

**HOSPITAL UNIVERSITÁRIO DE BRASÍLIA – HUB/EBSERH**  
**Unidade de Diagnósticos Especializados – UDE**  
**Capacitação em Medicina Nuclear**

**EBSERH**

HOSPITAIS UNIVERSITÁRIOS FEDERAIS

Protocolos do preparo e Procedimentos do uso de radiofármacos para cintilografia de perfusão do miocárdio (MIBI), cintilografia óssea (MDP), renal (DMSA/DTPA), sangramento oculto com hemácias marcadas (PIROFOSFATO), cintilografia pulmonar (MAA), cintilografia do fígado e baço (Estanho Coloidal), cintilografia das vias biliares (DISIDA), avaliação de Refluxo Gastresofágico, Linfocintilografia (FITATO), cintilografia de perfusão cerebral (TRODAT / ECD), cistocintilografia direta, dacriocintilografia, Divertículo de Meckel, cintilografia das glândulas salivares e protocolo do uso de Tecnécio Metaestável Livre para aquisição de imagens em medicina nuclear.



Instrutor: **HUGO TOSTA**  
CRF-DF: 5597 / SIAPE 2085135

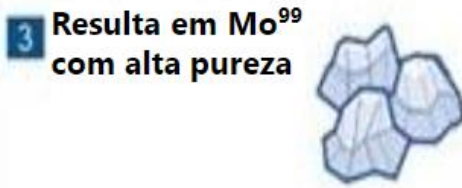
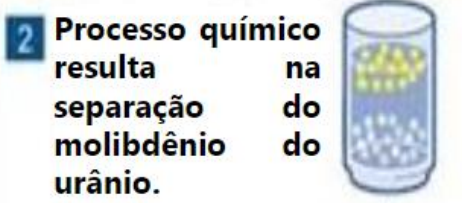
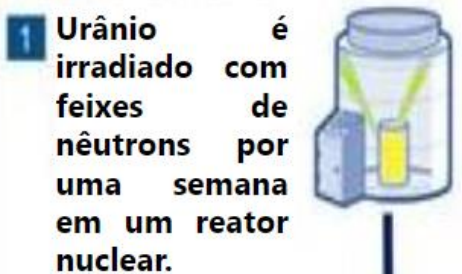
Brasília, 2022.

