

Kidney Targeting Nanoparticles for Chronic Kidney Diseases

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Introduction

Many Americans are at risk of chronic kidney diseases. Such diseases would lower the kidney functionality, but treatments offered are not optimal.

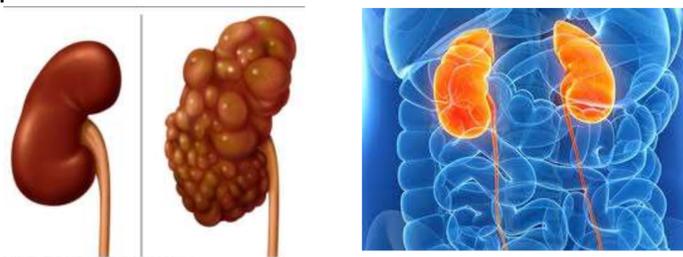


Figure 1: Left: A normal kidney, Right: A kidney with PKD [1]

Objective & Impact of Professor's Research

- Current treatments are either expensive or have major drawbacks on patients, so the research project focuses on testing nanoparticles to target therapeutics to the kidney.
- Other diseases the lab looks into include atherosclerosis and cancer, also prevalent diseases without optimal treatments.

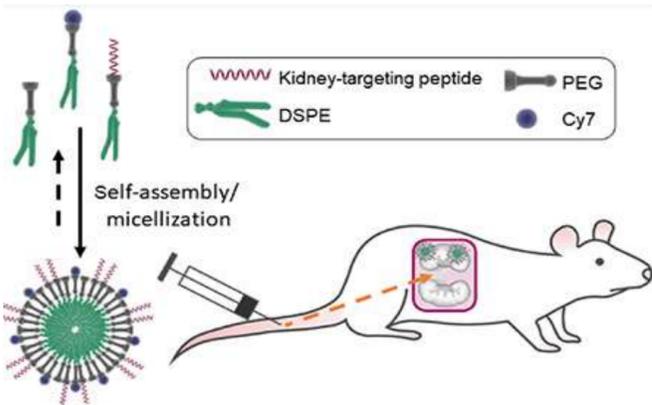


Figure 2 displays testing the self-assembling multimodal micelle nanoparticles on mice [3]

Methods

I have learned to use the application ImageJ to analyze different channels of kidney images to observe the effects of kidney targeting nanoparticles.

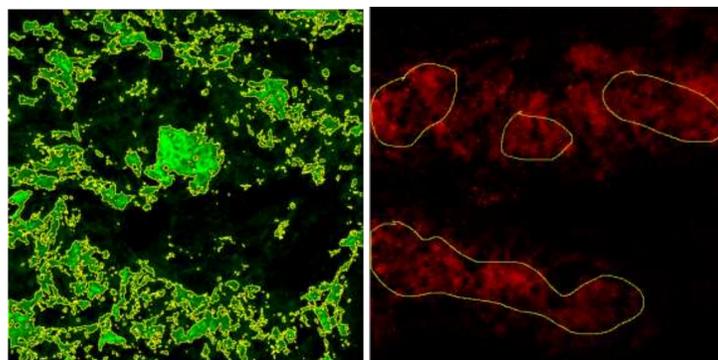
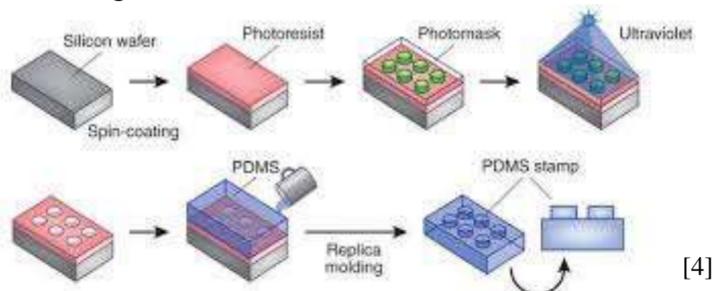


Figure 3: kidney cells channel traced by the color threshold option

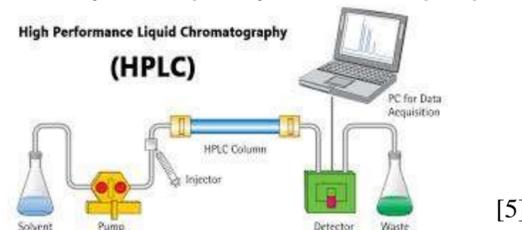
Figure 4: areas affected by nanoparticles traced by hand

Skills Learned

Microfabrication- create "stamps" to transfer molecules to substrates or make surfaces for cells to grow on



HPLC- analyze or purify chemical properties



Results

The kidney targeting nanoparticles affected more kidney cell area than non targeting particles on average.

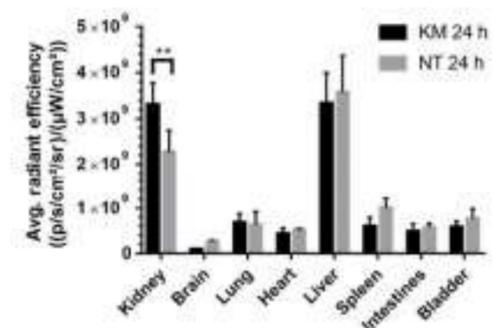
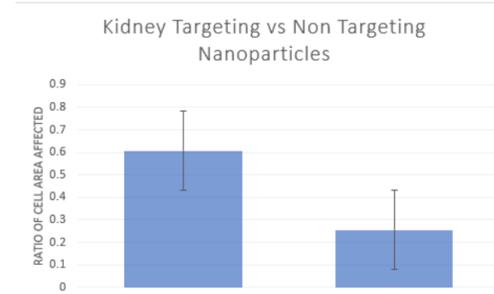


Figure 5: targeting nanoparticles affect the kidney more and the liver less than nontargeting particles [3]

How This Relates to Your STEM Coursework

AP Chemistry- Having lab work in the class helped me understand wet lab procedures. I could also understand HPLC and peptide synthesis better.

Biology Honors- The course mainly helped me with the anatomy of the kidney and understanding of diseases. It also helped me with the western blot technique

Advice for Future SHINE Students

My biggest advice would be to not be afraid to ask for help. The people at SHINE are always there to help you learn and gain the most experience you can.

You should also put enough time in to understand your research topic by reading the articles closely or researching the idea on your own.

Acknowledgements

I would like to thank Professor Chung and my mentor Jonathan Wang for guiding me through the internship. I would also like to thank my partner Ethan Lee and the SHINE team.

References

- [1] Mayo Clinic
- [2] National Institute of Diabetes and Digestive and Kidney Diseases
- [3] Wang, J., et al. Nano Research. (2018)
- [4] Darwin Microfluidics
- [5] Microbe Notes