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Curcumin as the OO Bidentate Ligand in "2 + 1" Complexes with the $[M(CO)_3]^+$ (M = Re, $(^{99m})Tc$) Tricarbonyl Core for Radiodiagnostic Applications.

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Abstract

The synthesis and characterization of "2 + 1" complexes of the $[M(CO)_3]^+$ (M = Re, $(^{99m})Tc$) core with the β -diketones acetylacetonone (complexes 2, 8) and curcumin (complexes 5, 10 and 6, 11) as bidentate OO ligands, and imidazole or isocyanocyclohexane as monodentate ligands is reported. The complexes were synthesized by reacting the $[NEt_4]_2[Re(CO)_3Br_3]$ precursor with the β -diketone to generate the intermediate aqua complex $fac-Re(CO)_3(OO)(H_2O)$ that was isolated and characterized, followed by replacement of the labile water by the monodentate ligand. All complexes were characterized by mass spectrometry, NMR and IR spectroscopies, and elemental analysis. In the case of complex 2, bearing imidazole as the monodentate ligand, X-ray analysis was possible. The chemistry was successfully transferred at $(^{99m})Tc$ tracer level. The curcumin complexes 5 and 6, as well as their intermediate aqua complex 4, that bear potential for radiopharmaceutical applications due to the wide spectrum of pharmacological activity of curcumin, were successfully tested for selective staining of β -amyloid plaques of Alzheimer's disease. The fact that the complexes maintain the affinity of the mother compound curcumin for β -amyloid plaques prompts for further exploration of their chemistry and biological properties as radioimaging probes.

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