# Radiolabeled Protein Nanoparticles for Cancer Diagnosis

| Reference | Presenter | Authors (Institution) | Abstract |
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| 01-040 | Aryel Heitor Ferreira | Ferreira, A.H. (Instituto de Pesquisas Energéticas e Nucleares); Marques, F.N. (Faculdade de Medicina da Universidade de São Paulo); de Souza, L.E. (Faculdade de Medicina da Universidade de São Paulo); Varca, G.H. (Instituto de Pesquisas Energéticas e Nucleares); Real, C.C. (Faculdade de Medicina da Universidade de São Paulo); Faria, D.d. (Faculdade de Medicina da Universidade de São Paulo); Junqueira, M.d. (Faculdade de Medicina da Universidade de São Paulo); Lugao, A.B. (IPEN); Freitas, L.F.(Instituto de Pesquisas Energéticas e Nucleares); | Recent advances in nanomedicine and nanotechnology have expanded the development of multifunctional nanostructures which combine specificity, diagnostic and therapeutic functions in nanostructured complexes in order to overcome biological barriers that may hinder the selective and effective administration and uptake of drugs and diagnostic agents in tumor tissue. Nanoparticles have been used in nuclear medicine as nano-radiopharmaceuticals to carry PET and SPECT ?- and ?-emitting radioisotopes used in endoradiotherapy to specifically destroy tumor tissue. The aim of the present work was the study of radiolabeling of albumin (BSA-NPs) and papain (P-NPs) nanoparticles synthesized by gamma irradiation, with 99mTc and characterize their in vitro and in vivo properties as potential novel nano-radiopharmaceuticals. Electron microscopy and light scattering techniques show spherical shapes of nanoparticles and average diameter of 9.3 ± 1.9 nm for P-NPs and 25.1 ± 2.9 nm for BSA-NPs. The radiolabeling reached around 90% yield, and the 99mTc-BSA-NPs showed stability for 24 h in all assayed conditions, while 99mTc-P-NPs presented stability for 6 h in human serum. The biodistribution studies in healthy animals have shown different excretion profiles, 99mTc-P-NPs featured a renal excretion. On the other hand the 99mTc-BSA-NPs were found in the liver and spleen to a larger extent, undergoing hepatic excretion. In vitro studies showed promising internalization rates for both nanoparticles with 74% and 57.6% of total uptake in MDA-MB231 cells, respectively for 99mTc-P-NPs and 99mTc-BSA-NPs. In vivo studies in micro-SPECT/CT images also showed a high tumor uptake for both nanoparticles. The autoradiographic studies and immunohistochemistry assays revealed a high density of both papain and BSA nanoparticles in peripheral regions of tumor tissue and confirmed the efficacy of the developed nano-radioparmaceuticals for targeting breast cancer. |

<< Back