COMPARATIVE HEPATOTOXICITY ASSESSMENT OF A MAGNETIC COLLOIDAL SUSPENSION CONTAINING OLEIC ACID-DOUBLE FUNCTIONALIZED IRON OXIDE NANOPARTICLES IN 2D AND 3D LIVER MODELS

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INTRODUCTION

Magnetic iron oxide nanoparticles (MIONPs) exemplify one of the most studied classes of materials in biomedicine, distinguished by unique physicochemical properties, low toxicity, innate therapeutic activity, and various applications such as targeted drug delivery, hyperthermia, tissue repair, and imaging. To further ensure their proper stability for biomedical use, the field has gradually progressed toward functionalized MIONPs, often achieved through surface modification with coatings such as oleic acid (OA). Although the safety of MIONPs has been widely explored previously, few studies have researched the potential toxicity of MIONPs following OA-coating.

AIM OF THE STUDY

This study aimed to investigate the *in vitro* hepatotoxicity of a colloidal suspension containing double-layer OA-coated MIONPs (sample MCS_OA) obtained through combustion for potential therapeutic applications.

MATERIALS AND METHODS

This aim was achieved following a 24 h MCS_OA treatment of HepG2 cells cultured as monolayers and spheroids, which had previously served as experimental models in nanotoxicity screenings.

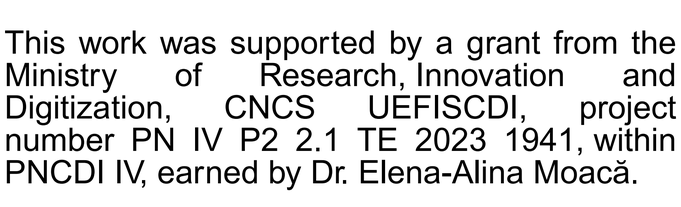


Figure 1. Schematic illustration of the main materials and methods applied in the present study.

CONCLUSION

MCS_OA was found to induce hepatotoxicity in vitro only at high concentrations, while low MCS_OA doses lacked cytotoxic potential in these liver models.

ACKNOWLEDGEMENT

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RESULTS

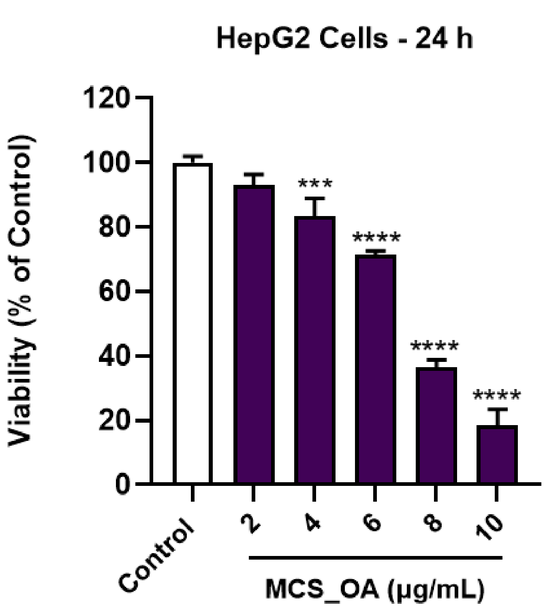


Figure 2. Viability of HepG2 cells after 24 h of treatment with MCS_OA (2, 4, 6, 8, and 10 µg/mL). The results show viability percentages (%) normalized to control and expressed as means ± standard deviation of three experiments performed in triplicate. The statistical differences between control and treated groups were analyzed using the one-way ANOVA and Dunnett's multiple comparisons tests (*p<0.001; **** p<0.0001).**

