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Azithromycin reshapes the effect of toxic *Microcystis aeruginosa* on the grazing behavior of *Daphnia similis* at environmentally relevant concentrations

Michael Ribas Celano[1], Júlia Vianna de Pinho [2], Mariana Dias Marques[1], Mauro Cesar Palmeira Vilar[1], Sandra Maria Feliciano de Oliveira e Azevedo [1]

[1] Carlos Chagas Filho Institute of Biophysics, Federal University of Rio de Janeiro, Brazil
[2] National Institute Quality Control In Health, Oswaldo Cruz Foundation, Brazil

INTRODUCTION & AIM

The irregular disposal of effluents and agropastoral waste promotes artificial eutrophication, favoring the proliferation of cyanobacteria in water bodies. In addition to nutrients, antibiotics frequently reach these environments, further limiting water quality and impacting aquatic biota. During the SARS-CoV-2 pandemic in Brazil, the indiscriminate use of azithromycin (AZT) significantly increased its concentrations in water bodies, with concentrations reaching up to 2.85 µg L^{-1}, a value four times higher than that reported before the pandemic. This study investigated the effect of environmentally relevant concentrations of AZT on the feeding behavior of the zooplankton *Daphnia similis* in the presence of the toxic cyanobacterium *Microcystis aeruginosa* (LETC-MC-25).

METHOD

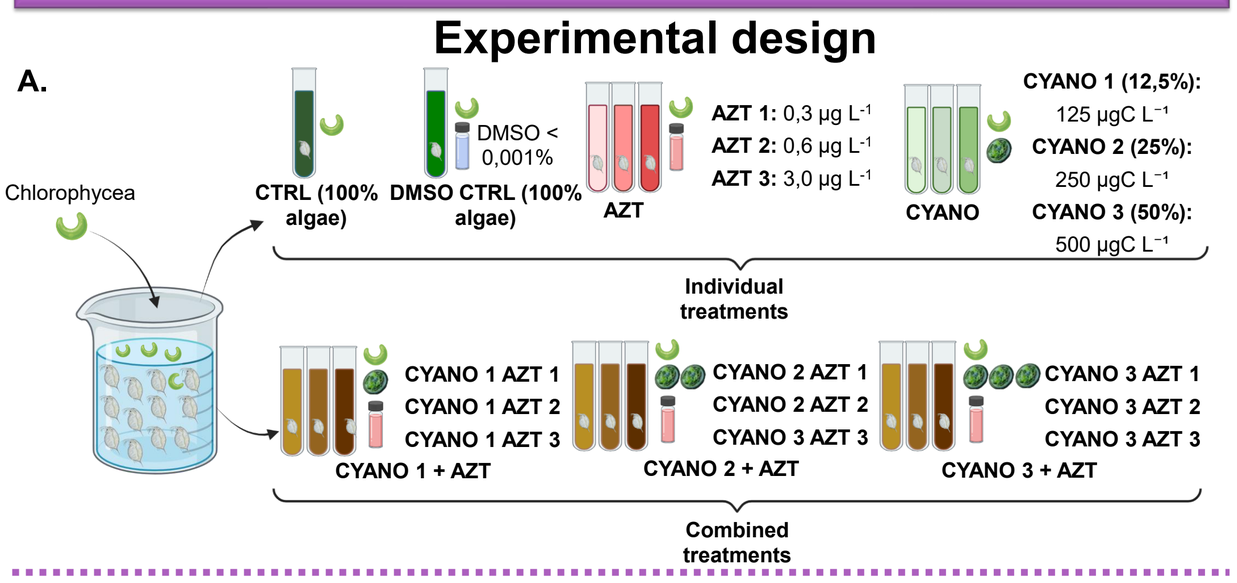

Figure 1: Experimental design with chlorophyceae, cyanobacteria, and AZT treatments, under conditions with and without animals, for clearance rate (CR) analysis using PHYTO-PAM

