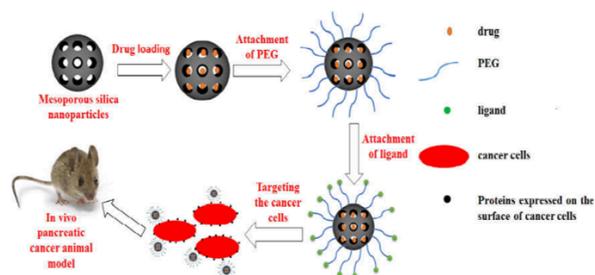


Drug-nanoparticle-polymer conjugate as a platform for targeted treatment of pancreatic cancer

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Specific problem being addressed: Pancreatic cancer is a disease of the pancreas and is one of the most difficult to detect and treat among all types of cancer, with a death percentage almost close to 79%. In fact, the five-year survival rate is less than 5% and this is the only cancer, for which the survival rate has not improved over the last 40 years. This is because ~80% of the pancreatic cancer cases were diagnosed when it spread to nearby organs, a stage where surgery is not possible. The commonly used treatment in pancreatic cancer is chemotherapy, which affects healthy cells too. In this project we aim to do a targeted delivery of drugs to cancer cells, and reduce the cost of treatment from ~lakhs to ~ a few tens of thousands of rupees.

Project summary: In our project we aim to do at first a *Targeted nanoparticle-based formulation for the delivery of chemotherapeutic drugs*. Curcumin is a natural drug extracted from turmeric, which shows an incredibly good anticancer property. Our primary *in vitro* results showed that curcumin performs much better than gemcitabine in killing pancreatic cancer cells, Mia-Paca-2. Delivering the gemcitabine with curcumin to the tumour site will therefore increase the anticancer potential of gemcitabine.



Polymeric implant for the delivery of chemotherapeutic drug: Intravenous delivery of chemotherapeutic drugs certain types of cancers like lung, breast can be effective it cannot be effective. Since pancreas is situated deep inside the body, it is hard for the free drug to reach the target. So, most of the administered drug, in the absence of any targeting, will diffuse in other parts of the body. Therefore, our proposed solution to pancreatic cancer treatment via a targeted

ligand on a nanoparticle-based formulation will circumvent that. In addition, a polymeric implant with the dual-drug combination can be placed at the tumour site with minimal surgery. It will prevent the metastasis of cancer cells to other parts of the body. They are equipped to release the drugs for more than a month. The schematic diagram of the nanoparticle formulation of the drug is shown in the figure. If successful, we aim to do clinical trials in future.

Impact of the innovation: The success of nanoparticle formulation and polymeric implant from this project can be translated to commercial use with the help of pharmaceutical companies. We will bring down the six months' cost of chemotherapeutic treatment of pancreatic cancer from Rs. 1.25 lakhs to a few tens of thousands of rupees. So, this will make a significant impact on the underprivileged section of our society, who otherwise cannot afford the treatment cost.