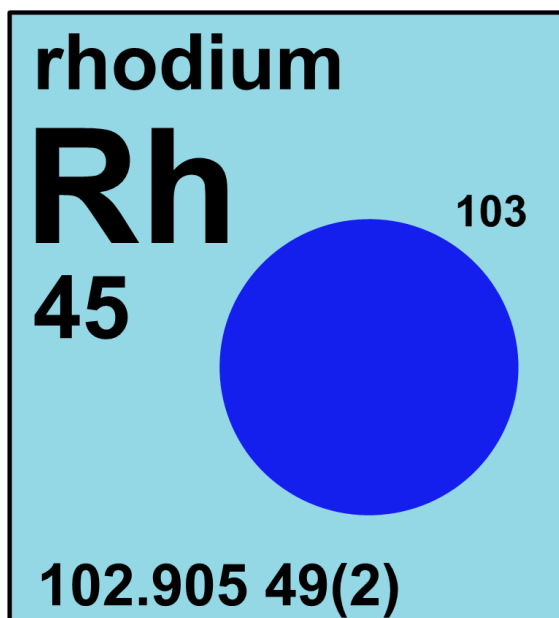





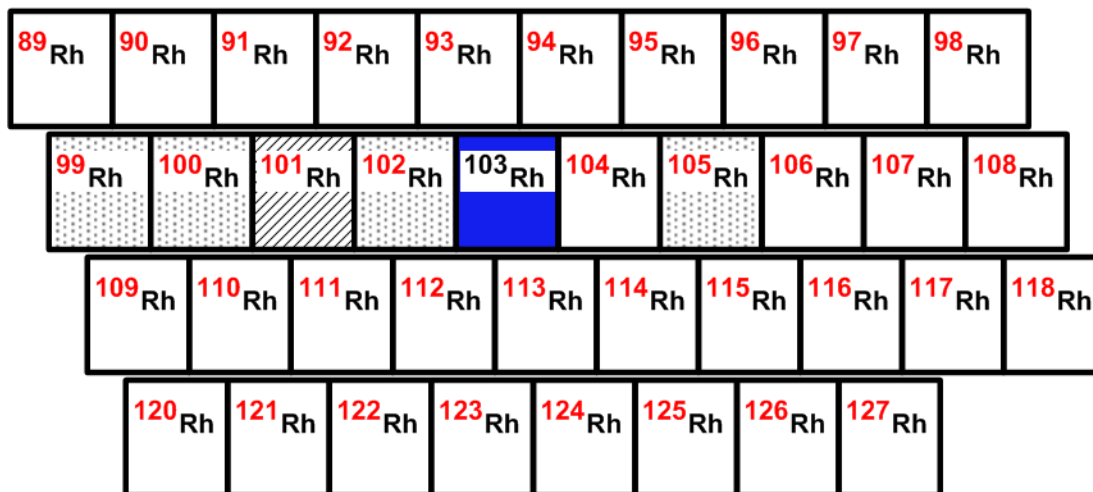
4.45 rhodium



Stable isotope	Relative atomic mass	Mole fraction
^{103}Rh	102.905 50	1

Half-life of radioactive isotope

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



4.45.1 Rhodium isotopes in medicine

The beta particles of ^{105}Rh (with a **half-life** of about 35 hours) are used in target **radiotherapy** to kill cancer cells or cause cancer cell sterilization [331]. The **gamma rays** from ^{105}Rh enable *in vivo* tracking during radiotherapy [331]. ^{105}Rh has been used in the treatment of bone pain (Figure 4.45.1) [331, 334].

Ocular brachytherapy currently is performed using ^{125}I (with a half-life of about 59 hours) or ^{106}Rh (with a half-life of about 30 seconds) seeds [335]. Brachytherapy can allow a good spatial dose distribution over the ocular tumor with lower radiation on adjacent tissues. In

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the case of irradiation of the eyeball with ^{106}Rh , 80 percent of the dose has been absorbed within a depth of 5.2 mm and 90 percent has been absorbed within 7.2 mm (Figure 4.45.2). This limits the application of ^{106}Rh ; however, when ^{106}Rh can be used, the radiation dose can be lower, which is preferred.

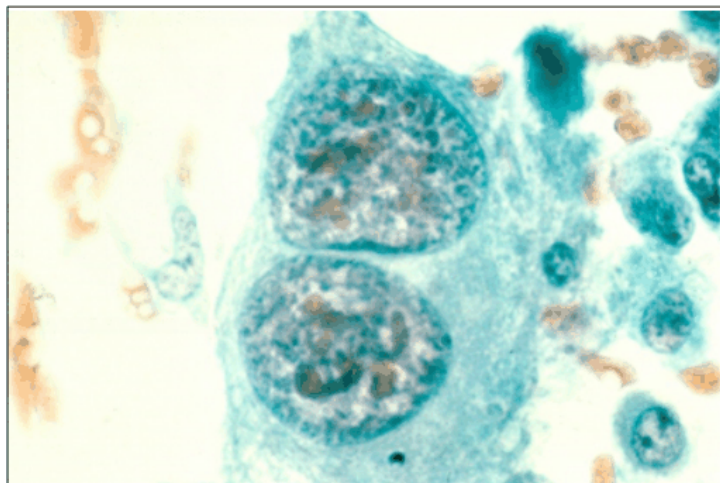


Fig. 4.45.1: Bone cancer cells that have been pap stained and magnified to 400 times. The beta particles and **gamma rays** of ^{105}Rh are used, respectively, in **radiotherapy** to kill cancer cells and for *in vivo* tracking during radiotherapy. (Photo Source: National Cancer Institute at the National Institutes of Health) [336].

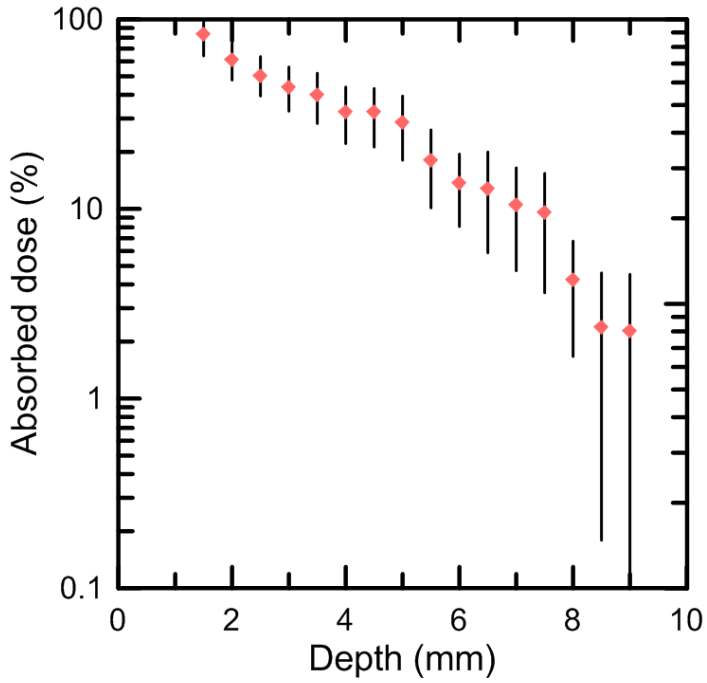


Fig. 4.45.2: Variation in absorbed dose of ^{106}Rh as a function of tissue depth in **ocular brachytherapy** (modified from [335]).