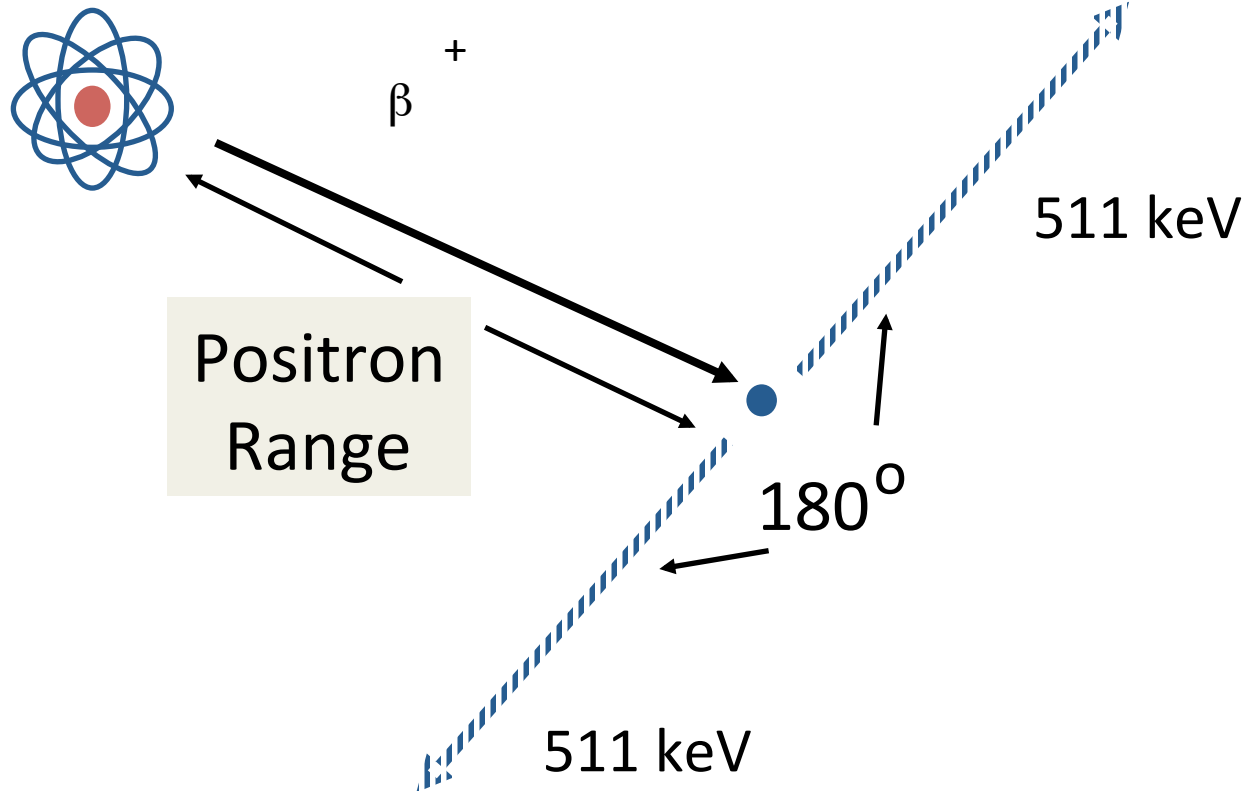


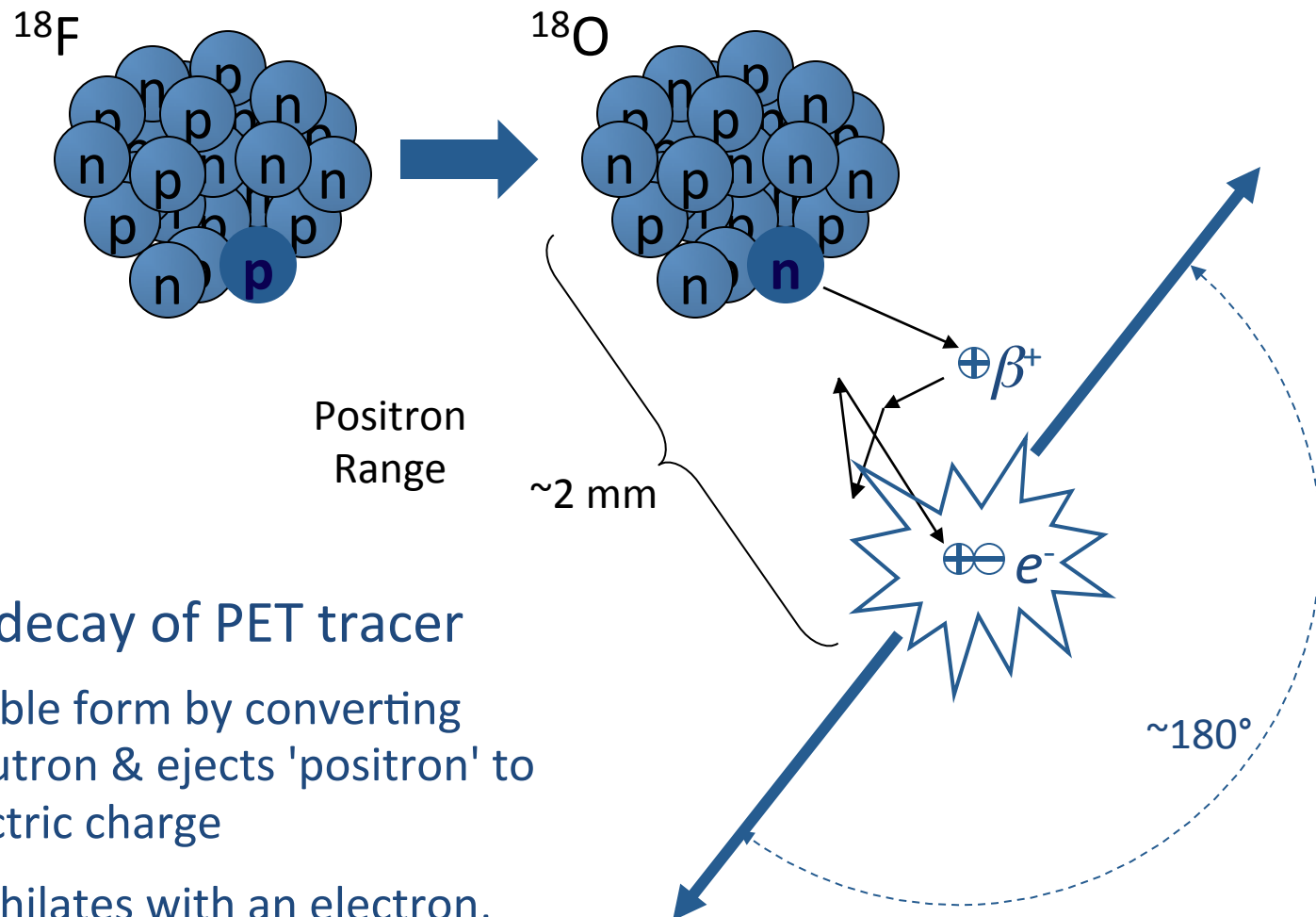