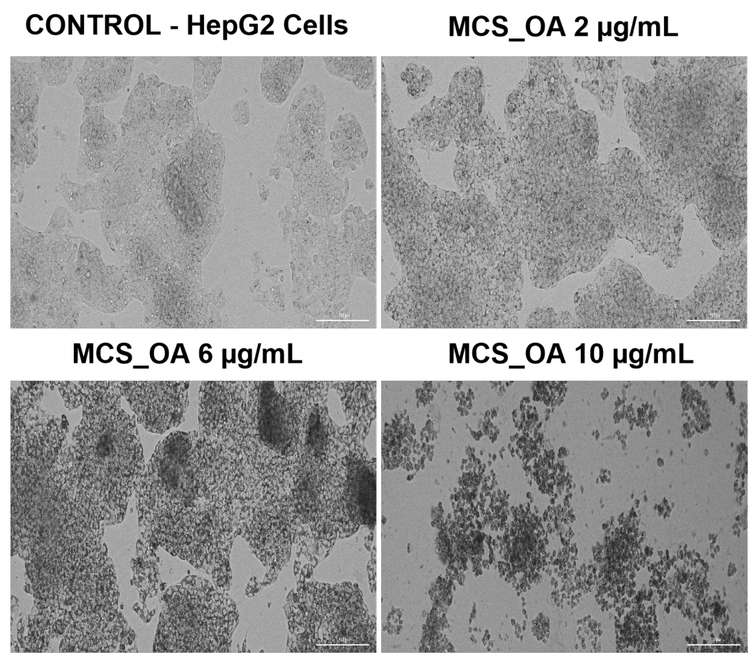


Figure 3. Representative images illustrating the morphology and confluence of HepG2 cells post-treatment with MCS_OA (2, 6, and 10 µg/mL) for 24 h.