# USO DE ISOTOPOS RADIOATIVOS NA MEDICINA NUCLEAR

**Mo99**

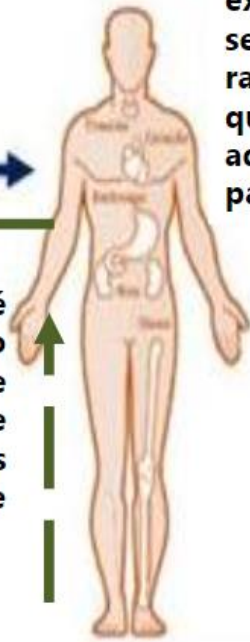
Usado há mais de 50 anos

Única aplicação descrita para o Mo99 é a geração do Tc99m

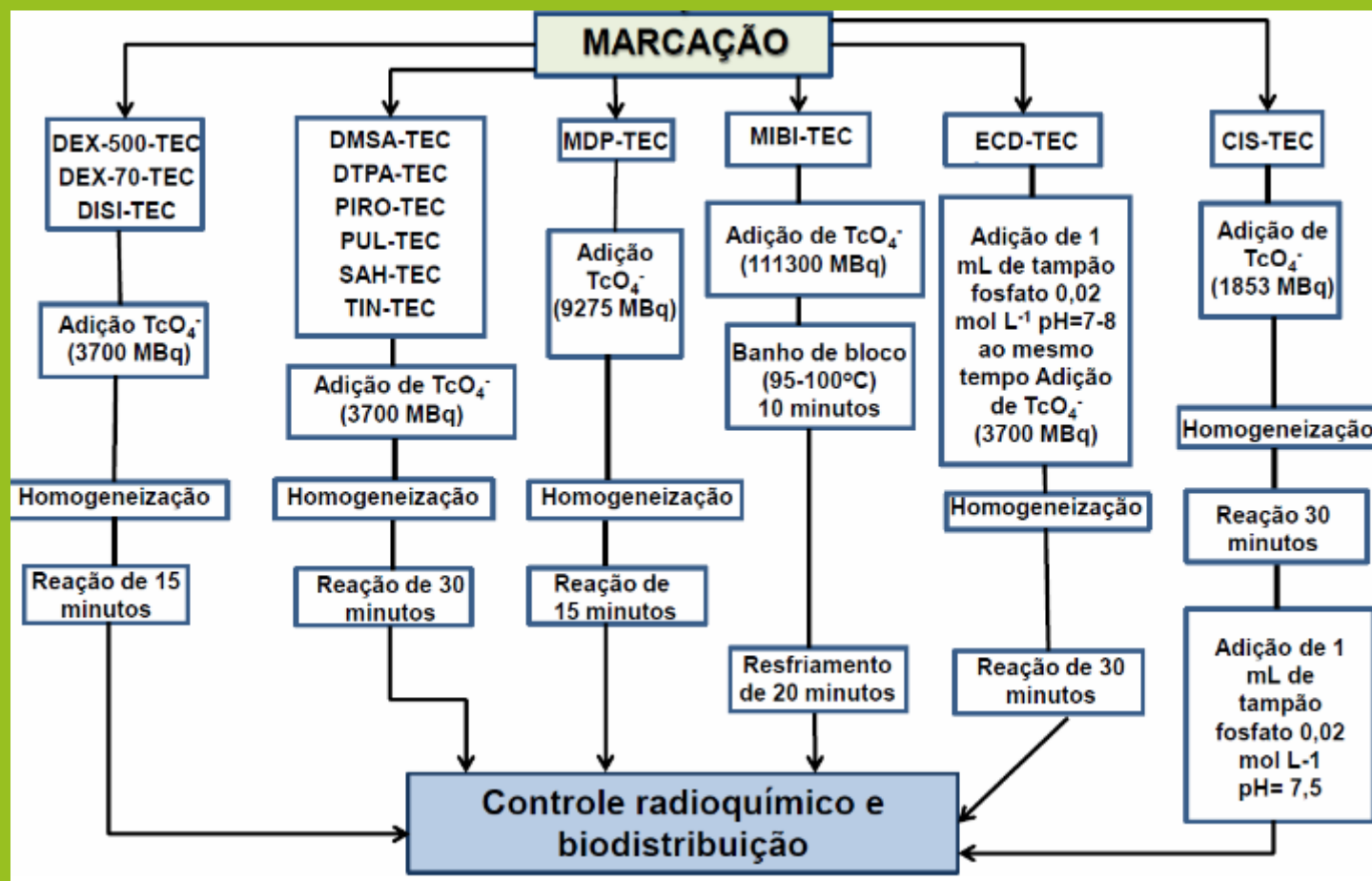


No serviço, sempre que necessário é realizada a eluição do gerador, processo que resulta na separação do "radionuclídeo pai" (<sup>99</sup>Mo) do "radionuclídeo filho" (<sup>99m</sup>Tc)

6 <sup>99m</sup>Tc é marcado com fármaco que possui afinidade com o órgão de interesse para o exame, passando a ser chamado de radiofármaco, o qual deverá ser administrado ao paciente



## Introdução à Radiofarmácia

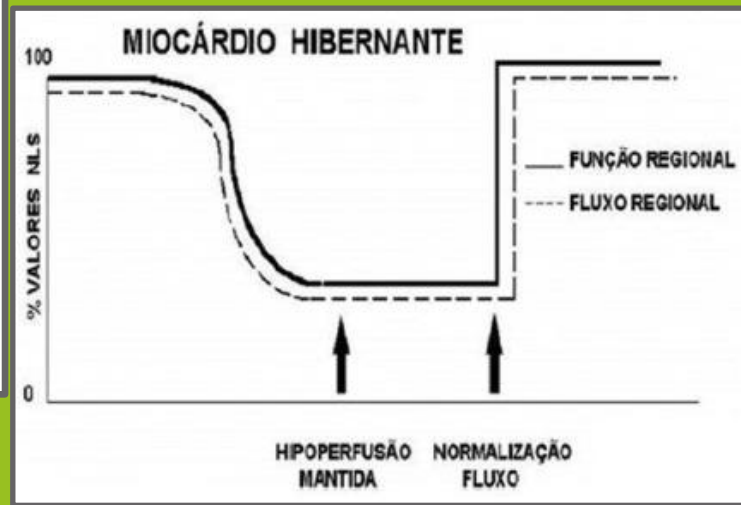
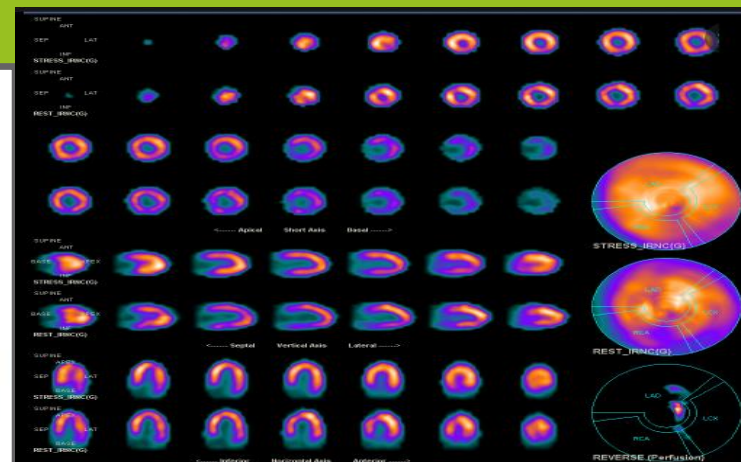
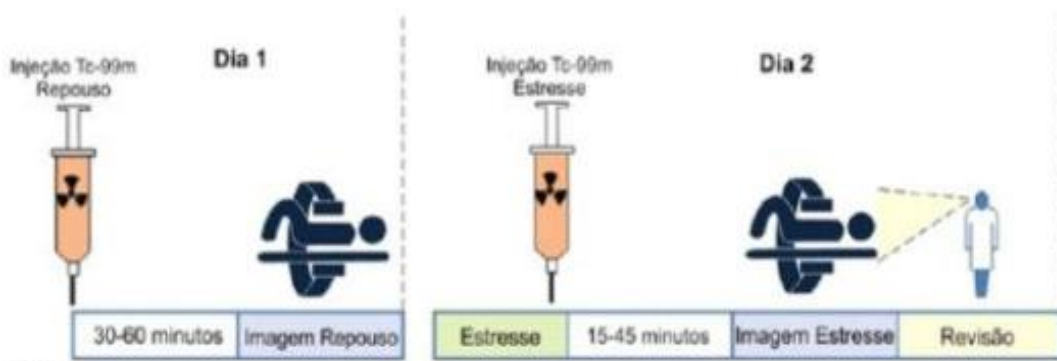
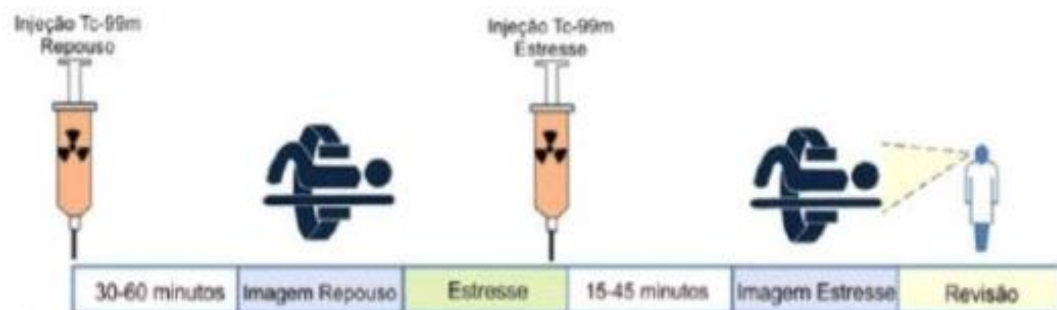


