

THE LEGENDS ENTREPRENEURIAL STUDENT AWARDS

Collagen Nanofiber- Based Drug Delivery System

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Nanomedicine

- ❖ Application of nanotechnology to the field of medicine
- ❖ Medicine on the molecular level
 - ❖ Ultra sensitive biosensors
 - ❖ Tissue engineering
 - ❖ Targeted drug delivery



Cancer Statistics

- ❖ Each year globally, 12.7 million learn they have cancer
- ❖ Each year globally, 7.6 million deaths
- ❖ As of 2009: 12.5 million afflicted by cancer in the U.S.
- ❖ Treatment: Chemotherapy
 - Nausea and Vomiting
 - Loss of Appetite
 - Fatigue

Current Treatments

Generic Name	Form ¹	Brand Name	Available as a Generic?
1. Dolasetron	Tablet	Anzemet	No
2. Granisetron	Tablet	Kytril	Yes
	Skin Patch	Sancuso	No
3. Ondansetron	Tablet	Zofran	Yes
	Dissolvable Tablet	Zofran ODT	Yes
4. Palonosetron ²	Injection	Aloxi	No

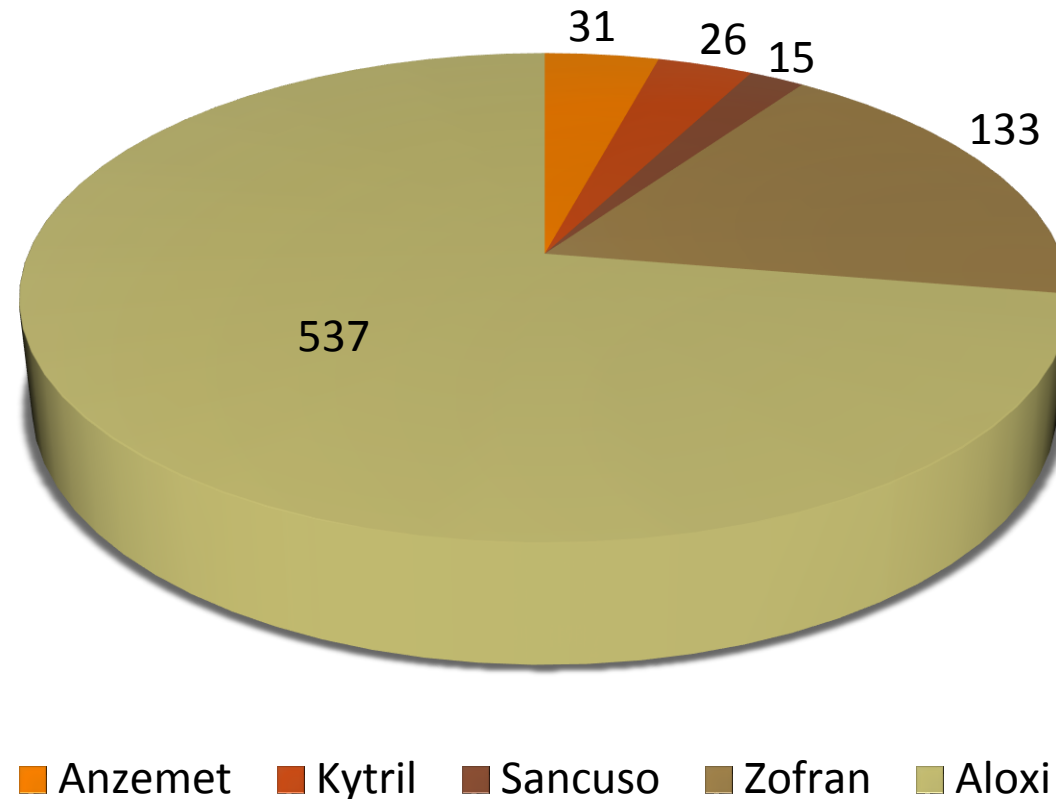
1. All four drugs are also available as injectable formulations, but we do not evaluate any of them in this report.

