

Organ Printing: a novel tissue engineering paradigm

Today:

The number of medical devices implanted in human bodies is surging. Nearly half a million coronary stents - metal gadgets to hold arteries open - are installed in human chests each year in the United States. There are 325,000 knee replacements every year, 165,000 artificial hips, 177,000 cardiac pacemakers and 2.5 million eye lenses after cataract surgery. About 46,000 people a year get internal cardiac defibrillators to treat excessive heart rate.

Today (in the USA alone):

Demand for replacement organs

78,000 kidney

4,000 heart

19,000 liver

450,000 cardiac bypass surgery (arteries)

100,000 leg arteries bypass

350,000 dialysis access

A number of those on the waiting list die before a solution can be found. If no remedy to these problems is soon found, the situation will become critical in the not so distant future (in your lifetime).

Today:

Source for replacement organs

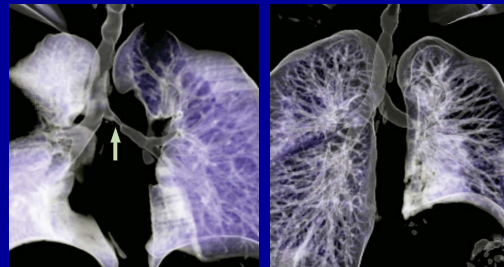
Matching donors

Cadavers

Xenotransplantation

Artificial organs

Tissue engineering-
Regenerative medicine



Glimpse into what is coming

The Tomorrow: building organs by printing



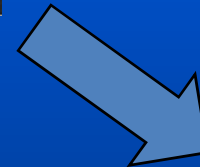
Rapid prototyping biofabrication methods

Bioprinting

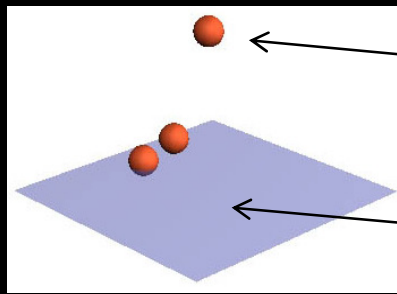
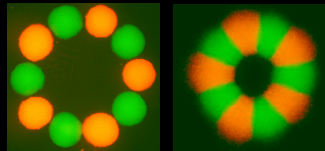
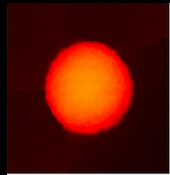
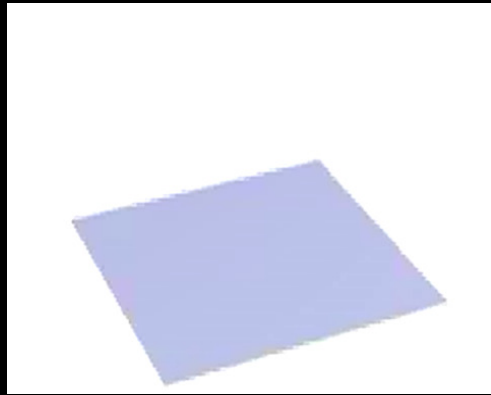
The bioink

The biopaper

The bioprinter

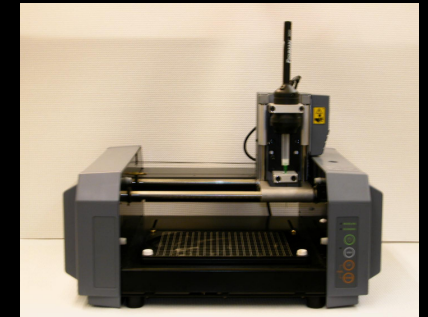


Organ Printing Technology Developed at MU, licenced to Organovo, Inc.



