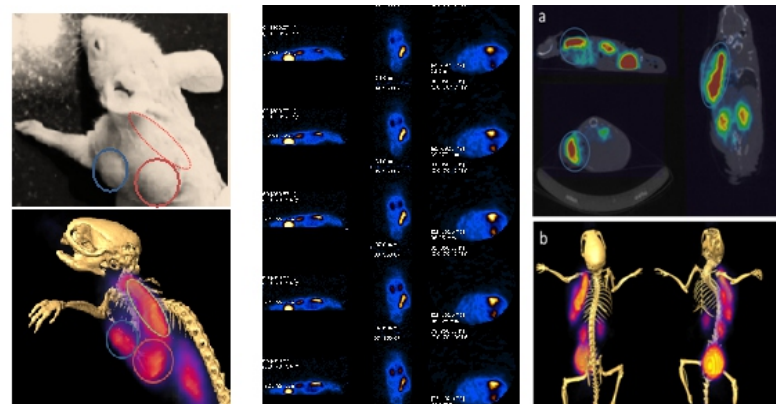
Kumar et al, has standardized and designed software sequence for automated synthesis of F18-Flumazenil in FX2N tracerlab module. The images were acquired after injecting around 5 mCi of 18F-FMZ. The images showed binding to central benzodiazepine (BZ) receptor as analyzed by PET-quantitative analysis in BZ receptor rich regions, such as the neocortex, the regional time activity curve showed the highest uptake at 12 min in neocortical regions, followed by cerebellum, thalamus and putamen, and low uptake in the brain stem regions (pons and medulla). Binding potential values obtained by the reference tissue models were in good agreement with those obtained by the kinetic analysis.

Images Contributed by : Chandana Nagaraj, Pardeep Kumar, Sandhya M, Jitender Saini, Aravinda HR, Rose Dawn Bharath, NIMHANS, Bengaluru. We acknowledge the immense contribution of the consultants and scientific staff of NHR, Neurosurgery and Psychiatry.

**Two Step Targeting using BIOTIN-AVIDIN system [ATRIDAT-BIO] with translatable efficiency for Theranostics**  
Signal Amplification using two step targeting for Diagnosis and therapy