2. Palonosetron (Aloxi) capsules were approved in 2008, but they are not available because the manufacturer decided not to market it.

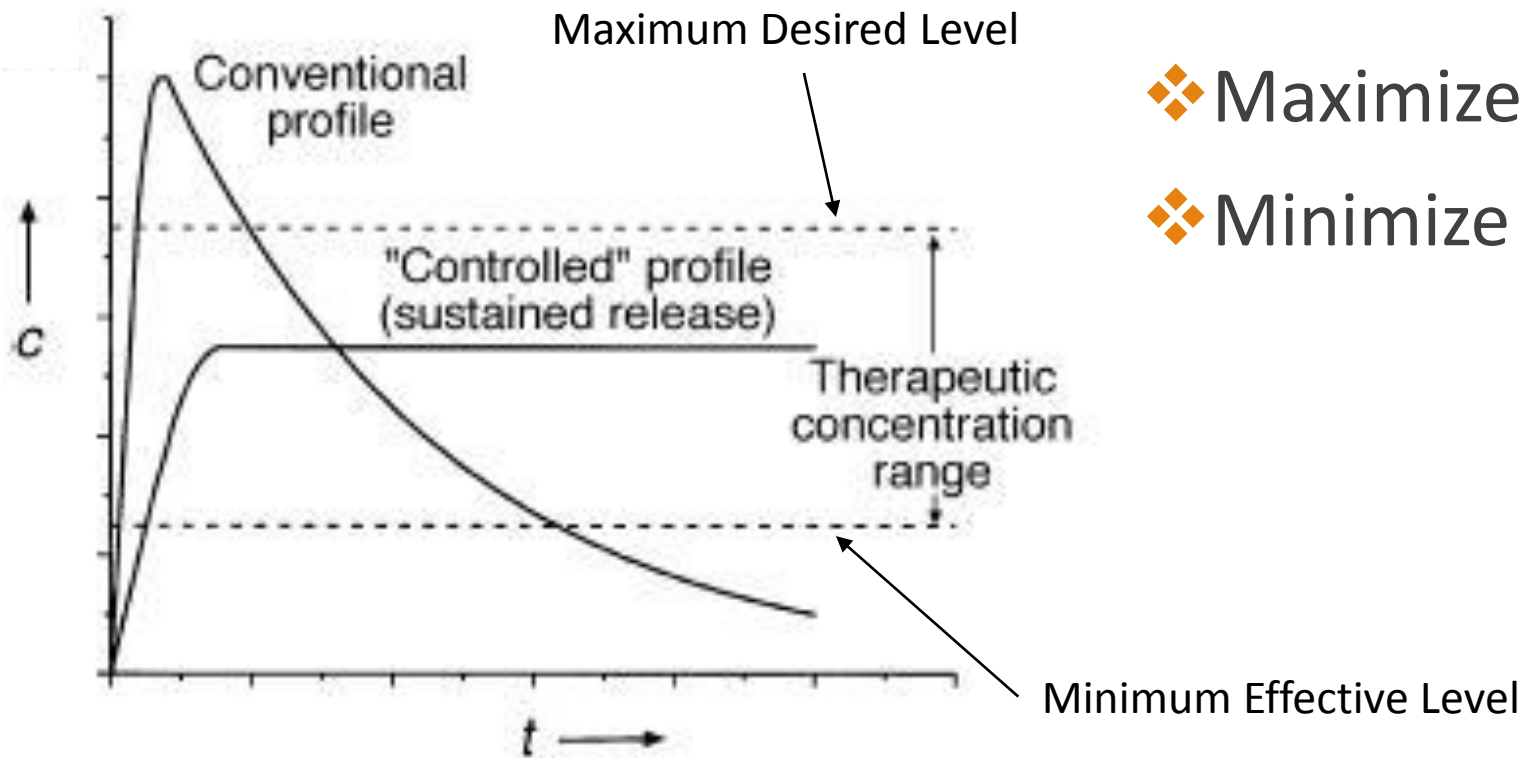
Anti-Nausea Medications

Sales: US \$ (million) 2010/2011

❖ Total of \$742 million spent on nausea medication



Drug Release Profile



