

AIM OF THE WORK

Micro and nanoplastics are ubiquitous in the marine ecosystem, representing an emerging threat due to their small size able to be taken up by many organisms



The aim of this study was to investigate for the first time micro and nanoplastics (MPs, NPs) ingestion and ecotoxicological effects in the ephyra stage of the *Aurelia* sp. (Cnidarian jellyfish), recently suggested as valid model organisms in ecotoxicology

MATERIAL AND METHODS

Model organisms

Aurelia sp Ephyrae (0 days)

From Acquario di Genova (Italy)

Faimali et al. 2014. Mar. Environ. Res. 93 93e101

Exposure

Ephyrae were exposed to environmental and high (0.01-0.1-1-10- mg/L) concentrations of commercial:

- 100 nm visible blue dyed and fluorescent polystyrene (PS) particles**
Gambardella et al. Submitted. Mar. Environ. Res. .
- 1-4 µm green fluorescent polyethylene (PE) particles**
Costa et al. 2020 Ecotoxicol. Environ. Saf. 189 (109983)

24 and 48 hours of exposure
At 20°C in dark condition

1 ephyra/each well
8 ephyrae for replica
4 replica

1) Uptake

MPs and NPs uptake was investigated by using an innovative **holotomographic microscope**

2) Ecotoxicological End-points

Immobility:
% organisms that perform any kind of movement

Frequency of pulsations (Fp)=number of pulsations/1 minute

Investigated effects

(Tomocube)

Swimming Behavioral Recorder (SBR) system developed at CNR-IAS

Black Box → Software

IR source → Camera → Infra-red light source

Multwell plate with organisms

(%AFp) = 100* (Fp control - Fp treated)/Fp control

AFp= Alteration of frequency of pulsations

3) Recovery

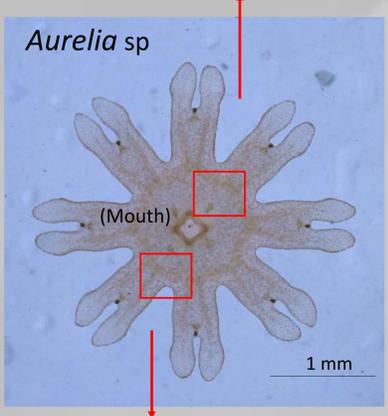
After exposure to MPs and NPs ephyrae were washed and transferred in clean sea water to verify the **Time (hours) needed for organisms to recover the ability to perform Fp of control organisms (not contaminated)**

RESULTS

1) Uptake

Fluorescent PS NPs were **inside the ephyra jellyfish body**, (blue colour representing the fluorescence channel visible)

Labels: Gelatinous body (RI=1.36), Nematocysts (RI=1.4), PS NPs (RI=1.58)