RESULTS & DISCUSSION

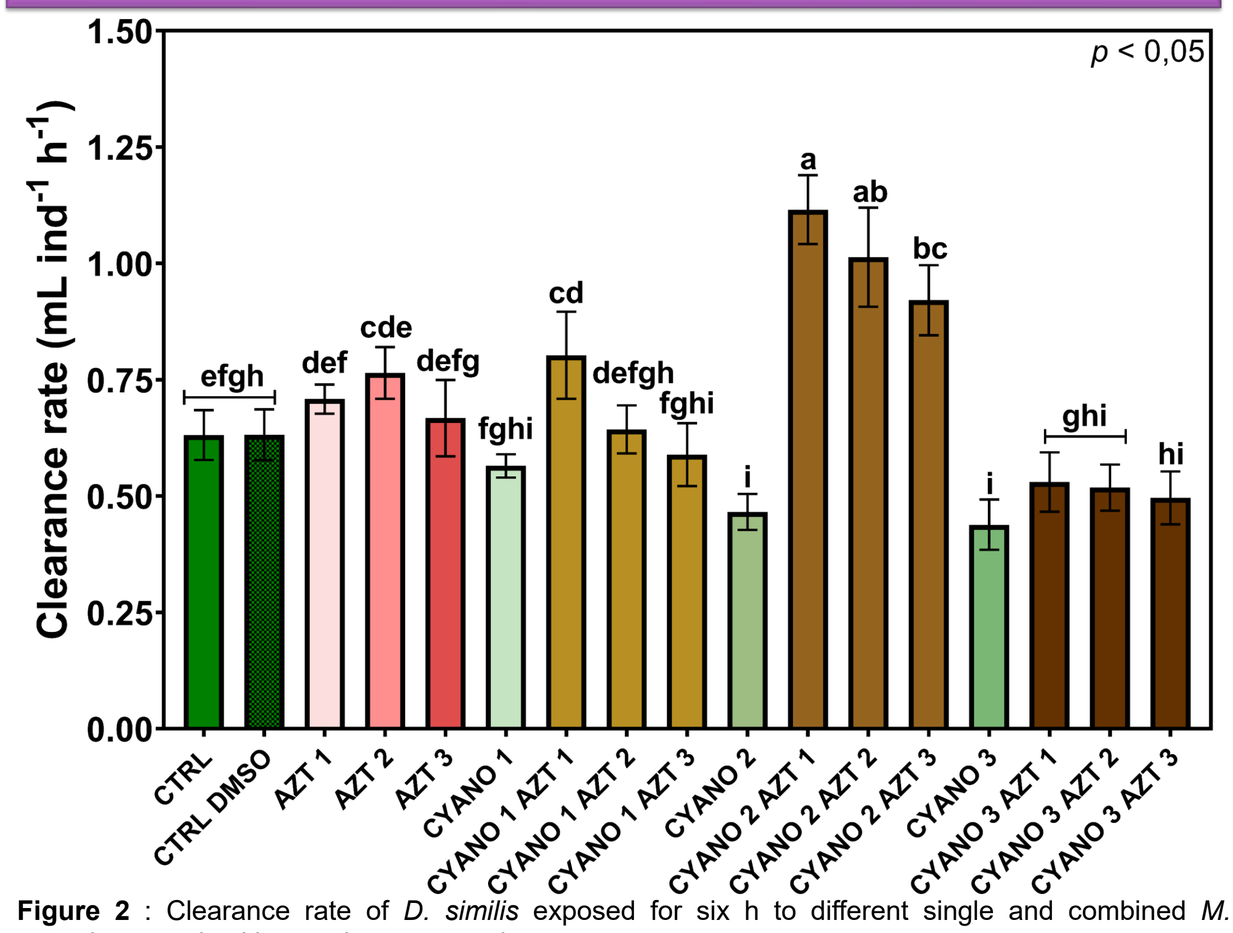

Figure 2 : Clearance rate of *D. similis* exposed for six h to different single and combined *M. aeruginosa* and azithromycin concentrations.
*Different letters represent statistical differences

Isolated exposure to AZT did not significantly alter the feeding behavior of the organisms. In contrast, a single exposure to *M. aeruginosa* reduced the clearance rate by up to 34%. However, in combined exposures, a significant increase in clearance rates was observed, indicating greater consumption of toxic cells in the presence of the antibiotic. This increase was 16% for 125 µgC L^{-1} of *M. aeruginosa* combined with 0.3 µg L^{-1} of AZT, and between 33.7% and 61.8% for 250 µgC L^{-1} of *M. aeruginosa* combined with 0.3-3.0 µg L^{-1} of AZT.

CONCLUSION

These results suggest that azithromycin enhances the consumption of toxic cyanobacteria, increasing the risk of exposure to their toxins. Therefore, it is essential to investigate the combined effects of antibiotics and cyanobacteria on non-target species.