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Proceedings

Editor: Ivan Spasojević

Technical support: Jelena Korać Jačić

Cover design: Zoran Beloševac

Publisher: Faculty of Chemistry, Serbian Biochemical Society

Printed by: Colorgrafx, Belgrade

Serbian Biochemical Society

Eleventh Conference

Scientific meeting of an international character

September 22nd and 23rd, 2022, Novi Sad, Serbia

“Amazing Biochemistry”

Mesoporous silica nanoparticles improve the antitumour activity of cisplatin-acetylated caffeic acid conjugate

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Severe side effects and drug resistance are the main obstacles in clinical usage of cisplatin. The preparation of platinum(IV) prodrugs and the use of nanoparticles might be potential paths for overcoming the problem of toxicity. Caffeic acid is plant metabolite with many pharmacological effects such as antiinflammatory, anticancer, and hepatoprotective¹. In this study, a hybrid molecule build up from cisplatin and acetylated caffeic acid, free and loaded into nanoparticles, SBA-15, was evaluated as an anticancer agent. Cytotoxic studies revealed that free conjugate possessed similar activity as cisplatin alone against 4T1 cell line, while upon immobilisation in SBA-15, much improved cytotoxicity was noticed. Further investigation showed that these compounds induced caspase-dependent apoptosis and an accumulation of cells in the subG compartment of the cell cycle. Intensive production of oxygen and nitrogen radicals was also observed. Also, survived clones lost their dividing potential. Mode of action of this cisplatin-caffeic acid conjugate against 4T1 cells makes it valuable in further research, from the side of enhancement of its antitumour activity upon mobilisation into nanoparticles and potential reduced toxicity *in vivo*.

Acknowledgements

This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, grant number 451-03-68/2022-14/200007.

References

1. Kumar N, Goel N. Phenolic acids: Natural versatile molecules with promising therapeutic applications. *Biotechnol Rep* 2019;24:e00370.