

Toxic effects of dissolved TNT on the Baltic mussels (*Mytilus spp.*): first results from lab exposure studies

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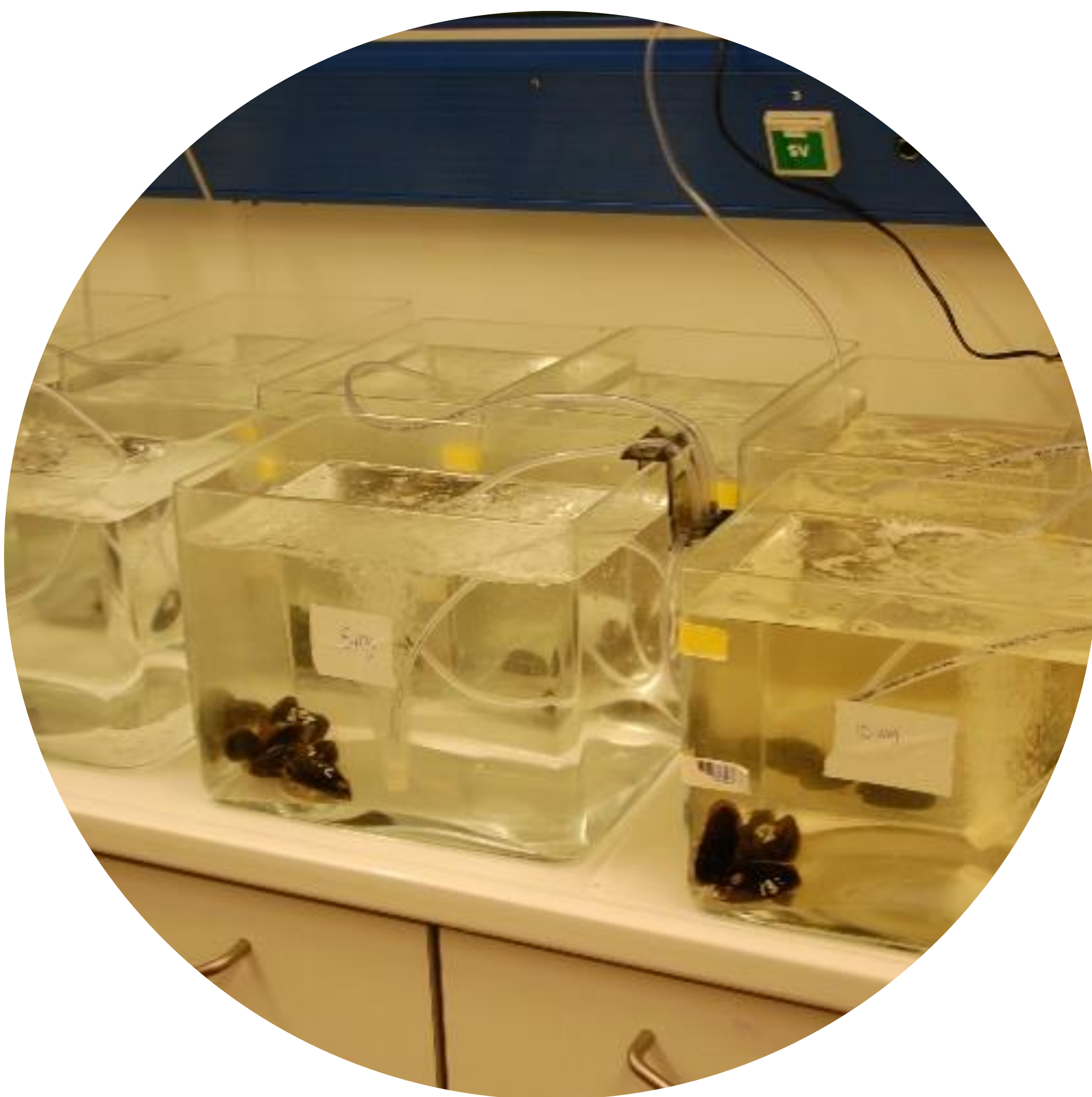
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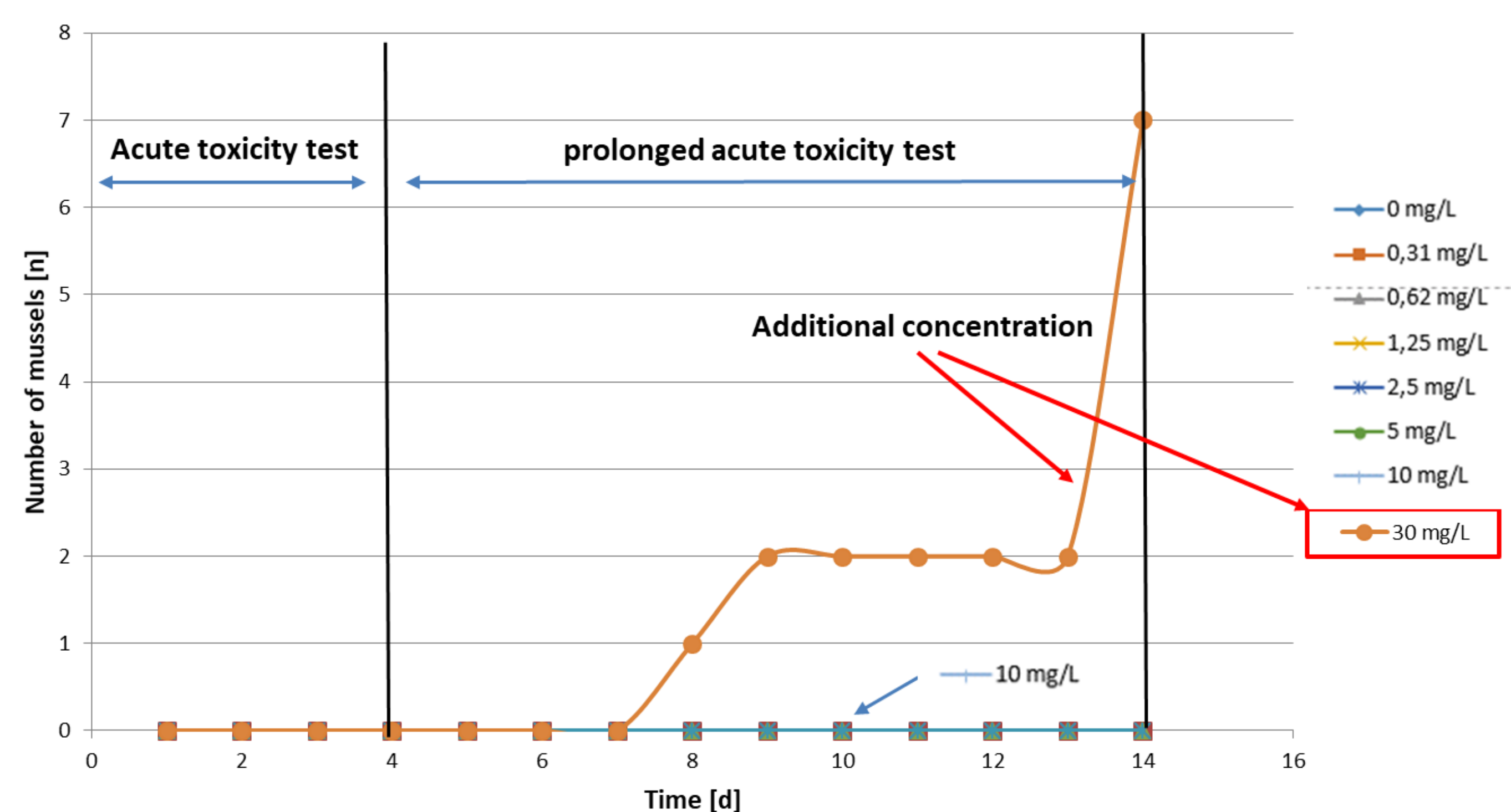
During and after the WWs, large amounts of chemical weapons and conventional munitions stored on German territory were dumped in the Baltic Sea by order of the allied forces or German administration. In addition of being a cheap method of disposal, the belief was that the vast amounts of waters in the oceans would neutralize and absorb the dangerous substances. Nowadays, dumped warfare agents are posing a growing concern for the marine environment since dangerous contents are leaking from corroding metal shells and pollute ambient sediments and water. Both, chemical and conventional warfare agents and their degradation products have been detected in noticeable concentrations in sediments at the major dumping sites in the Baltic Sea.