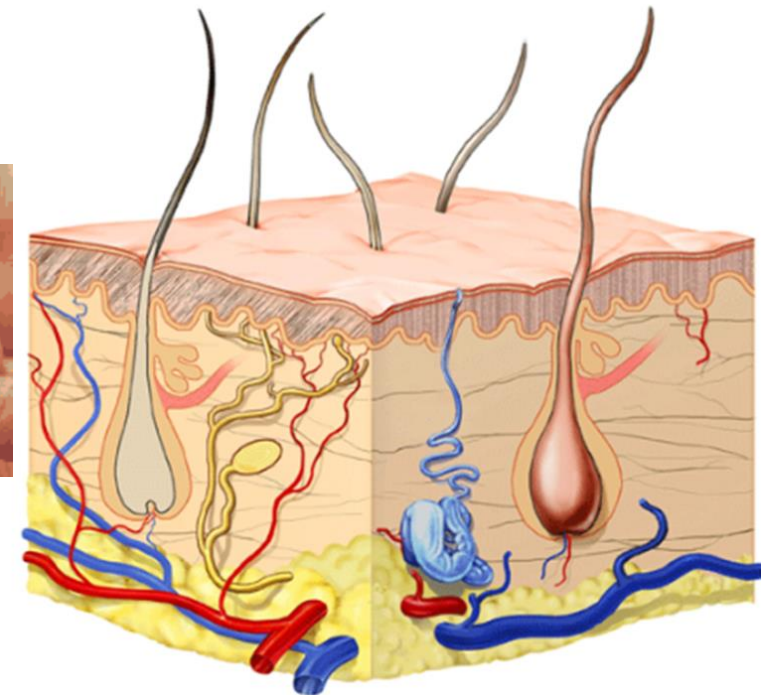
- ❖ Maximize drug effectiveness
- ❖ Minimize harmful side effects

Design Overview

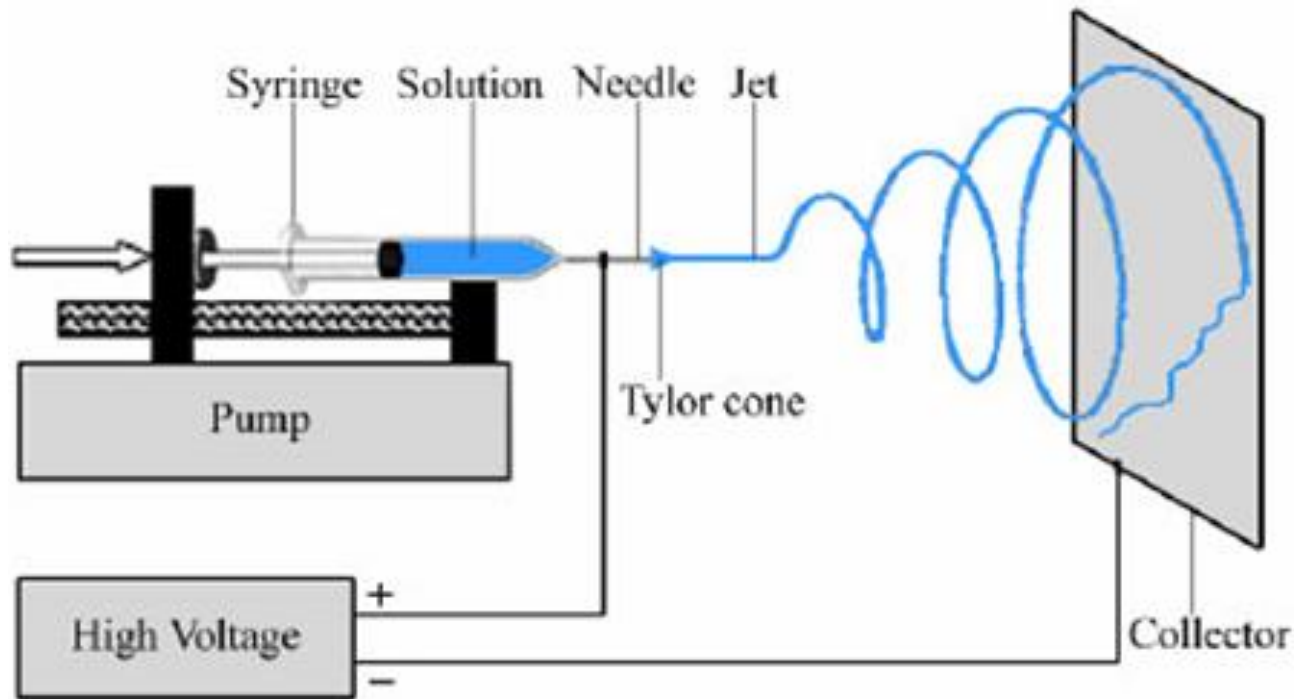
❖ Develop the technology to create an electrospun biodegradable patch embedded with drugs to be used as a subcutaneous drug delivery system.

