

Rosalind Franklin: DNA e dintorni

11 febbraio 2022



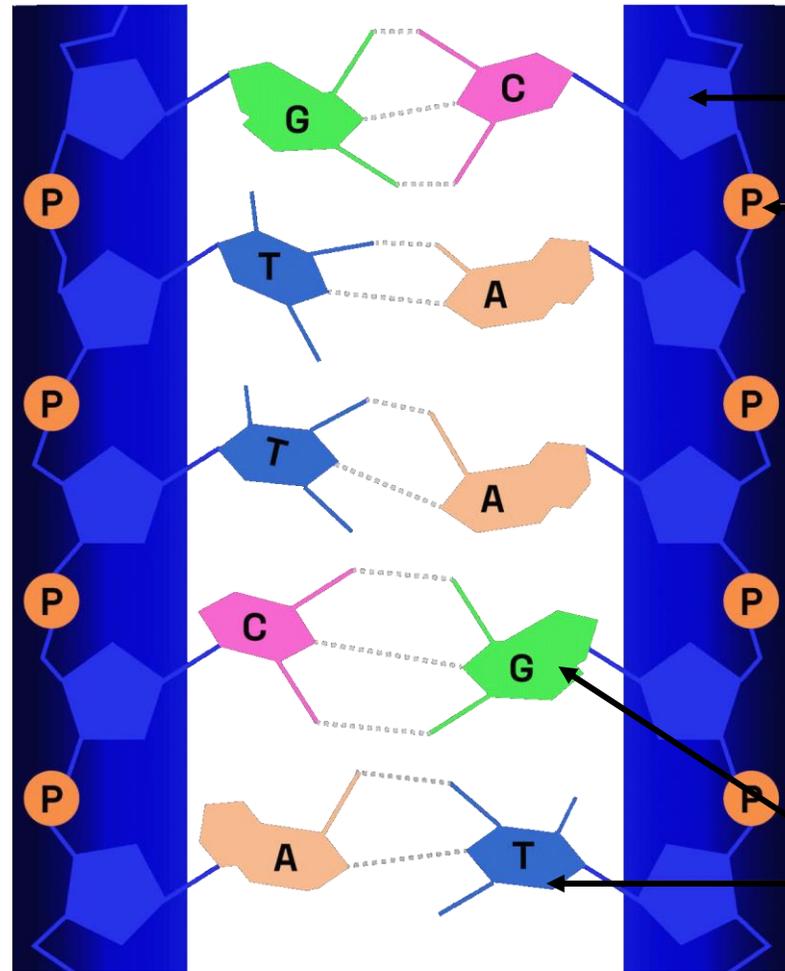
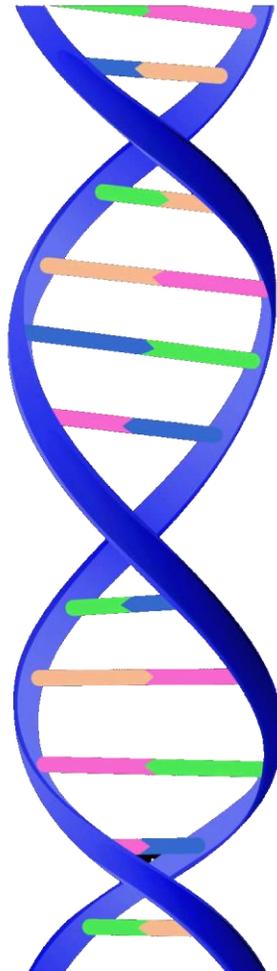
Women in Science 2022

RADIOFARMACI

TERAPEUTICI:

progressi attuali e sfide future

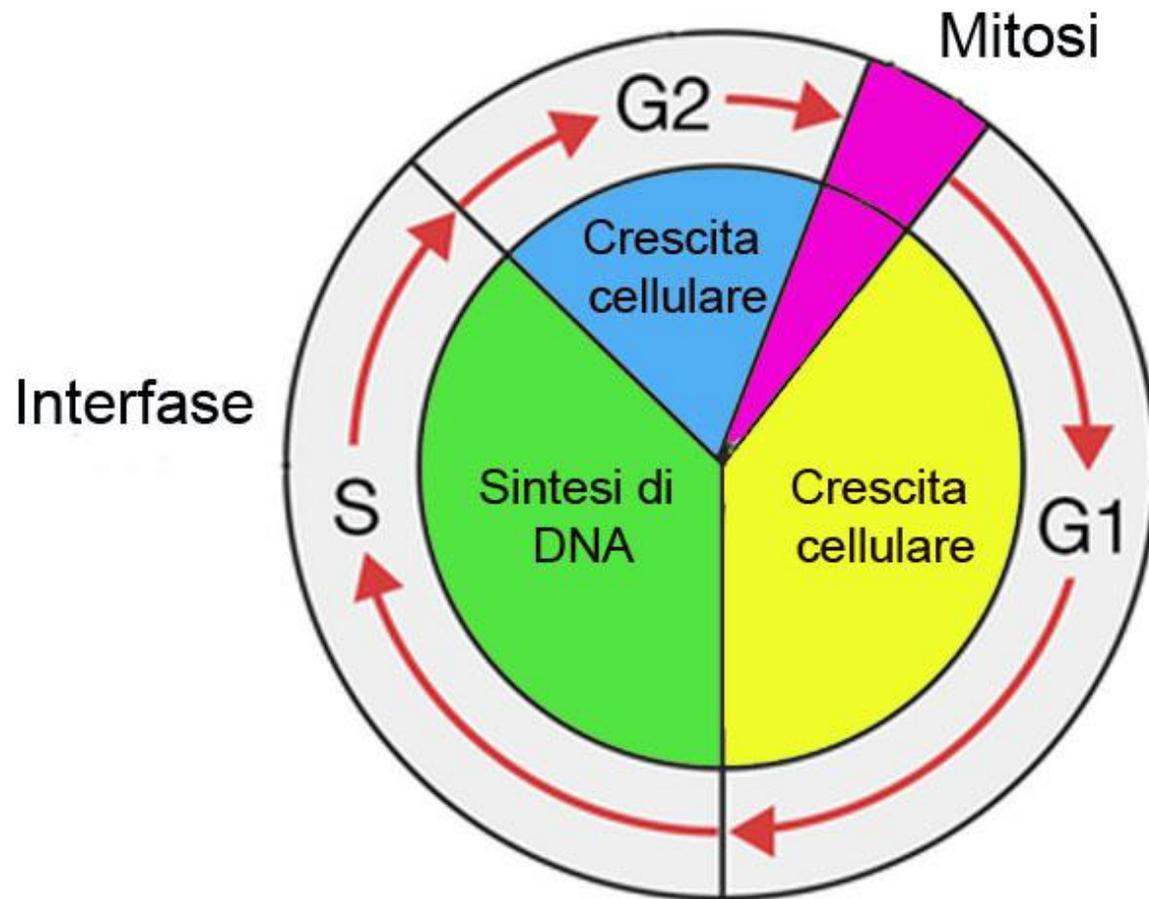
Laura Melendez Alafort



Zucchero (deossiribosio)

Gruppo fosfato

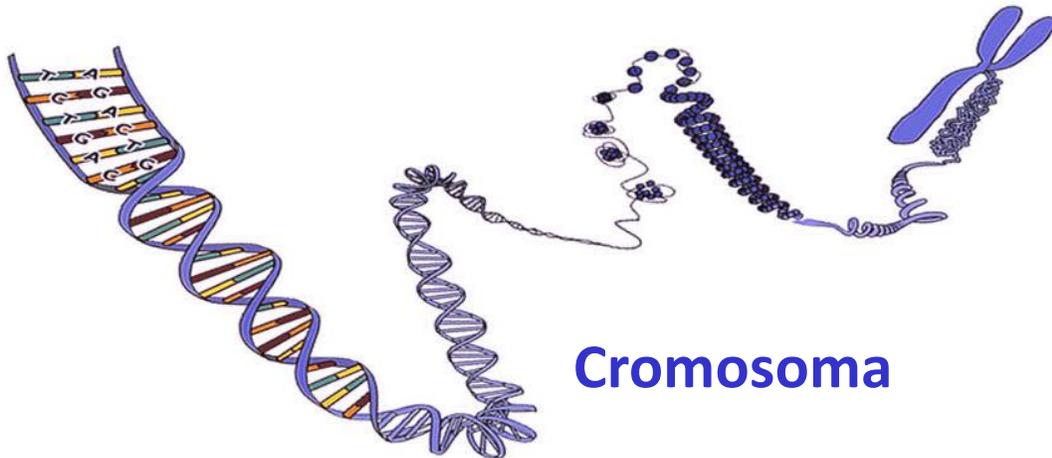
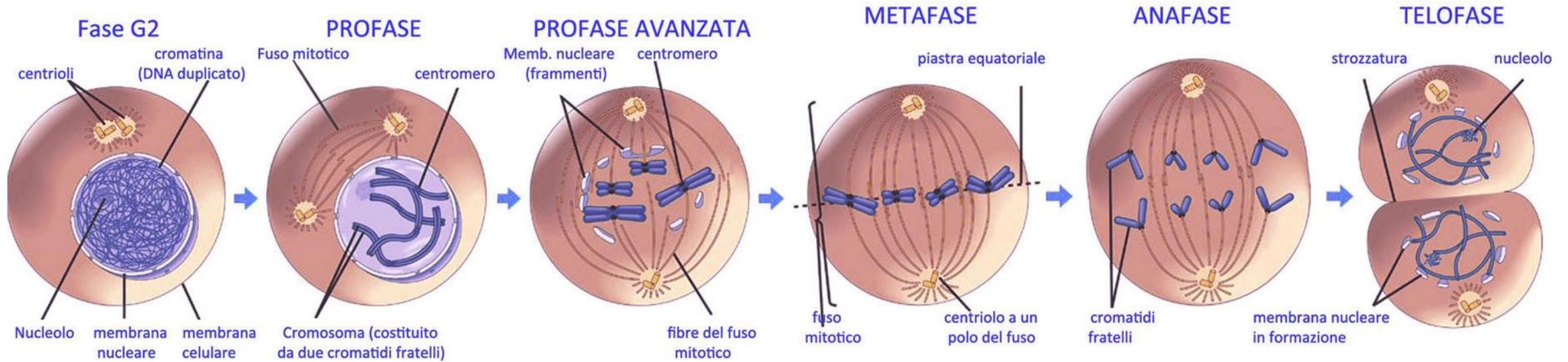
Base azotada



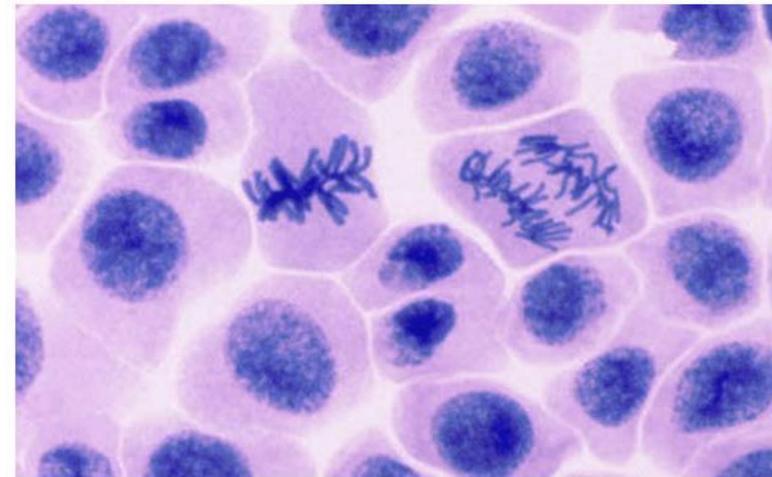
Ciclo cellulare

eventi ordinati che porta alla corretta proliferazione delle cellule

Mitosi cellulare

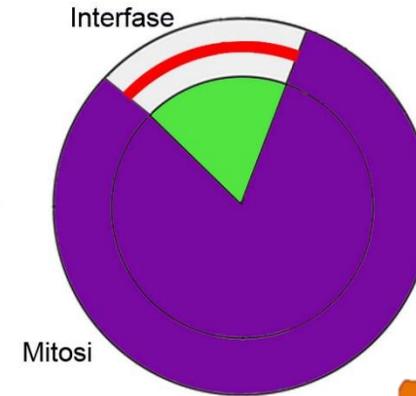
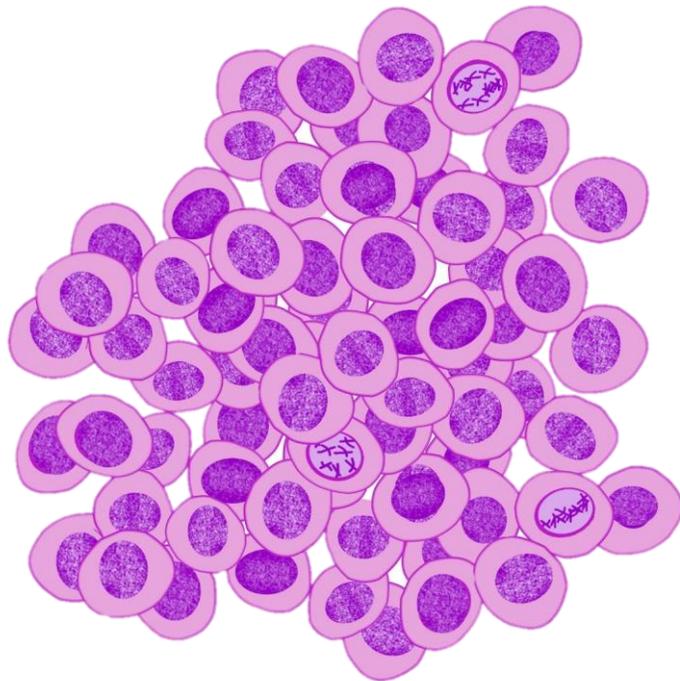
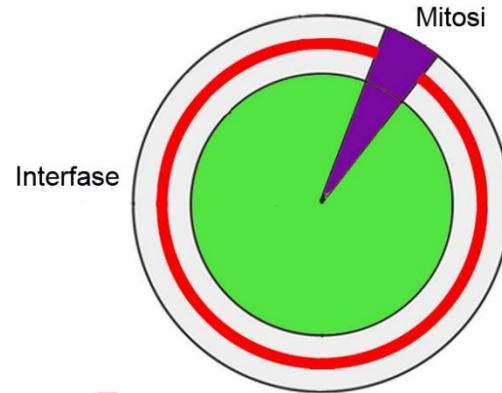


