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Abstract

Porous Materials as Platforms for the Delivery of Polyphenols †

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Drug delivery systems are intensively studied for a wide range of biomedical applications [1–3]. A special class of materials is related to porous materials, which have the ability to host and release biological active agents (BAAs). The release of biological active agents can be tuned according to needs. Mesoporous silica has a history of about 30 years and can be used for the release of a wide range of BAAs. The release is dependent on the size of the pores and can be further tuned based on the surface functionalization [4].

Starting from the advantages of the mesoporous silica supports, innovative drug delivery systems can be developed in order to obtain controlled, targeted drug delivery systems that are able to maintain the therapeutic needs of the BAAs (Figure 1). In this work, several examples of drug delivery systems based on mesoporous silica and different polyphenols will be discussed, highlighting the potential of their use in the treatment of different diseases, and especially, in the treatment of dysbiosis.

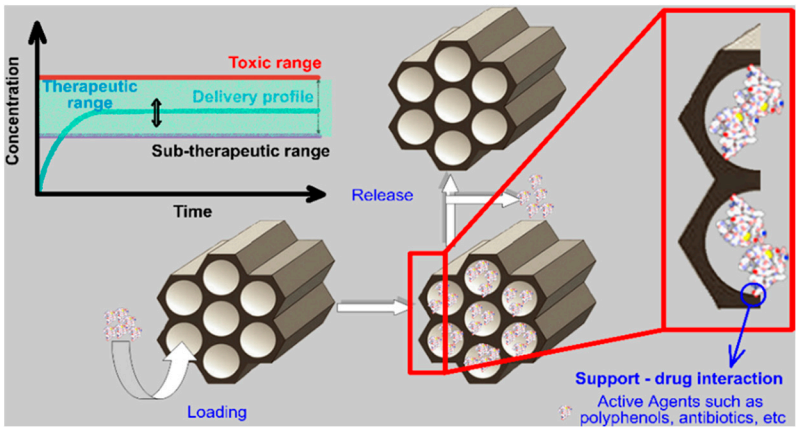

Figure 1. Mesoporous silica-based drug delivery system for the treatment of dysbiosis.

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References

1. Sonmez, M.; Ficai, D.; Ficai, A.; Alexandrescu, L.; Georgescu, M.; Trusca, R.; Gurau, G.; Titu, M.A.; Andronescu, E. Applications of mesoporous silica in biosensing and controlled release of insulin. *Int. J. Pharmaceut.* **2018**, *549*, 179–200. [CrossRef] [PubMed]
2. Popescu, S.; Ardelean, I.L.; Gudovan, D.; Radulescu, M.; Ficai, D.; Ficai, A.; Vasile, B.S.; Andronescu, E. Multifunctional materials such as MCM-41/Fe3O4/folic acid as drug delivery system. *Rom. J. Morphol. Embryol.* **2016**, *57*, 483–489. [PubMed]
3. Gunduz, O.; Yetmez, M.; Sonmez, M.; Georgescu, M.; Alexandrescu, L.; Ficai, A.; Ficai, D.; Andronescu, E. Mesoporous Materials Used in Medicine and Environmental Applications. *Curr. Top. Med. Chem.* **2015**, *15*, 1501–1515. [CrossRef] [PubMed]
4. Kresge, C.T.; Leonowicz, M.E.; Roth, W.J.; Vartuli, J.C.; Beck, J.S. Ordered mesoporous molecular sieves synthesized by a liquid-crystal template mechanism. *Nature* **1992**, *359*, 710–712. [CrossRef]