❖ Advantages

- ❖ Bypass transport barrier
- ❖ Safely degrades in the body
- ❖ Control drug release profile



Electrospinning

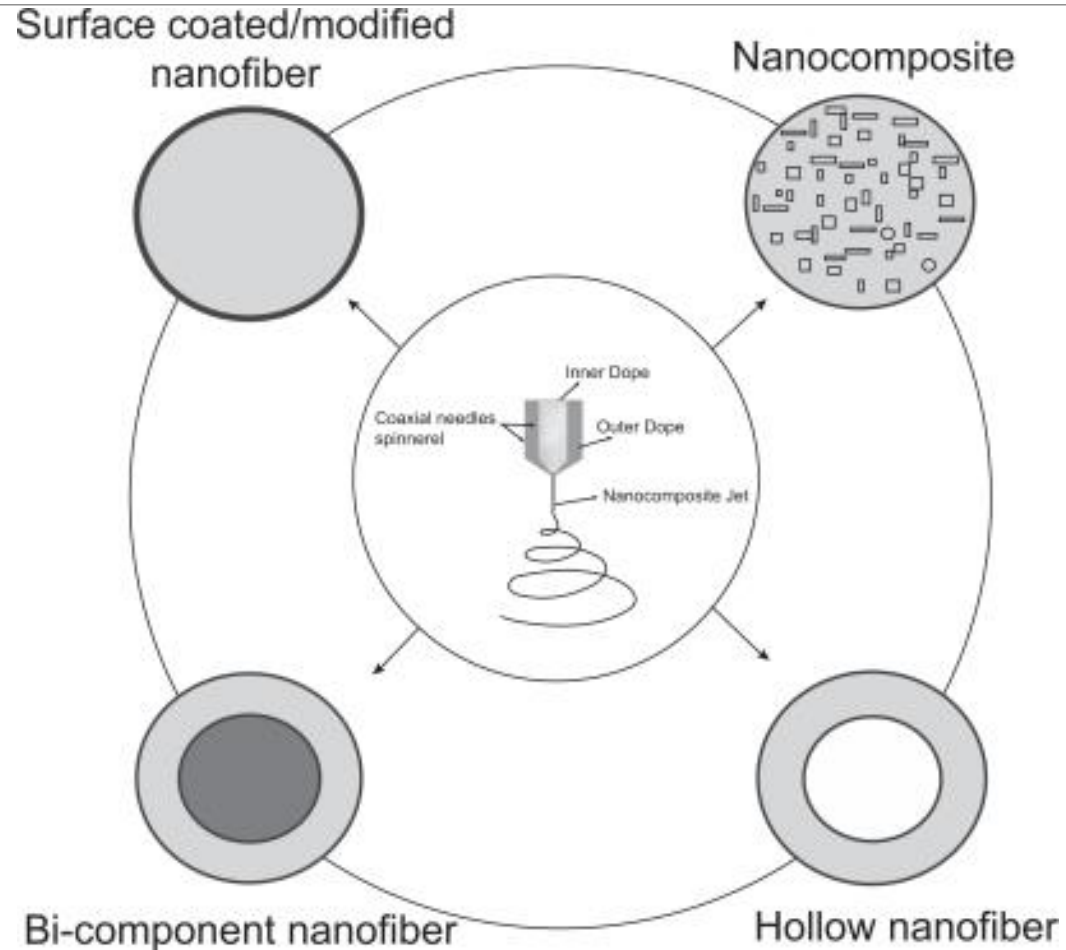


❖ Easily obtain desired characteristics

- Fiber diameter