## Sistemas Cromatográficos para determinar impurezas (Controle Radioquímico)

Produto	Impureza	Rf	Suporte (fase estacionária)	Solvente (fase móvel)
CIS-TEC	$^{99m}\text{TcO}_4^-$	1,0	ITLC-SG	Acetona
	$^{99m}\text{TcO}_2$	0,0	ITLC-SG	Ácido acético 0,5 M
	$^{99m}\text{TcO}_2$	0,0	TLC-SG	NaCl 0,9%
DISI-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	NaCl 30%
	$^{99m}\text{TcO}_2$	0,0	HPTLC-Celulose	Metanol 85%
DTPA-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	Acetona
	$^{99m}\text{TcO}_2$	0,0	Whatman 3MM	NaCl 0,9%
ECD-TEC	$^{99m}\text{TcO}_4^-$	1,0	TLC-SG	NaCl 20%
	$^{99m}\text{TcO}_2$	0,0	HPTLC-Celulose	Acetato de etila: etanol (3:7)
FITA-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	Metanol 85%
MDP-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	Acetona
	$^{99m}\text{TcO}_2$	0,0	Whatman 3MM	NaCl 0,9%
MIBI-TEC	$^{99m}\text{TcO}_4^-$	0,9-1,0	TLC-SG 60 fase reversa	Acetonitrila: metanol: acetato de amônio 0,5 M: tetraidrofurano (4:3:2:1)
	$^{99m}\text{TcO}_2$	0,0		
PIRO-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	Acetona
	$^{99m}\text{TcO}_2$	0,0	HPTLC-Celulose	NaCl 0,9%
PUL-TEC	$^{99m}\text{TcO}_4^-$	1,0	Whatman 3MM	Metanol 70%
SAH-TEC	$^{99m}\text{TcO}_4^-$	1,0	TLC-SG	Acetona



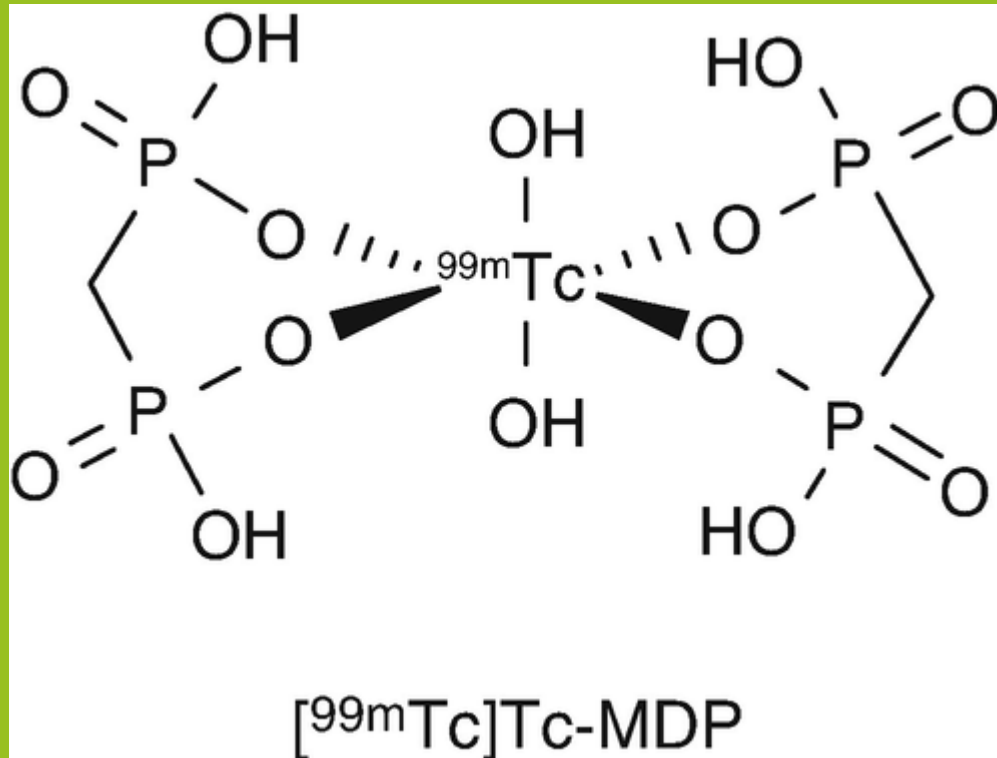
### Protocolos do preparo e Procedimentos do uso de radiofármacos para cintilografia de perfusão do miocárdio (MIBI)



Sestamib – Prot. Único ou de 2 dias (stress / Rest)  
Ex: 450mCi/4ml (MIBICHECK. – dose 30mCi – 70Kg)



## Cintilografia óssea (MDP)

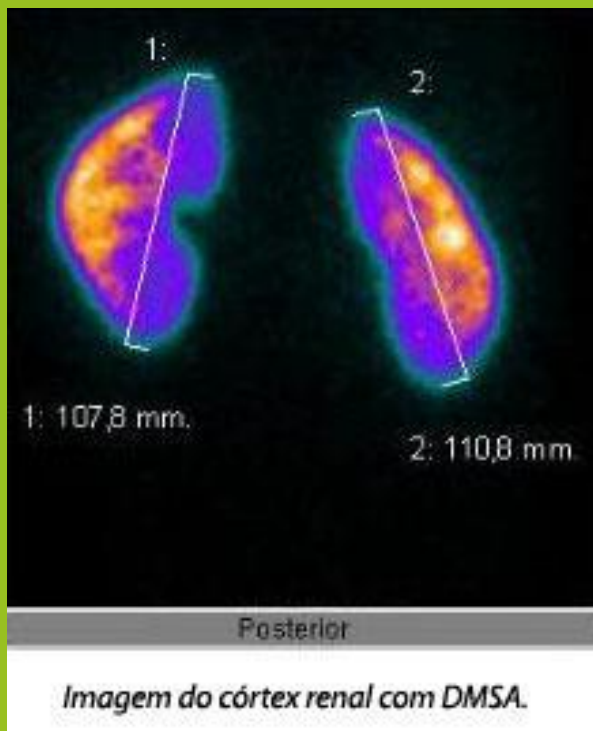


Ácido Mendrônico – PCI Esqueleto / Trifásica  
Ex: 500mCi/5ml (15min. – dose 30mCi – 70Kg)



