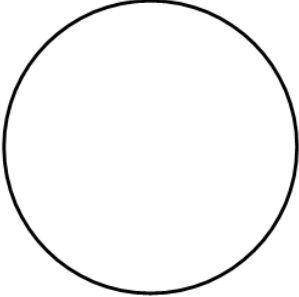





4.43 technetium

technetium Tc 43 

Stable isotope	Relative atomic mass	Mole fraction
(none)		

Half-life of radioactive isotope

Less than 1 hour 
 Between 1 hour and 1 year 
 Greater than 1 year 

^{85}Tc	^{86}Tc	^{87}Tc	^{88}Tc	^{89}Tc	^{90}Tc	^{91}Tc	^{92}Tc	^{93}Tc	^{94}Tc
^{95}Tc	^{96}Tc	^{97}Tc	^{98}Tc	^{99}Tc	^{100}Tc	^{101}Tc	^{102}Tc	^{103}Tc	^{104}Tc
^{105}Tc	^{106}Tc	^{107}Tc	^{108}Tc	^{109}Tc	^{110}Tc	^{111}Tc	^{112}Tc	^{113}Tc	^{114}Tc
^{115}Tc	^{116}Tc	^{117}Tc	^{118}Tc	^{119}Tc	^{120}Tc	^{121}Tc			

4.43.1 Technetium isotopes in medicine

$^{99\text{m}}\text{Tc}$ is an **isomer** of ^{99}Tc with a **half-life** of approximately 6 hours that is used to label **peptides** for morphologic (the form and structure of an organism) and dynamic modeling of renal (kidney), hepatic (liver), bone, and cardiac imaging [317, 319]. $^{99\text{m}}\text{Tc}$ **radiopharmaceuticals** absorb to a variety of tumors). These tumors can be imaged using **single-photon emission computed tomography** (SPECT) coupled with non-invasive computed tomography (**CT scan**),

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which provides a high level of functional and anatomical information in a three-dimensional image (Figure 4.43.1) [320, 321]. Medronate is a radioactive pharmaceutical, which has been used to find, treat, or study certain diseases or body functions. ^{99m}Tc -labeled medronate (^{99m}Tc -MDP) is used in a diagnostic test to detect **metastases** from prostate, lung or thyroid cancer, making use of a **gamma camera** to record the distribution of ^{99m}Tc -MDP within the body. A two-dimensional image of the affected areas is produced.



Fig. 4.43.1: Single-photon emission computed tomography (SPECT CT) machine. (Image source National Institute of Allergy and Infectious Diseases (NIAID) and National Institutes of Health) [322].