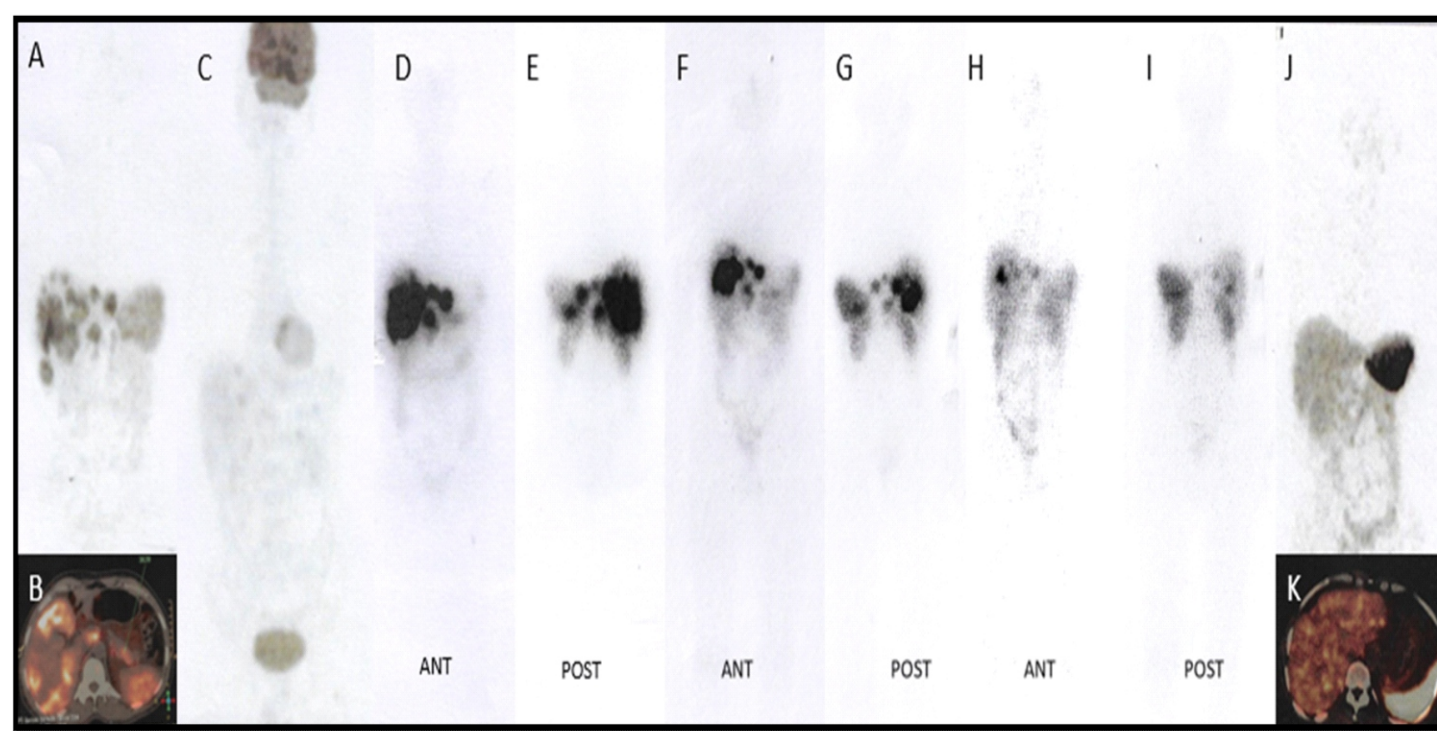


<sup>68</sup>PET image depicting radiotracer accumulation in consecutive slices



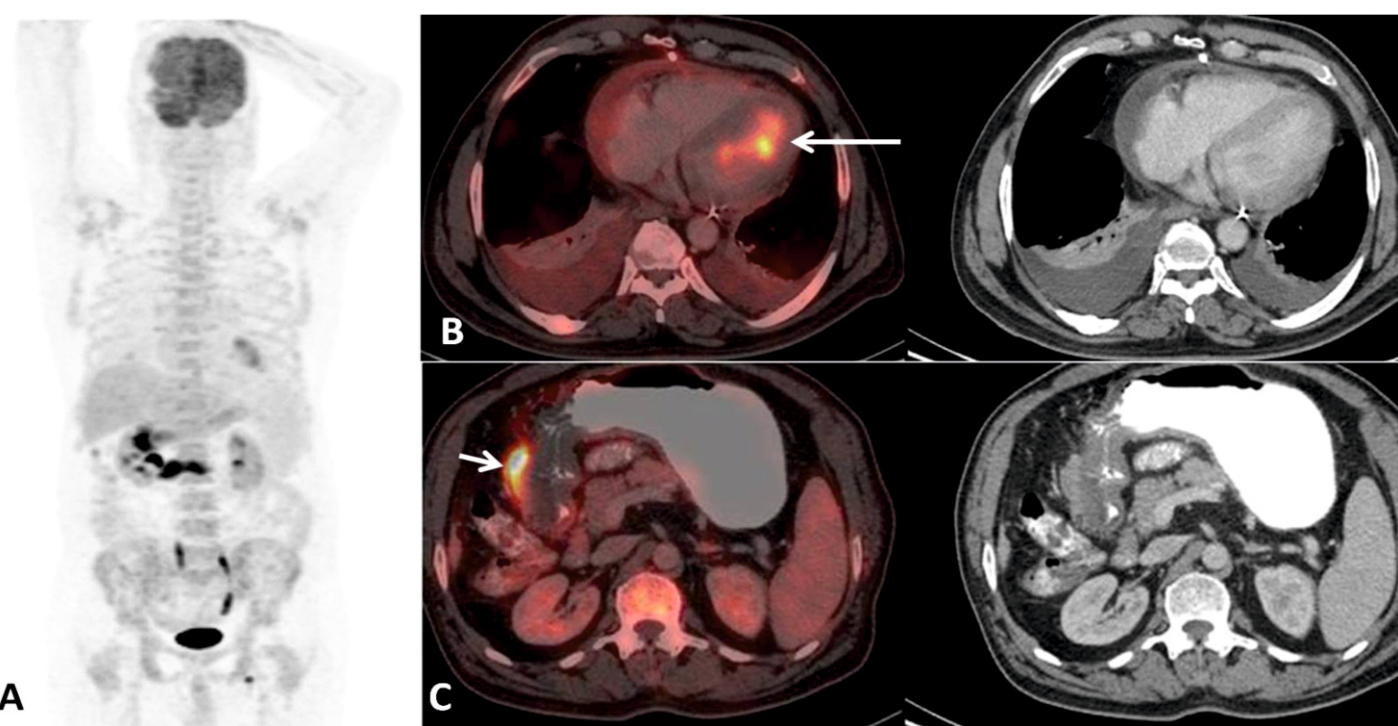
**Functionalization of molecules with biotin analogues due to extremely strong affinity for the proteins avidin (Av) and streptavidin (SAv) results in remarkable affinity/avidity in femtomolar range.**  
**This high selectivity of biotin for avidin and fast blood clearance gives the advantage of better tumor to non-tumor ratio over conventionally used radiolabeled monoclonal antibodies and long peptides.**  
**A new macrocyclic system 2,2'-(12-amino-11,13-dioxo-1,4,7,10-tetraazacyclotridecane-4,7-diyl)diacetic acid (ATRIDAT) was designed for coordinating metals in +2 and +3 oxidation states. <sup>68</sup>Ga/44Sc for PET imaging and <sup>64</sup>Cu for theranostic.**  
**This model provides high tumor targeting efficiency, stability to biotinidase activity leading to modest signal amplification at the tumor site**

