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Migration of radionuclides ^{137}Cs and ^{90}Sr in the soil – Plant system and modeling of these processes

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The models of ^{137}Cs and ^{90}Sr migration in the soil–plant system were developed. The models are based on the general mechanisms of physicochemical and biological processes in the soil-plant system, the couple of which determines migration of ^{137}Cs and ^{90}Sr from contaminated soils into plants. The following conclusions can be drawn from a number of laboratory experiments aimed at verification of the developed models: The parameters of ^{137}Cs and ^{90}Sr migration from soil into plant, calculated on the basis of parameters of soil solution, are linearly related with the coefficients of ^{137}Cs and ^{90}Sr accumulation in the soil–plant system. It is a correlation between migration of ^{137}Cs and concentration of K^+ in the soil–plant system. The cation K^+ is a concurring ion to $^{137}Cs^+$ and is able to prevent it's fixation on soil. The migration of ^{90}Sr in the soil–plant system can be reduced by liming of acidic soils. This process is limited by the cation-exchange capacity (CEC) of the soil. Concentration of exchangeable forms of Ca^{2+} is the main factor having influence on the migration of ^{90}Sr in the soil–plant system. Liming leads to reduction of exchangeable forms of ^{90}Sr and increasing of exchangeable forms of Ca^{2+}. The maximum effect of liming is observed when the initial concentration of Ca^{2+} in the soil solution is less than 1/2 of CEC of the soil. Taking into account the economically acceptable level for sorbent insertion into soil (1–4 wt %), migration of ^{90}Sr from soils into plants is efficiently reduced (up 2 times). There is a necessary condition: the ratio of sorption potentials of the sorbent and the soil should be >25. An expression for the parameter of ^{137}Cs and ^{90}Sr migration in soil was received: it is a combination of parameters of soil solutions, such as concentrations of radionuclides and exchangeable cations. This parameter allows to predict coefficients of ^{137}Cs and ^{90}Sr accumulation in plants and to estimate the efficiency of different methods of reduction of ^{137}Cs and ^{90}Sr migration from soils to plants. The developed models of ^{137}Cs and ^{90}Sr migration in the soil–plant system are in a good agreement with the obtained experimental data.

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Bombesin (7-14) derivative: Radiochemical evaluation using different spacers

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Several strategies have been used in the design and development of diagnostic radiopharmaceuticals for early detection of human cancer. The spacer technology seems to be one of the most promising approaches concerning the design of new Bombesin analogues since spacer would be to prevent possible interaction between the radiometal-chelator complex and the receptor binding region of the biomolecule, which has influence on tumor /normal organ ration. The spacer can also act as a pharmacokinetic modifier. Moreover the spacers effect on the function of ^{99m}Tc-labeled peptide- HYNIC conjugate and their ability. The aim of this study was to evaluate the radiochemical and to determine the effects on ability of bombesin derivative labeled with ^{99m}Tc via hydrazinonicotinamide (HYNIC) with tripeptidic (Ser- Ser - Ser) and (Gly-Gly-Gly) spacer. Prepared bombein- HYNIC conjugates radio-labeled with ^{99m}Tc using tricine and ethylenediamine diacetic acid (EDDA) as exchange labeling method at 100°C for 10 min and radiochemical analysis involved ITLC and HPLC methods. The stability of radiopeptide was checked in the presence of human serum at 37°C and saline up to 24 h. [^{99m}Tc-EDDA/tricin/HYNIC-$(Ser)_3$-D-Phe^{13}]BN(7-14) and [^{99m}Tc-EDDA/tricin/HYNIC-$(Gly)_3$-D-Phe^{13}]BN (7-14) were obtained with Radiochemical purities of >95%. Results of *in-vitro* studies demonstrated a high stability in serum and saline. Radio-labeling of this novel conjugates with ^{99m}Tc easily were performed using exchange labeling and high radiochemical yields achieved. The prepared ^{99m}Tc-HYNIC-Bombesin conjugates demonstrated some potential as site-directed diagnostic radiopharmaceuticals; therefore, *in vivo* studies are required and are being carried out.

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