**DTPA – Dinâmica + Diurético**  
 Ex: 100mCi/3ml - 15min.  
 (Fluxo – dose 10mCi)

## Cintilografia Renal (DMSA/DTPA)



**DMSA – Estática / Morfológica**  
 Ex: 80mCi/3ml (40min. – dose 5mCi)



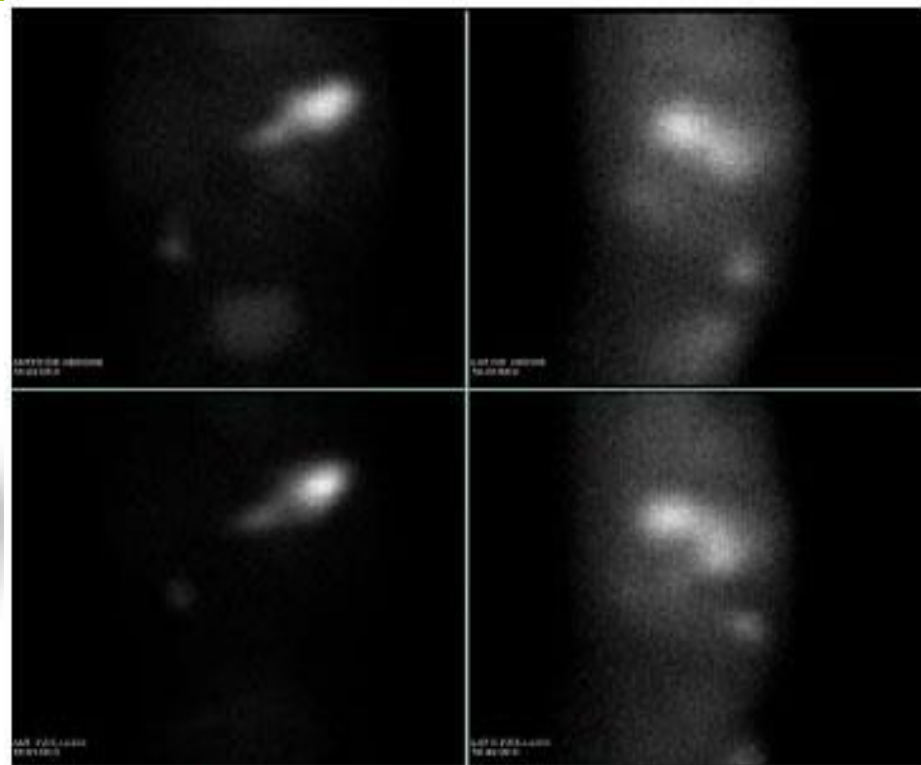
## Cintilografia de sangramento oculto com hemácias marcadas (PIROFOSFATO)

Pirofosfato – IN VIVO / IN VITRO

Solução Fisiológica (15min. – dose 30mCi – 70Kg)



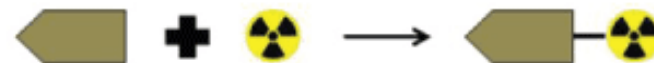
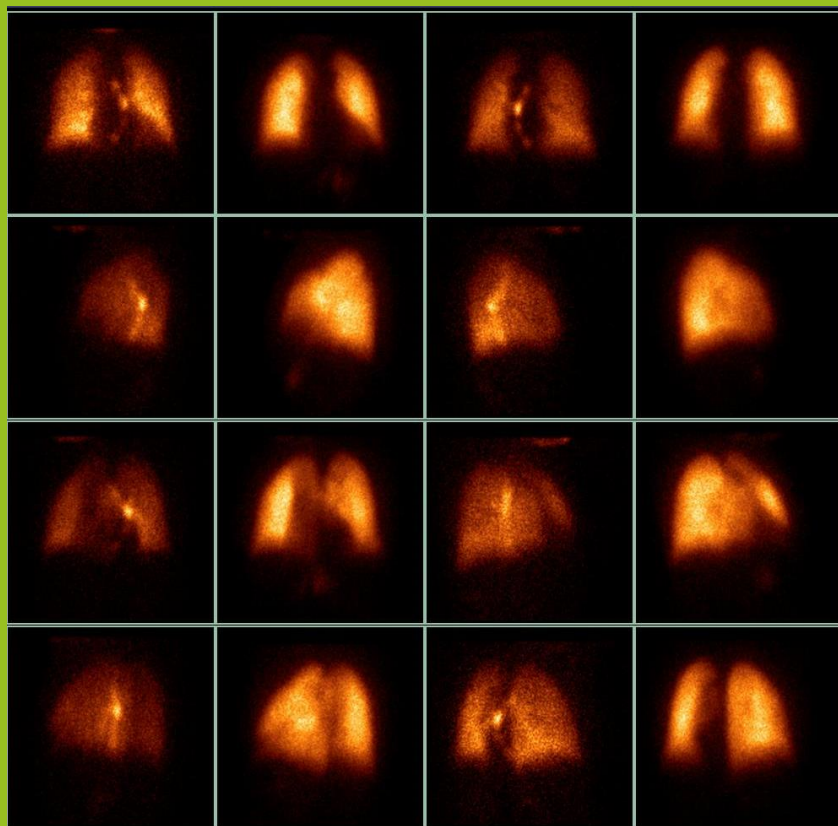
Gamma camera





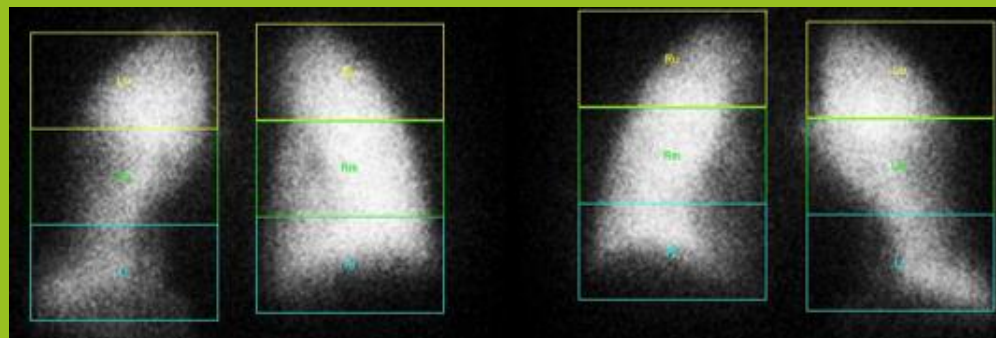
## Cintilografia pulmonar (MAA)