However, the knowledge about dissolved explosives on the health of marine organisms is scarce. Even basic toxicity values such as lethal TNT concentrations are missing in literature for most organisms. Therefore, we conducted blue mussel exposure experiments in the lab to assess environmental impact of dissolved TNT. Biomarkers representing different biological functions were investigated.

First results are presented here:



Lethal TNT concentrations - acute toxicity test (AT)

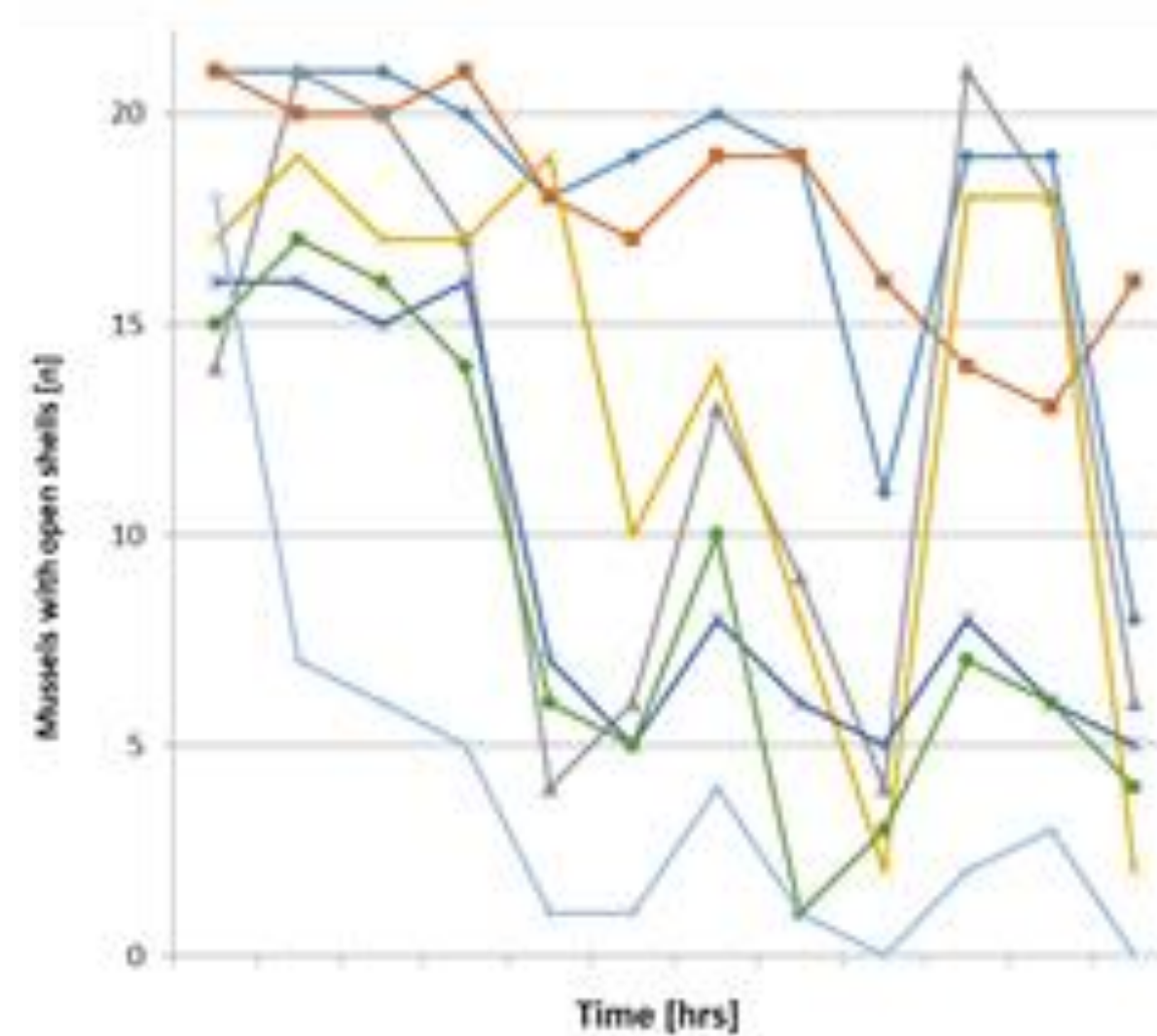


Mortality occurred only at TNT concentrations of 30mg/L in the prolonged acute toxicity test