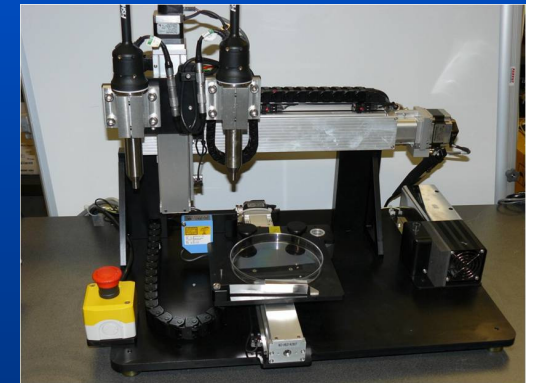
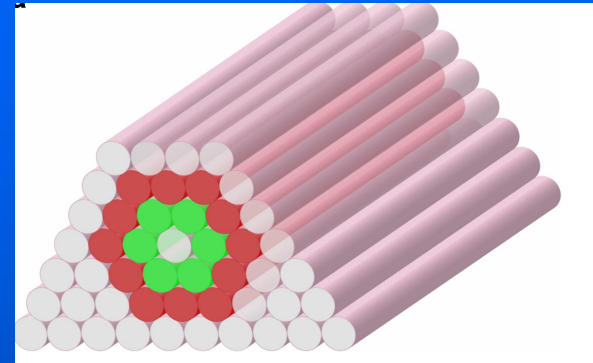
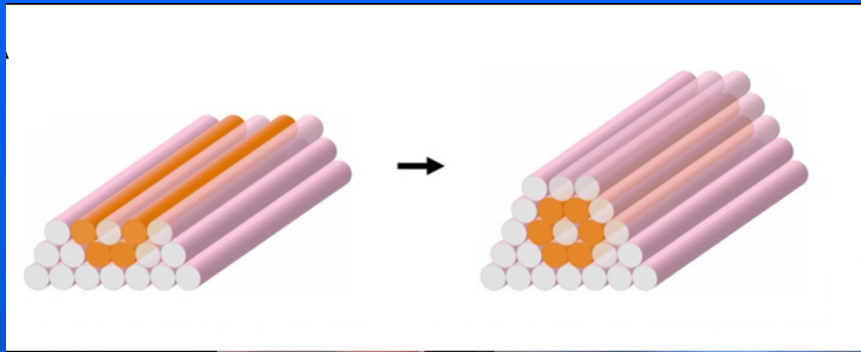
Spherical or cylindrical cell aggregate: the bioink

Supporting biocompatible gel: the biopaper



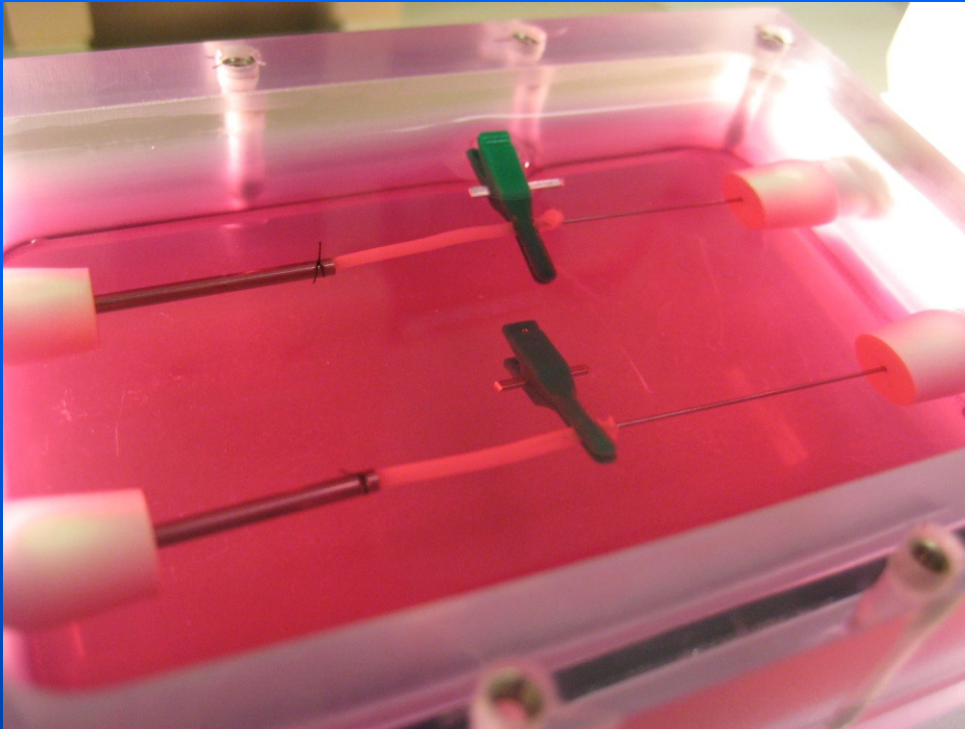
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(Scaffoldless technology, based on developmental principles; fusion, cell sorting)