Image Contributed by : Puja Panwar Hazari and Anil Kumar Mishra\*, INMAS, New Delhi



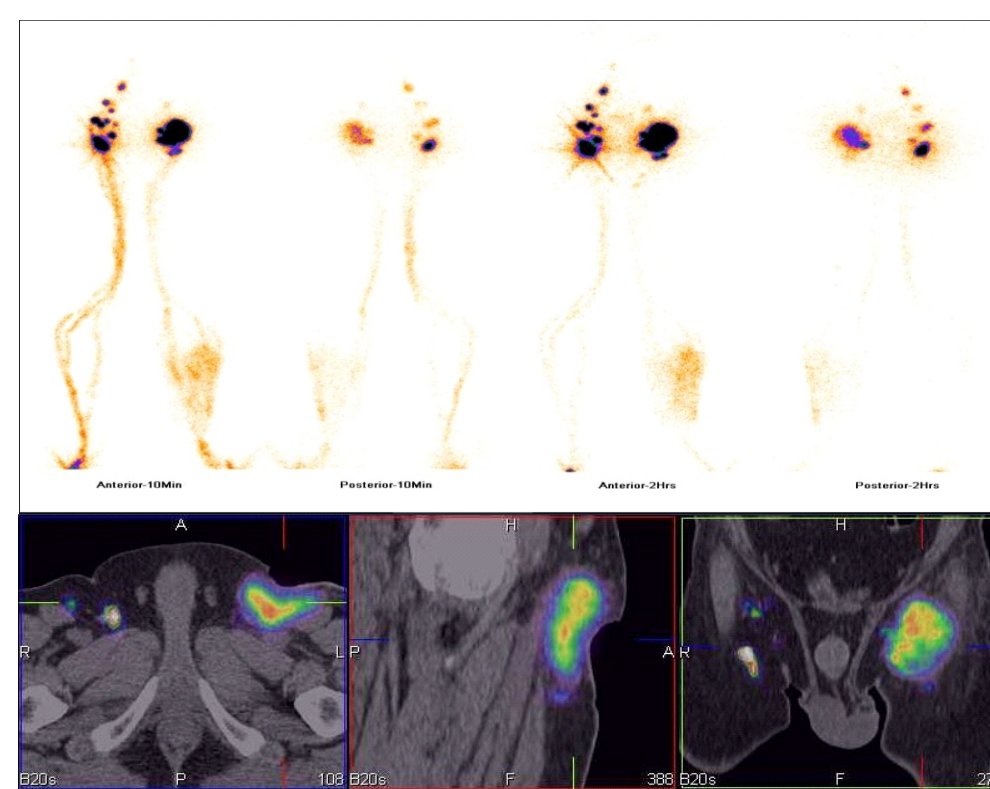
**New therapeutic intervention in INSULINOMA patients:**  
Complete Resolution of disease after <sup>177</sup>Lu-DOTATATE therapy in metastatic INSULINOMA. Initial <sup>68</sup>Ga-DOTATATE PET/CT (A & B) shows SSTR expression in primary insulinoma in Pancreas & other metastatic liver lesions, While <sup>18</sup>F-FDG PET (C) shows no abnormal uptake. Imaging following subsequent 6 cycles of <sup>177</sup>Lu-DOTATATE therapy (D-I) shows serial reduction in SSTR expressing lesions. Follow-up <sup>68</sup>Ga-DOTATATE PET/CT (J,K) shows no sign of any functional or morphological lesion consistent with complete therapeutic response.

