InVitroMetrix QCM-Based Cell Biosensor: Research tool to accelerate pharmaceutical drug discovery success

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QCM-Based Cell Biosensor

Research tool to accelerate pharmaceutical drug discovery success

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Disclosure

• Grant/Research Support: Army Research Labs
• Major Shareholder: InVitroMetrix
  – President of InVitroMetrix
The research

- We wanted to measure in real time the changes that were happening with cells
  - Nanocanary

**Analytes**
- Drugs
- Vitamin
- Pollutant
- Chemical

**Bio-Element**
- Cell
- Enzyme
- Antibody
- Microbe

**Sensed Property**
- Mass
- Viscoelasticity
- Temperature

**Transducer**
- Piezoelectric
- Optical
- Thermal
- MEMS

**Quantifiable signal**

Piezoelectric: Quartz Crystal Microbalance (QCM)
Optical: Surface Plasmon Resonance (SPR)
Whole Cell Quartz Crystal Microbalance

Living whole cell biosensor

Measurable changes in cellular biomechanics: attachment, mass redistribution, viscoelasticity
The problem

The chemist tool
Prototypes V1 and V2

PROBLEM = ONLY ONE WELL
Prototype Concept 2
Prototype V3

PROBLEM = WEAK CONNECTIONS
Prototype V4

INNOVATION = CAN WE HAVE 12 WELLS?
The solution - Invitro-Q™

Integrated system

Data acquisition system 6”x4”

Invitro-Q™ x12

Cell culture wells

Personal Computer, Cloud, Smartphone

Calibrated to each other and to standard
Commercialization Research

• LOCK DOWN YOUR IP

• Competitive edge
The competition

• Micro Analysis Systems - Biacore (SPR)
  – Problem: single component systems

http://www.nature.com/nrd/journal/v1/n7/full/nrd838.html
Commercialization Research

• LOCK DOWN YOUR IP
• Competitive edge= We can do whole cells
• Market size= Can we be profitable
• Customer needs= TALK TO THE USERS
• Value proposition
  – The User= 12 wells
  – Who will buy it=> Savings to company?
    • INVESTORS: they want to see this
Value Proposition
Drug discovery and orphan drugs

• Cell assays are more successful at identifying first in class small molecule drugs

• Orphan drug repurposing $10M/2-3yrs ➞ $100K/4-6mo

1 Drug discovery today [http://dx.doi.org/10.1016/j.drudis.2013.07.001](http://dx.doi.org/10.1016/j.drudis.2013.07.001)
Commercialization Research

- Competitive edge
- Market size
- Customer needs
- Value proposition
- Go to market strategy
  - FORM THE COMPANY
Formation

• Legal paperwork
  – Entity, EIN, DUNS, SAM, NSF/NIH, Bank Accounts

• The Team
  – Diverse team with different expertise

• Find a research location

• Ask/convince Scientific Advisors to join

• Find wonderful mentors

• GET THE MONEY

• Get the prototype into people’s hands
Up Next

- Move to our new lab
- Finalize the product
- Validation
- Release first product
- Start researching next designs - SBIR/NSF
- More Money!
Thank you

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