How to understand and prevent the development of cardiac and pulmonary fibrosis:

The Use of mouse model

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Impact of cardiovascular diseases
1.2 million Americans have a heart attack every single year

Cardiovascular disease is the #1 cause of death in the U.S.

Major risk factors are:
Lipid levels
Diabetes
Sedentary lifestyle
Genetic factors
Smoking
AGE
What is cardiac remodeling?
Components of LV remodeling

**Cellular:**
- Macrophages
- Fibroblasts

**Extracellular:**
- MMPs
- Collagen
Can we predict cardiac remodeling?

Patients with same MI size

~75%

Reinforced infarct scar

~25%

Adverse LV remodeling
Progressing to heart failure

The 5-year mortality rate for heart failure is 50%
Use of mouse models to understand

Courtesy of Dr. Merry Lindsey
Our research...

Extracellular space

Cytoplasm

Caveolae

No signaling

Degradation

Dimeric TGF-β

TGF-β receptors

3d

14d

30d

Signaling → Remodeling

WT

Cav1−/−

Remodeling

Degradation

Caveolae

Degradation

Signaling

Remodeling
Use of mouse models to develop new therapy

Cryoinjury

0 1

Treatment 1

7

Treatment 2

14 days

Collection

Inflammation

Proliferation

Maturation
Cav1-  WT

scrambled peptide  14d long treatment

cav1 scaffolding domain peptide  7d long treatment
Lung Fibrosis

- Shortness of breath, cough
- 50-60 years old, men > women
- Infiltrates on chest x-ray
- Impaired gas exchange
- Poor prognosis (50% with 3-5 years)

**No treatment! No biomarkers!**
Development of therapeutic strategies

What is role of caveolin-1 driven senescence in lung fibrosis development. Could we use cav1 peptide as a therapeutic strategy?

Telomerase activator as potential treatment for lung fibrosis
Translational Research

Cardiac Project
- Human specimen
  - Cardiothoracic Surgeons
  - Immunologists

Lung Project
- Finding new biomarkers
  - Collagen degradation products
- Screening for new treatments
  - new compound
  - existing drugs
## Acknowledgment

### Cardiac Project

- **UTHSCSA**
  - Dr. M. Lindsey
  - Dr. J. Pal
- **Outside**
  - Dr. M. Entman (Baylor)
  - Dr. R. xShohet (UH)

### Lung Project

- **UTHSCSA**
  - Dr. J. Peters
  - Dr. A. Richardson
  - Dr. C. Orihuela
- **Outside**
  - Dr. H. Chapman (UCSF)
  - Dr. Thannickal (UAB)
  - Dr. Tam (UH)