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**$^{117m}\text{Sn}$  colloid as a potential candidate to replace  $^{169}\text{Er}$  colloids in radiosynovectomy of small joints**

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**Abstract:**

Abstract: Radiosynovectomy or radiosynoviorthesis (RSO) is a common therapeutic treatment of arthritis in Germany and in many other countries. In this regard,  $^{169}\text{Er}$  is universally used for the therapy of small joints but its availability is limited particularly outside of Europe. The dosimetry characteristics of  $^{117m}\text{Sn}$  and  $^{169}\text{Er}$  are very similar therefore making  $^{117m}\text{Sn}$  is an ideal replacement for this application. Methods: In a safety trial 5 dogs were injected the left elbow using  $93 \pm 2$  MBq of  $^{117m}\text{Sn}$  colloid. The animals were sacrificed after  $49 \pm 1$  day's ( $>3 * t_{1/2_{\text{phys}}}$ ) and the amount of activity in the dissected tissue was measured. Results:  $99.19 \pm 0.36\%$  of administered activity (%ID) was determined in to be in the synovia of the treated joints despite multiple prior synovial punctures. The majority of the radiocolloid that was found outside the treated joint was in the liver ( $0.70 \pm 0.36\%$ ID), significant lower are the %ID in local lymph node at treated site ( $0.07 \pm 0.03\%$ ID) and spleen ( $0.01 \pm 0.07\%$ ID). Over the follow-up period  $0.06 \pm 0.02\%$ ID was found in blood, faces and urine within the first 14 days;  $0.75 \pm 0.38\%$ ID in organs outside the joint after 45 days. In postmortem autoradiographic studies most of activity was found in the macrophages of sub-synovial tissue and less commonly in a few other locations (synovial lining cells, macrophage-like cells and macrophages). Summary:  $^{117m}\text{Sn}$  colloid is useful in RSO of small joints with a high target dose and very limited dose outside the joint. Autoradiographic studies documented a fixed uptake in macrophages by phagocytosis. These macrophages were found in all layers of the synovium, which showed transportation of  $^{117m}\text{Sn}$  colloid from the surface to varying depths. This opens up the possibility of treating larger joints.