



Mesoporous Silica Nanoparticles as a Promising Carrier for the Enhanced Delivery of Fenbendazole

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Introduction

Drug repositioning is a promising strategy in the pre-clinical process of new drug development in terms of saving time and cost. In recent years, the repositioning of anthelmintics, e.g., fenbendazole (FBZ), for the treatment of cancer has received considerable attention. However, its low water solubility and consequently low bioavailability limit its clinical application as a potential anticancer drug [1]. mesoporous silica nanoparticles (MSNPs) (e.g., Mobil Composition of Matter Number 41 (MCM)) as a drug carrier, can improve the water solubility of drugs [2].

Objectives

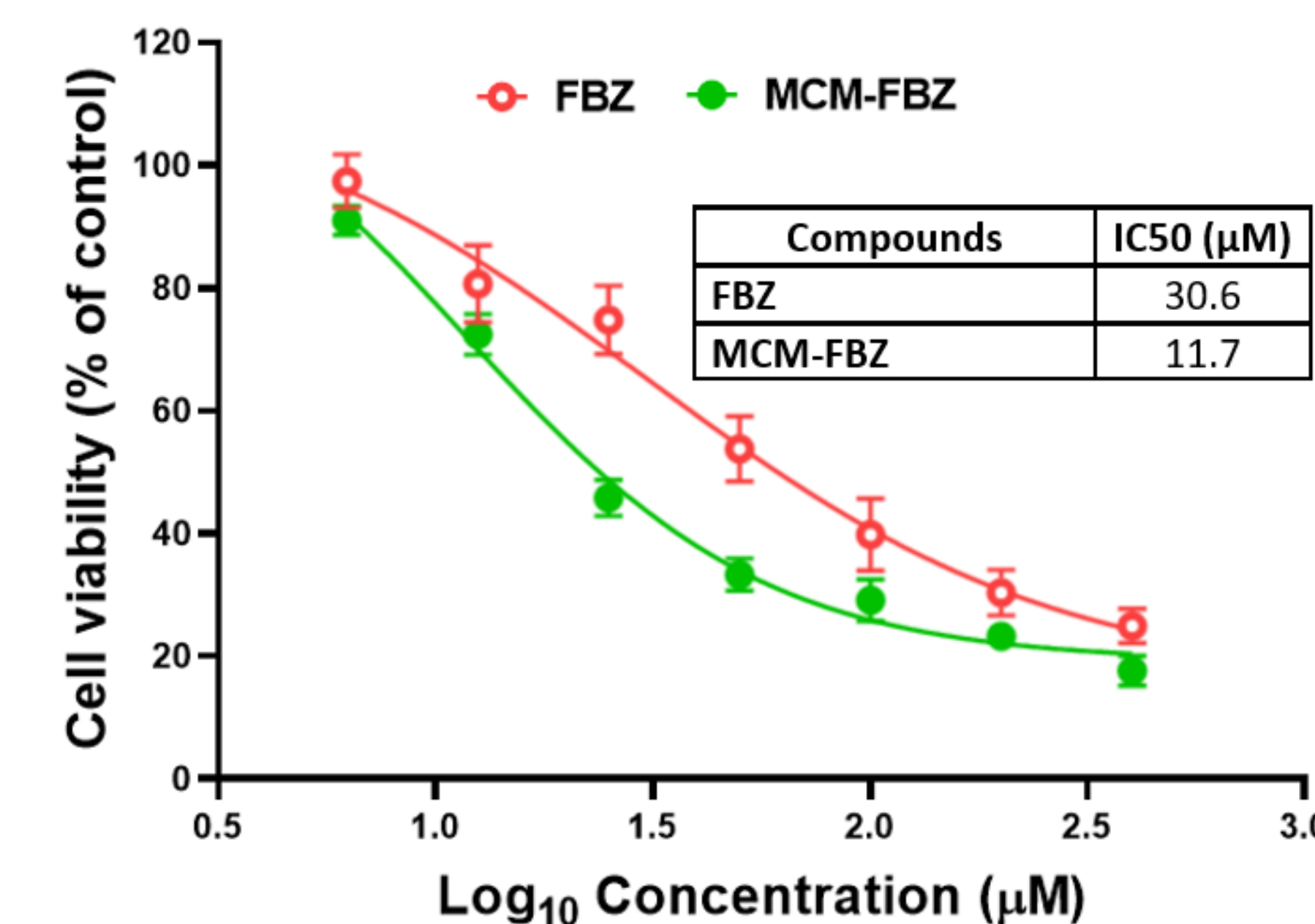
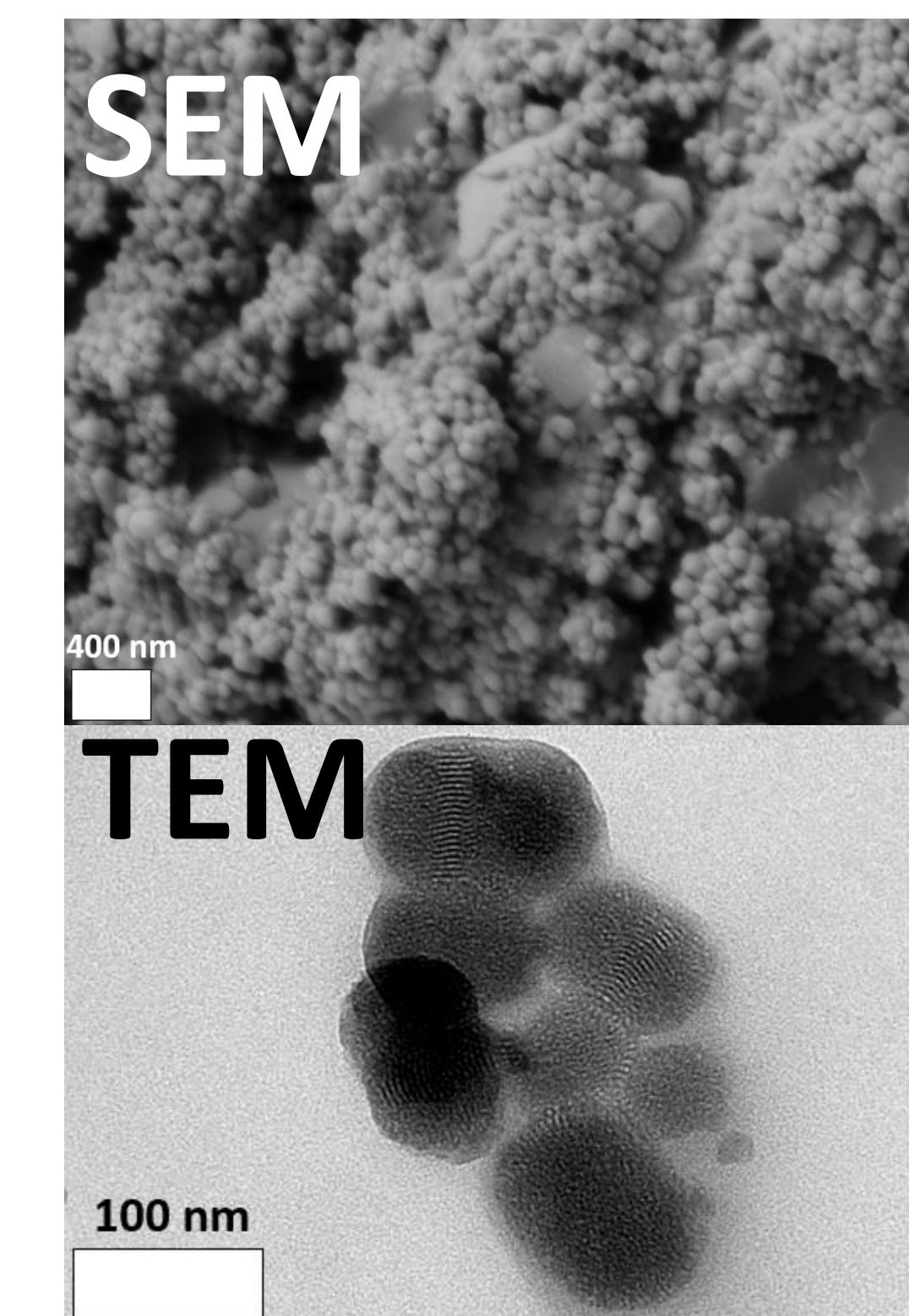
Considering the potency of MSNPs to improve the therapeutic effects of the drugs, the study aimed to load FBZ into the nanoparticles to improve its therapeutic effects.