Cromosoma



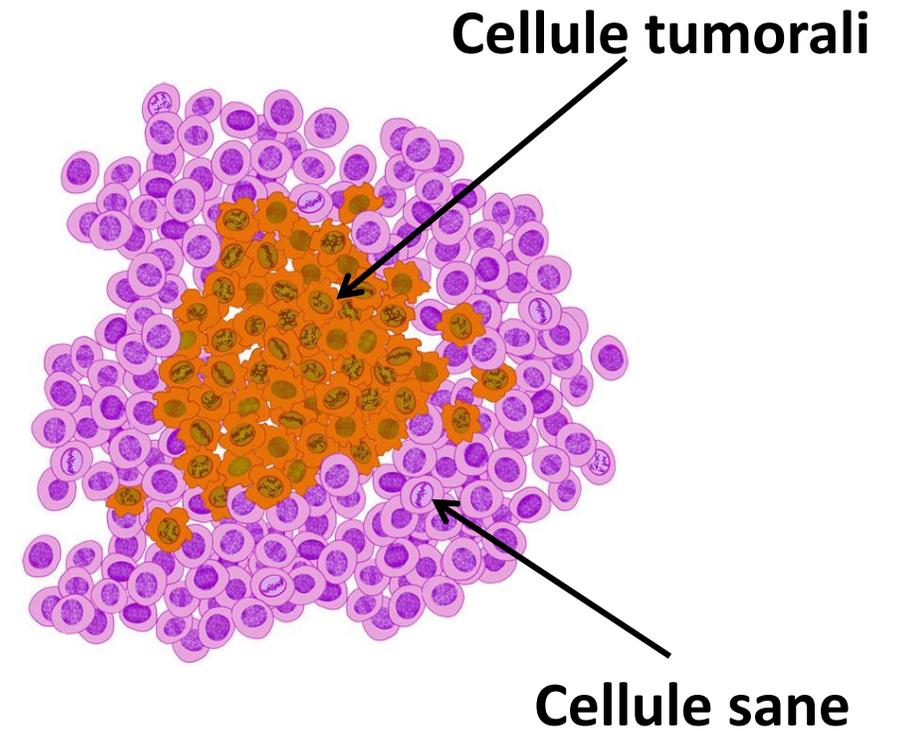
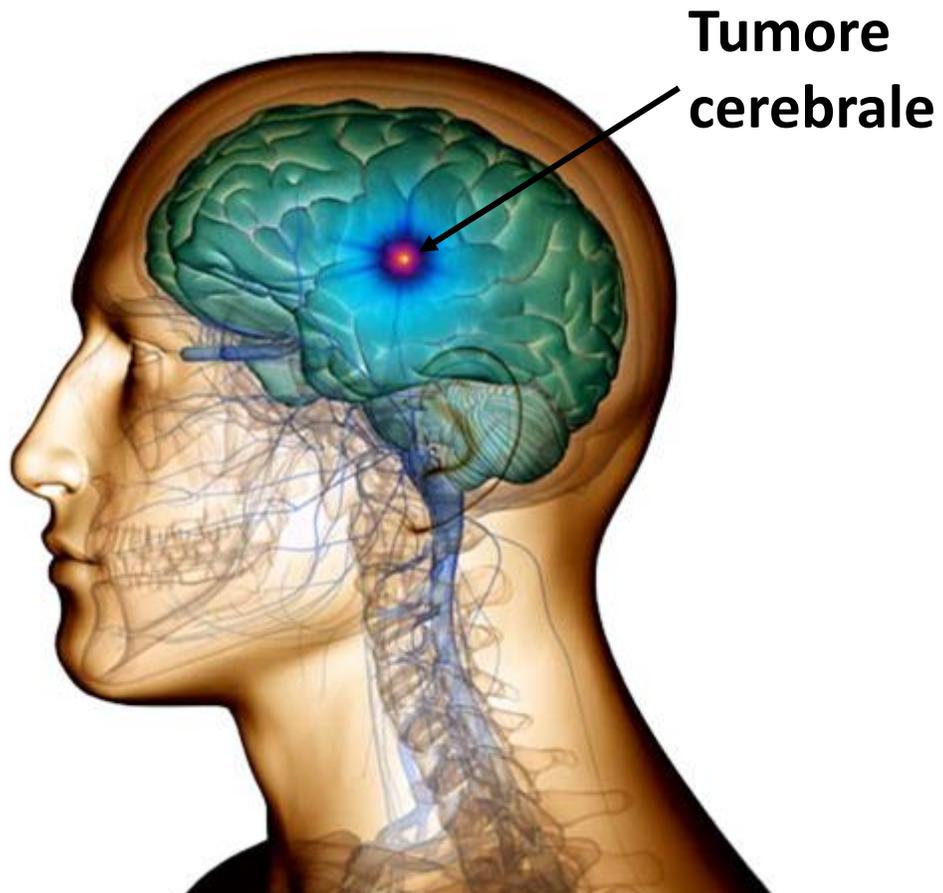
Cellule cancerose vs sane

**Cellule
sane**

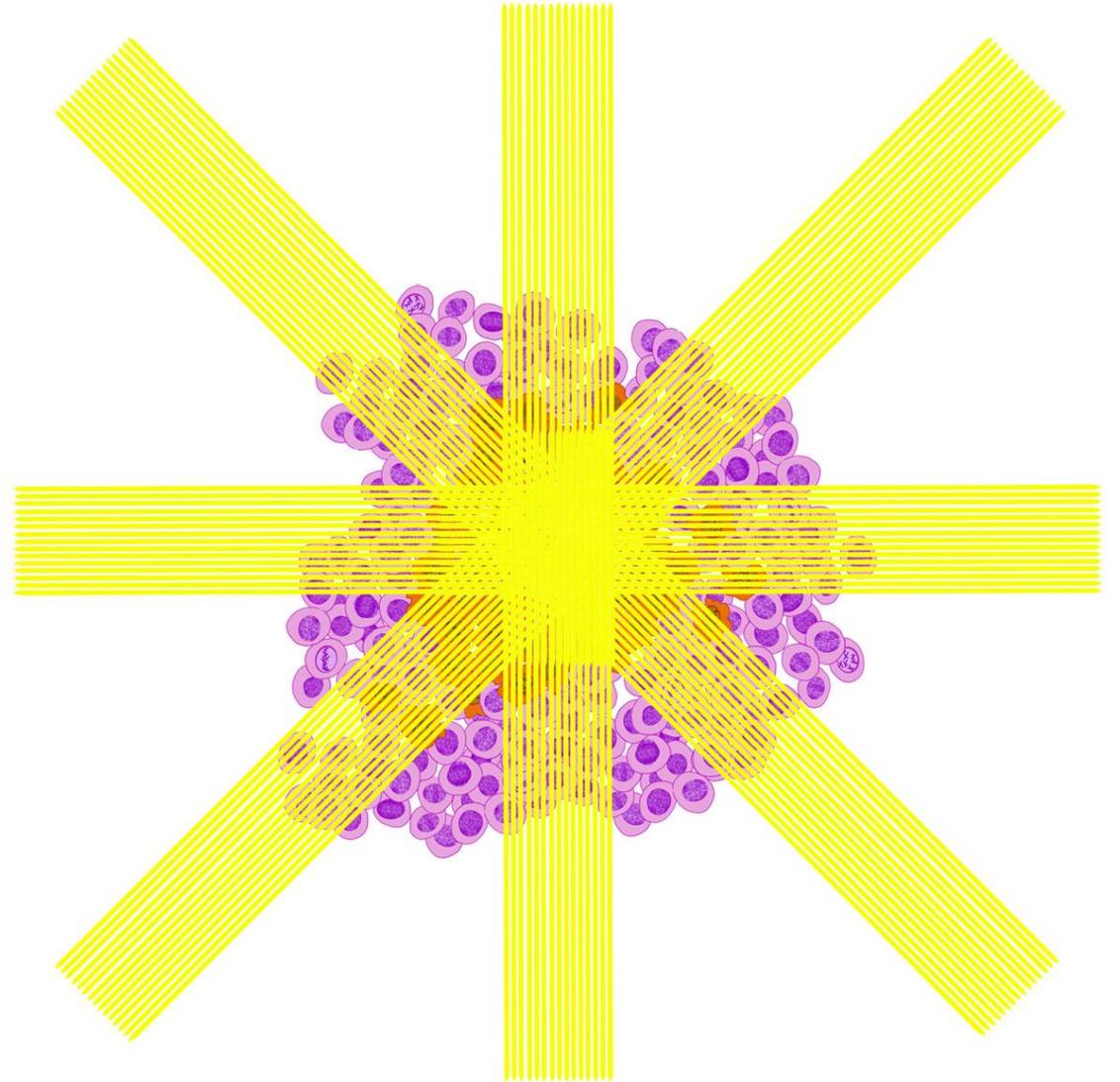
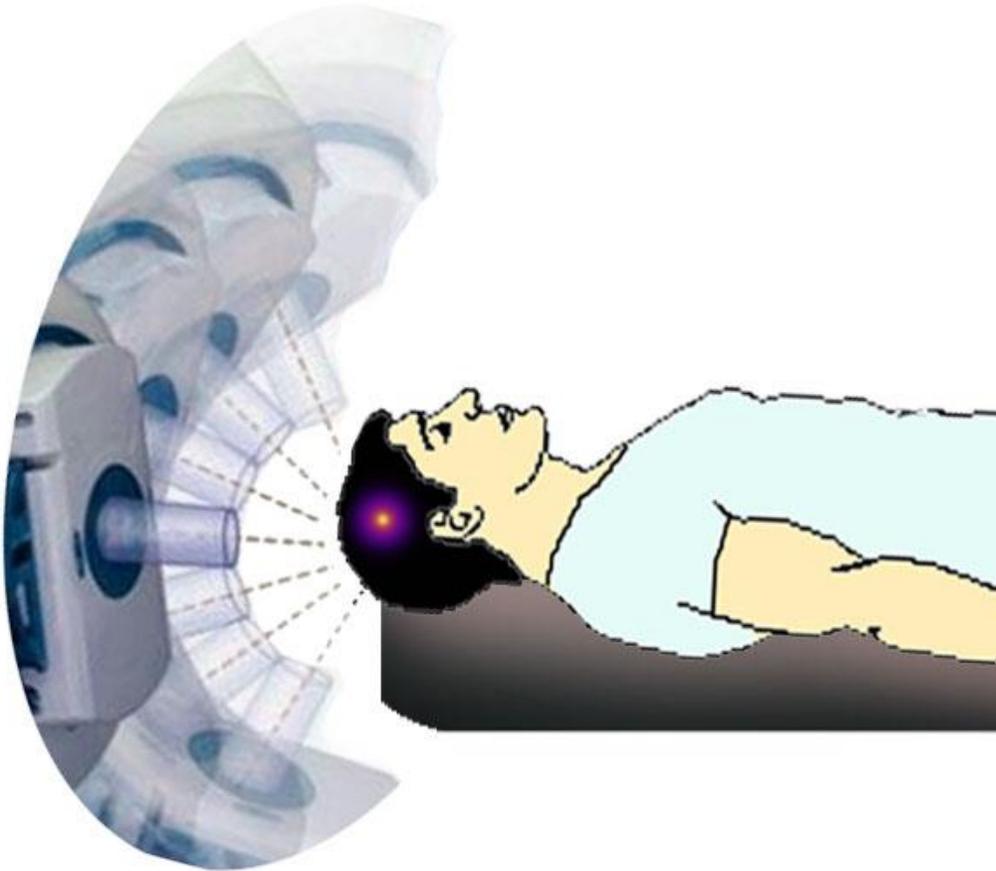