Positron Emission Tomography

Positron Emitter

Annihilation
Photons



What PET Detects: Positron Annihilation

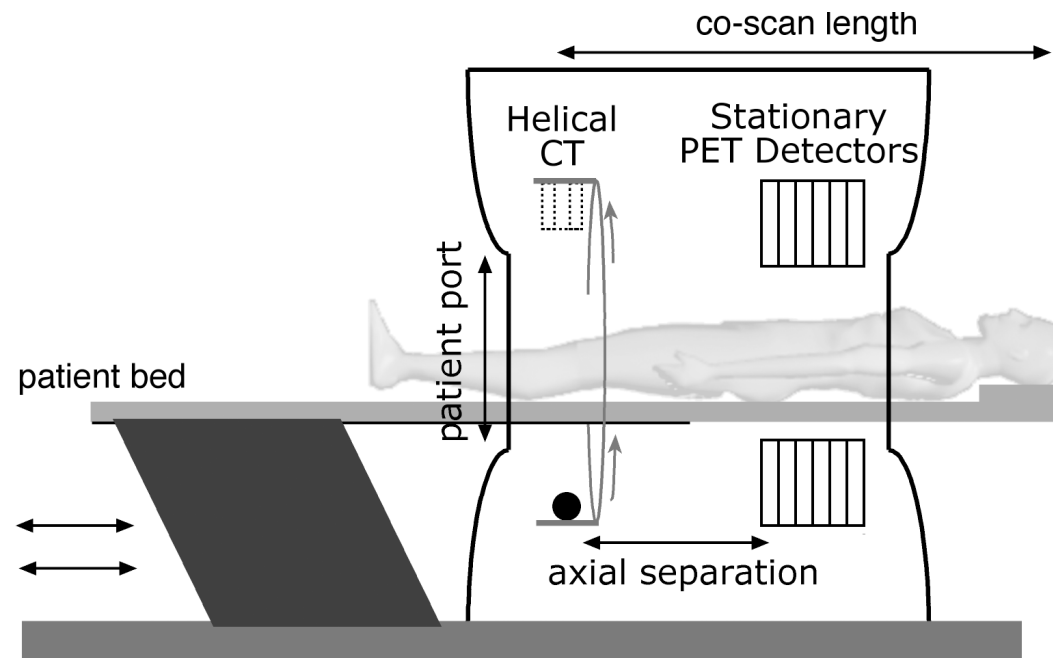
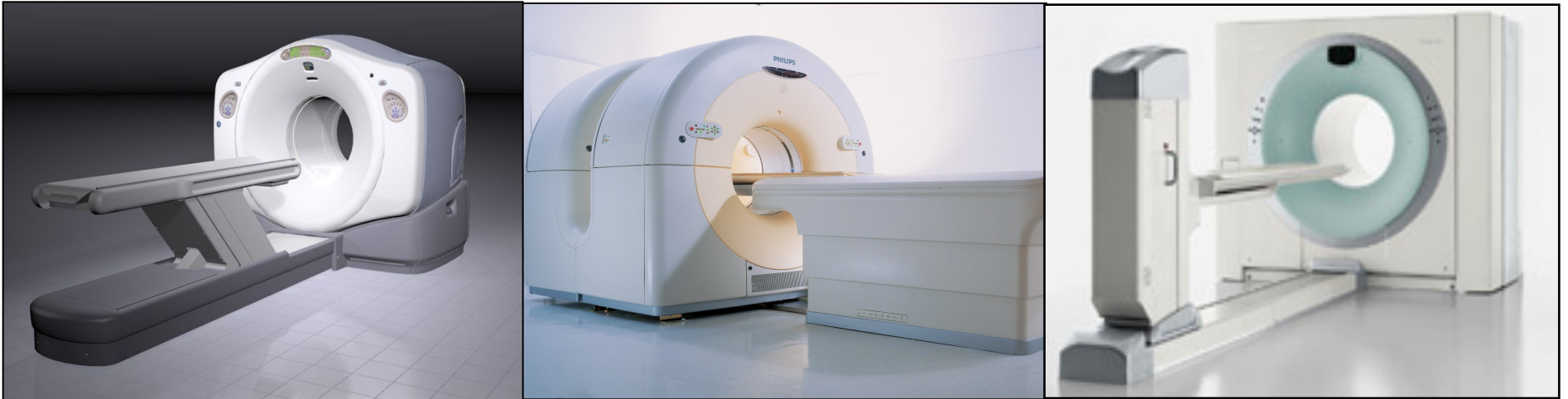