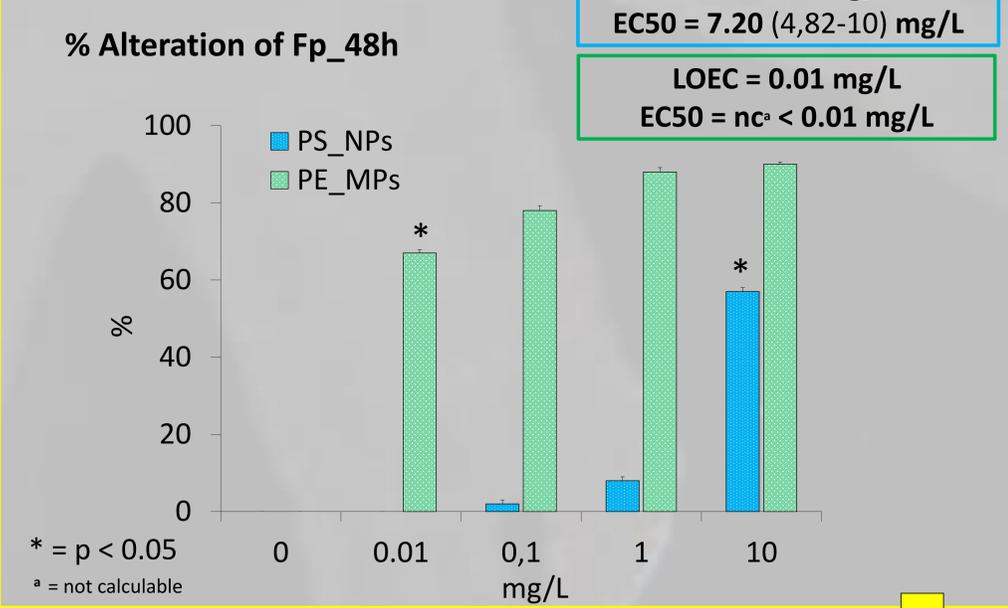
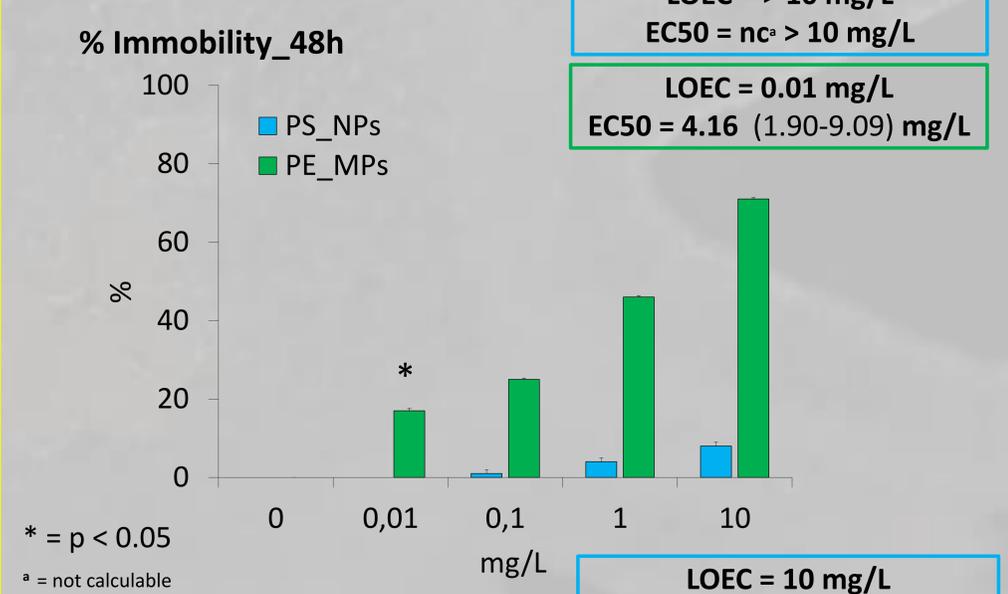
(Tomocube)

A 3D holotomography map shows different structures based on different **Refractive Index (RI)**

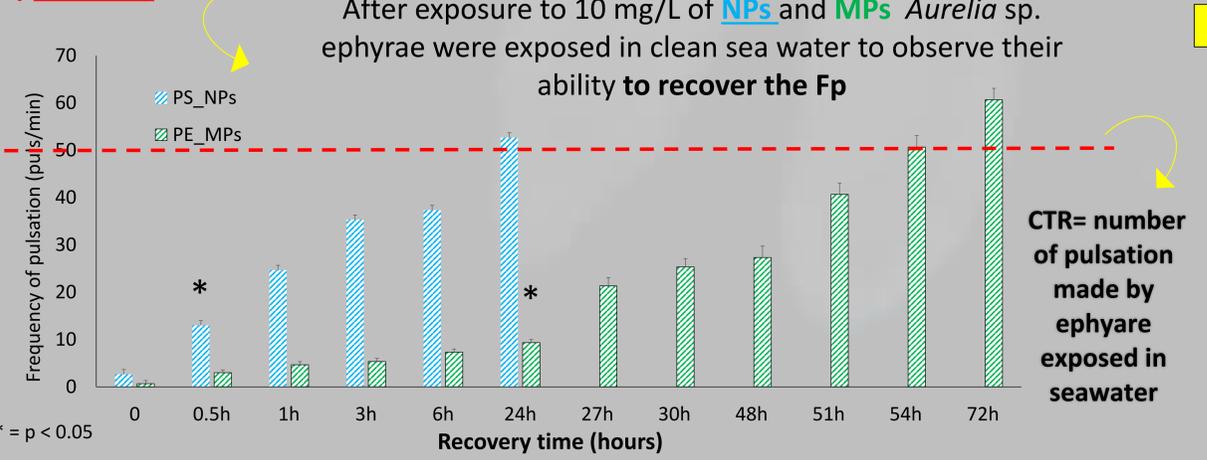
Labels: Gelatinous body (RI=1.36), Nematocysts (RI=1.4), PE MPs (RI=1.5)

Fluorescent PE MPs were **inside the ephyra jellyfish body**, (green colour representing the fluorescence channel visible)

2) Ecotoxicological End-points



3) Recovery



A short-term exposure to MPs and NPs temporarily affects ephyrae jellyfish health, impairing in different manner their survival and behavior, probably due to a mechanical disturbance triggering a loss of radial symmetry in ephyrae more evident after MP than NP exposure

CONCLUSIONS

This study provides a first step towards understanding and clarifying the potential impacts of MP and NP contamination in gelatinous zooplankton, a key component in marine ecosystems and in the marine food web