**Macro Agregado de Albumina**  
**Cuidados na administração/Inalação**  
**Ex: 80mCi/3ml (40min. – dose 8mCi)**



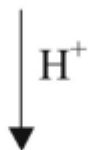
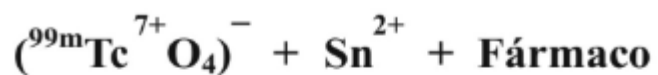
Radiomarcacão

Radiofármaco



## Cintilografia do fígado e baço (Estanho Coloidal) - Fluxo

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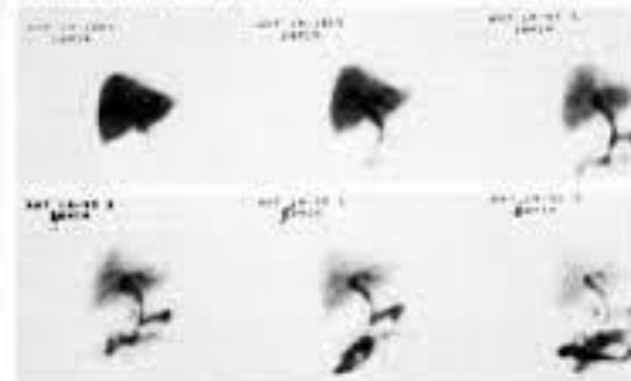
[n+ = estado de oxidação (1 a 6)]



## Cintilografia das vias biliares (DISIDA) - Fluxo

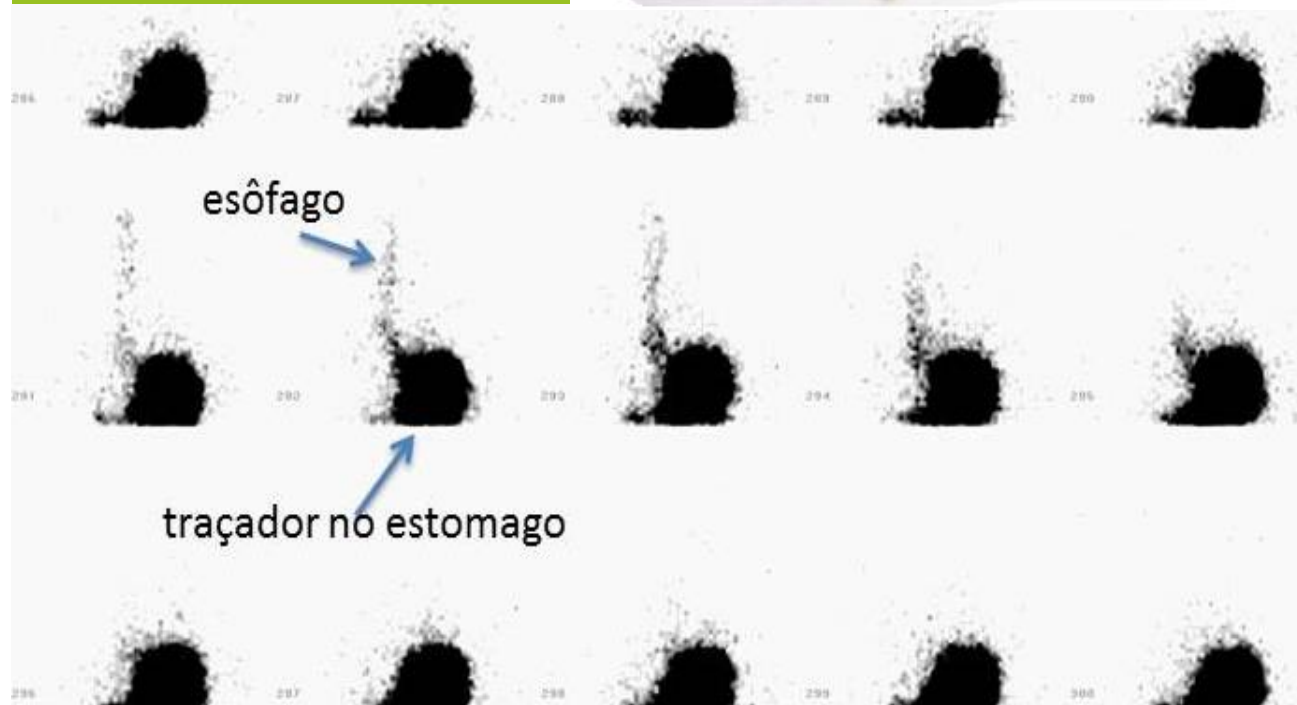
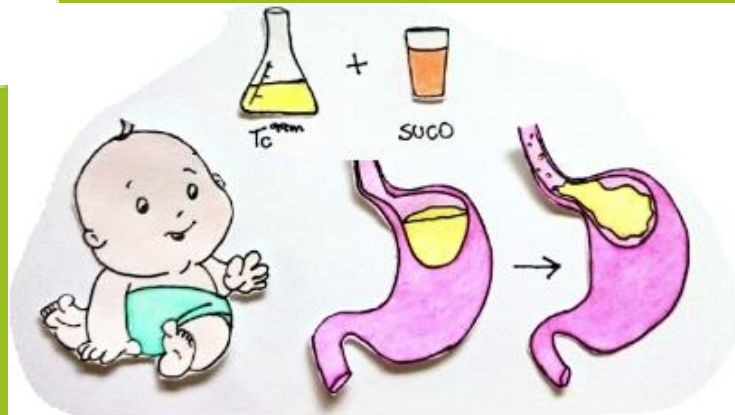


Cintilografia com tecnécio-99m (Tc99m) com exame normal. Note a vesícula visualizada no final do exame (seta).



Cintilografia com tecnécio-99m (Tc99m) com exame demonstrando colecistite aguda, não se evidencia a vesícula no exame (seta).