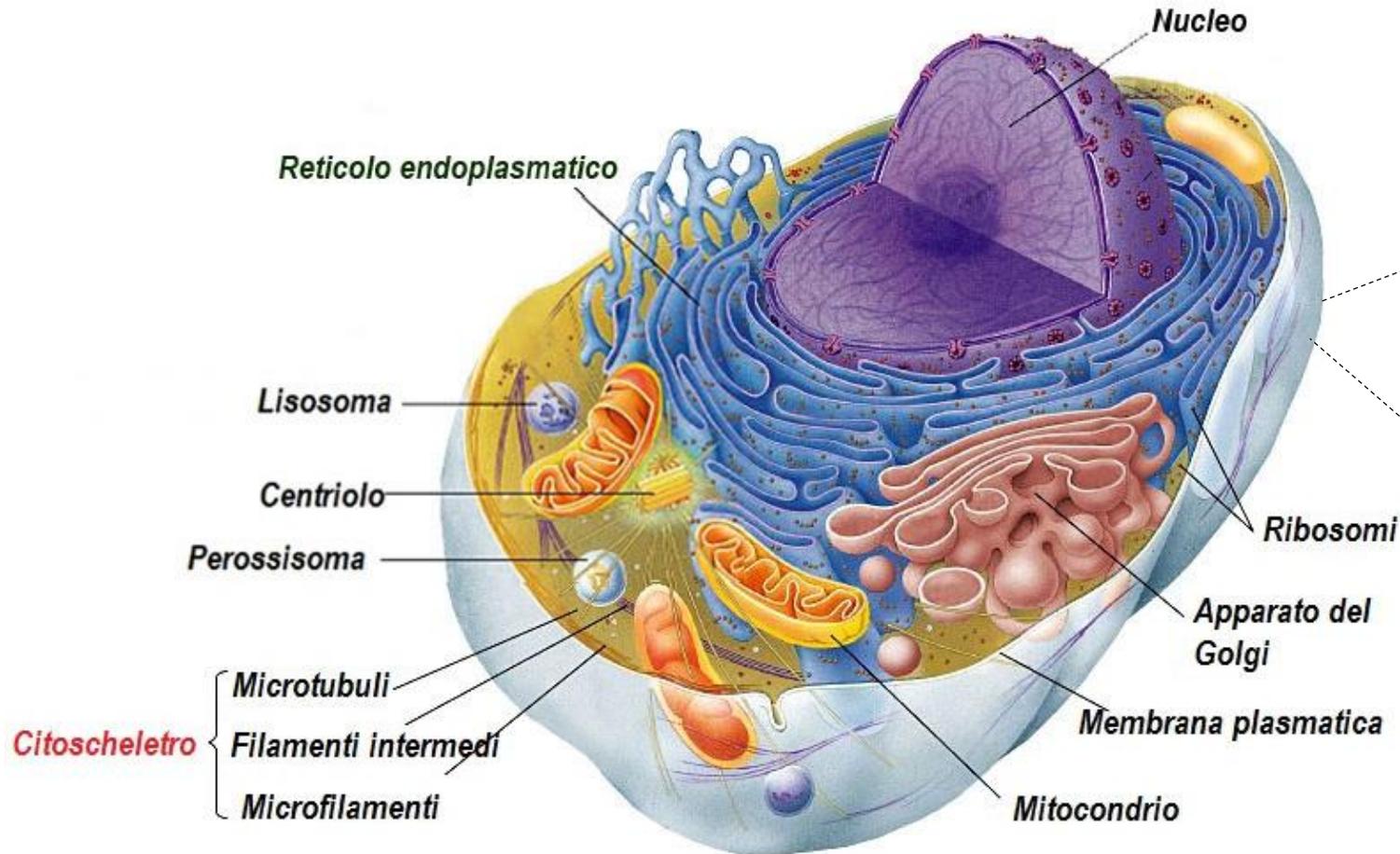
**Cellule
tumoriali**



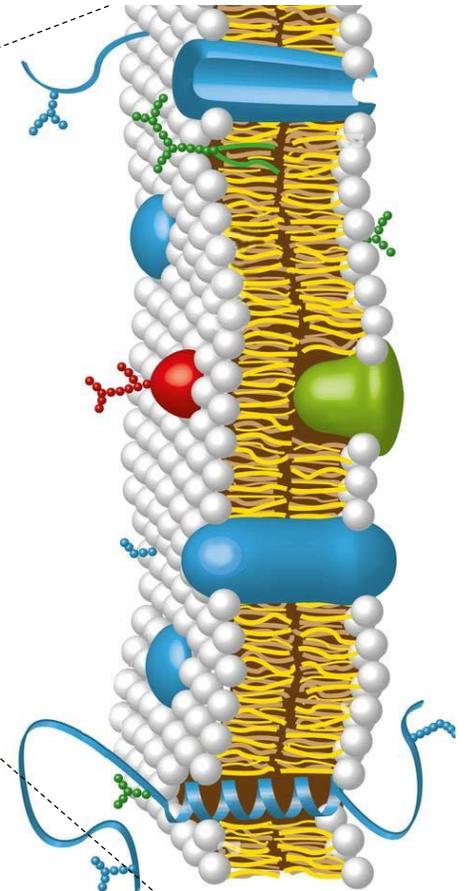


Radioterapia esterna



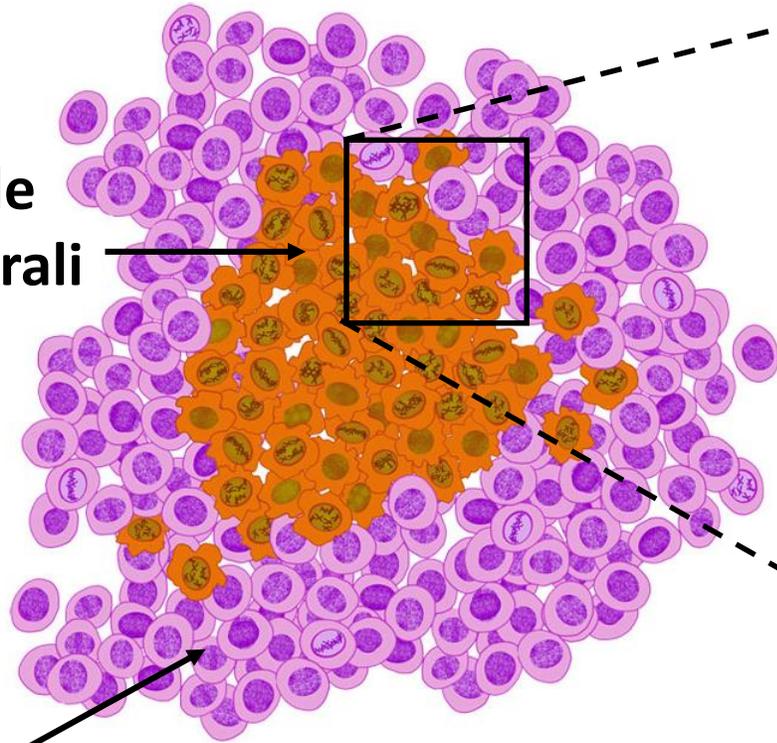


Membrana cellulare

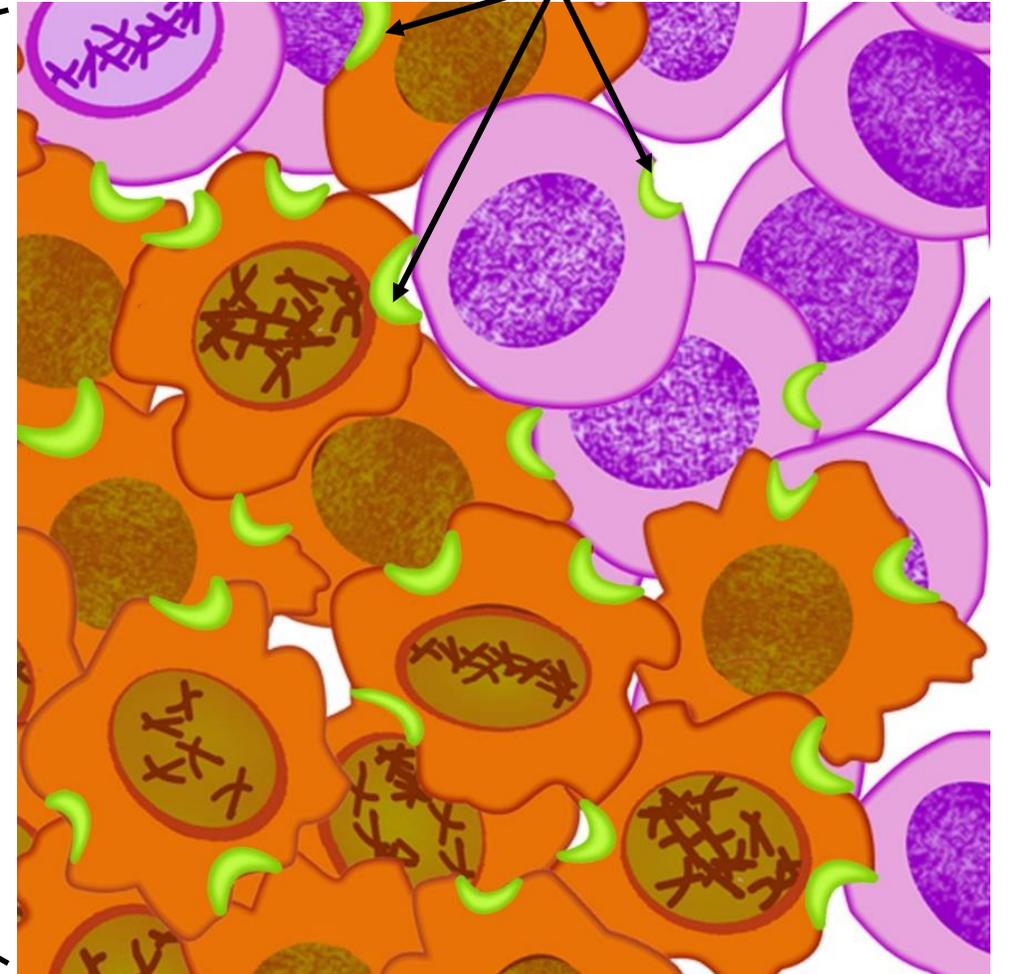


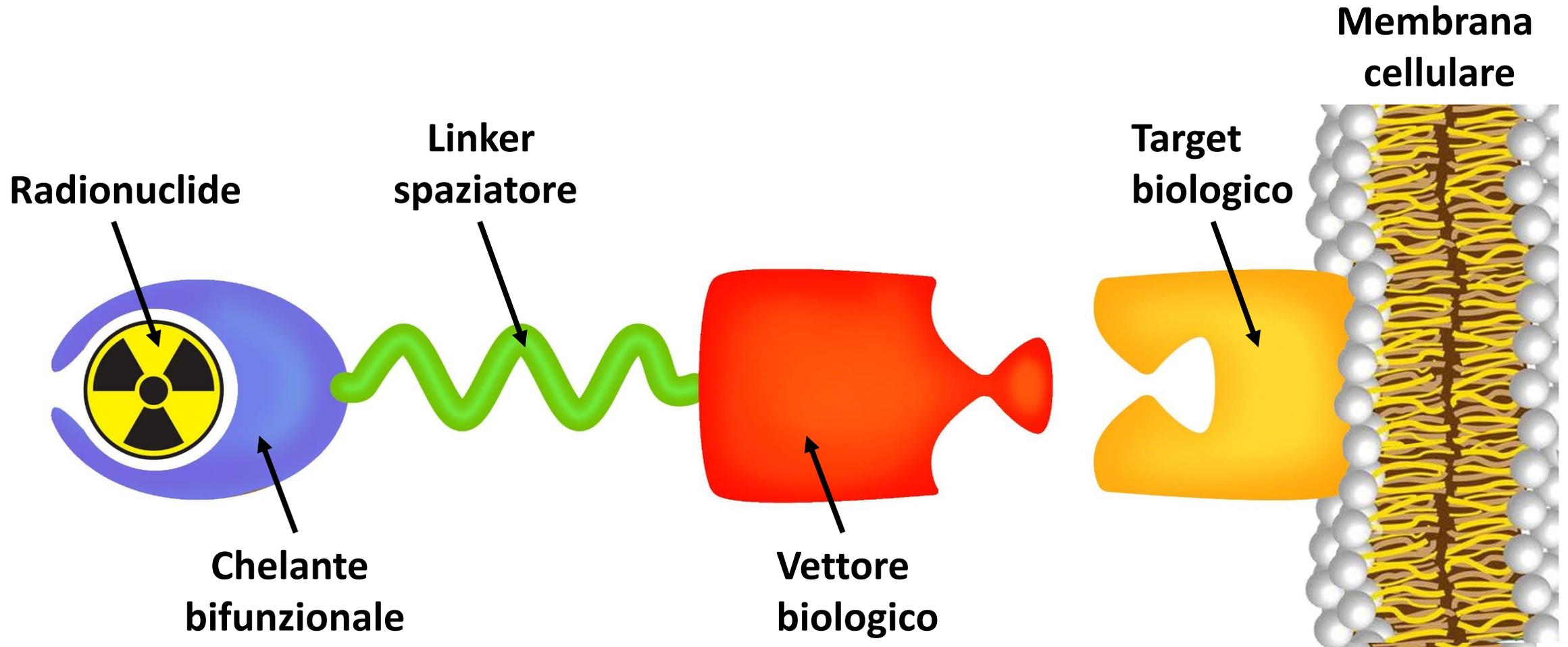
Cellule
tumoralì

Cellule sane