Methods

In this study, MCM NPs were synthesized according to the method by Talavera-Pech *et al* [3]. Next, FBZ was loaded into MCM, and the nanoparticles were characterized to determine their size, size distribution, zeta potential, morphology, and drug loading capacity. In addition, the nanoparticles' cytotoxicity effects against human prostate cancer PC-3 cells were assessed.

Results and Discussion

The nanoparticles had the drug loading efficiency, size, and zeta potential of 17.2%, 366.3 ± 6.9 nm, and 24.7 ± 0.4 mV, respectively. The NPs released FBZ in a controlled manner. In addition, the formulation could increase the cytotoxicity effects of FBZ by 3.8-fold. The NPs could promote ROS production by 1.3-fold compared to FBZ.



Limitations

Due to COVID-19 pandemic-related quarantine and situation, access to the labs has been limited.

Conclusions

Overall, the results demonstrated that MSNPs were a promising carrier for FBZ delivery to PC-3 cells and suggested evaluating the efficacy of the formulation *in vivo*.

References

1. Alavi, *et al.* (2021).. Saudi Pharmaceutical Journal: SPJ, 29(5), 434.
2. Esfahani, *et al.* (2021).. ACS Biomaterials Science & Engineering.
3. Talavera-Pech, *et al.* (2019). 11(3), 1547-1555.