- Fiber alignment
- Porosity
- Bulk shape/size

Drug Loading

- ❖ Post-processing
- ❖ Pre-processing
- ❖ Coaxial design
- ❖ Triaxial design

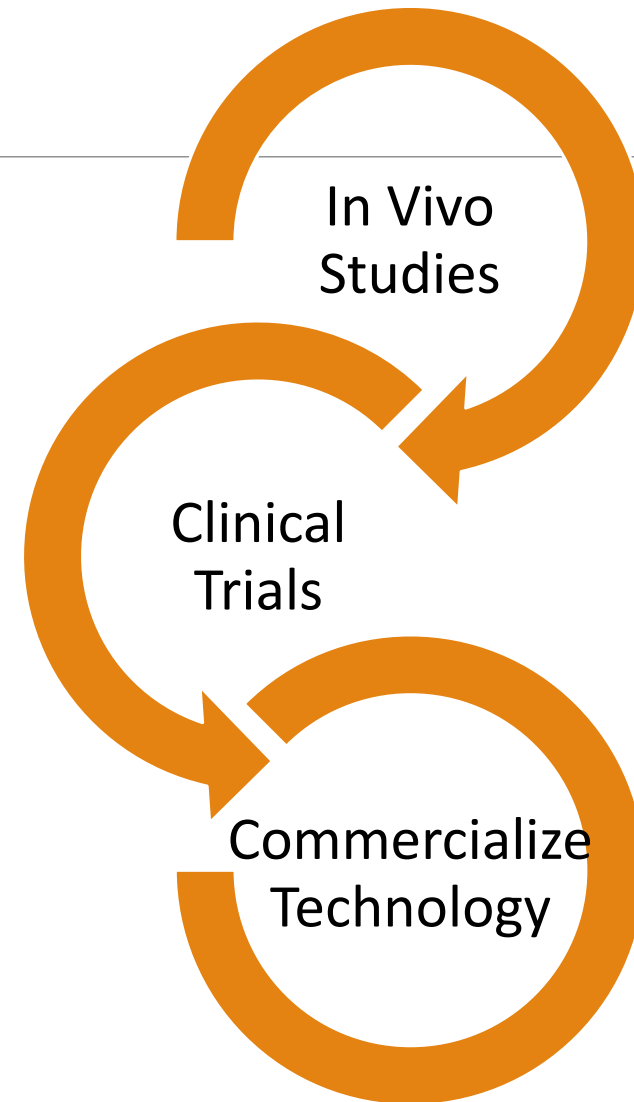
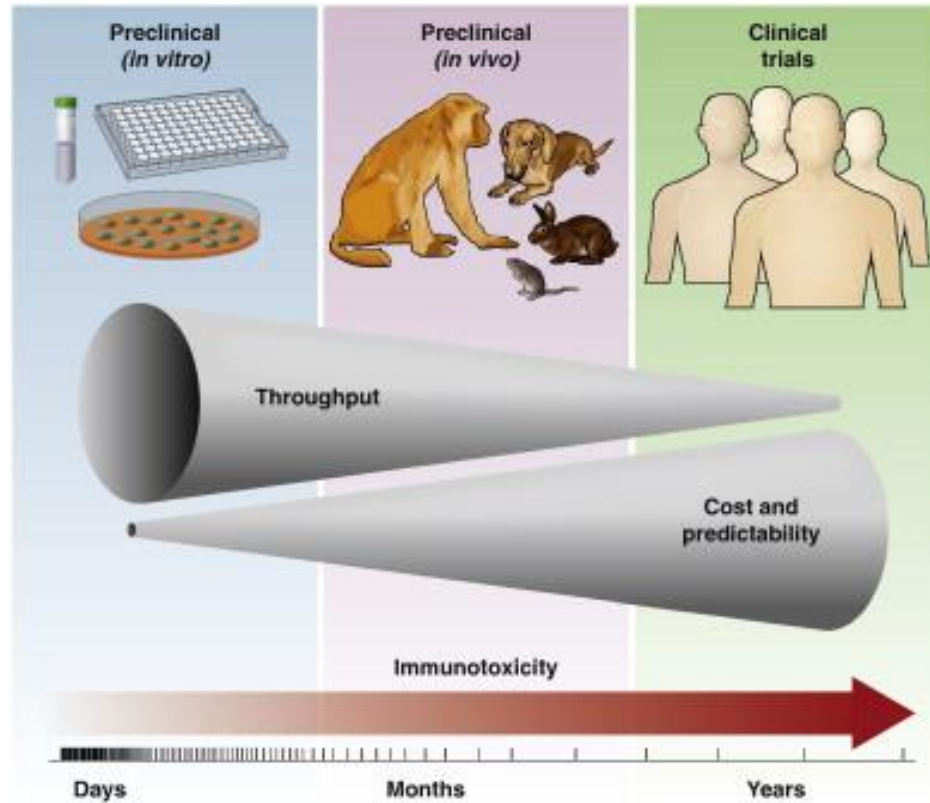


