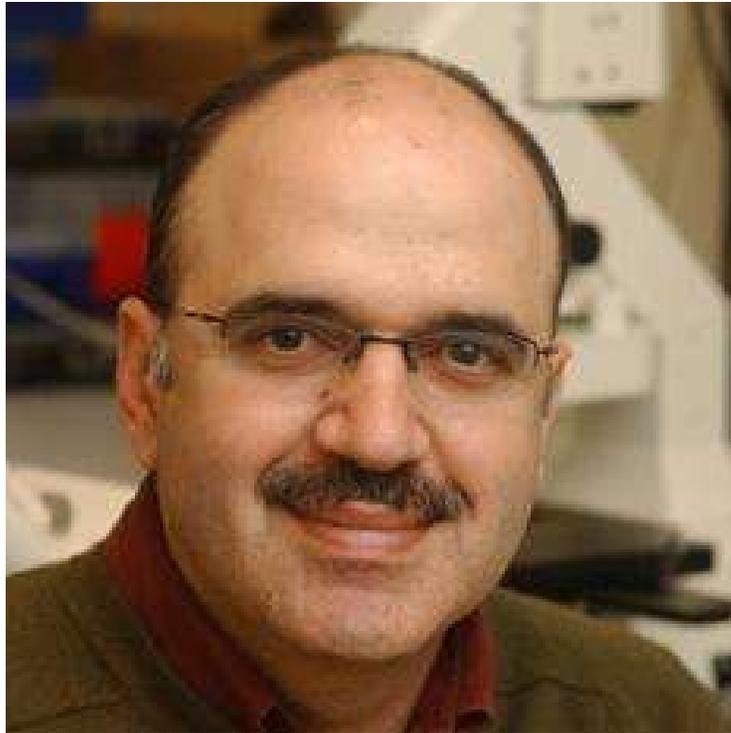


The Matrix Reloaded: Engineering Materials for Hernia Repair

Themis R. Kyriakides, Ph.D.
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Blavatnik Fund Pitch, 2018

Prometheon



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ECM Materials for Improved Integration and Wound Healing

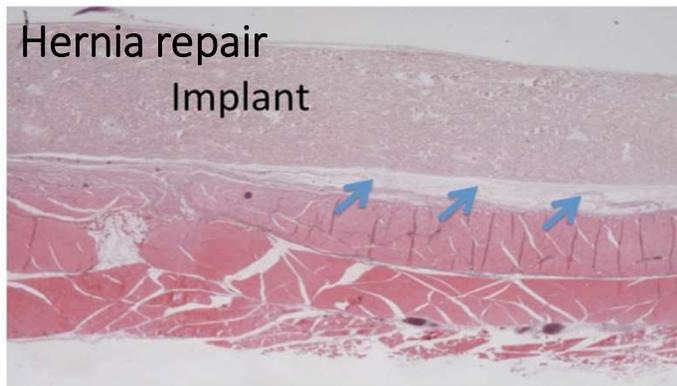
Patent 1: PCT/US2018/056710 COMPOSITIONS AND METHODS USEFUL IN REGENERATIVE MEDICINE

Patent 2: PCT/US2017/029247 COMPOSITIONS AND METHODS FOR GRAFTS MODIFIED WITH NON-THROMBOGENIC AND PRO-MIGRATORY CELL-DERIVED EXTRACELLULAR MATRIX

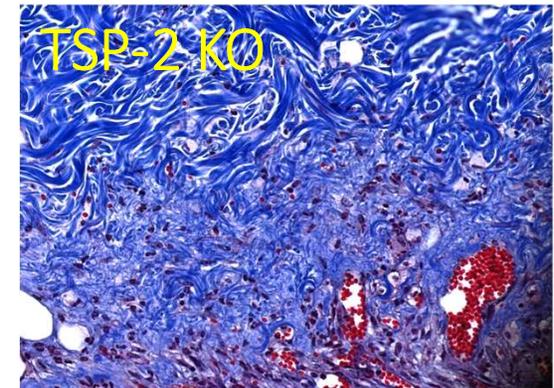
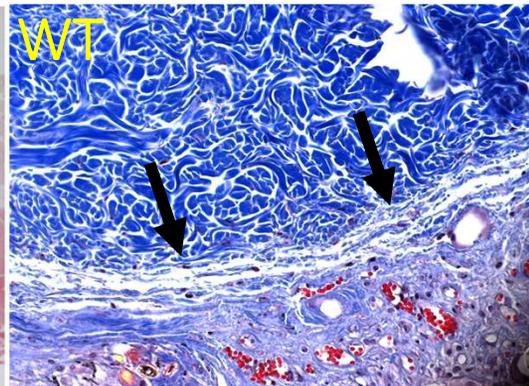
Technology based on deleting thrombospondin-2, a matrix protein.

