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Protective influence of thiacalix[4]arenes on myosin ATPase activity against inhibitory effects of Zn^{2+}

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Thiacalixarenes are cyclic oligomers in which phenol rings are connected by sulfur bridges that have basket shape with hydrophobic cavity, upper and lower rims. These compounds can be funtionalized at the upper and lower rims with different chemical groups [1, 2]. Some of thiacalixarenes can bind cations of divalent heavy metals [3,4]. Cations of heavy metals including Zn^{2+}can be cause of different pathologies of female reproductive system during pregnancy and childbirth [5, 6].

We have studied the ability of tetrahydroxythiacalix[4]arene-tetrasulphonate and tetrahydroxythiacalix[4]arene-tetrakis[hydroxy(ethoxyphosphoryl)]methyl to eliminate the negative effects of Zn cations on uterine myosin ATP hydrolysis that is one of the most important mechanisms of uterine smooth muscle (myometrium) contraction [7]. It was found that 300 μM Zn^{2+} has inhibitory effect on ATP hydrolysis catalyzed by myosin subfragment-1 from swine uterus. It was demonstrated that both tetrahydroxythiacalix[4]arene-tetrasulphonate and tetrahydroxythiacalix[4]arene-tetrakis[hydroxy(ethoxyphosphoryl)]methyl at a concentration of 100 μM restore normal activity of myosin ATPase in the presence of Zn^{2+}. The results can be used for further research aimed to use these thiacalix[4]arenes for design of pharmacological compounds that can effectively normalize myometrial contractile hypofunction after exposure to heavy metals in the environment.

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