Design Characterization

- ❖ Drug release profile
- ❖ Drug integrity
- ❖ Weight change
- ❖ Molecular weight change

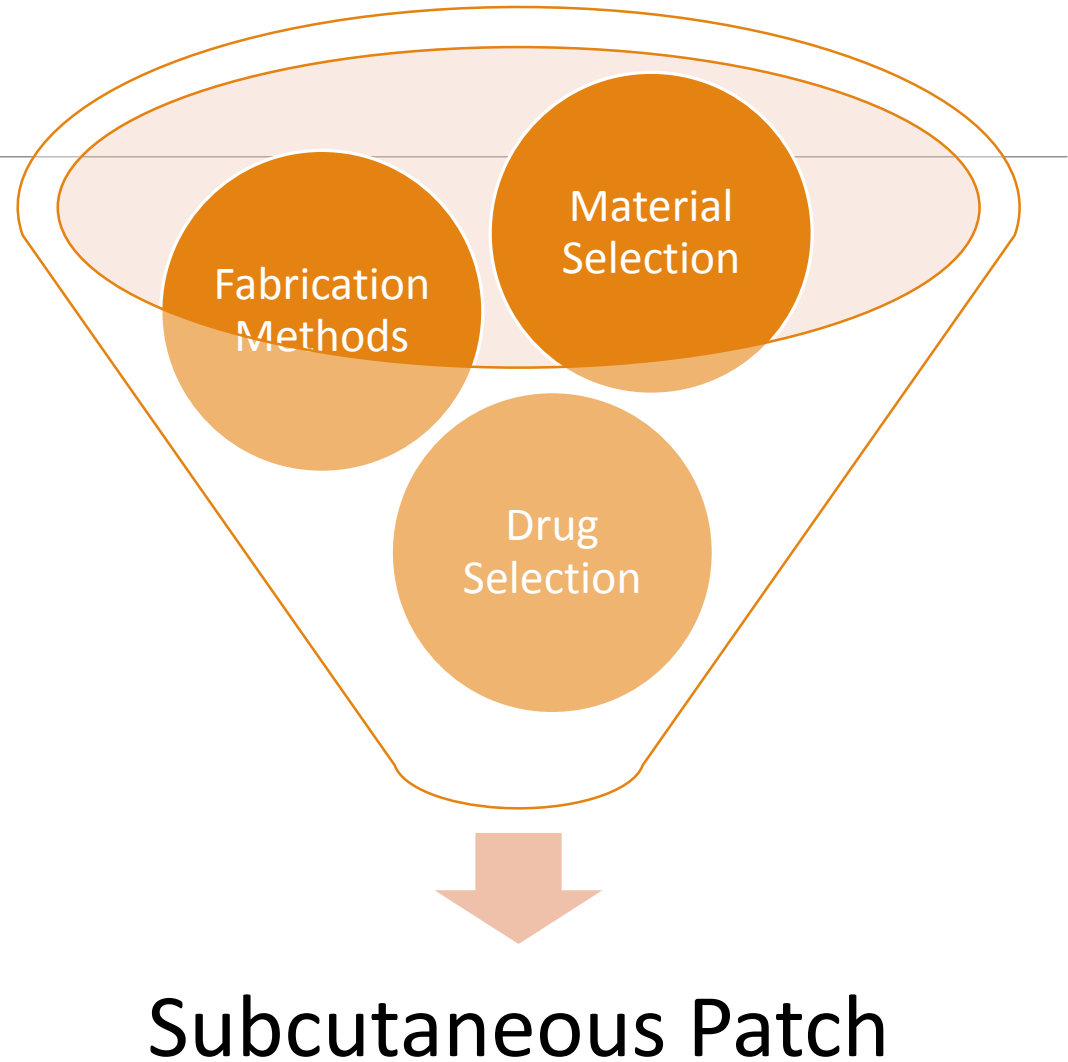


Future Direction



Future Potential

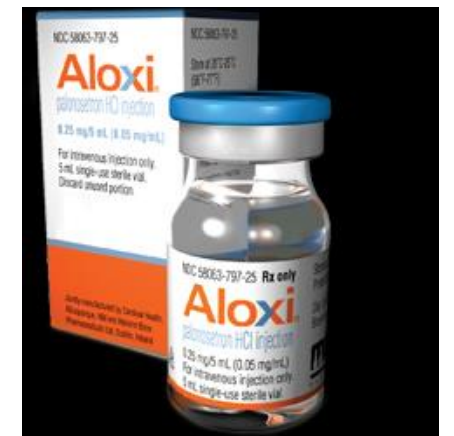
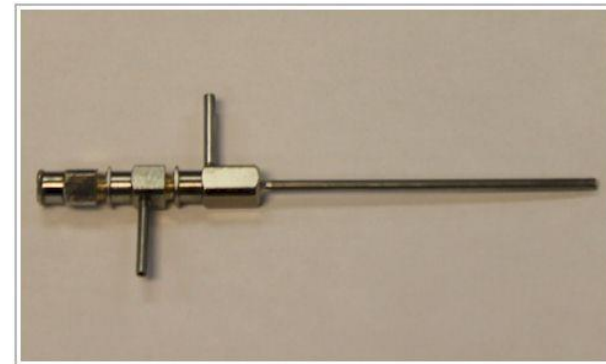
- ❖ Variety of materials
- ❖ Variety of drugs
- ❖ Subcutaneous patch
 - ❖ Anti-inflammatory
 - ❖ Retroviral
 - ❖ Cancer



Funding Needs

Collagen extraction materials	\$200
Collagen solvents for electrospinning	\$500
Electrospinning needles	\$700
Drugs such as Aloxi	\$1400
Drug release analysis tools	\$500
Total cost	\$3300

❖ Funding Request: \$2000



Team Members

- ❖ Dr. Yawen Li (PhD)
 - Lawrence Technological University
 - Academic Advisor
- ❖ Dr. Therese Bou-Akl (PhD)
 - Wayne State University
 - Technical Advisor
- ❖ Collaborators
 - Michelle Leach
 - Sam Tuck



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Questions?

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