TSP2-deficient ECM materials permit faster and increased cell migration, increased tissue integration, and accelerate wound healing in diabetic animals.

Competition



Strattice®



Our Technology

By 2021, hernia mesh market: \$3.7 billion + 3.4 billion for other applications

Funds requested to generate TSP2-null pigs in collaboration with **Recombinetics Inc.** for the production of clinical grade tissue scaffolds, grafts, and hydrogels.

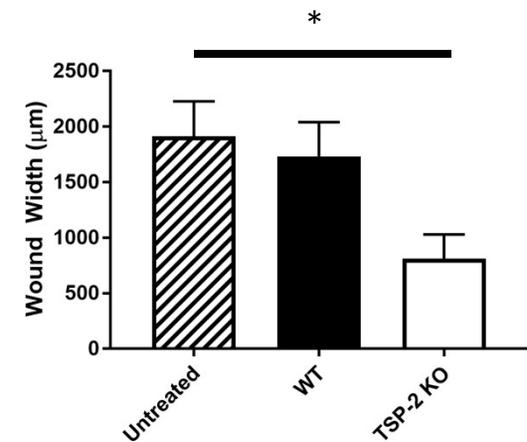
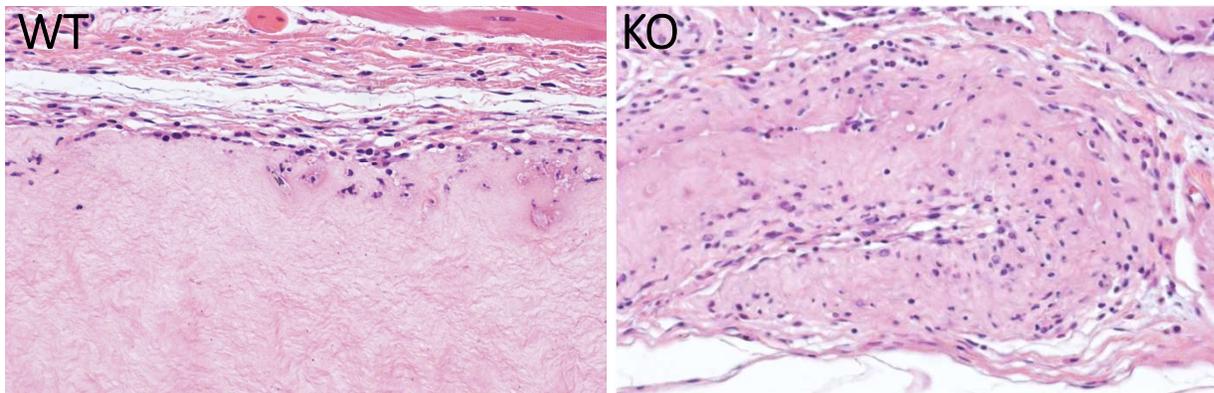
Limitations of current hernia meshes - Competition



Synthetics	Biologics
Prone to shrinkage	Limited Engineering Capacity
Frequently erode into bowel	High Complication Rates
High chance of interface failure	Slow Integration
High infection risk	Lack of Integration leads to follow-up surgeries

Platform Technology: Genetically Engineered Extracellular Matrix-based biomaterials

Derived from TSP-2 null animals with unique properties: altered composition, cross-linking, biomechanical properties.