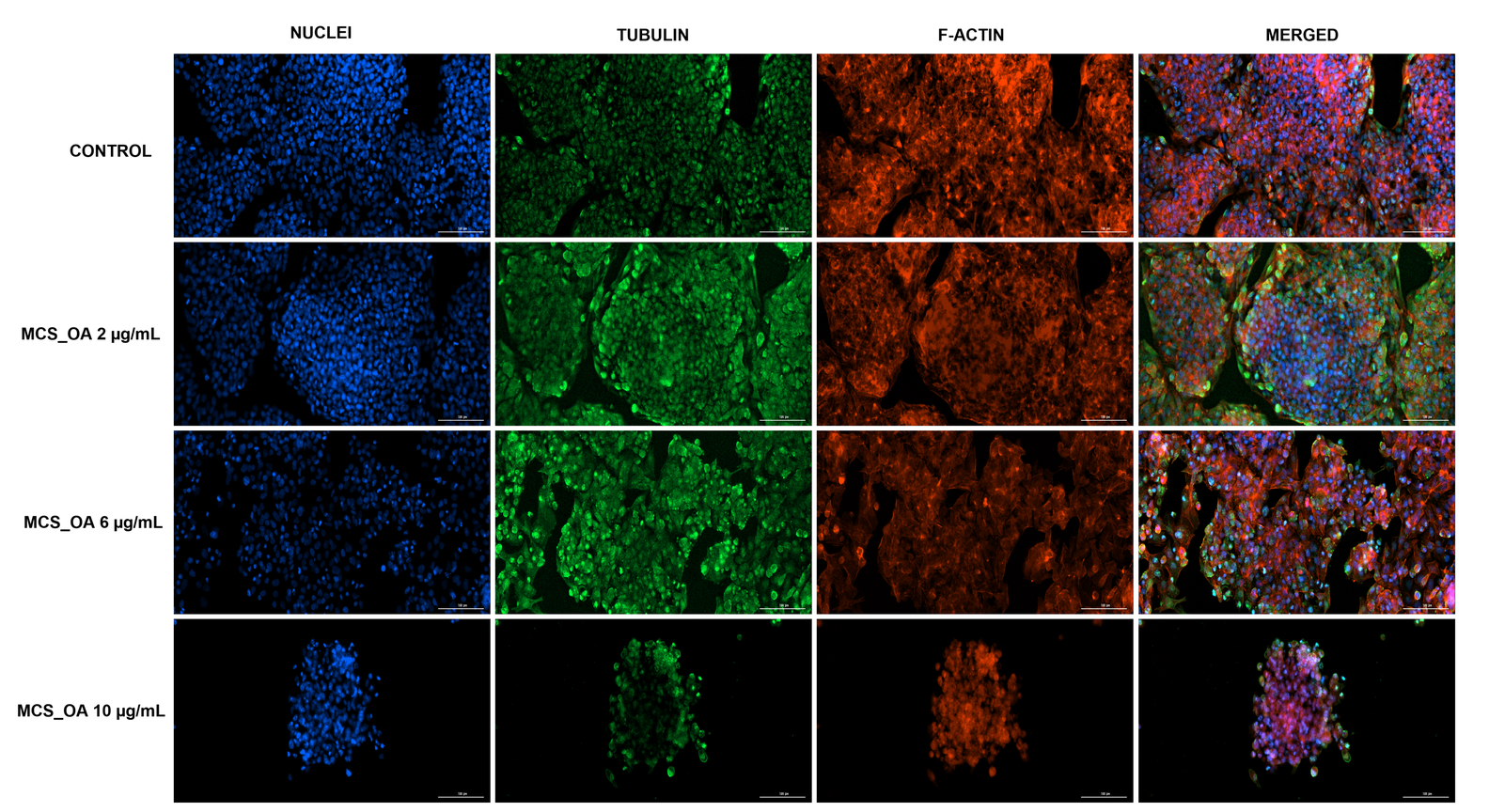


Figure 4. Representative images showing the aspect of nuclei, tubulin and F-actin of HepG2 cells post-treatment with MCS_OA (2, 6, and 10 µg/mL) for 24 h.

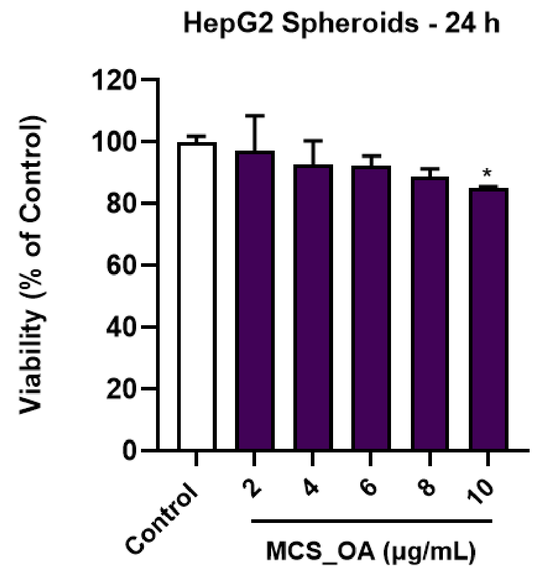


Figure 5. Viability of HepG2 spheroids after 24 h of treatment with MCS_OA (2, 4, 6, 8, and 10 µg/mL). The results show viability percentages (%) normalized to control and expressed as means ± standard deviation of three experiments performed in triplicate. The statistical differences between control and the treated groups were analyzed using the one-way ANOVA and Dunnett's multiple comparisons tests (*p<0.05).

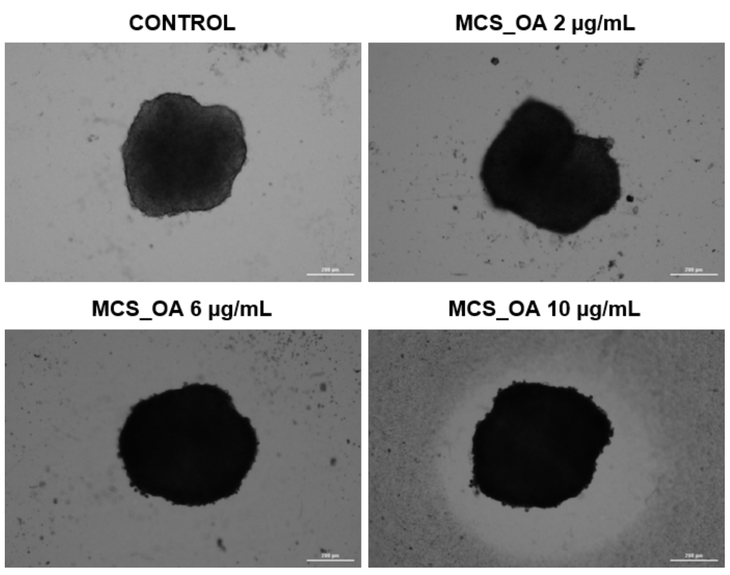


Figure 6. Representative images illustrating the morphology and confluence of HepG2 spheroids post-treatment with MCS_OA (2, 6, and 10 µg/mL) for 24 h.

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