Selective Study on Pathological Uses of Organotellurium and Organoselenium Compounds - A Review

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ABSTRACT

Organometallic compounds play an important role in the treatment of a number of diseases. Organometallic compounds of selenium and tellurium are found to possess antioxidant, neuroprotective, hepatoprotective, anti-inflammatory properties. In present review authors try to explore the recent trends in synthesis of organometallic compounds specially organoselenium & organotellurium compounds.

Keywords: Organometallic compounds, organoselenium & organotellurium compounds, antinociceptive agents

1. INTRODUCTION

From the past few decades interest in the field of synthesis and reactivity of organoselenium and organotellurium compounds has increased. These compounds are important not only for synthetic organic chemistry but also in materials science as well as in pharmacology specifically in view of the observations that they can exhibit important biological activities. These compounds have been described as antioxidant and neuroprotective, hepatoprotective, anti-inflammatory, and antinociceptive agents.

2. OBSERVATION AND DISCUSSION

Savengo et al., (2006) were reported that on the evaluation of antioxidant activity and potential toxicity of 1-
buthyltellurenyl-2-methylthioheptene and reported that this compound induced a significant decrease in plasma triglycerides levels but none of the doses changed the cholesterol level. This is a very promising compound for more detailed biological studies. Melo et al., (2012), has reported that Diphenyl diselenide protects cultured MCF-7 cells against tamoxifen-induced oxidative DNA damage. Studies on DPDS have found that it shows antioxidant, antimutagenic and antitumoral effects. They reported that antigenotoxic properties of DPDS against tamoxifen (TAM)-induced oxidative DNA damage in MCF-7 cultured cell line. Our results demonstrate that the cellular effects of DPDS appear to be complex and concentration-dependent. The present findings show that DPDS is not genotoxic (at concentrations lower than 2.0 µmol/L) in MCF-7 cells, as observed in the modified comet assay. Moreover, DPDS protects against TAM-induced oxidative DNA damage, probably by its antioxidant activity, without interfering with its cytotoxicity. Thus the treatment with low concentrations of DPDS, a synthetic organo selenium compound, could be used as a potent antigenotoxic agent to prevent the risk of cancer induction triggered by tamoxifen hormone therapy.

Costa et al., (2012) investigated the effect of ebselen (EB) against hyperglycemia induced by the organophosphate (OPI) diazinon (DI) in rats. Insulin-mimetic properties of Ebselen were tested in vitro with the aim of better understanding the hypoglycemic effect of this compound. The protective effect of EB against pancreatic and hepatic damage caused by DI in rats was also appraised. EB increased the glucose uptake in skeletal muscle, stimulated hepatic glycogen synthesis and inhibited glycogen breakdown in a similar way to IN. In conclusion, EB, possibly through its insulin-mimetic action, protected against pancreatic and hepatic damage caused by DI in rats.

Gerzsona et al., (2012) has reported that in mice α-(phenylselanyl) acetophenone (PSAP) shows antioxidant activity in vitro and antidepressant-like in vivo. Antioxidant properties of PSAP (in vitro) was studied in four system (DPPH, ABTS, FRAP and inhibition of lipid peroxidation) and PSAP (100–500 µM) showed potent antioxidant activity and protected against lipid peroxidation, but further investigation suggested that when administered in mice (100, 200 and 400 mg/kg, per oral, p.o.), could cause acute toxicity. Our results demonstrated that PSAP did not cause the death of any animal, significantly reduce body weight or cause any oxidative tissue stress following treatment. Final results of this study suggest that PSAP has antioxidant and antidepressant-like properties and may be of interest as a therapeutic agent for the treatment of depressive disorders.

Marut et al., (2011) has studied that The Organotelluride Catalyst (PHTE)2NQ Prevents HOCl-Induced Systemic Sclerosis in Mouse HOCl-induced mouse SSC is a murine model that mimics the main features of the human disease, especially the activation and hyperproliferation rate of skin fibroblasts. They presented that the efficiency of a tellurium-based catalyst 2,3-bis (phenyltellanyl) naphtho quinone ((PHTE)2NQ) in the treatment of murine SSC, through its selective cytotoxic effects on activated SSC skin fibroblasts. SSC mice treated with (PHTE)2NQ displayed a significant decrease in lung and skin fibrosis and in alpha-smooth muscle actin (α-SMA) expression in the skin compared with untreated mouse SSC animals. Their research conclude that effectiveness of (PHTE)2NQ in the treatment of mouse SSC seems to be linked to the selective pro-oxidative and cyto-toxic effects of (PHTE)2NQ on hyper proliferative fibroblasts.

3. RESULT
The results presented in this review paper clearly indicate the potential pharmacological and therapeutic uses of organoselenium and organo-tellurium compounds. Indeed, these classes of molecules exhibit a variety of interesting biological effects, namely antioxidant, antidepressant etc., which can account for their in vitro and in vivo beneficial effects in a wide range of models of different human pathologies. We can conclude that the future of medicinal chemistry of organoselenium and organo-tellurium compounds will depend on the rational development of new molecules, which can be guided by chemical and biological approaches. Moreover, the structure-activity relationship for a given class of organoselenium or organo-tellurium compounds should be used as a toll for screening molecules with high probability of exhibiting low toxicity and high pharmacological activity in mammals.

REFERENCE


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