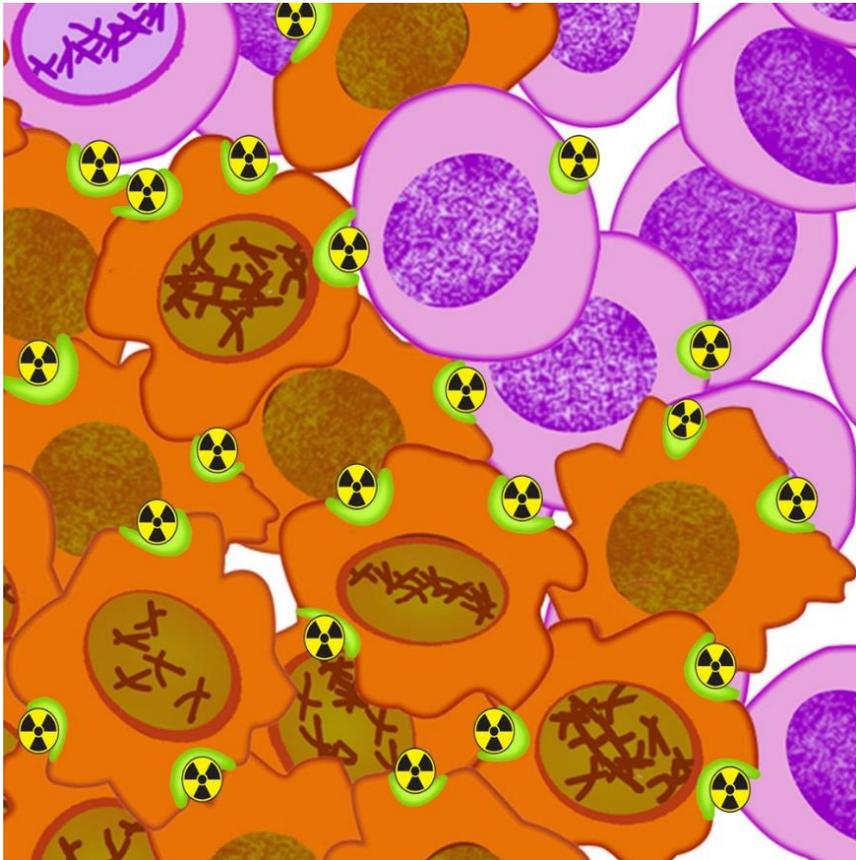


Ricettori cellulari

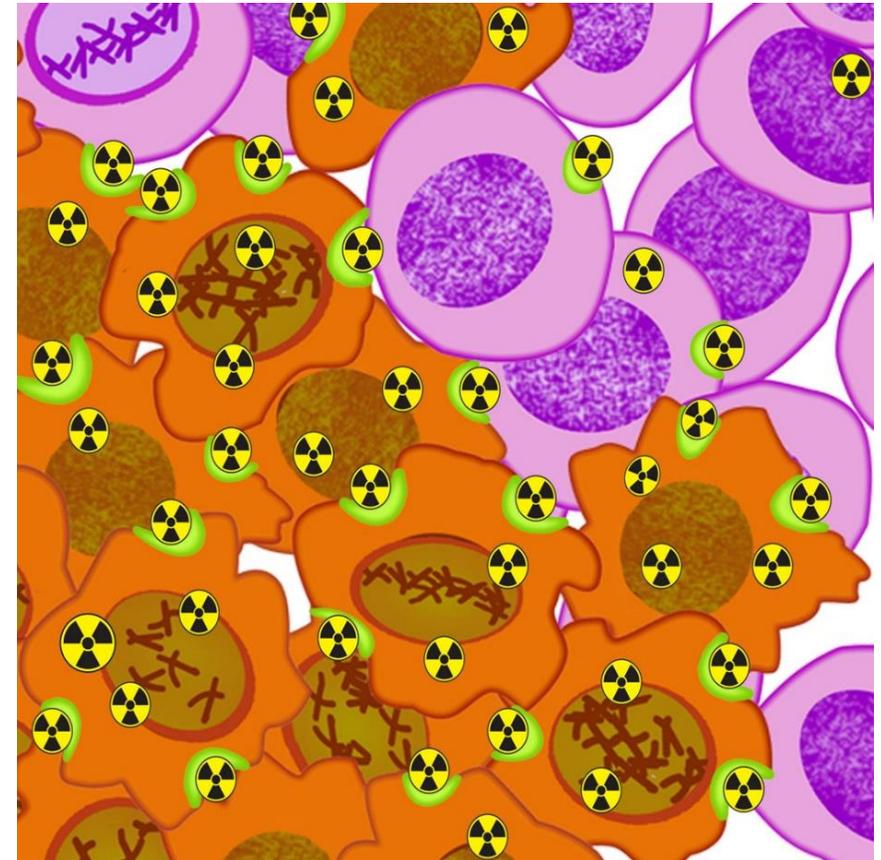




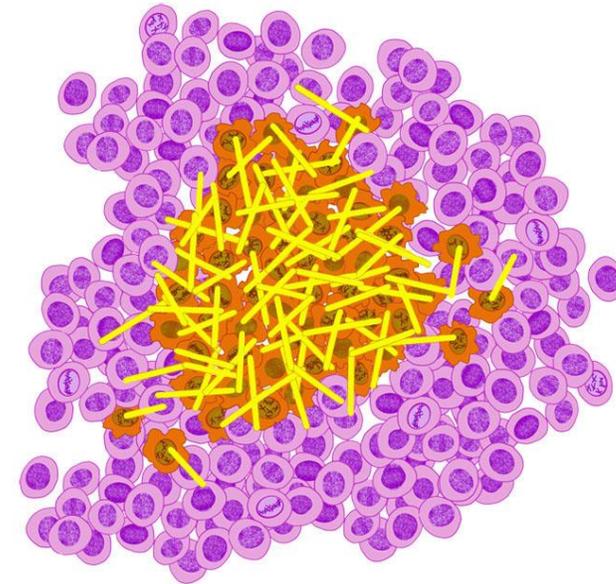
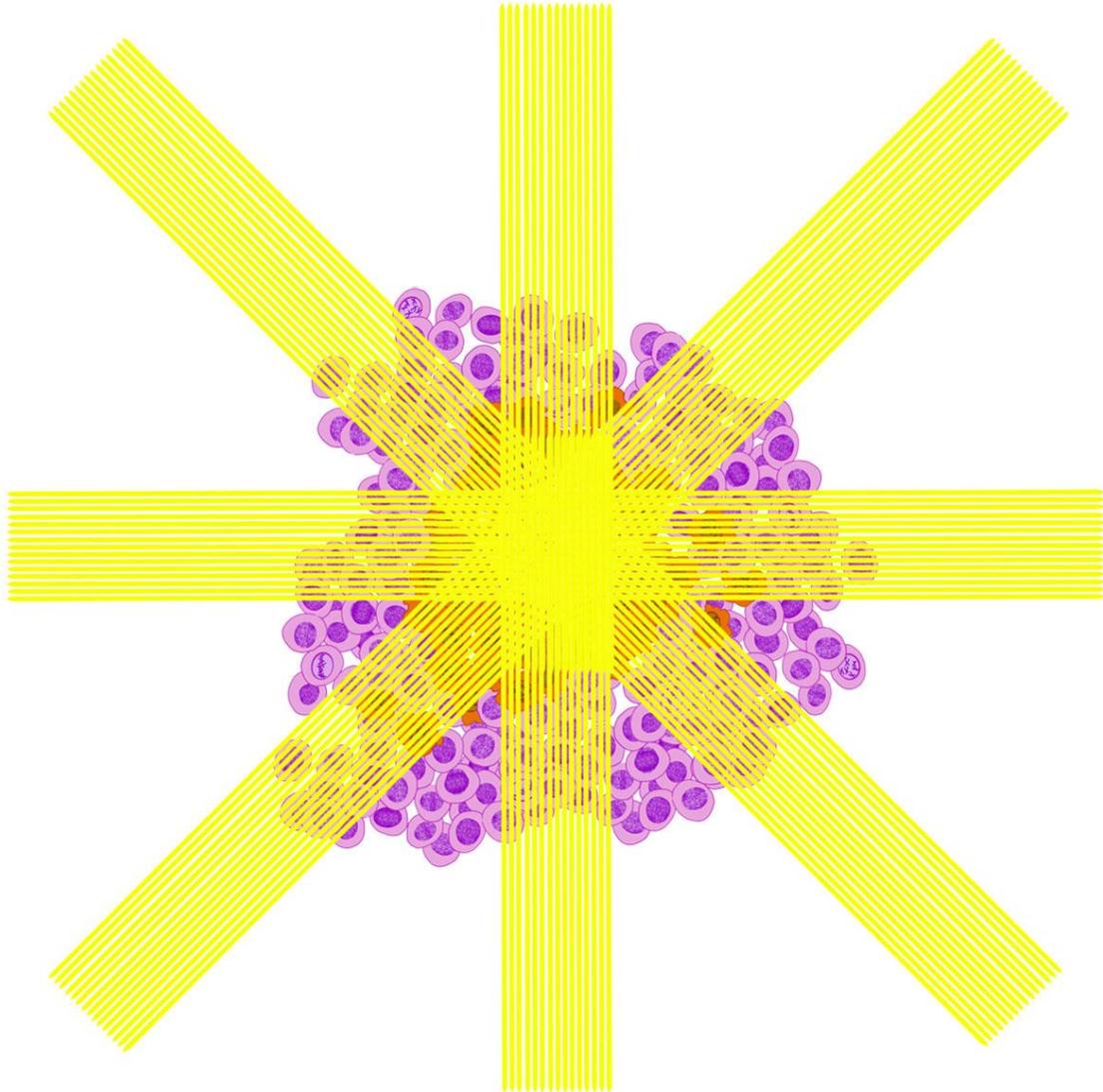
Radiofarmaco sulla superficie
cellulare



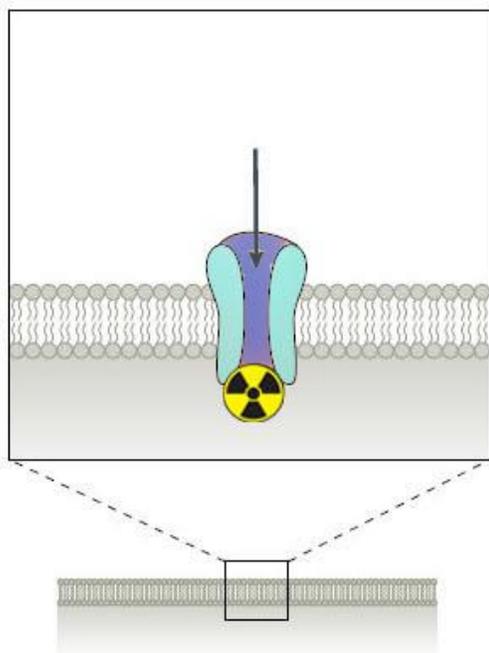
Internalizzazione del radiofarmaco
nelle cellule



