

MAKING PLATELETS: How Scientists Become Entrepreneurs

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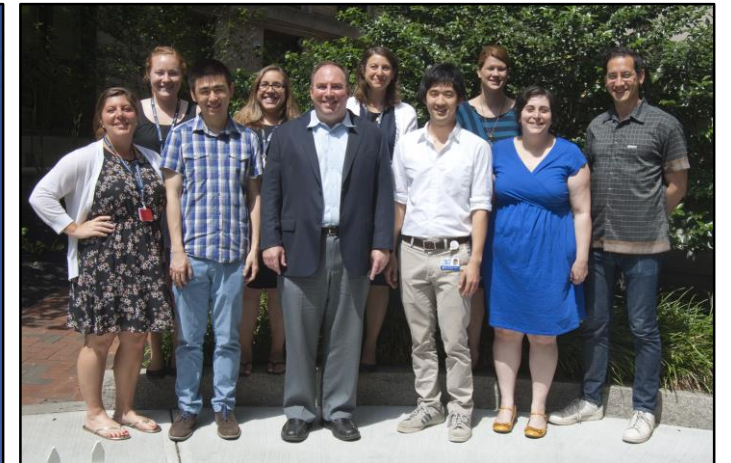
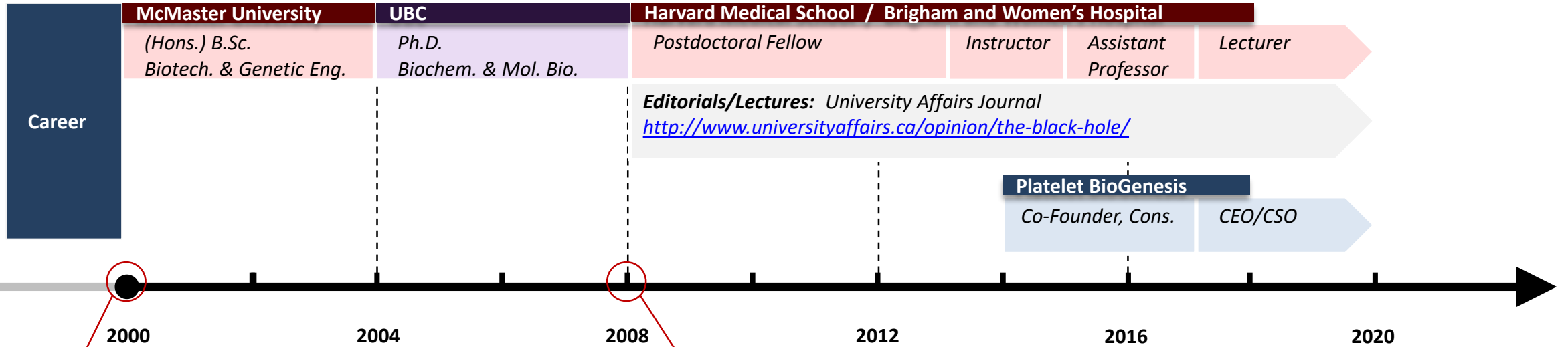
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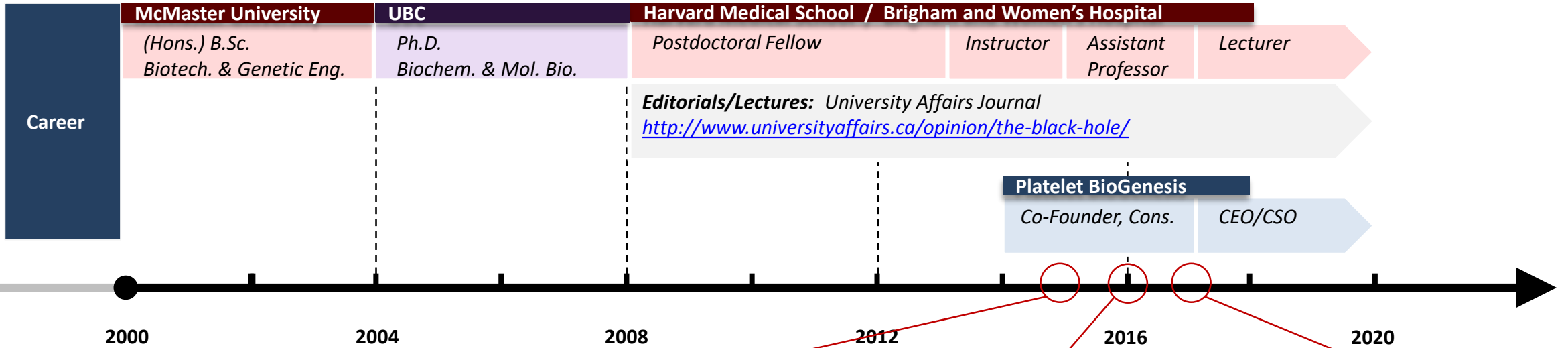
Who Am I?

Jonathan N. Thon, Ph.D.