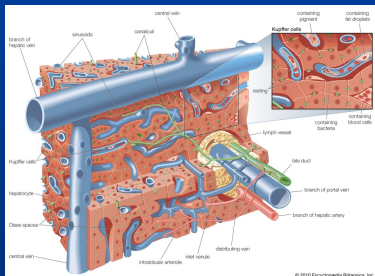
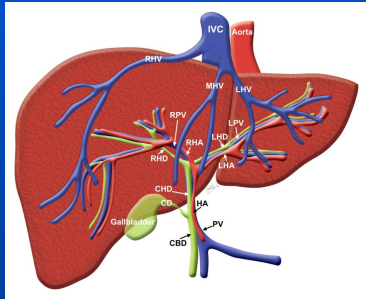
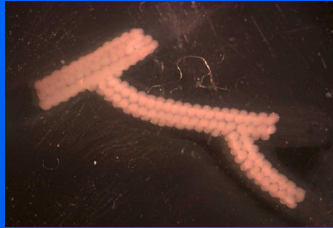
Novogen Printer

After Printing, Blood Vessels Are Matured in Bioreactors

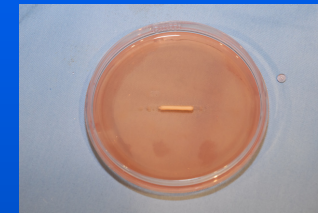
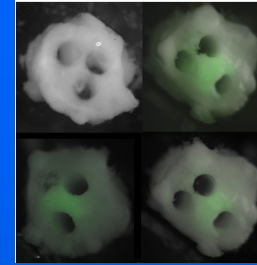


Other graft products

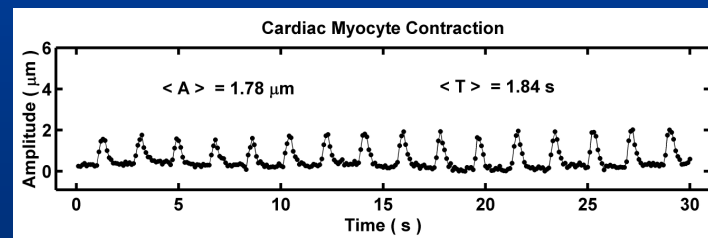
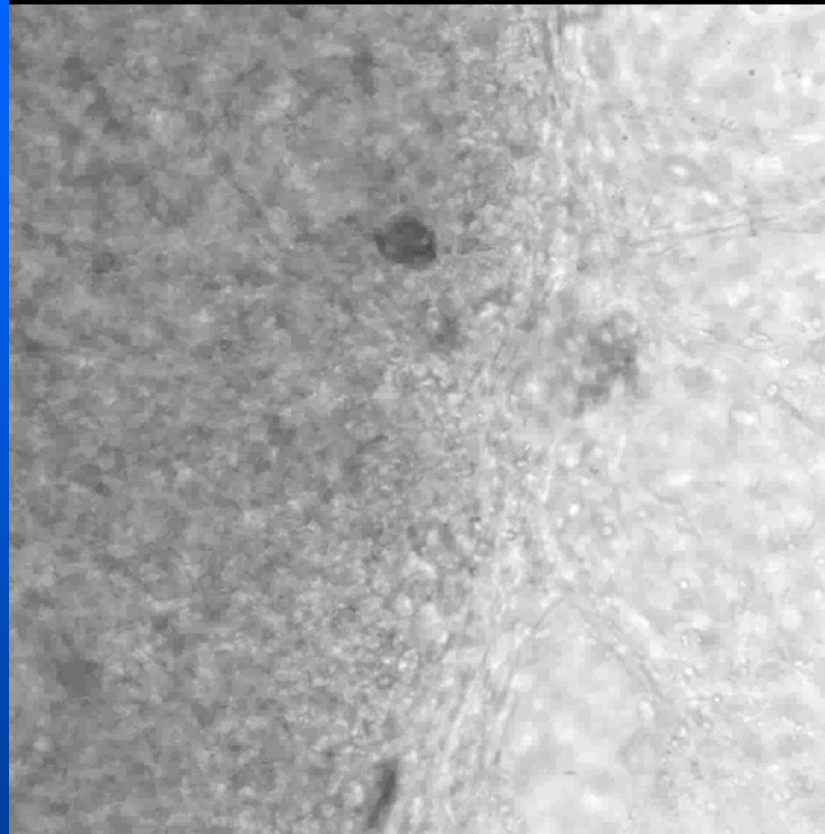
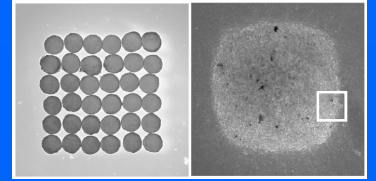
Branching tubes