## Avaliação de Refluxo Gastresofágico (RGE)



## Linfocintilografia (FITATO) - Membros Inferiores e Superiores



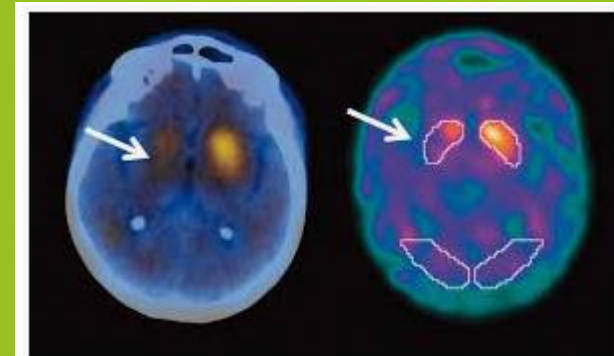
20 minutos



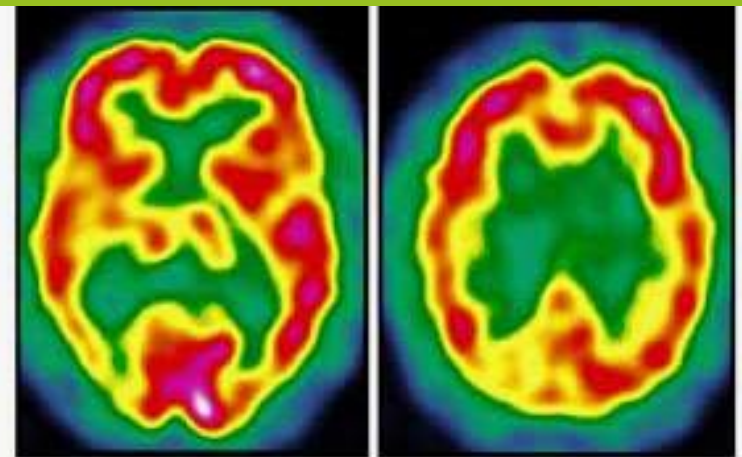
2 horas

Linfocintilografia da perna esquerda

## Cintilografia de perfusão cerebral (TRODAT / ECD)



Cintilografia com Trodat



Cerebral perfusion SPECT (ECD-Tc 99m ...

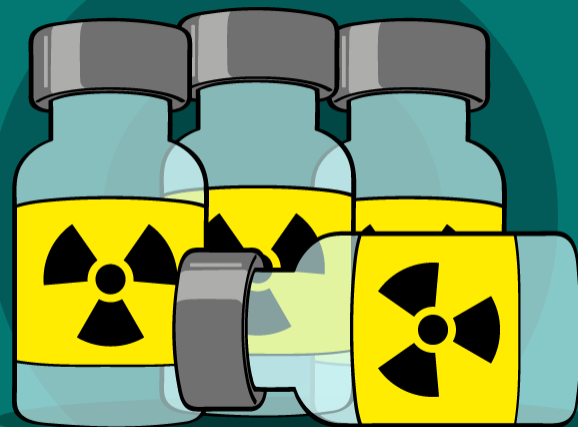
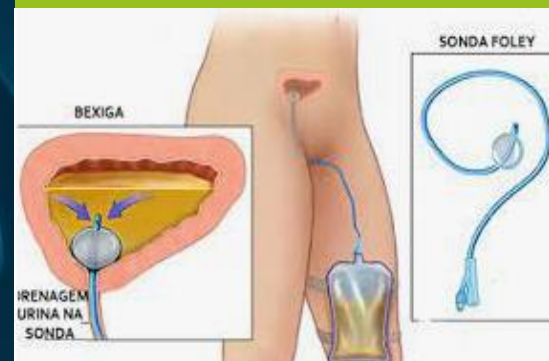
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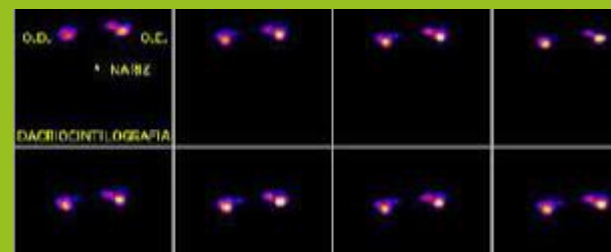
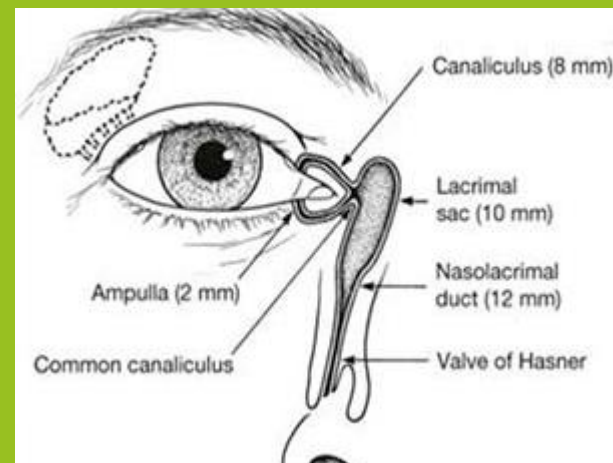