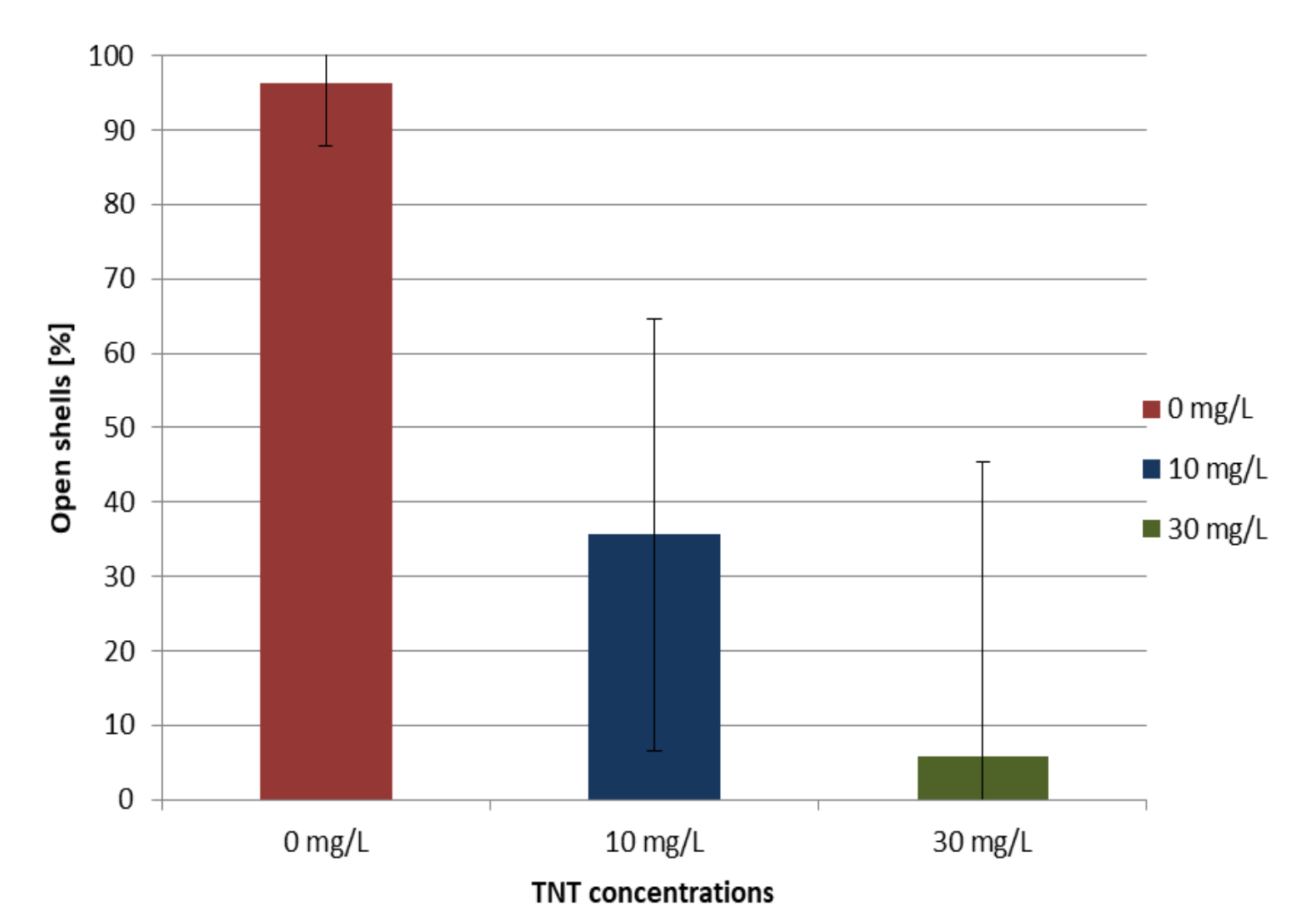
Key observations

- No mortality occurred within 96 hrs acute toxicity test.
- Total loss of mussel after 13 days at 30 mg/L dissolved TNT.
- Shells of mussels exposed to higher TNT concentrations were more often closed.
- Photo controlled mussels show significant decrease in shell opening time.
- Biological effects were measured already at relatively low concentrations of dissolved TNT (test on chronic toxicity over 21 days).

