INTRODUCTION

- Cervical cancer is the fourth most common cancer in women.
- 90% of the disease is caused by HPV.
- In 2018, 570 000 women were diagnosed with the disease worldwide and about 311 000 women died from the disease (WHO, 2018).
- Cisplatin is the standard chemotherapeutic agent, usually in combination, for treating cervical cancer.
- Usually given IV over hours, patients might develop tissue necrosis due to the incidence of extravasation. This can be prevented by local administration of the drug using hybrid aerogel microparticles as therapeutic systems.

AIM AND OBJECTIVES

- Improve chemotherapy approach by developing a model that locally delivers Cisplatin to the tumour tissues of the cervix, colon, rectum. The developed aerogel microparticles should be biodegradable, biocompatible and mucoadhesive, and is capable to be delivered intravaginally and intrarectally (in suitable formulations) and releases Cisplatin in a modified, controlled-release manner.

MATERIALS AND METHODS

Points included in the text:
- Synthesis: The hybrid aerogels were synthesized by sol–gel method. 1.17 g of gelatin was dissolved in 10 ml of DMSO and 5.4 ml of water under continuous stirring at 80°C and then a mix of 10 ml DMSO, 3 ml TMOS and 1 ml APTMS is added and stirred overnight. DMSO is then gradually replaced with Acetone for a period of 2 weeks after which a solution of 2.18 g PMDA dissolved in 100 ml DMAC was added. After 1 week, a solution of 100 mg Cisplatin dissolved in 100 ml DMSO was added to the alcool and kept in the dark for 2 weeks to allow for Cisplatin incorporation. The particles were degassed and dried under supercritical CO2.
- Porosimetry: The aerogel specific surface area (as) was determined by the BET method. The pore size and pore volume was determined from the N2 adsorption isotherm using the BJH method, using the Quantachrome NovaWin 200e instrument. The measurement tube was washed with Argon. 32.3 mg of Aerogels was used for the measurement, for 24 hours at 500°C.
- Morphology: The morphology of the aerogels was imaged by Scanning Electron Microscope (SEM) which also showed the aerogel micropores and its skeletal framework.
- Cytotoxicity: Cytotoxicity studies was carried out on HeLa cells in vitro. The particles were incubated with the cells over a period of 72h.

RESULT

Structural parameters of Silica-gelatin aerogels estimated by the BET and the BJH methods from N2 adsorption-desorption porosimetry data.

SEM images of the Silica gelatin aerogels

Unloaded SG antiproliferative activity on HeLa cells

Cisplatin antiproliferative activity on HeLa cells

Unloaded aerogels, pure cisplatin, and cisplatin-loaded aerogels tested against HeLa cells In Vitro.

DISCUSSION AND CONCLUSION

- These novel aerogel microparticles are mesoporous having micro- and macropores. The pores and the loaded drug is accessible for extracellular liquid. 15–40µm particles SG-Cpt.
- Cisplatin content is 10-15mg/g.
- The pristine aerogel particles are biocompatible with the cells (95-120% viability).
- There is a significant difference in the antiproliferative effect observed at the highest concentration of SG-Cpt when compared to the control (t-test; p <0.01). The highest concentration has approximately equivalent effect to the 0.5µg/ml free dose of cisplatin.
- The future goal is to formulate the system into suppositories which can be self-administered.

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