Tissue-Engineered Aneurysm Occlusion

Applicant:
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Introduction – Background

• **Endovascular Treatment** of small narrow-necked cerebral aneurysms has become an **Equivalent Alternative** to microsurgical clipping.

• Introduction of **Guglielmi Detachable Platinum Coils** at the beginning of the 1990’s numerous attempts to enlarge field of application from **Small-Necked Aneurysms** to complex or broad-necked aneurysms.

• The **Current Armamentarium** includes bioactive coated HydroCoils, three-dimensional coils, liquid embolic agents (Onyx), balloon remodeling techniques, micro stents, and flow diverters.
Introduction – Objective

• Many Unsolved Problems: Coils: persisting neck remnants, high rates of recanalization. Stents: implant migration, disturbance of adjacent vessels, lifelong anticoagulation, and in-stent stenosis.

• Trend toward of biologically Inert Embolization Materials (Onyx, HydroCoil) is Irrational: aneurysm filled with foreign material, no biological effect, holds aneurysm wall apart, exerts pressure on the wall itself, and actually Interferes with Aneurysm Healing.

• In the future, the focus will be on the Biological Activity of the endovascular device. Go Organic, complete aneurysm occlusion Tissue Engineered Reconstruction of the affected vasculature.
Methods – Ingredients

- **Fibrin Glue** will serve as **Biomatrix** for substances and cells. High concentration of components and fibrinolysis inhibitor (aprotinin) results in **Delayed Degradation**.

- **Fibroblasts, Smooth Muscle Cells, Endothelial Cells** in combination with growth factors. Cell suspension is incubated with a **Fluorescent Cell Marker**.

- **Mix** of Biomatrix, Cells, and Growth Factors as a **Biologically Active Embolization Material** will be used to occlude venous pouch sidewall aneurysms in rats.
Outlook – and Challenges

- Fibrin Glue
- Cell Culture
- Flow Dynamics
- Application
- Architecture