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INTERACTION OF CARBON NANOTUBE AND CELLULOSE NANOFIBER WITH ALGALCELLS KLEBSORMIDIUM FLACCIDUM

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Multi-walled carbon nanotubes (MWCNTs) and cellulose nanofibers (CNF) are noteworthy nanoparticles (NPs), which encompass a number of potential applications, being used in water treatment, cosmetics, as well as reinforcement materials, biosensors and medical equipment. However, with the rise of nanotechnologies, the risk of contamination of aquatic ecosystems with NPs is increasing. Thus, the aim of this study was to evaluate the MWCNT and cotton CNF toxicological effects on freshwater green microalgae *Klebsormidium flaccidum*. *K. flaccidum* was grown in sterile *Bold's Basal* (BB) culture medium at pH 7.4 at a controlled temperature of 20.0 ± 0.5°C and luminosity of 50-80 µmol m^{-2} s^{-1} photosynthetic photon flux. Appropriate concentrations of each nanomaterial stock solution (1, 50 and 100µg ml^{-1}) were added to a microalgal culture in the exponential growth phase and incubated for 24, 48, 72 and 96 hrs. Cell viability was measured by a trypan blue dye exclusion test. In order to evaluate morphological, cellular ultrastructure changes and interaction between NPs and *K. flaccidum*, we analyzed microalgae cells by Scanning electron microscopy (SEM) after 48 h of contact with MWCNT and cotton CNF (100 µg ml^{-1}). Data were analyzed by ANOVA and differences among means were compared by the Student–Newman–Keuls' test using the general linear model by SAS version 9.1. Differences between different groups were considered statistically significant at $P < 0.05$. NPs significantly decreased cell viability ($P < 0.05$), depending on concentration and time (Fig. 1). The cell shrinkage was noted on the cells treated with both MWCNTs and cotton CNFs (Fig. 2B and 2C). In conclusion, we have demonstrated that exposure to MWCNTs and to cotton CNFs affects cell viability and algal cell morphology.

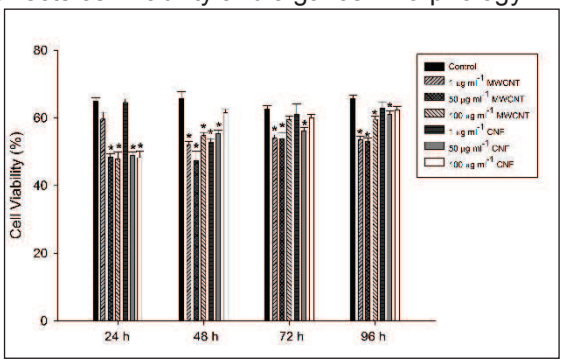

*Fig. 1 – Effect of MWCNTs or CNF on cytotoxicity of K. flaccidum in vitro cultured in BB medium. *Asterisks denote a significant difference from the control group. Calculated probability (*P < 0.05).*

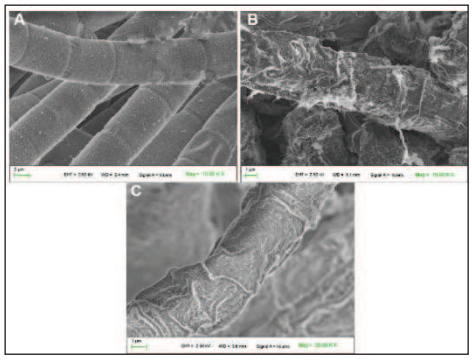

Fig. 2 – SEM images of K. flaccidum exposed to 100 µg mL^{-1} MWCNTs or cotton CNF for 48h in BB medium. A: Control; B: MWCNTs; C: CNF.

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