

## Cytotoxicity of sea-dumped chemical munitions in rainbow trout gill (RTgill-W1) and human colon adenocarcinoma (Caco2) cells

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Following the First and Second World Wars colossal amounts of munition, including conventional explosives and chemical warfare agents, were sea-dumped in coastal and off-shore sites all over the globe. As a consequence of decades of exposure to seawater, munition shells are expected to be highly corroded thus allowing the release of toxic chemicals to the environment. Despite the growing environmental concern, the toxic potential of dumped munition and their reaction products is largely unknown.

In this study, the cytotoxicity of thiodiglycol, 1,4-oxathiane and 1,4-dithiane, three metabolites of the chemical warfare agent sulphur mustard frequently detected in environmental samples from dumpsites, was assessed in rainbow trout gill (RTgill-W1) and human colon adenocarcinoma (Caco2) cells following 24 hours and 24 and 48 hours exposure, respectively. For that, a combination of three viability assays was used following the test guideline 249 from OECD.

The obtained results for RTgill-W1 allowed the estimation of the LOECs of 50 mg/L and 100 mg/L for 1,4-dithiane and 1,4-oxathiane, respectively, which correspond to the 96 hours LOEC in fish, while a NOEC of 100 mg/L was estimated for thiodiglycol. Similarly, for Caco2, 1,4-dithiane also proved to be the most toxic of the tested chemicals with the LOECs of 6.25 mg/L and 100 mg/L, following 24 and 48 hours exposure. Furthermore, LOECs of 100 mg/L were estimated for 1,4-oxathiane and thiodiglycol following both exposure periods.

This first insight on the cytotoxic potential of three relevant sulphur mustard related products reveals that 1,4-dithiane is the most toxic of the tested chemicals, even though all estimated LOECs are well above the concentrations detected in environmental samples, which normally range µg/L.

**Keywords:** Dumped munition; Cytotoxicity; RTgill-W1; Caco2