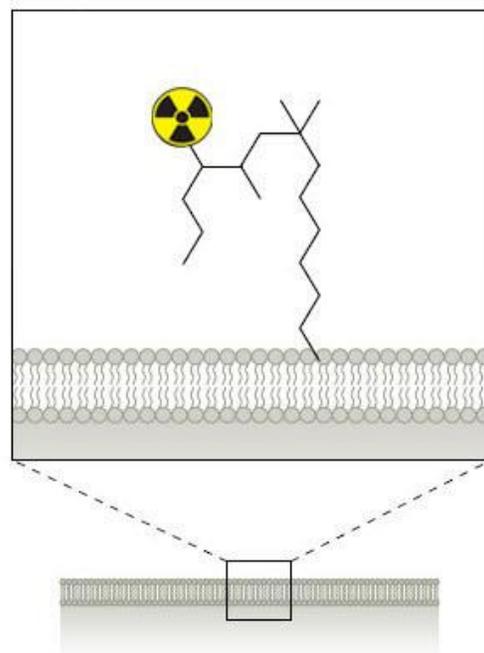
Radioterapia vs Endoradioterapia



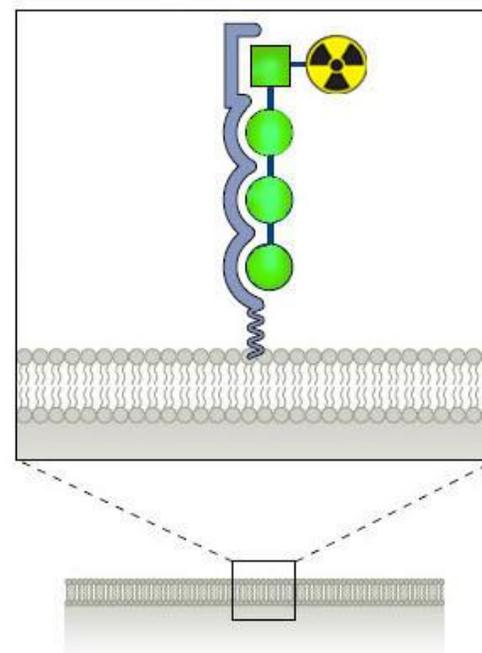
elemento radioattivo



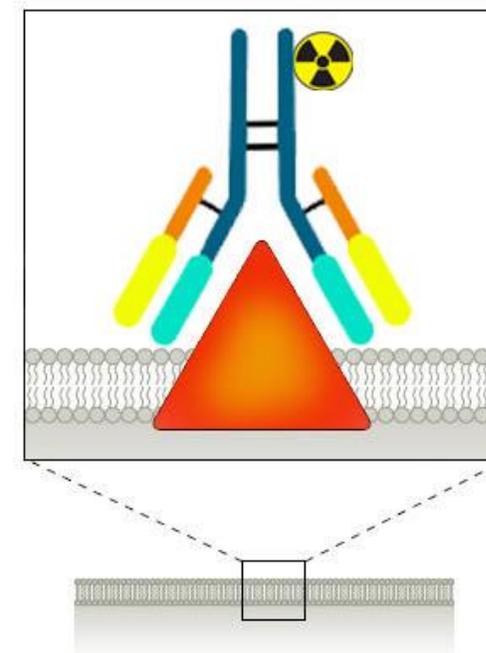
piccola molecola



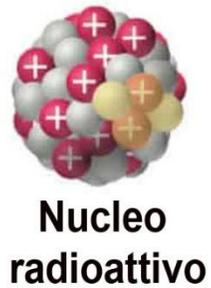
peptide



anticorpo



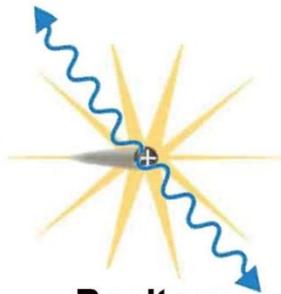
Particelle



Particella
alfa



Particella
beta

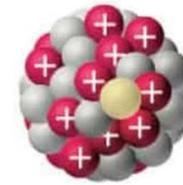


Positron

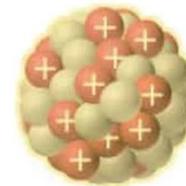
Radiazione elettromagnetica



Electrone

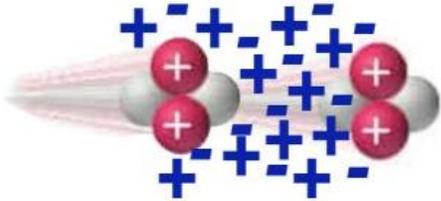


Raggi X

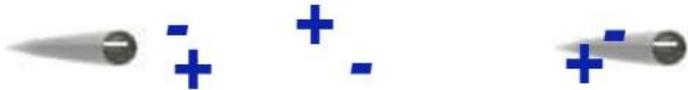


Raggi gamma

Particelle alfa



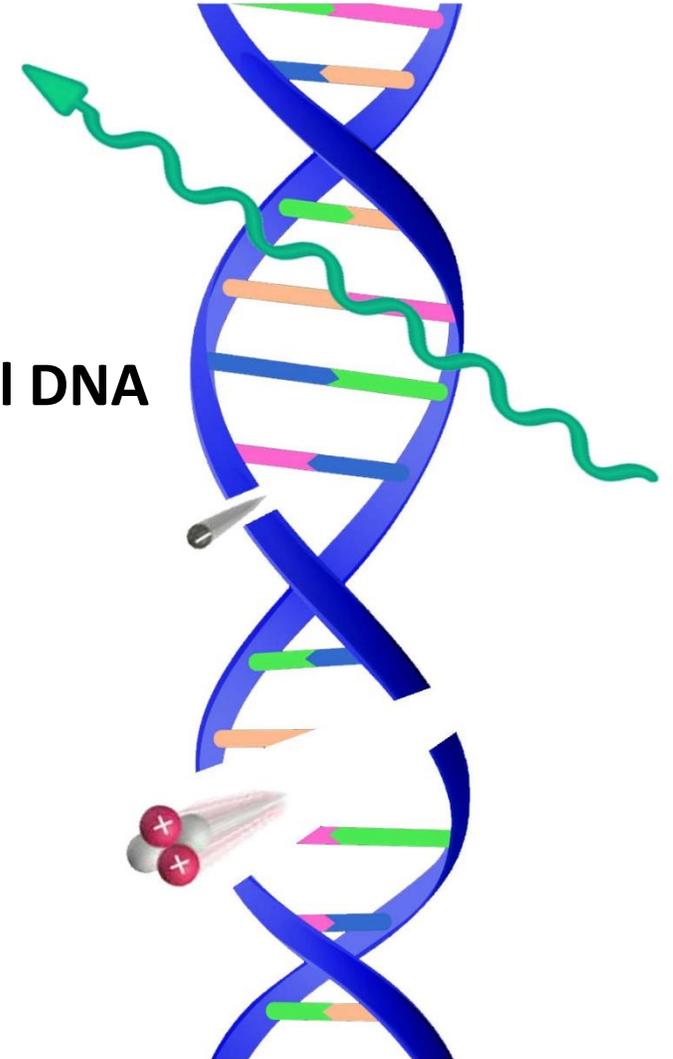
Particelle beta

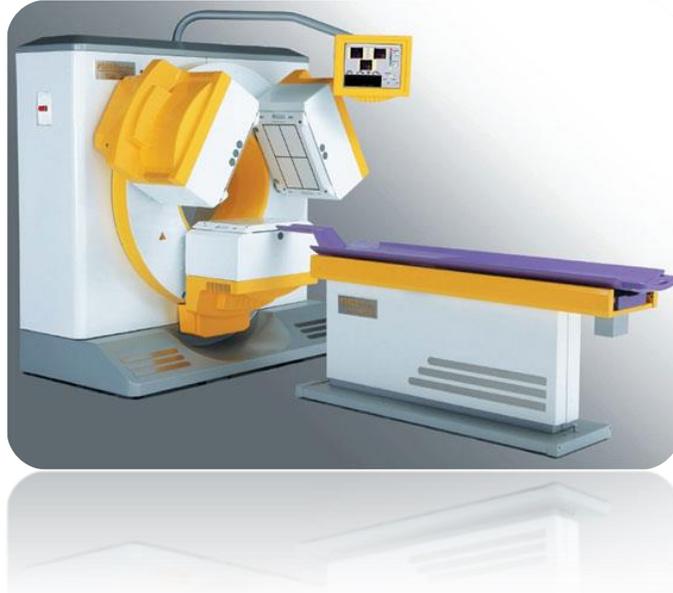
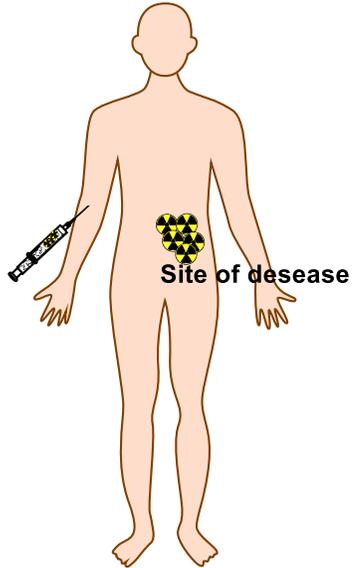


Raggi gamma

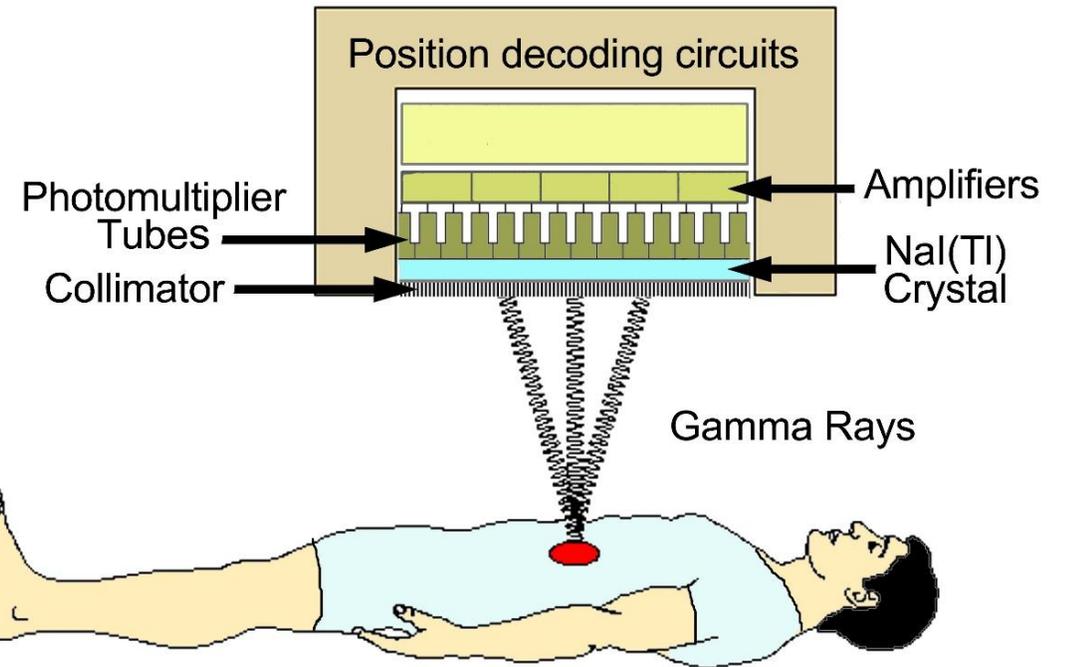


Danno al DNA





Tomografia computerizzata a emissione di singoli fotoni (SPECT)