Radioactive decay of PET tracer

- Decays to stable form by converting proton to neutron & ejects 'positron' to conserve electric charge
- Positron annihilates with an electron, releasing two anti-colinear high-energy photons

PET/CT

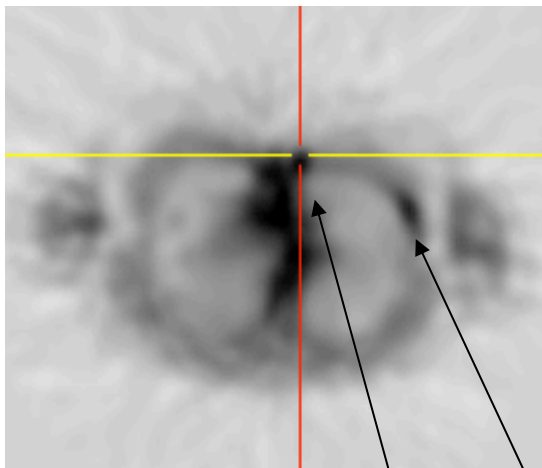
Combines Molecular and Anatomical Imaging



(Alessio Rad Clin N Amer 2005)

Co-Registered PET and CT

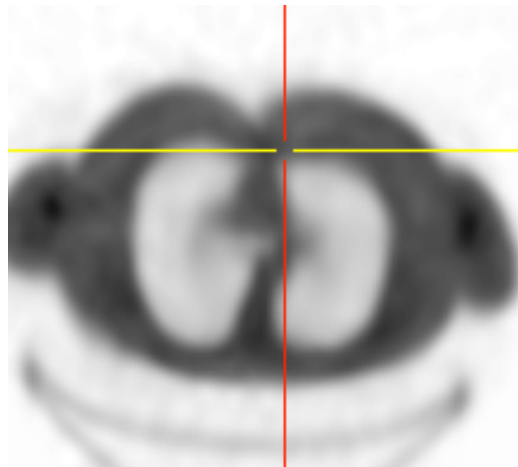
PET
Emission



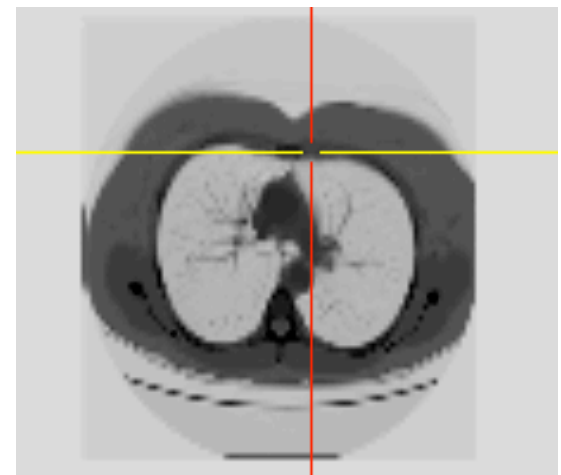
IM Node

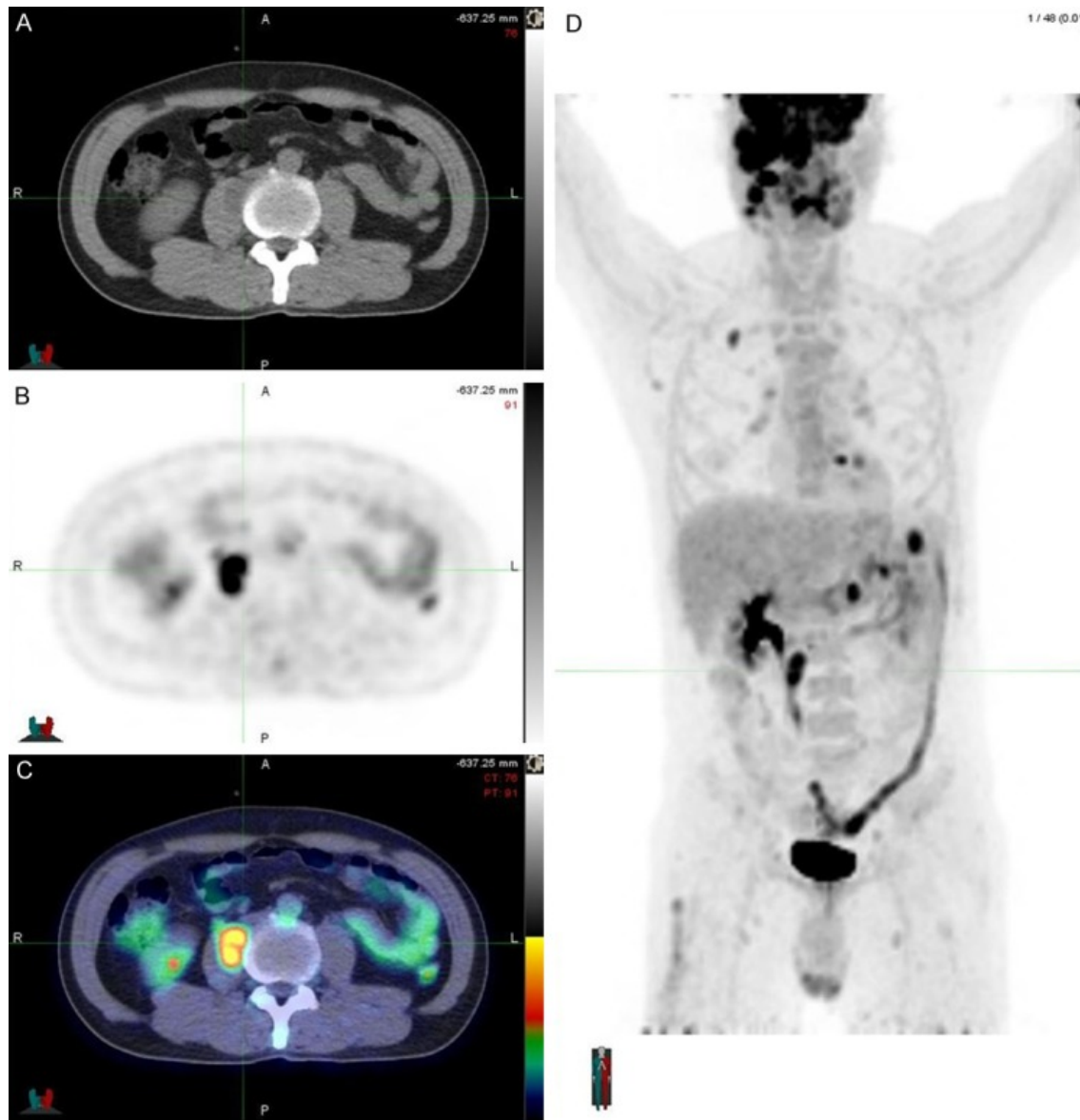
Axillary Node

PET
Transmission



CT





Initial PET/CT done during radiation therapy shows spread of the disease beyond the primary tumor. Increased uptakes are noticeable in the head, upper right lung, upper left abdominal quadrant and right psoas (D). Uptake in the descending colon was interpreted as physiologic. Axial CT (A), PET (B) and fusion (C) images show in more detail the lesion described in the psoas, which is slightly noticeable in the CT image(A) as a less hypodense structure inside the psoas and presents homogeneous FDG uptake in the PET image (B). (Partovi S, Kohan A et al. Int J Clin Exp Med 2014 7(3):640-8)