Image Contributed by : Priyanka Verma, Gaurav Malhotra, Sunita Sonavane, Ashok Chandak, Manjiri Karlekar\*, Anurag Lila\*, Tushar Bandgar, Ramesh V. Asopa, Sharmila Banerjee. Radiation Medicine Centre (RMC), BARC, Mumbai & \*Dept of Endocrinology, KEM hospital, Mumbai



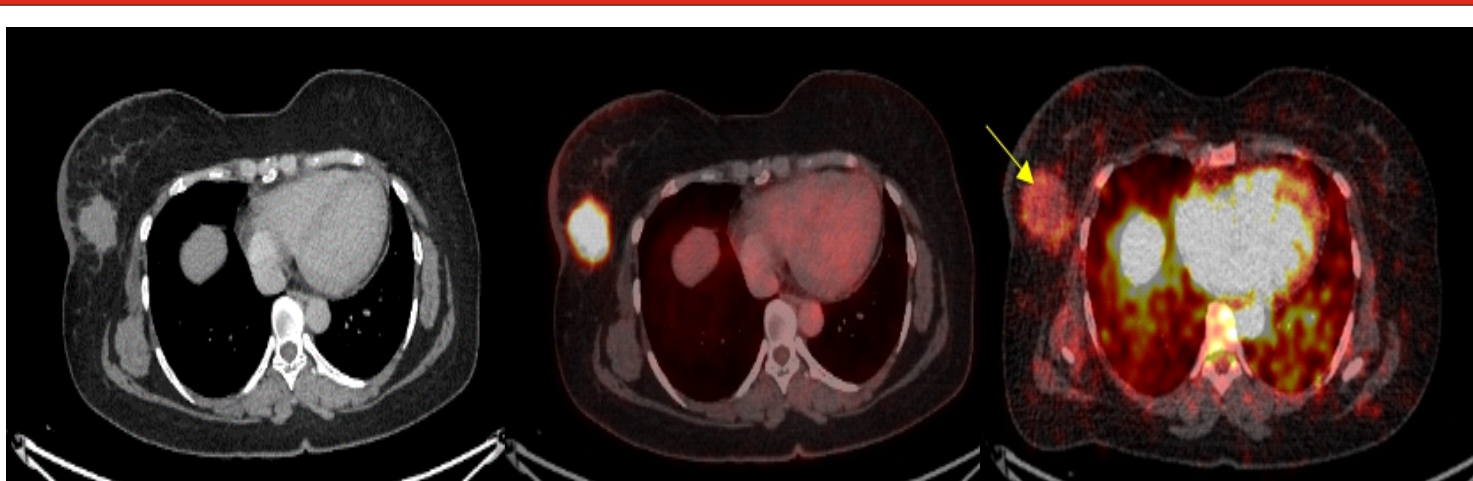
**Pericardial tamponade as initial presentation of lymphoma: Low carbohydrate high fat (LCHF) diet and unfractionated heparin augmented FDG PET-CT leads to diagnosis.**  
64 year-old male patient presented to emergency department with pericardial tamponade which was promptly drained and found to be hemorrhagic with no obvious evidence of malignancy. Patient was given low carbohydrate high fat (LCHF) diet 24 hours before scan & was injected unfractionated heparin (50 IU/kg) before FDG injection. <sup>18</sup>F-FDG PET-CT revealed hypermetabolism in left ventricular myocardium and pericardium (image B-arrow) as well as in a plaque-like enhancing serosal thickening in pyloric region of stomach (image C-arrow); suggesting sites of active pathology. Guided by the PET-CT findings, laproscopic biopsy of the thickening involving stomach and repeat cytology of pericardial fluid revealed plasmablastic lymphoma.

