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The antihyperglycemic and hypolipidemic activities of a sulfur-oxidovanadium(IV) complex

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This work describes the synthesis, characterization, and biological activities of a novel class of antidiabetic oxidovanadium(IV)-complexes with S_2O_2 coordination mode. The target complex 3,6-dithio-1,8-octanediolatooxidovanadium(IV), abbreviated as ([V^{IV}O(octd)]), where octd = 3,6-dithio-1,8-octanediol, is formed from the reaction between the 3,6-dithio-1,8-octanediol and vanadyl sulfate ($V^{IV}OSO_4$)[1]. The effects of treatment with this vanadium complex on blood glucose, lipidic profile, body weight, food intake, water intake, urinary volume, glycogen levels, and biomarkers for liver toxicity were investigated using a streptozotocin (STZ)-induced diabetic *Wistar* rats model.[2] The results have shown that the [V^{IV}O(octd)] complex caused a significant decrease in blood glucose (247.6 ± 19.3 mg/dL vs 430.1 ± 37.6 mg/dL diabetic group, $p < 0.05$), triglycerides (TG, 50%) and very low-density cholesterol (VLDL-C, 50%) levels in STZ-diabetic rats after 3 weeks of treatment. The [V^{IV}O(octd)] has shown antihyperglycemic activity in diabetic rats and reduced elevated lipid levels. Time-dependent studies using EPR and ^{51}V NMR spectroscopy demonstrated that hydrolysis and redox chemistry of [V^{IV}O(octd)] takes place in the administration solution, suggesting the formation of the oxidation product, [$V^{V}O_2$(octd)]$^-$ and oligomers of vanadate under physiological conditions. The spectroscopic studies have shown that the antidiabetic/hypolipidemic activity could be attributed to [V^{IV}O(octd)], vanadium species resulting from redox processes, the complex hydrolysis, and its decomposition products, or some combination of these factors. These findings show that the [V^{IV}O(octd)] has glucose-lowering activity, in STZ-induced diabetic *Wistar* rats, as well as reduces lipid metabolism disorders in diabetes. Therefore, the oxidovanadium(IV) complex containing the S_2O_2 donor ligand is a promising antidiabetic agent.

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