PLGA in treatment of liver fibrosis
Tianyun Zhao, Biomedical Engineering, University of Rhode Island
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Abstract—PLGA is the one of most successfully used biodegradable polymers in nanoparticle drug delivery development [1]. With this nanoparticle, we can improve the efficiency and limited the toxicity of the drug. Because of its property, it can be used to improve the treatment of liver fibrosis.

I. INTRODUCTION

PLGA is Poly (lactic-co-glycolic acid). It can be hydrolyzed to monomers, lactic acid and glycolic acid. They are endogenous and easily metabolized by the body via Krebs cycle, a minimal systemic toxicity is associated. PLGA has been proved by US FDA and European Medicine Agency(EMA) [1]. PLGA is a spheric molecule. The drug can be kept inside the sphere. The outside can be attached with targeted ligand. Liver fibrosis is a scar formation process that results from long-term liver injury. It can cause cirrhosis, liver failure and liver cancer. Sorafenib is used as anti-cancer drug. However, recent report and result from experimental liver fibrosis model shows that it can be used to treat hepatic fibrosis. [2][3]

II. METHODS

The experiment tested sorafenib-loaded PLGA NPs (because of its hydrophobic properties and biocompatibility) and PEG-PLGA NPs (it can reduce the size polydispersity and increase the stability of NPs in the blood circulation) to systemically treat liver fibrosis in CCI4-induced fibrosis models. [2]

In the experiment, they tested the drug encapsulation efficiency, tissue distribution and liver uptake compared with free sorafenib, empty PLGA NPs and PEG-PLGA NPs and normal condition. [2]

III. RESULTS

For controlled drug release test, they chose PEG-PLGA NPs (PEG-PLGA/PLGA = 10/0) and PEG-PLGA NPs (PEG-PLGA/PLGA = 5/5). The results show that PEG-PLGA releases faster than PEG-PLGA/PLGA NPs after long time while they are similar for short time.

Coumarin 6 was used as a tracer molecule to study the uptake of drug-loaded PLGA NPs. "In addition, NPs encapsulating coumarin 6 displayed similar size distributions, drug release profiles and pharmacokinetics as NPs containing sorafenib" [3]. The result shows the uptake of loaded NPs is much higher than free sorafenib.

The control group is mice after treating with CCI4 for 4 weeks to induce the liver fibrosis. The result shows that sorafenib-loaded PEG-PLGA NPs and PEG-PLGA/PLGA NPs at a high dose significantly decreased liver fibrosis. [2]

The toxicity test shows that sorafenib-loaded NPs only increases the toxin level a bit. It’s a safe drug delivery carrier.

IV. DISCUSSION

In this specific case of treating liver fibrosis, the PLGA nanoparticles shows a premising result that is can improve the using of sorafenib. However, it also shows that there is almost no different between PEG-PLGA NPs and PLGA NPs after comparing the influence of them. Next, what we can do is to find more appropriate polymers as PLGA itself can change its properties a bit by changing the ratio of the lactic acid and glycolic acid.

The development of drug delivery system is really impartment in medical field. With the polymer nanoparticles, the efficiency or change the solubility of the drug needed [4]. Also, with the development of the targeted ligand or some other identifying chains attached to the polymer nanoparticles. We can use NP in targeted drug delivery system. Decrease the level of toxicity and improve the efficiency of the drug further more.

REFERENCES