Cistocintilografia direta

Cistocintilografia indireta



## Dacriocintilografia (Olho / Canal Lacrimal)

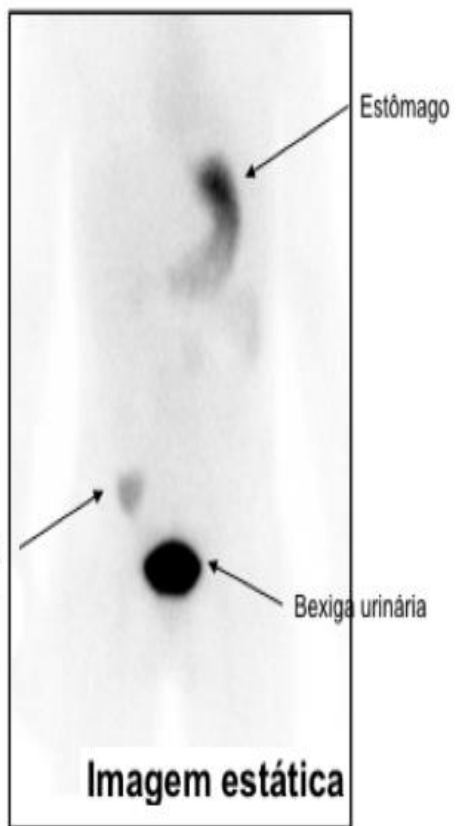






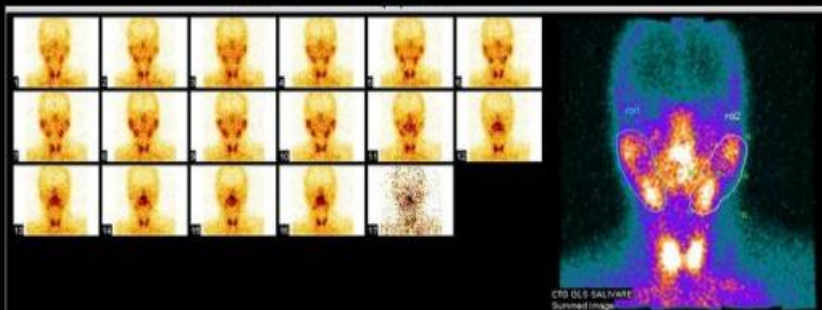
## Divertículo de Meckel (Tecnécio Metaestável Livre)

Cintilografia com pertecnetato de sódio- $^{99m}\text{Tc}$





## Cintilografia das glândulas salivares (99mTc)



CTI 015 SALIVAR  
Summed image

### Statistics

Integral 1->2.n  
Integral percent  
Integral Ratio  
Time to 1/2 max  
Time to peak  
T 1/2

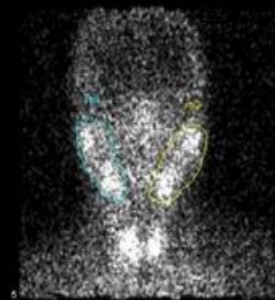
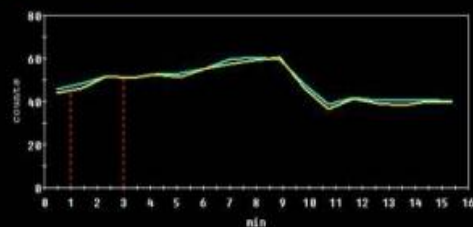
### Curve A

5.9 Kcsec  
58.53%  
A/B=1.821  
Not reached.  
7.9 min  
Not reached.

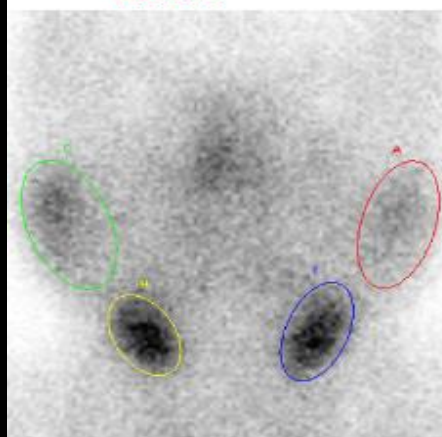
### Curve B

5.9 Kcsec  
49.47%  
B/A= .979  
Not reached.  
8.9 min  
Not reached.

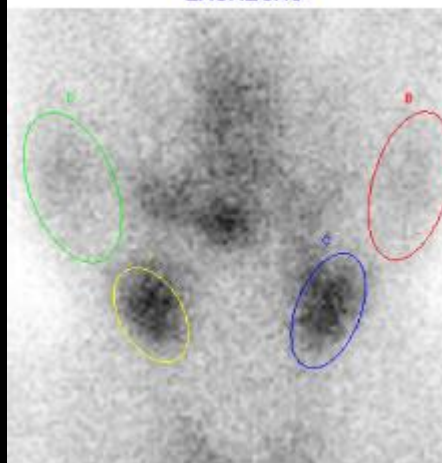
— roi1 — roi2



### ACUMULO



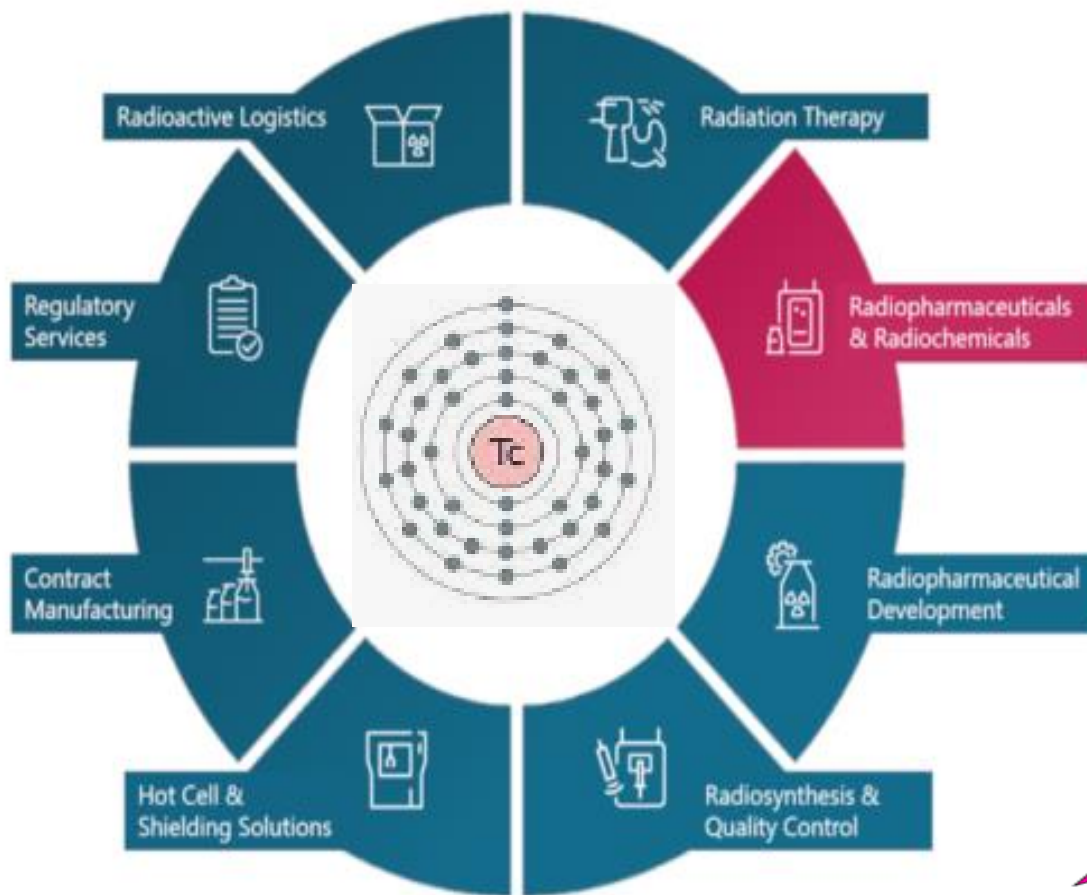
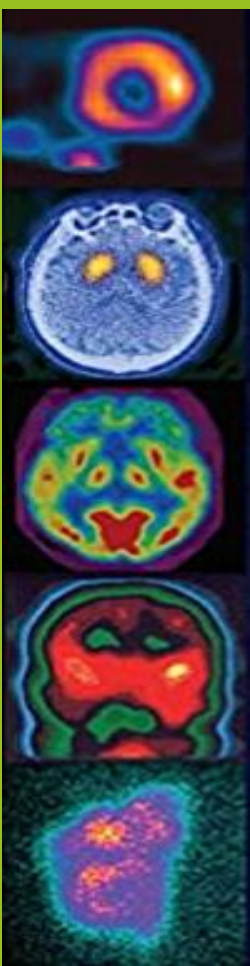
### EXCRECAO



