

CYTOTOXIC EFFECTS OF NANOPLASTICS ON THE MALE GONADS OF *MYTILUS GALLOPROVINCIALIS*

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Nanoplastics are increasingly recognized as global pollutants due to their persistence in marine ecosystems and their potential to disrupt biological functions in aquatic organisms. Their small size enables cellular uptake, raising concern about their impact on reproductive systems, particularly in filter-feeding invertebrates.

In this study, we investigated the potential toxic effects of polystyrene nanoplastics (NPs) on the lobular testis of *Mytilus galloprovincialis* after exposure to environmentally relevant concentrations at early and late time points (1 and 11 days, respectively).

Building on our previous study, demonstrating that micro and nanoplastics affect female reproductive tissues, we first performed histological analyses. Results revealed that NPs alter spermatogenic cysts by impairing germ cell differentiation.

Consequently, cysts appeared partially or completely empty compared to controls.

Furthermore, NPs exposure disrupted the physiological redox balance by increasing oxidative stress, as indicated by increased reactive oxygen species (ROS) production and lipid peroxidation. This imbalance was accompanied by a significant decrease in intracellular antioxidant defense, particularly in mitochondrial superoxide dismutase 2 (SOD2) protein expression.

After 11 days of exposure, more pronounced effects were observed, including damage to cytoskeletal structures, decreased androgen receptor expression, and activation of apoptotic pathways.

Taken together, these findings indicate that NPs exposure in mussels altered key cellular processes, impairing spermatogenesis and compromising reproductive function.