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Preparation of ^{99m}Tc-Levetiracetam intranasal microemulsion as the first radiotracer for SPECT imaging of the Synaptic Vesicle Protein SV2A

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Abstract

Selective receptors imaging using gamma emitting radiopharmaceuticals allows accurate diagnosis and follow up of many brain related disorders. Levetiracetam, a selective SV2A receptor antiepileptic, was successfully radiolabeled using ^{99m}Tc. Different conditions affecting the labelling process were studied and optimum radiochemical yield of 89.8% was obtained. ^{99m}Tc-levetiracetam was effectively formulated and characterized as microemulsion with particle size of 16.34 ± 5.58 nm and polydispersity index of 0.382 ± 0.05. Parallel biodistribution studies were performed comparing brain targeting efficiency of I.V ^{99m}Tc-levetiracetam solution, I.N ^{99m}Tc-levetiracetam solution and I.N ^{99m}Tc-levetiracetam microemulsion. Brain radioactivity uptake and brain/blood uptake ratio for I.N ^{99m}Tc-levetiracetam microemulsion were higher than the other two routes at all time intervals. Such results present ^{99m}Tc-levetiracetam microemulsion as the first SPECT tracer for imaging SV2A receptor.

Key Words

Radiopharmaceuticals, Receptor Imaging, Levetiracetam, Microemulsion.