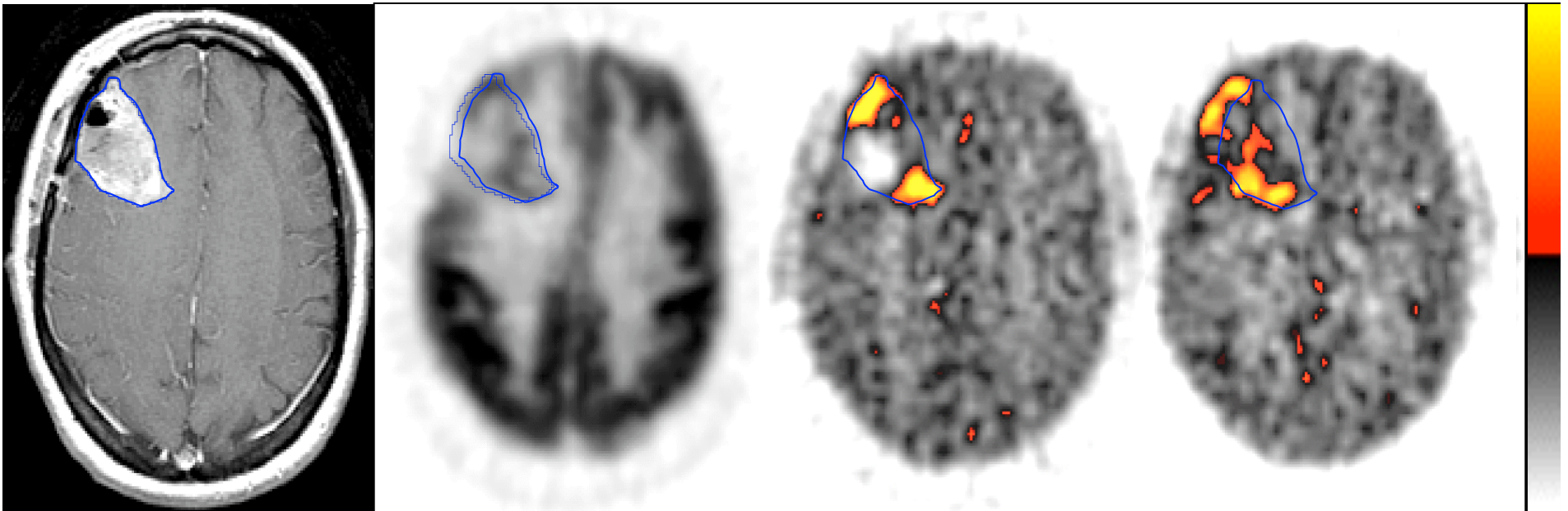
Hypoxia Imaging in Brain Tumors

MRI

FDG
(30-60m SUV)

FMISO Pre Rx
(120-140m T/B Ratio)

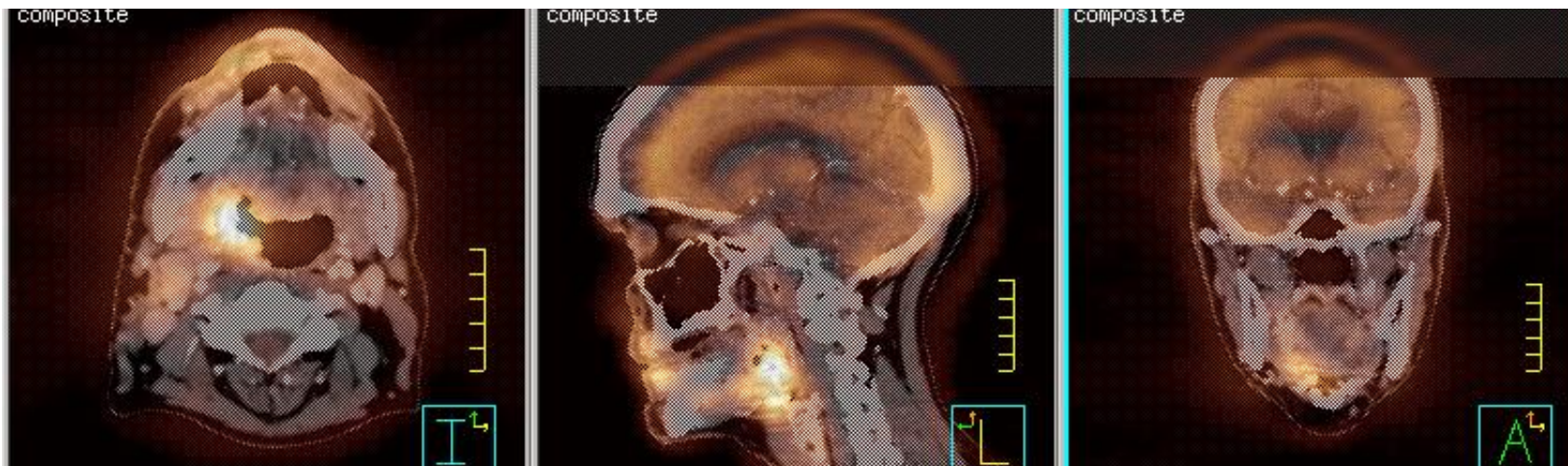
FMISO Post Rx
(120-140m T/B Ratio)