Image Contributed by : Mukta Kulkarni, Prathamesh Joshi, Ajit Bhagwat, Sachin Mukhedkar, Venkatesh Ekbote, Kritik Kumar, Kamalnayan, Bajaj Hospital, Aurangabad



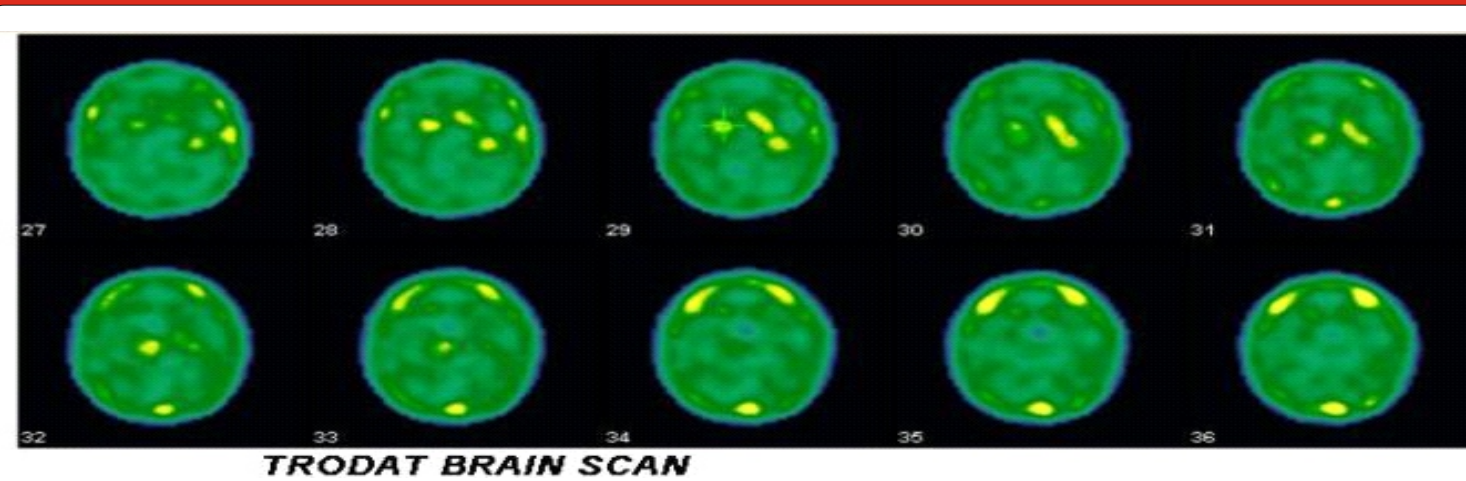
62 years old male presented with history of pain and swelling in left groin. He had recent past history of open-heart surgery for valve replacement and blood exchange. Incision for the surgery in left groin lead to formation of seroma. This was aspirated on four occasions but swelling did not resolve and the fluid was sent to culture and sensitivity. Fluid was suspected to be lymphatic origin (lymphocele) rather than seroma. Above is lymphatic scan with <sup>99m</sup>Tc – Nanocolloid of the Lower Limb revealing intense accumulation of radiotracer in left groin fluid collection confirming lymphocele.

Image Contribution by: Dr. S. V. Shikare, Al Zahra Hospital, Sharjah, United Arab Emirates (U.A.E.)



**<sup>68</sup>Ga-NOTA-Trastuzumab Fab PET/CT in Breast cancer**  
A 40 year old female with lump in right breast. Mammography showed BIRADS-IV and histopathology and immunohistochemistry revealed an IDC-II, HER2/neu (+), PR/ER(-). The trans-axial <sup>18</sup>F-FDG-PET/CT (362 MBq) images showed tracer avid lesion (SUVmax-14.6) in soft tissue lesion in the right breast (A, B). <sup>68</sup>Ga-NOTA-trastuzumab Fab (<sup>68</sup>Ga-Fab, 138.75 MBq) PET/CT image (C) shows increased tracer uptake in right breast lesion (SUVmax 3.4).

Image Contributed by: Yogesh Rathore, Jaya Shukla, Rajender Kumar, Gurpreet Singh, BR Mittal, PGIMER, Chandigarh.



Patient with history of tremors- Referred for diagnostic work-up for Parkinsonism. <sup>99m</sup>Tc-TROPAT scan shows moderately decreased uptake noted involving bilateral caudate and left putamen. Markedly impaired radiotracer uptake involving right putamen.

Image Contributed by : Shefali Gokhale, Inlaks and Budhrani Hospital, Pune