**ORIGINAL ARTICLE**

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# Relationship between the biodistributions of radioactive metal nuclides in tumor tissue and the physicochemical properties of these metal ions

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This study was undertaken to elucidate the relationship between the biodistribution of radioactive metal nuclides in tumor tissue and its physicochemical properties.

Potassium analogs ($^{86}$Rb, $^{134}$Cs, $^{201}$Tl) were taken up into viable tumor tissue, although $^{22}$Na concentrated in necrotic tumor tissue. $^{67}$Ga and $^{111}$In were more predominant in inflammatory tissue than in the viable and necrotic tumor tissue. $^{169}$Yb and $^{167}$Tm accumulated in viable tumor tissue and tissue containing viable and necrotic tumor tissue. $^{67}$Ga, $^{111}$In, $^{169}$Yb and $^{167}$Tm were bound to the acid mucopolysaccharide with a mol. wt. of about 10,000 daltons in the tumor tissue. $^{46}$Sc, $^{51}$Cr, $^{95}$Zr, $^{181}$Hf, $^{95}$Nb, $^{182}$Ta, and $^{103}$Ru were highly concentrated in inflammatory tissue and were bound to the acid mucopolysaccharides with a mol. wt. exceeding 40,000 daltons. $^{65}$Zn and $^{103}$Pd concentrated in viable tumor tissue and were bound to the protein in the tissue.

The results suggest that the difference in intra-tumor distribution of these elements is caused by a difference in the binding substances (or status) of these elements in the tissues, and the binding substance is determined by physicochemical properties of the elements. We therefore conclude that the biodistribution of radioactive metal ions in tumor tissue is determined by its own physicochemical properties.

**Key words:** biodistribution, macroautoradiogram, radioactive metal nuclides, physicochemical properties, tumor tissue