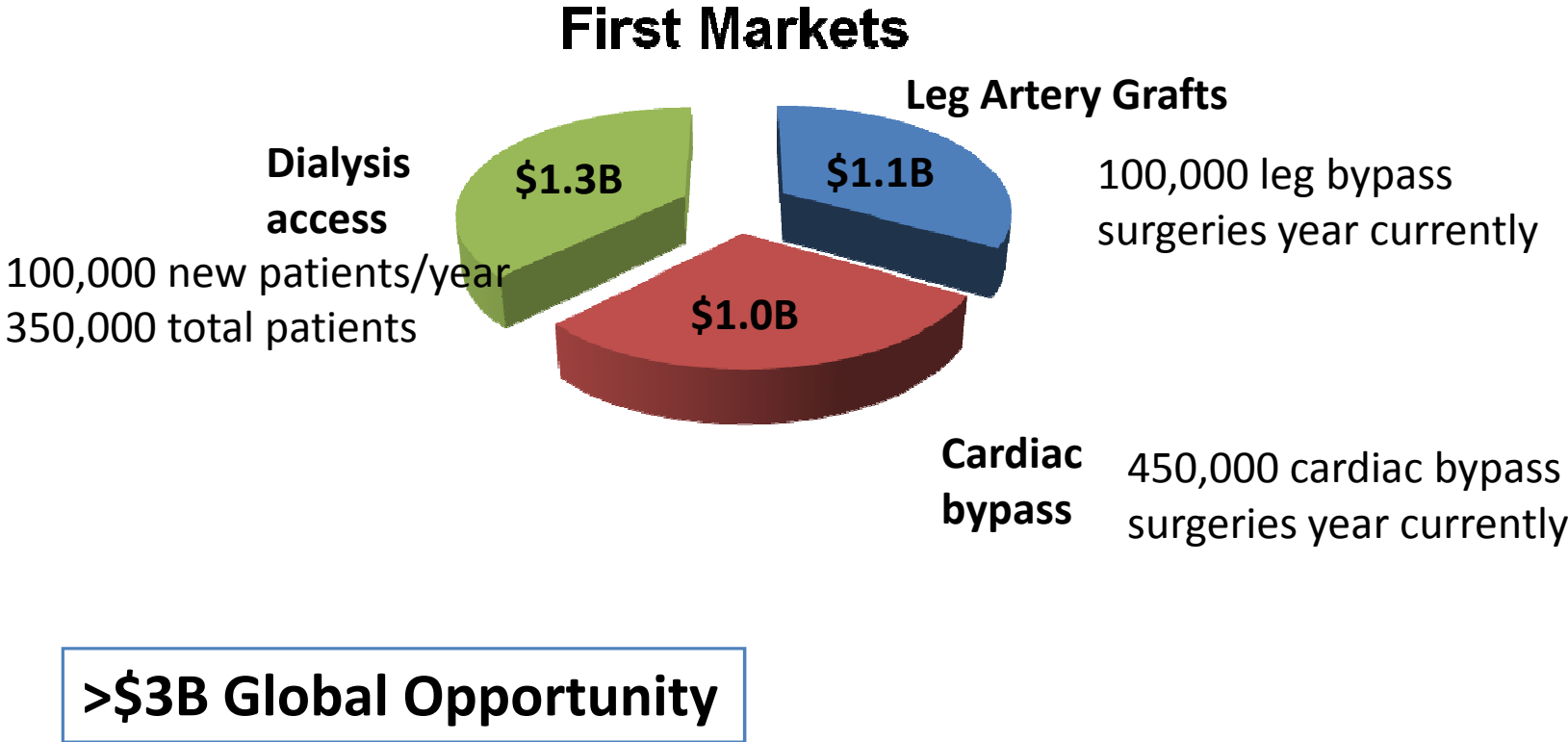
Nerve grafts



Functional Myocardial Graft

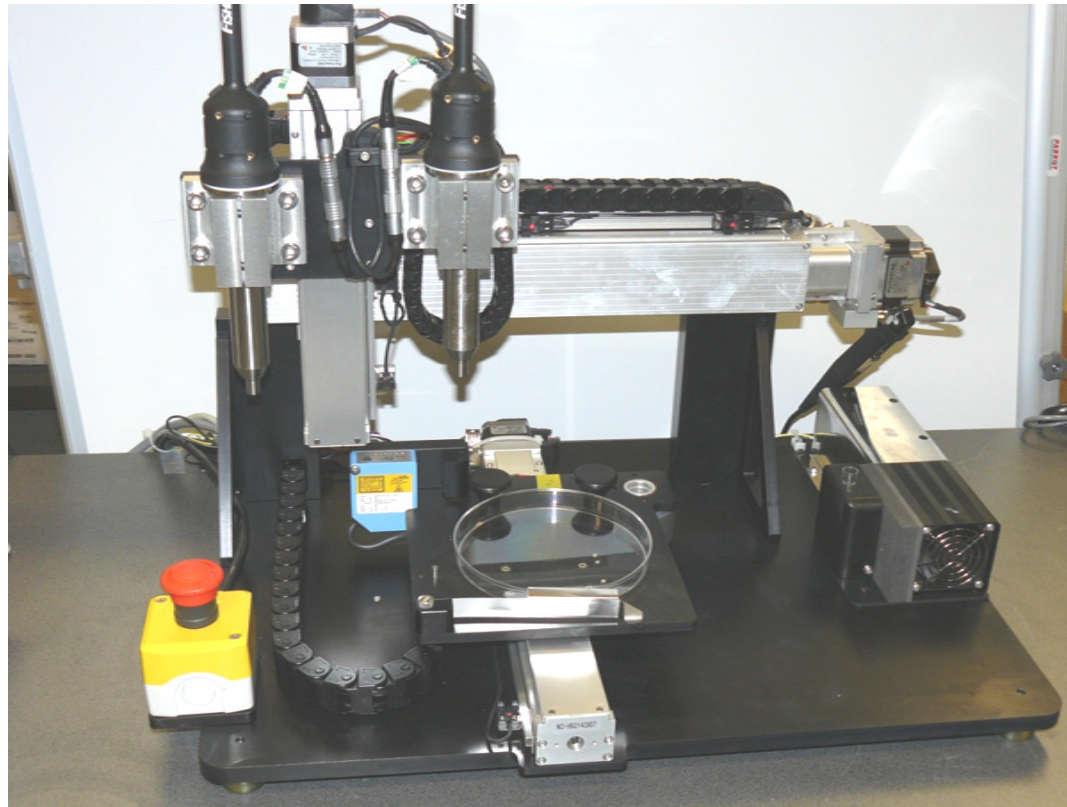


Vascular Health Presents Several Sets Of Large And Growing Opportunities For Medical Innovation