Publications:

1. Morris, et al. Decellularized materials derived from TSP2-KO mice promote enhanced neovascularization and integration in diabetic wounds. *Biomaterials*, 2018.
2. Kristofik, et al. Improving in vivo outcomes of decellularized vascular grafts via incorporation of a novel extracellular matrix. *Biomaterials*, 2017.
3. Morris et al. Tunable hydrogels derived from genetically engineered extracellular matrix accelerate diabetic wound healing. *ACS Applied Materials & Interfaces*, 2018.

IP Strategy

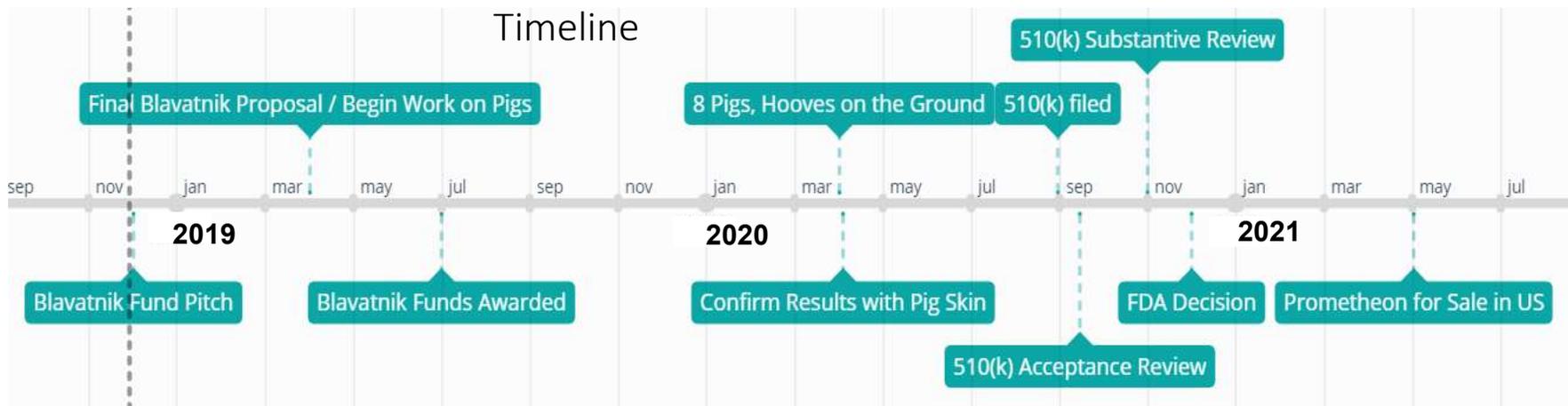
OCR has filed a patent covering genetically engineered ECM products for regenerative medicine:

62/575,595 COMPOSITIONS AND METHODS USEFUL IN REGENERATIVE MEDICINE



Anticipated worth of derived clinical products **per animal**:

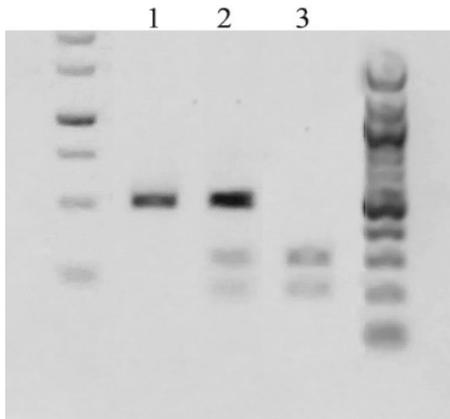
Hernia patch:	\$500,000
Hydrogels for tissue repair:	\$250,000
Vascular Grafts:	\$200,000
Valves:	\$50,000
Other: ?	
Total:	\$1,000,000



Partners: Recombinetics Inc. (Minneapolis, MN)

Experts in creation of genetically modified swine.

Successful removal of TSP-2 gene from 16 separate primary porcine cell lines



- Budget to make TSP-2 KO Pig:
 - Personnel: (\$42,660)
 - Reproduction services (\$96,000)
 - Animal Per Diem (\$43,800)
 - Animal Transport (\$4,800)
 - Lab Supplies (\$27,000)
 - Indirect Costs (\$85,704)
- Total: \$299,964

Value added: TSP2 null pigs can be bred to X-gal null pigs to render ECM less immunogenic.
Additional products: blood vessels, valves, scaffolds for regeneration