Shell closure - AT



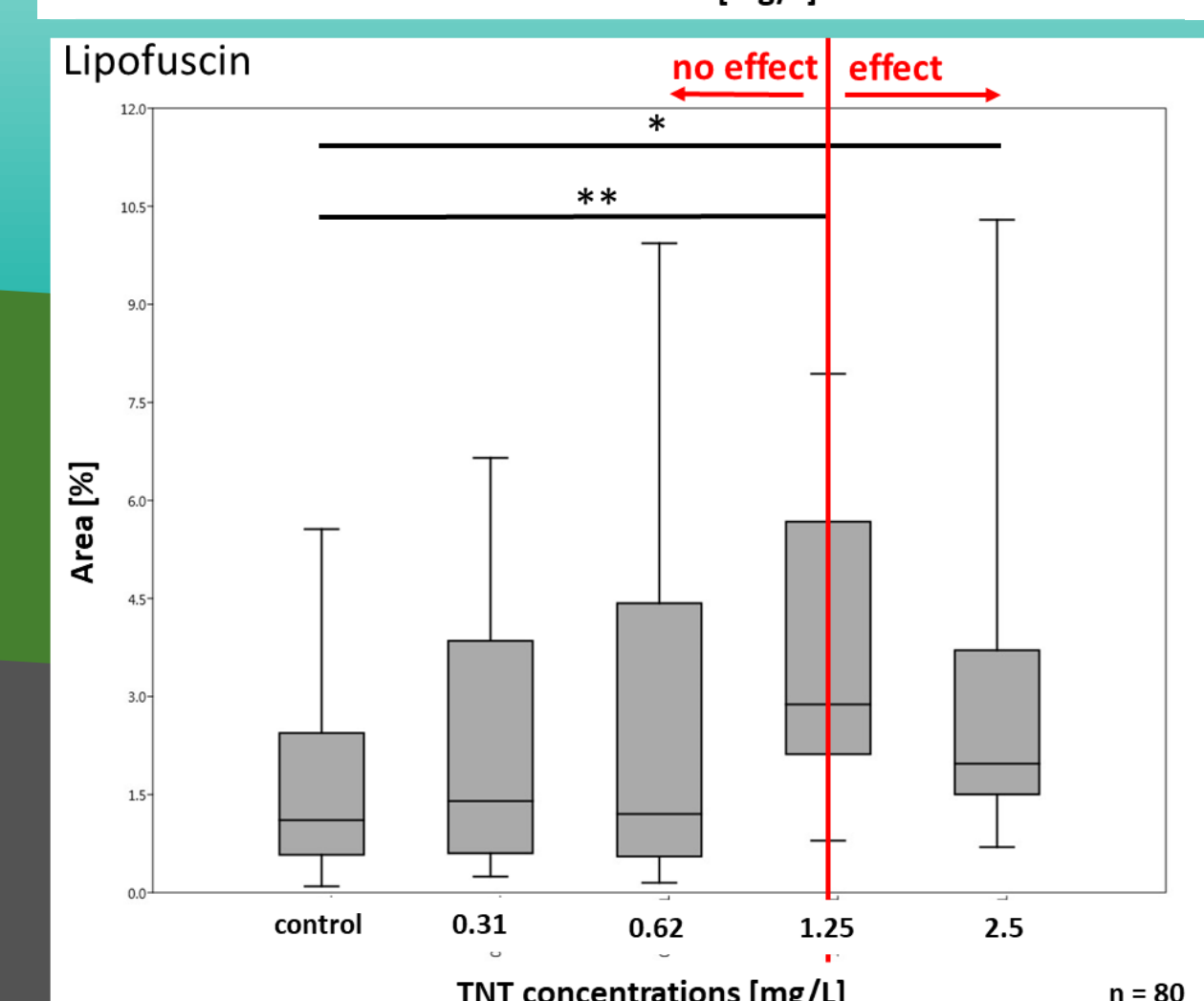
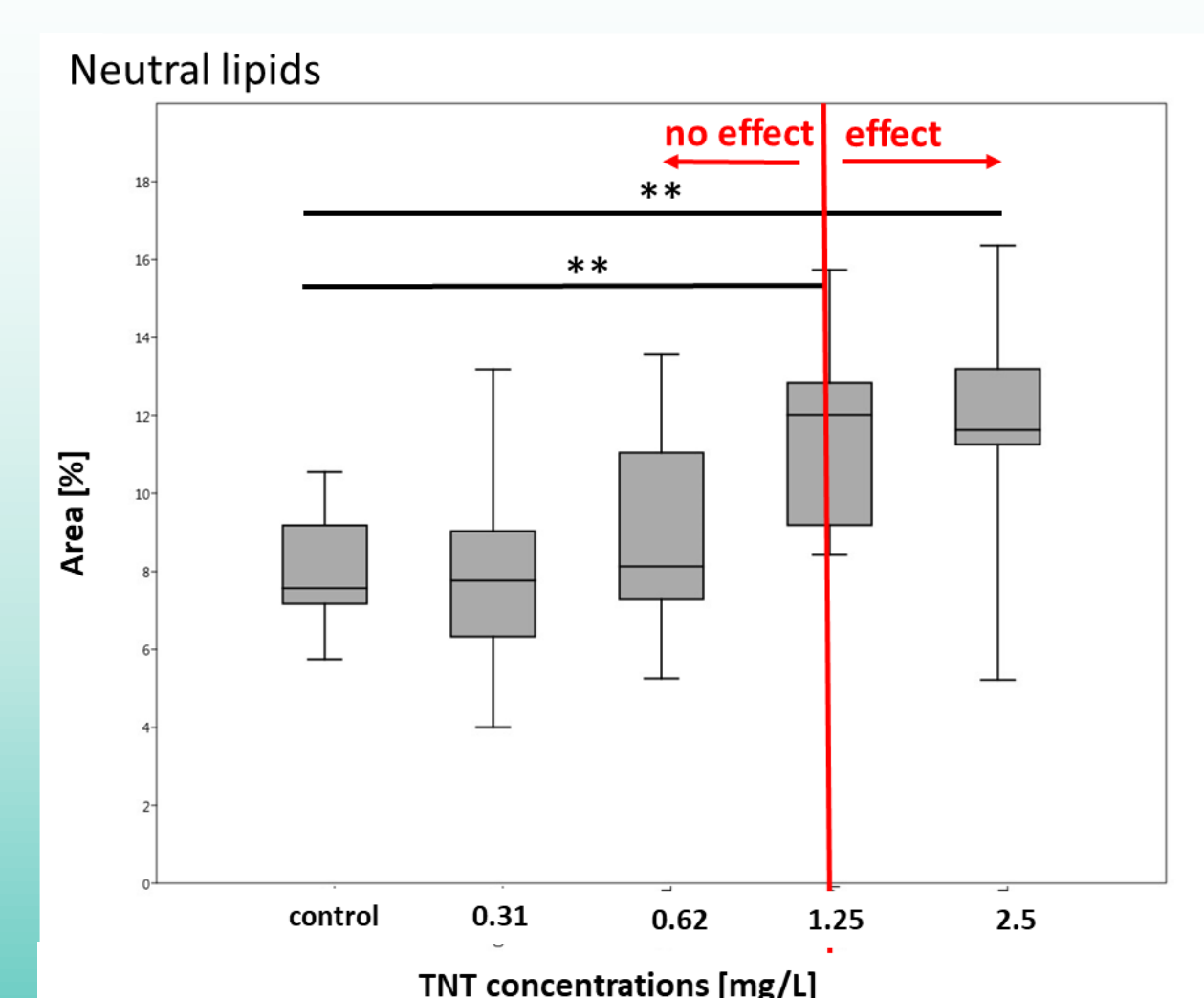
Shell opening - AT exposure



Exposure of high TNT concentrations lead to reduced shell opening

Chronic toxicity test

Test on chronic toxicity over 21 days of exposure revealed that first biological effects occurred at concentrations of 1.25 mg/L dissolved TNT between



Mussel have simple defence mechanism to avoid acute toxicity

Shell closure lead to underestimation of TNT toxicity

Most important no-effect concentration for risk assessment are low!