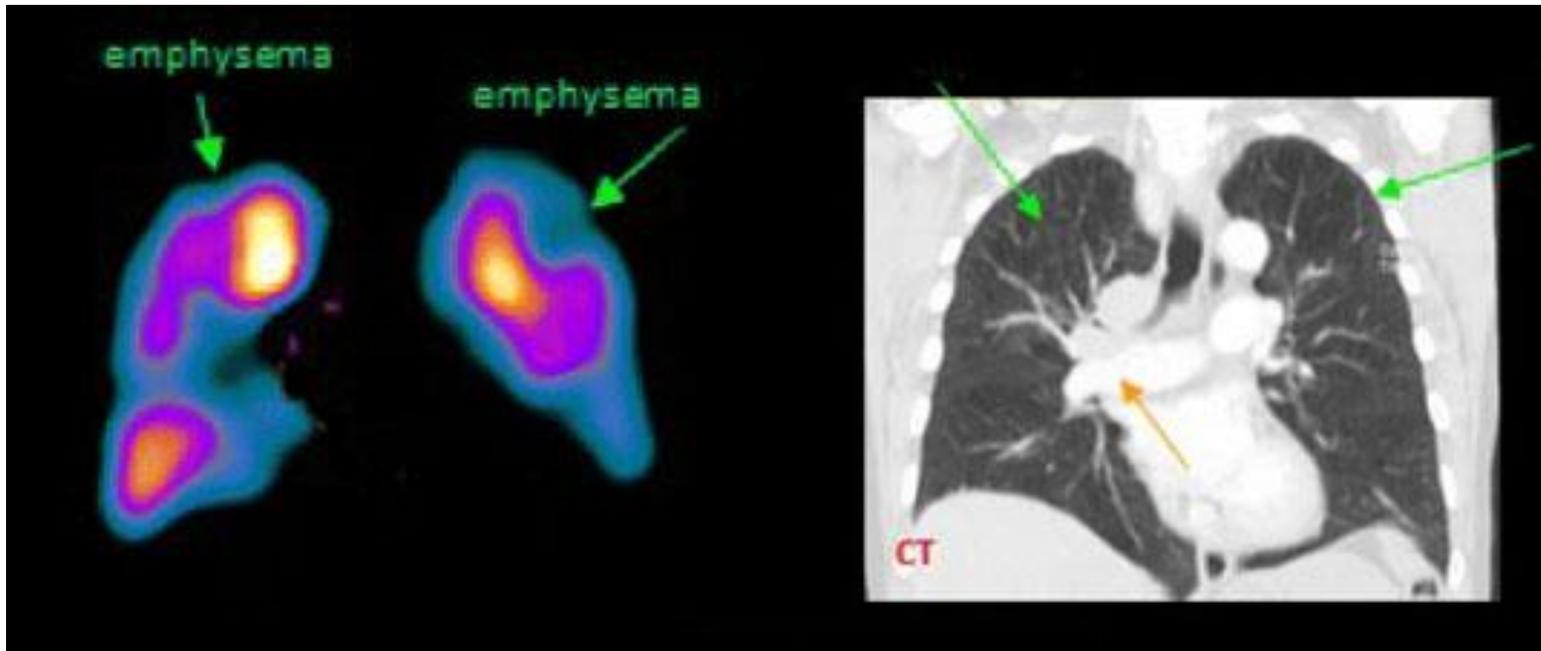


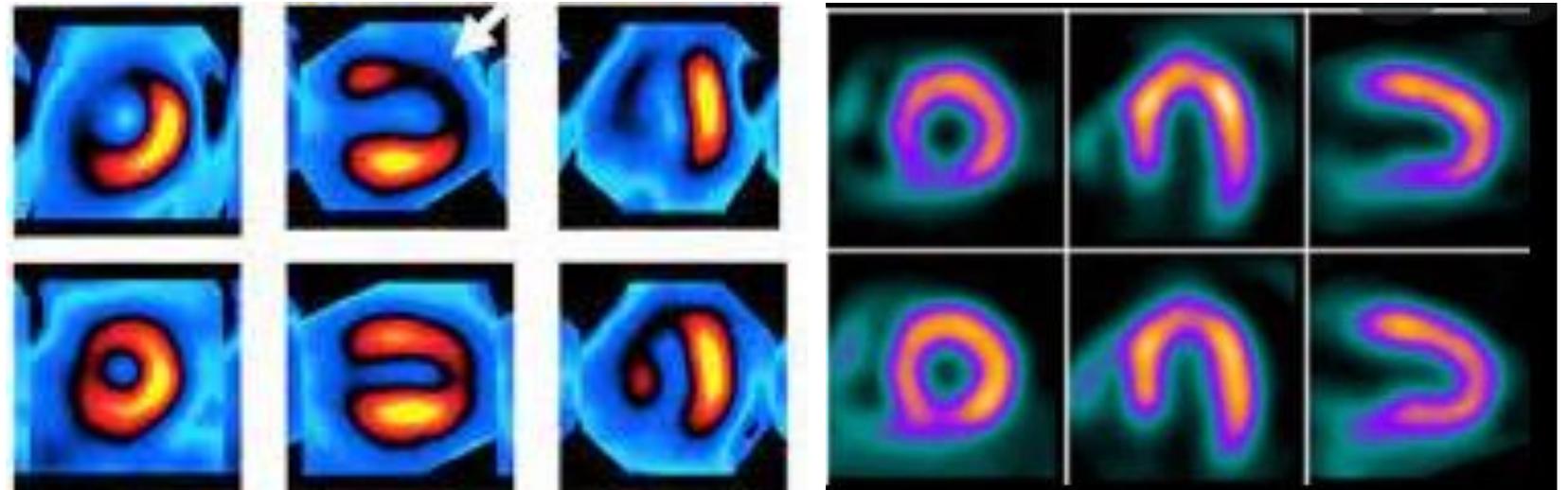
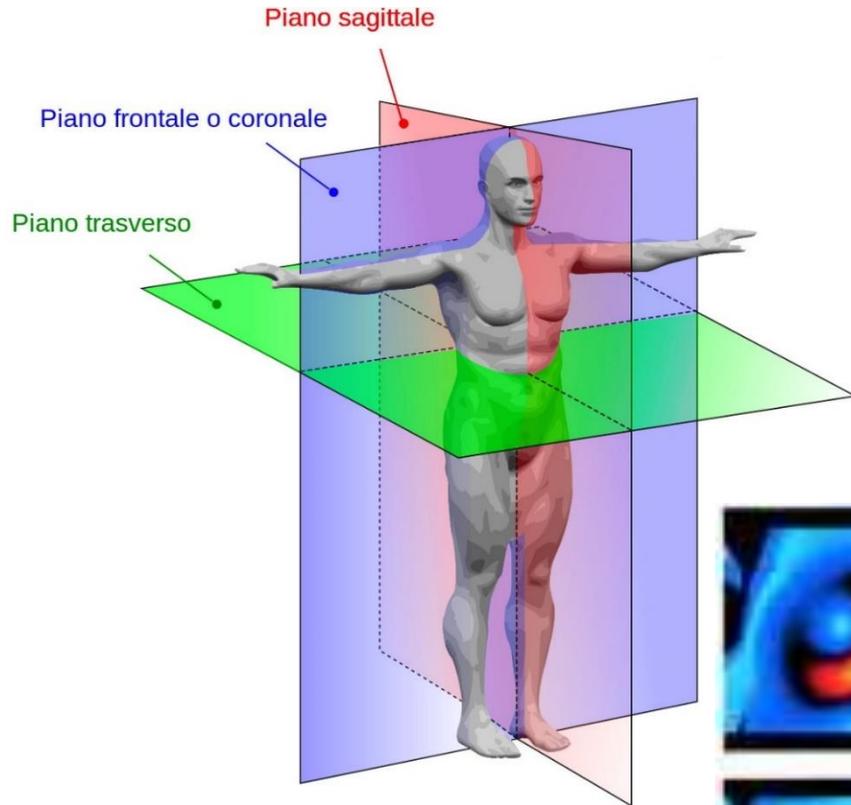
	$t_{1/2}$	Energia (keV)
^{99m}Tc	6 h	140
^{111}In	62h	170, 340
^{123}I	13 h	27, 159
^{201}Tl	73 h	130, 170
^{67}Ga	68 min	90, 180, 300

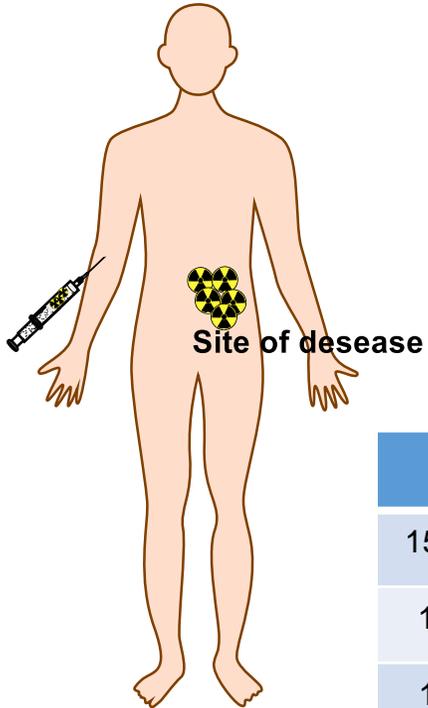
SPECT

Radionuclide più utilizzato per la diagnostica per immagini

- Emettore gamma puro
- Emivita breve (6.02 h)
- Versatilità chimica
- Bassa energia

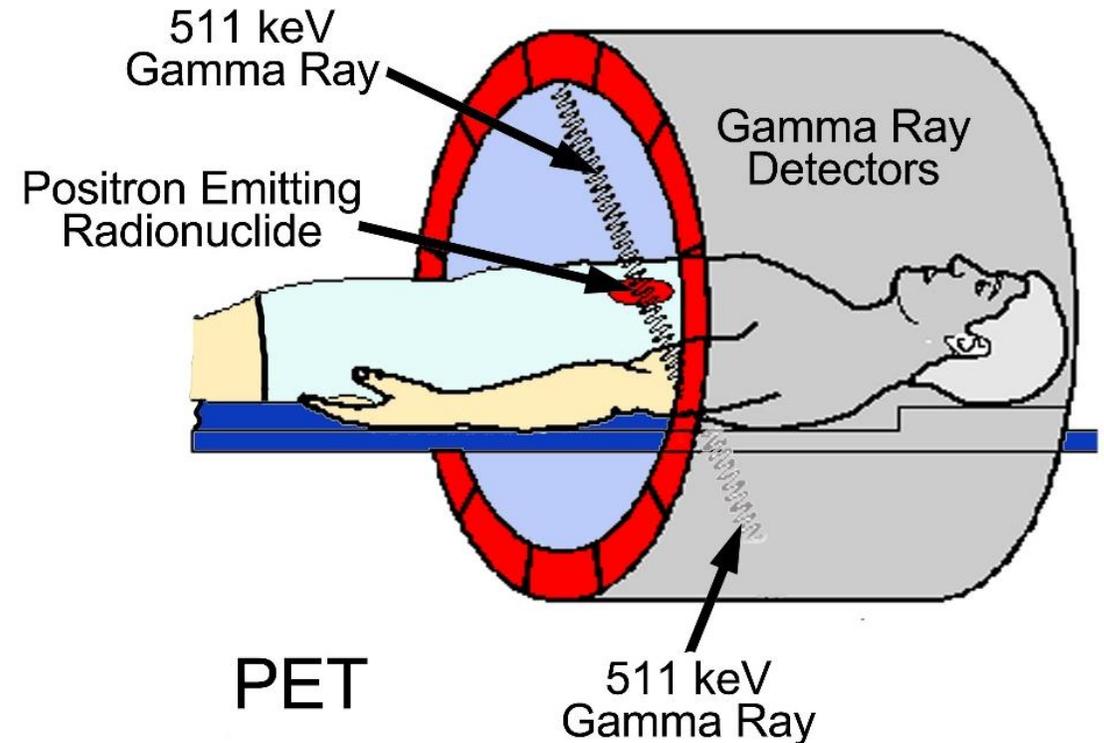




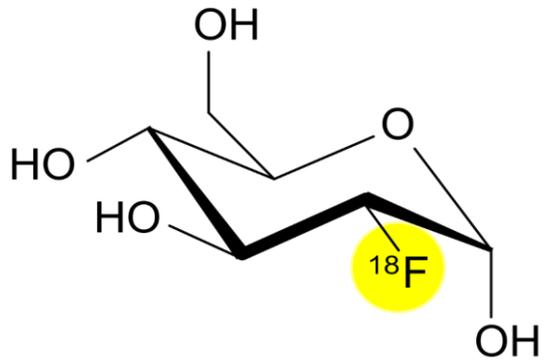


	$t_{1/2}$
^{15}O	2 min
^{13}N	10 min
^{11}C	20 min
^{68}Ga	68 min
^{18}F	110 min
^{64}Cu	12 h
^{89}Zr	78 h

Tomografia a emissione di positroni (PET)



Fluorodesossiglucosio (FDG)