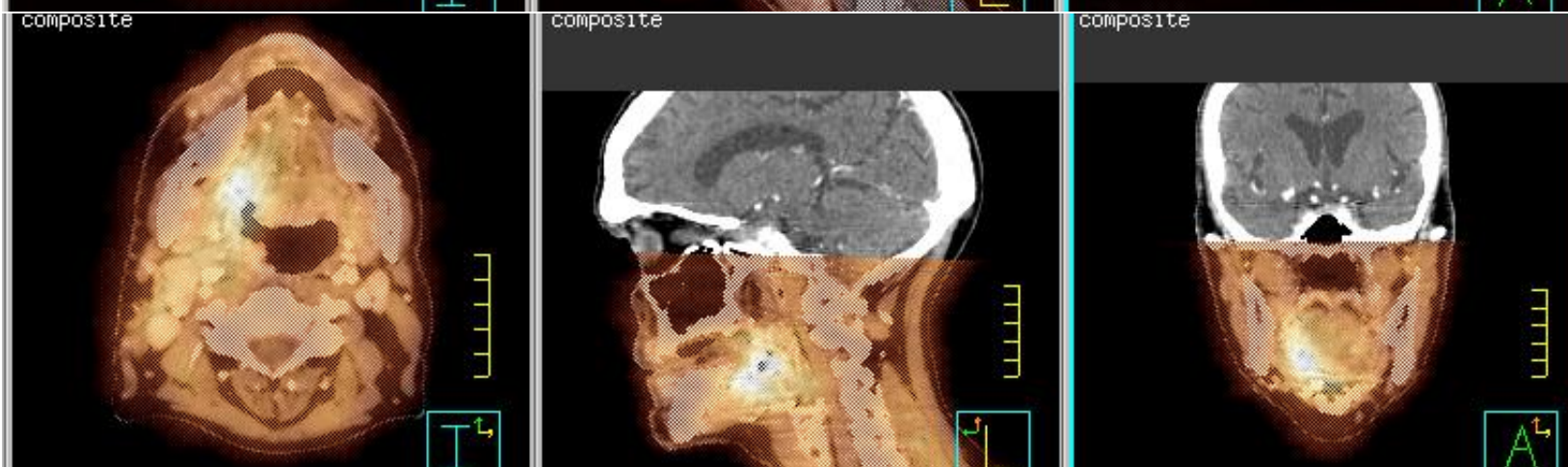
49 yo F with rt frontal GBM resected 9/19/01
MRI, FDG, FMISO pre therapy
Treated with 15 Gy neutrons, 3 / wk
Post neutron image shows no reoxygenation
Patient was continued with photon therapy

The thermometer is B/W in the normal range (<1.2) and color above the hypoxia threshold 1.2.

FDG



FMISO



Treatment
Plan