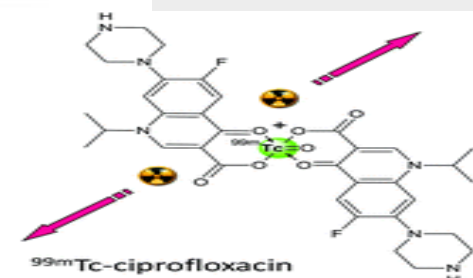
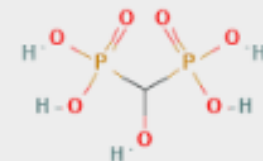
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Protocolo do uso de Tecnécio Metaestável Livre para aquisição de imagens e marcação em medicina nuclear



43  
**Tc**  
Technetium  
(99)



## Considerações Finais sobre Medicina Nuclear e Radiofarmácia - Radionuclídeos

**Radionuclide**

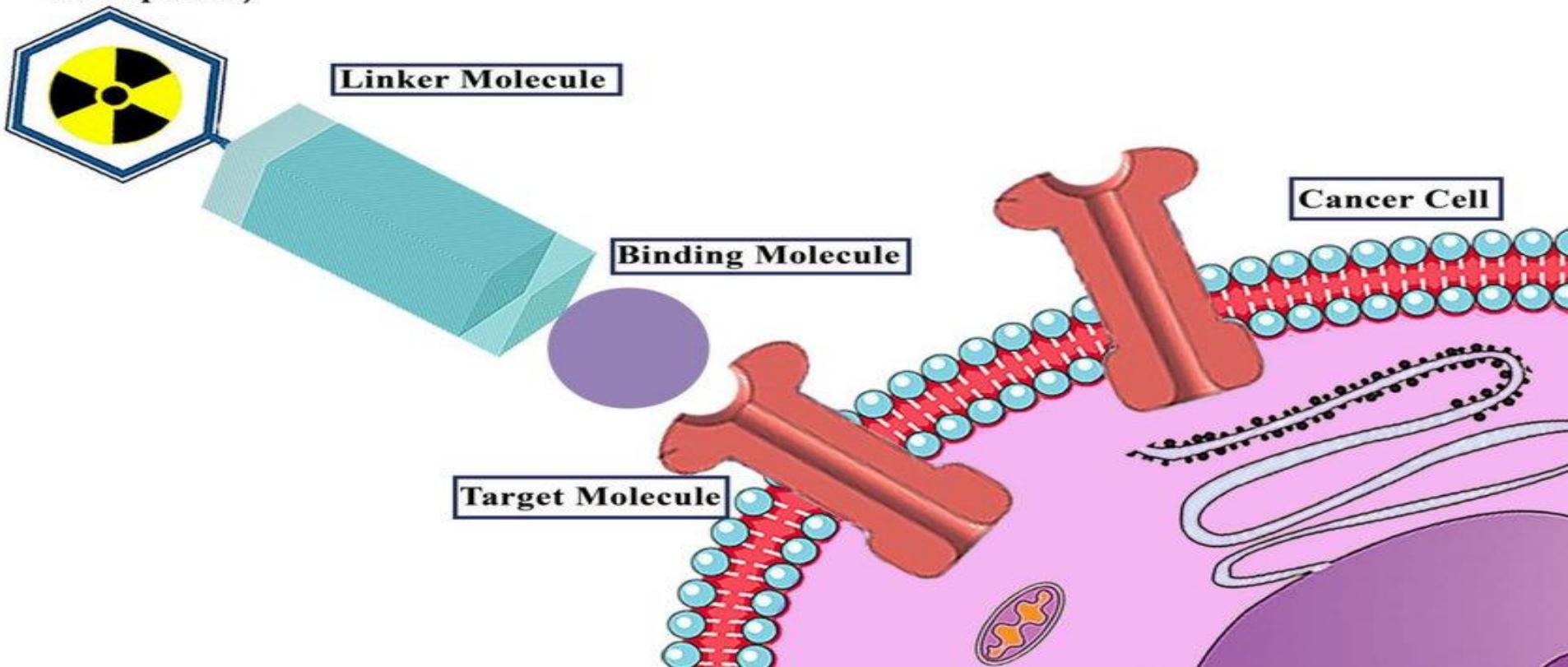
(Diagnostic or  
Therapeutic)

**Linker Molecule**

**Binding Molecule**

**Cancer Cell**

**Target Molecule**



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**OBRIQADO!**

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