Sano



tumore
intestinale

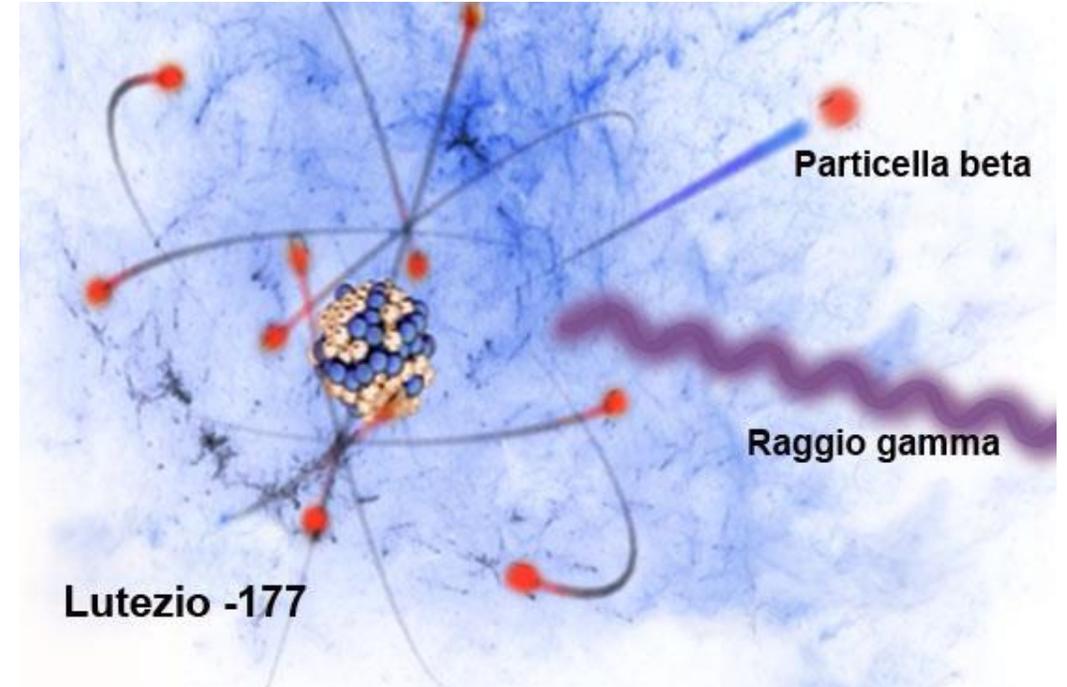


tumore
retroperitoneale



metastasi
ossee

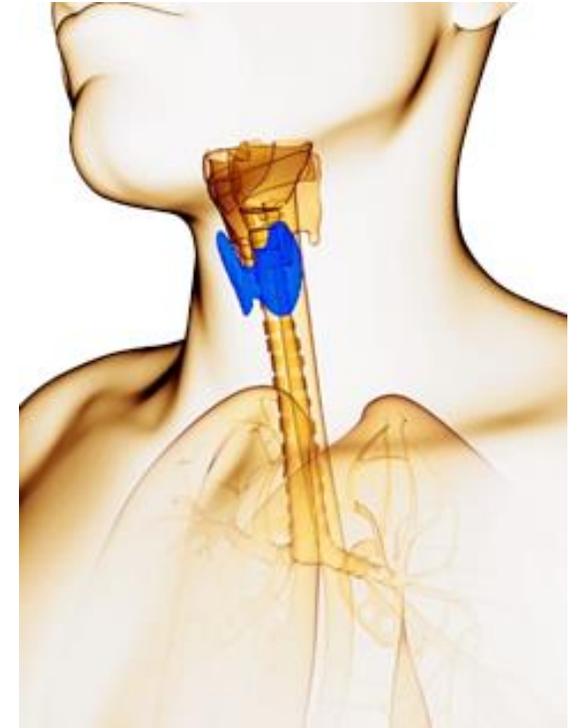
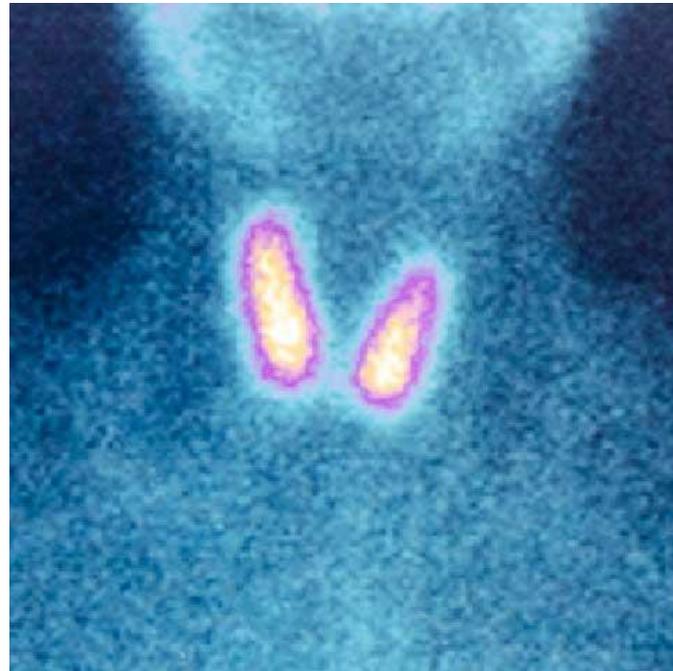
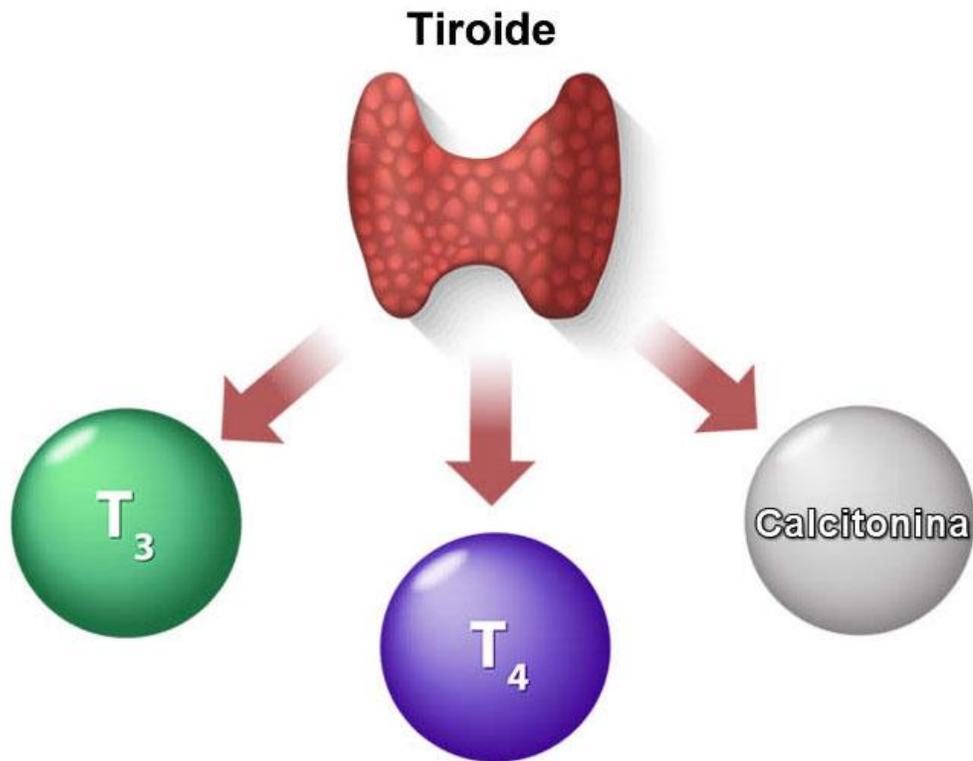




	$t_{1/2}$	Energia (keV)	Range (mm)
^{131}I	8 d	β^- (606), γ (365)	2.6 - 5
^{186}Re	3.7d	β^- (932,1069), γ (137)	7 - 12
^{188}Re	17 h	β^- (1965, 2120), γ (155)	23 - 32
^{177}Lu	6.7 d	β^- (490), γ (113), X (210)	1.2 - 3.0
^{67}Cu	2.6 d	β^- (377, 468), γ (185)	1.6 - 2.8

Primo radionuclide utilizzato in clinica (1941)

- Captazione selettiva nella tiroide
- β^- (970 keV) γ (365 keV)