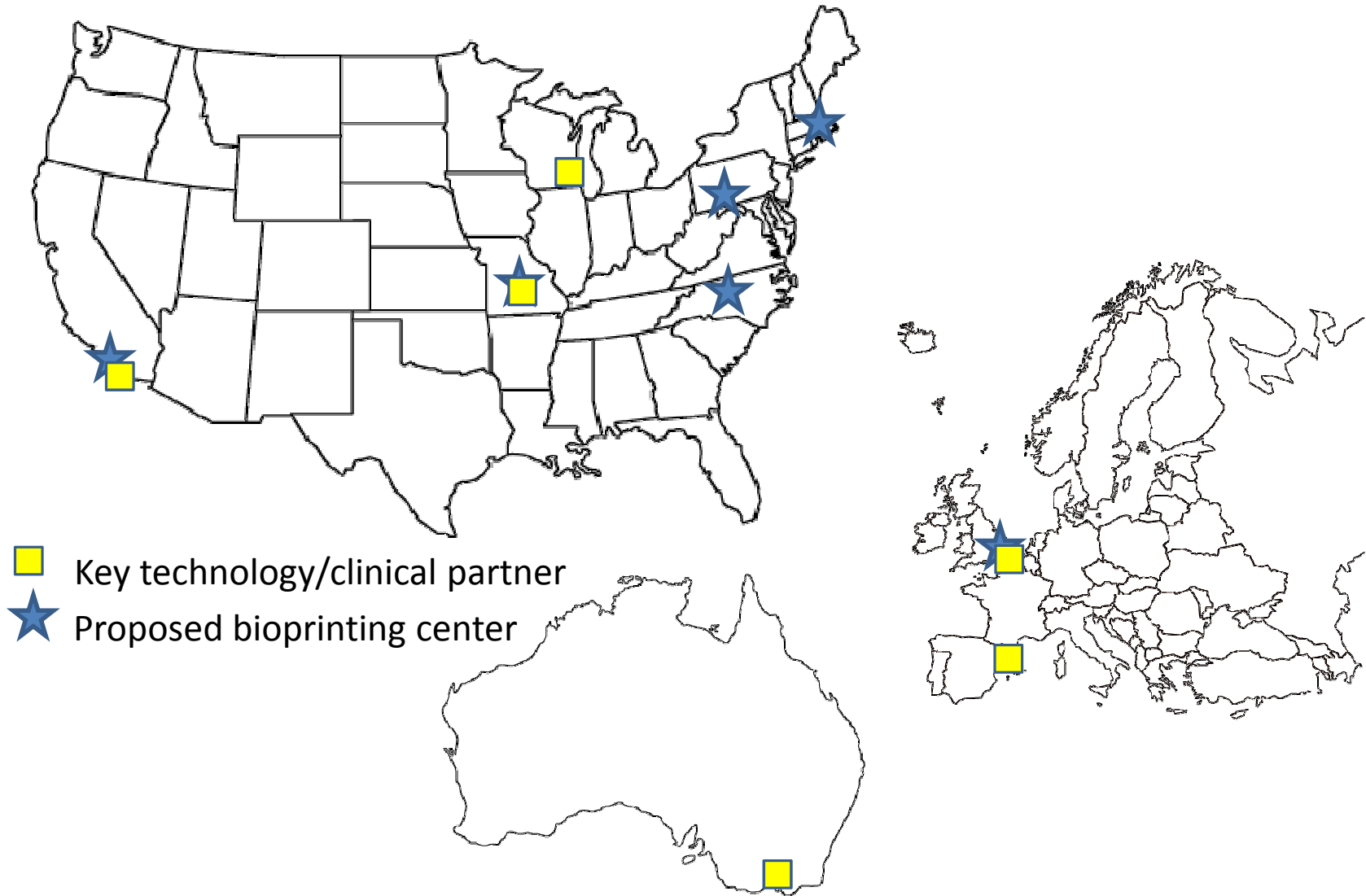


Source: HRI Global Medical Device Report, 2006 US Renal Data System 2007 Annual Data Report, Company Projections

Organovo's Bioprinter Technology Now Ready for Wide Use



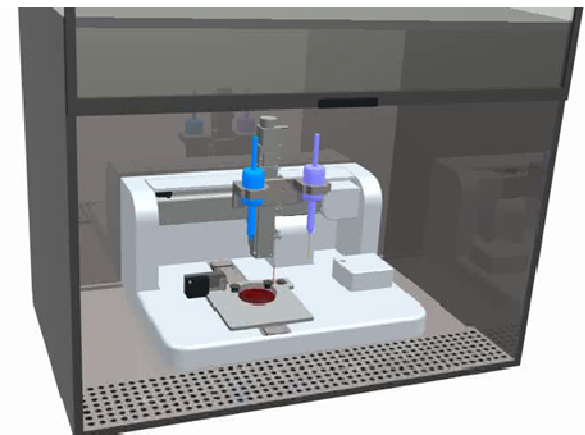
Organovo Bioprinter Sales Can Be Driven by Key Opinion Leader Sites



Organovo Has Used The Past 12 Months and Initial Seed Funding to Make Major Strides

- **Moved operations forward** – opened site in San Diego, tech transfer from University of Missouri (10 employees)
- **Advanced the science** – New NIH grant September 1, animal studies by U. Missouri, blood vessel proof of concept trial design w/U. Wisconsin, primary human cells in use
- **Printer development project** – first new top of the line printers delivered and ready for wide research use

- **Confirmed the market** – Quantitative and qualitative market research that gives high confidence in the business plan
- **Created new markets** – Bioprinter market plans are being executed





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