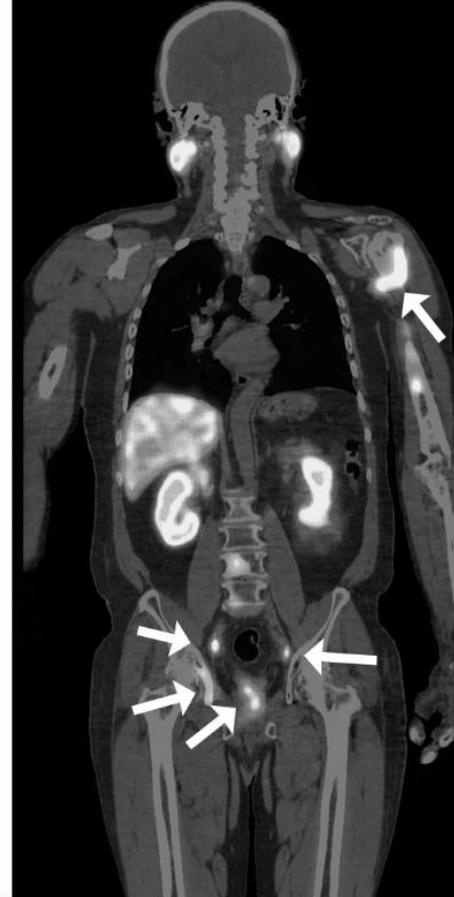
SPECT/CT



SPECT



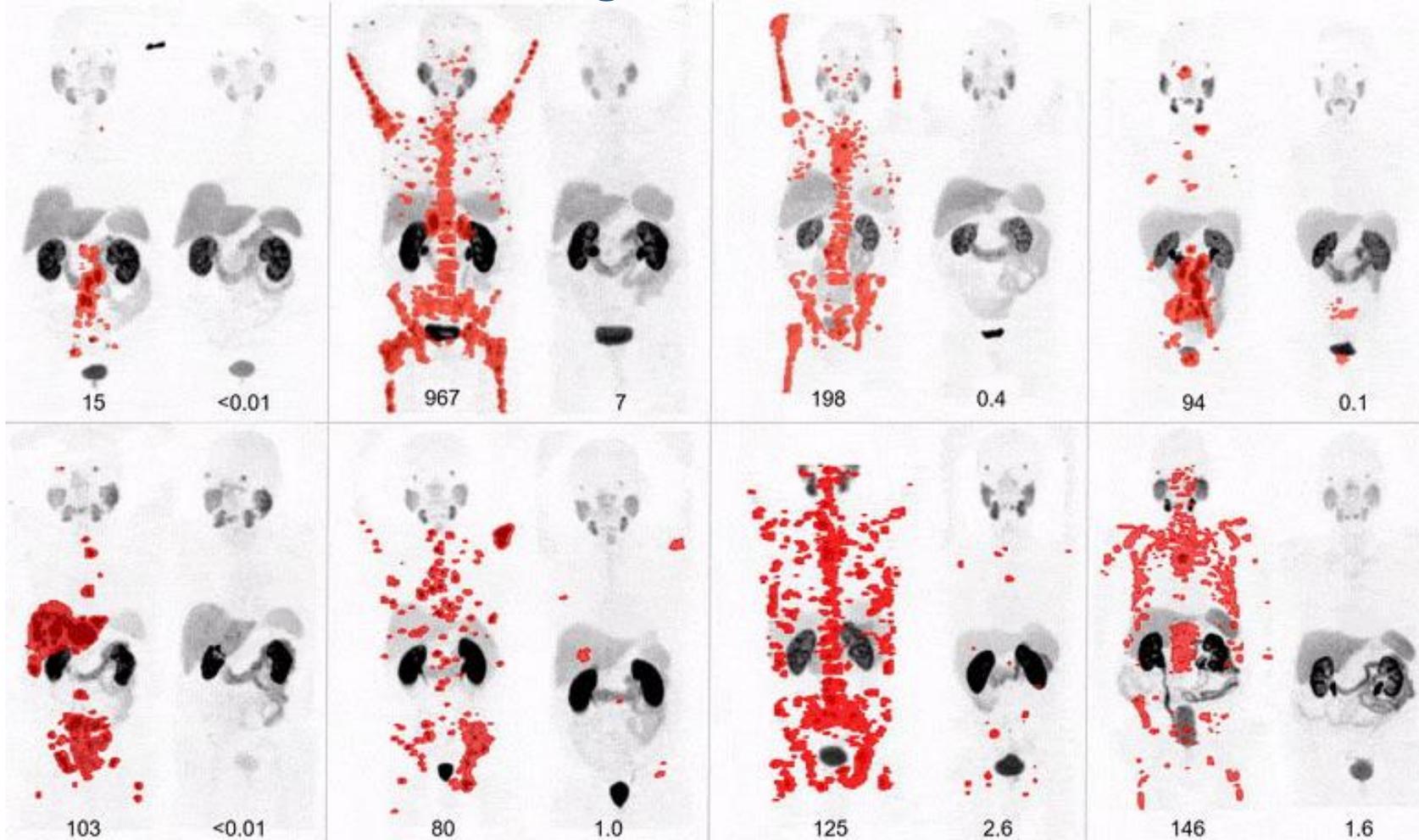
SPECT/CT



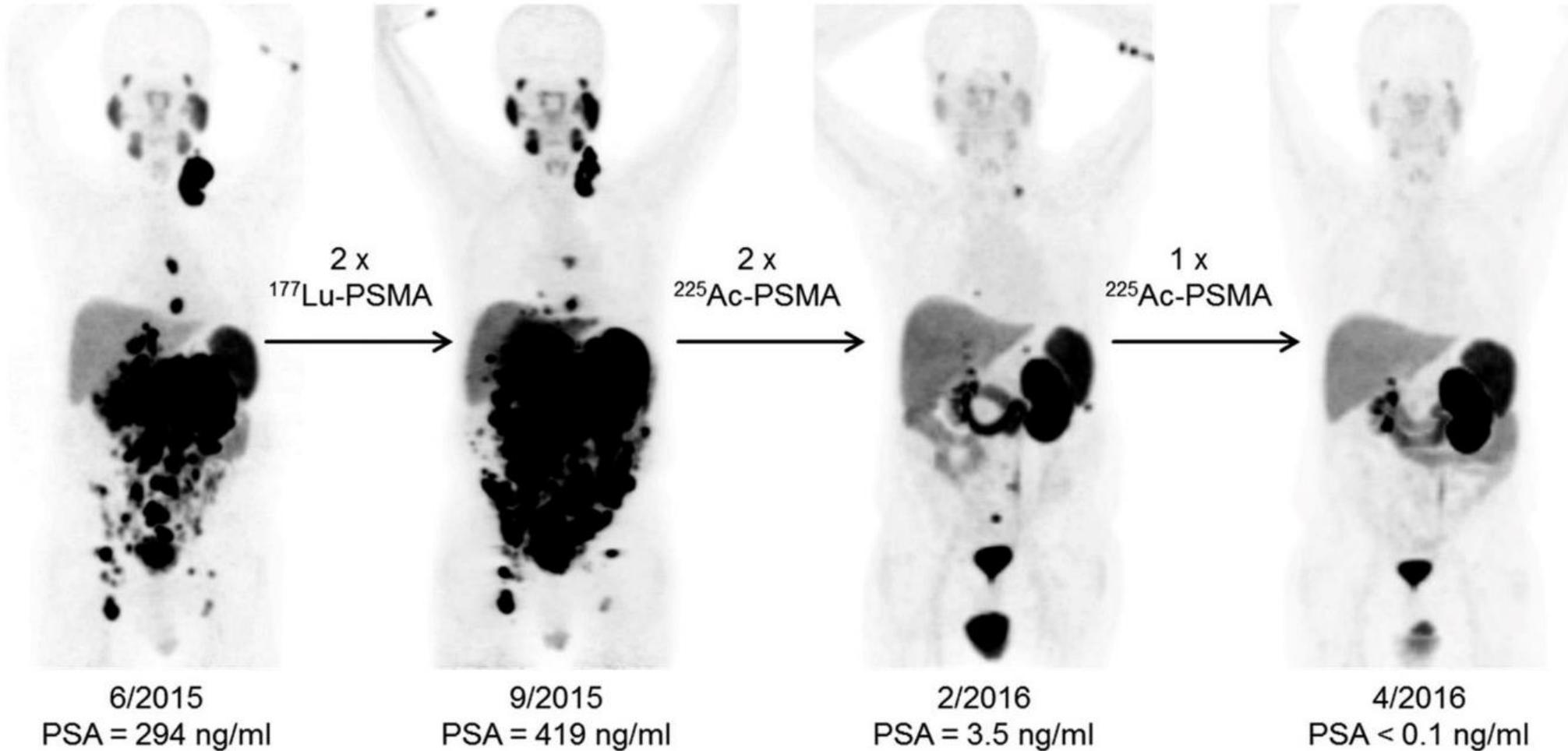
SPECT

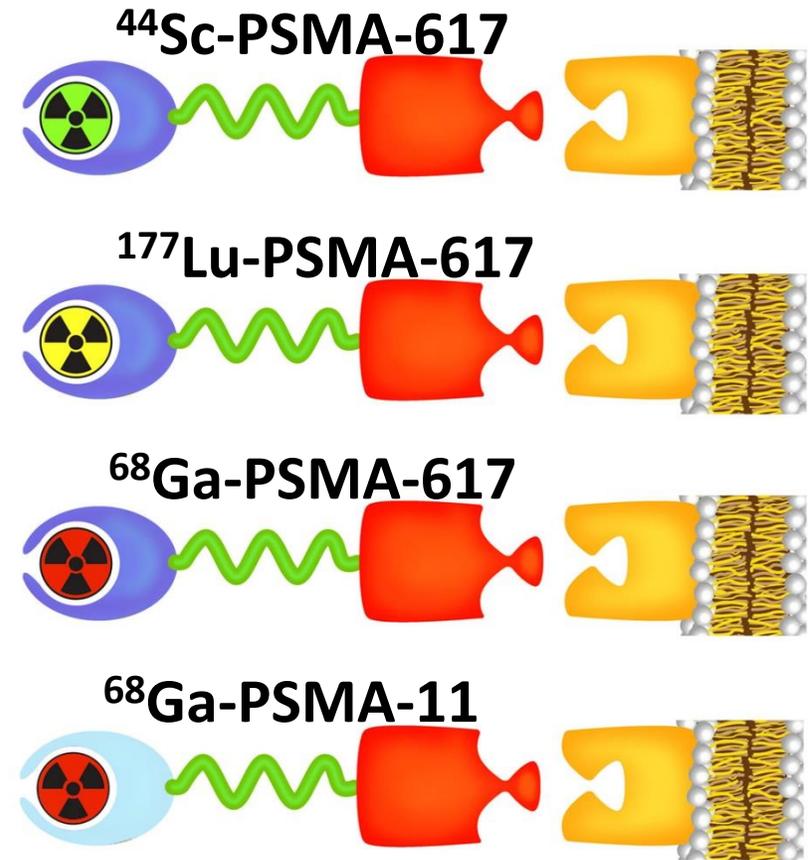
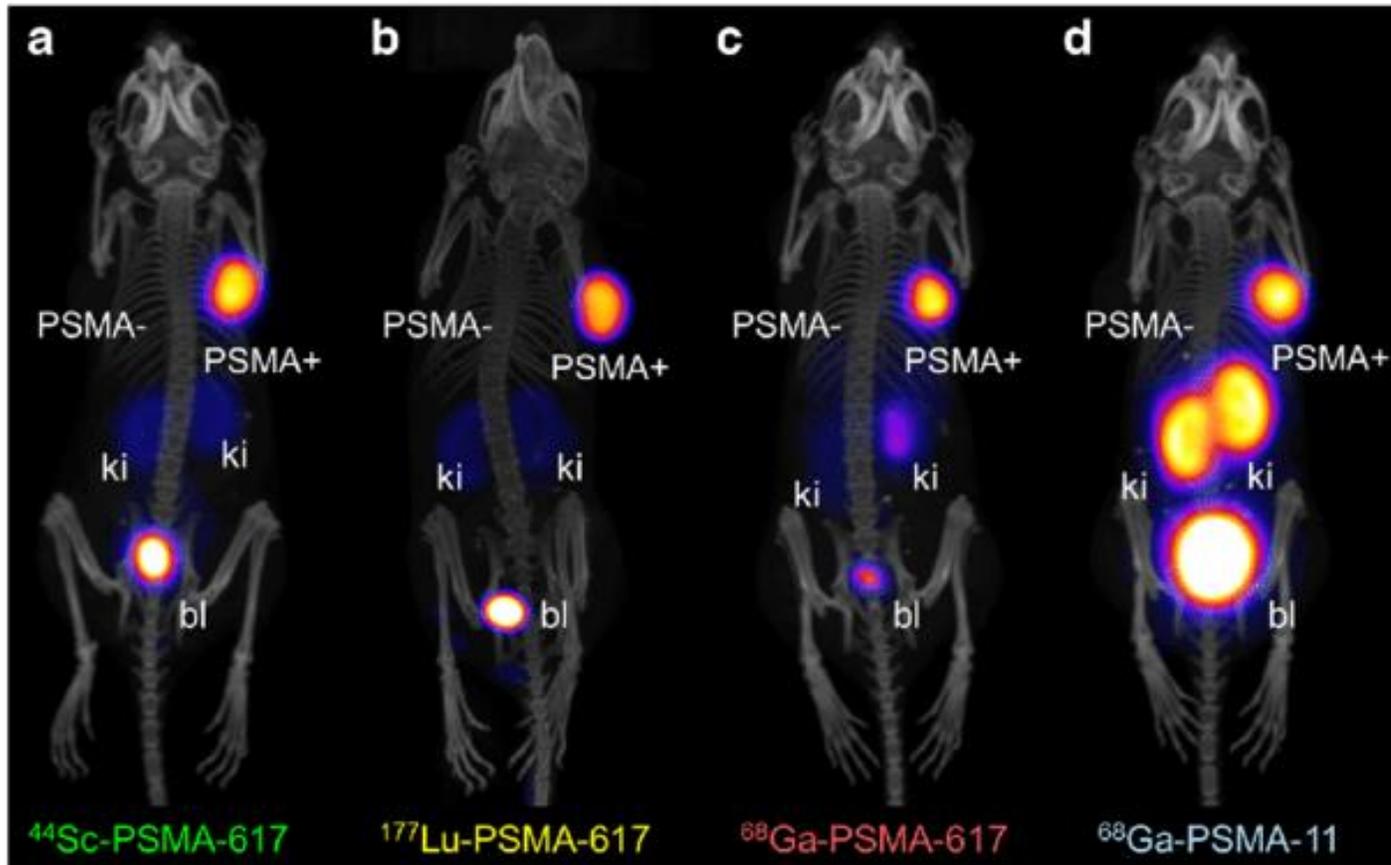


SNMMI Image of the Year 2018



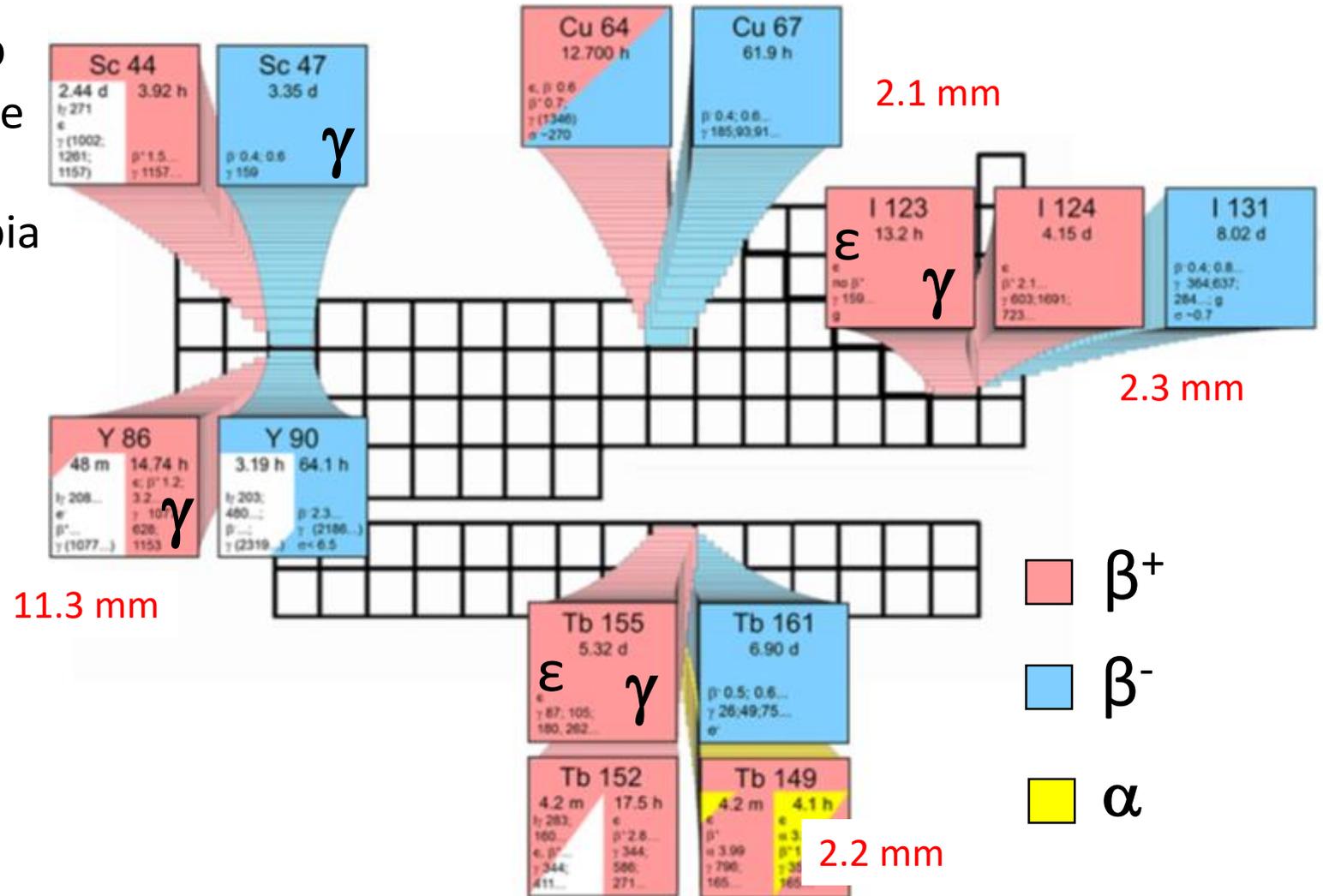
^{68}Ga -PSMA-11 PET prima della terapia e tre mesi dopo la somministrazione di ^{177}Lu -PSMA-617





Isotopi dello stesso elemento

- emettitore β^+ per un immagine ottima
- emettitore β^- or α per la terapia



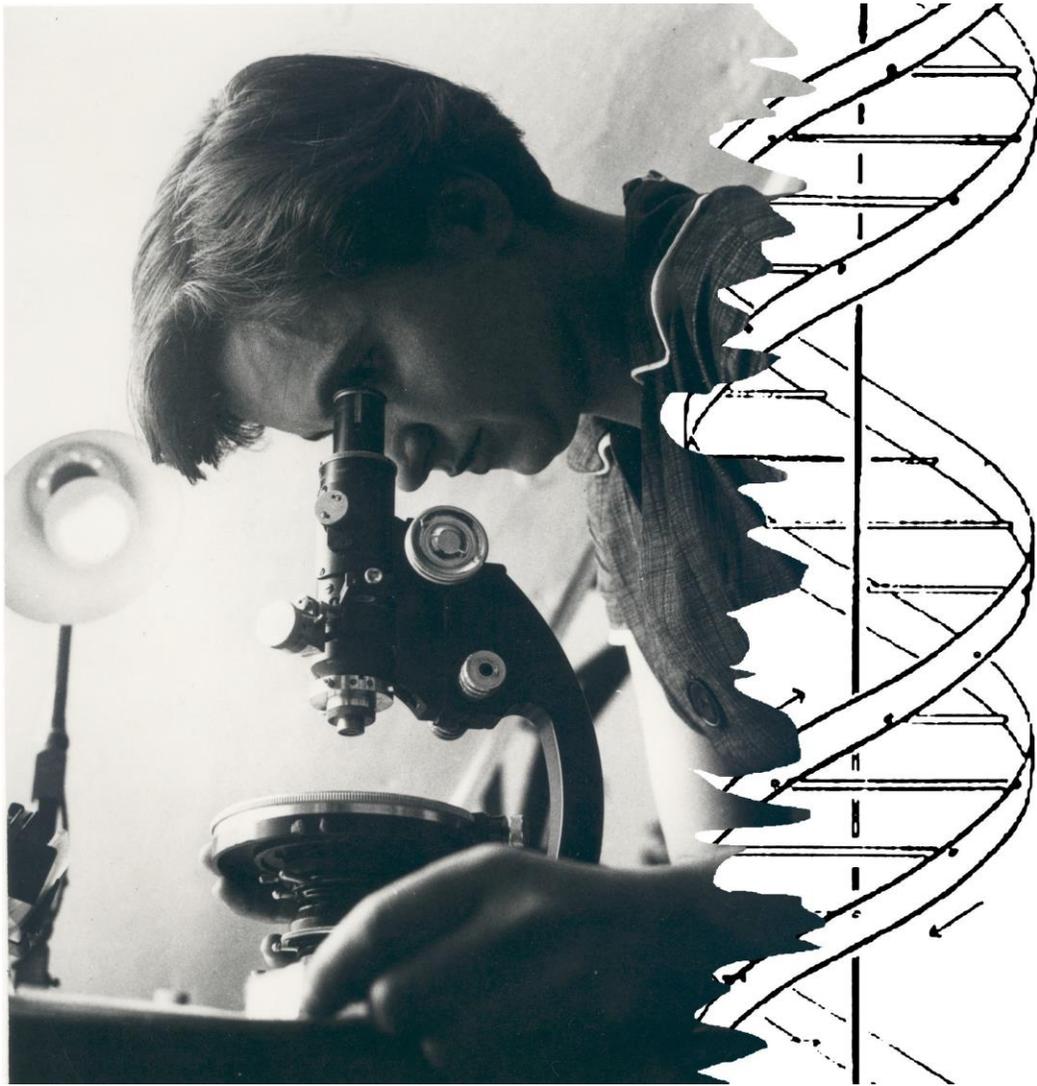
La terapia con radionuclidi è molto più efficace e causa meno danni ai tessuti sani rispetto alla radioterapia esterna.

Chimico-Biologico:

sviluppare nuovi complessi che si congiungano ai recettori presenti nelle membrane delle cellule tumorali e siano rapidamente eliminati dal tessuto sano

Fisico:

sviluppare nuove tecnologie per la produzione di coppie teranostiche reali come radioisotopi dello stesso elemento che emettano positroni e particelle alfa o beta.



Grazie per la
vostra
attenzione