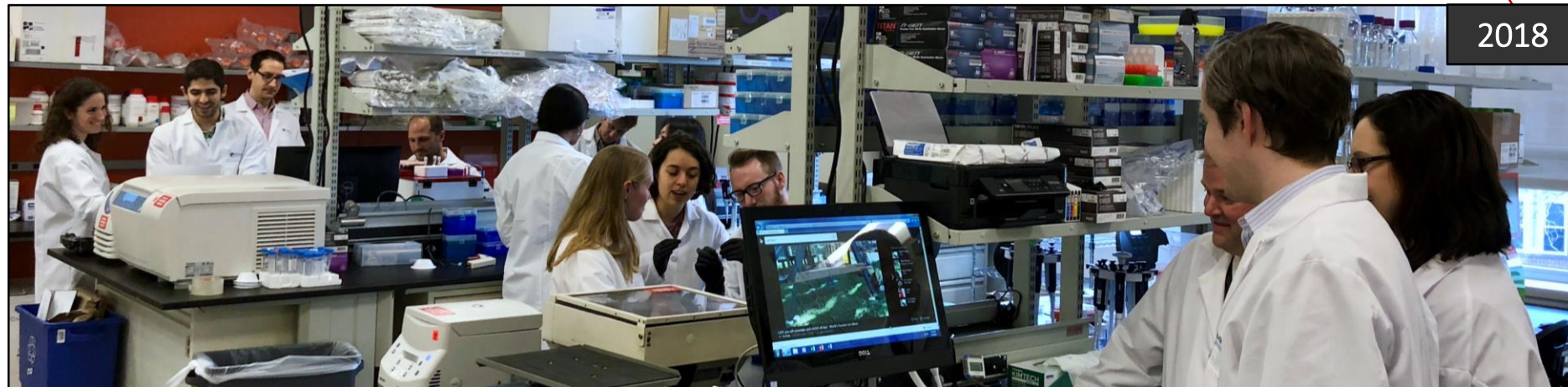
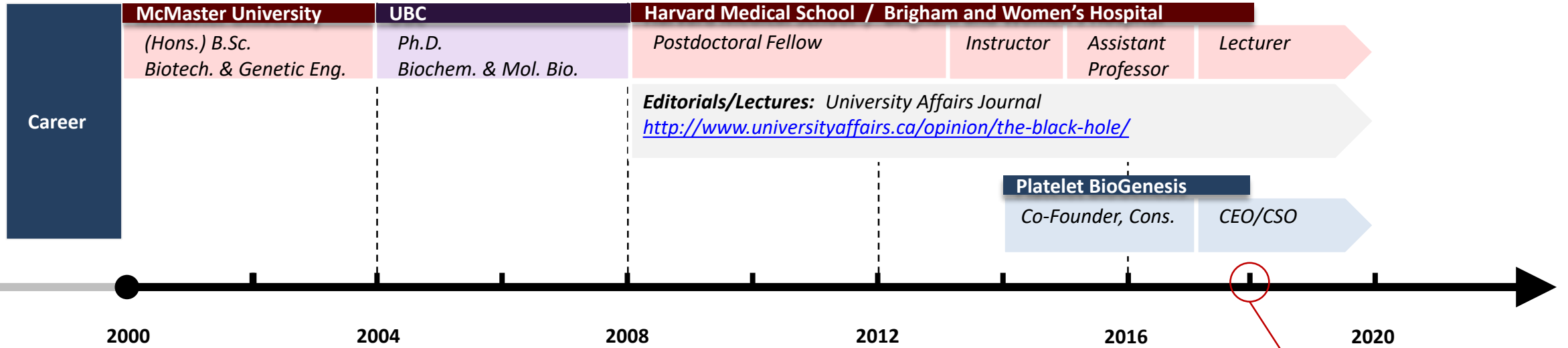
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“Translational Research is Scientist Driven and Institutionally Supported

- **Why** do Scientists Engage in Entrepreneurship?
- **What** does a Startup Look Like?

“**Desire to improve human health and wellbeing**

Risk to staying at University: Opportunity Cost?

Academic freedom?

- Misalignment in grant priorities
- High risk projects rarely funded
- Translational research requires validation and process optimization

Solution: Seek independent financing

Desire to improve human health and wellbeing

Risk to staying at University: Opportunity Cost?

Financial incentives skewed in favor of institutions not investigators

- % ownership of IP minimal and split amongst all inventors
- Recovered from royalty rate (low single-digit % of net sales) after costs
- Do not benefit from license fees, milestone costs, or equity ownership

Solution: Found/join startup

What Does A Startup Look Like?



“First understand your market...”

- Identify problem
- Define solution
- Resolve supply chain

Platelets are Life-Saving and Critical

2+ MILLION

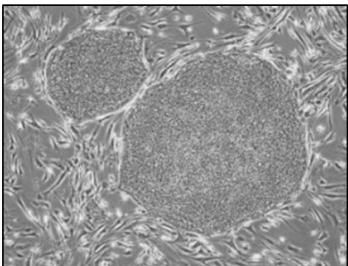
\$2B+

\$12B+

Phase 1: Est. Scalable Clinical Grade Process

STEM CELL

Select clinical grade hiPSC line



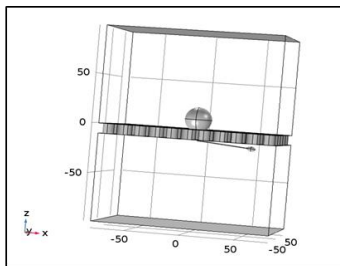
MEGAKARYOCYTE

Est. feeder/serum-free culture



PLATELET

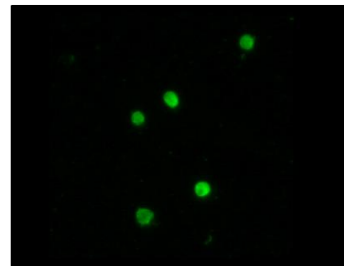
Scale platelet bioreactor



Phase 2: Validation & Commercial Manufacture

PRE-CLINICAL PRODUCT

Validate hiPSC-platelet unit



CLINICAL PRODUCT

Est. safety/efficacy in humans



COMMERCIALIZATION

Manufacture and distribute



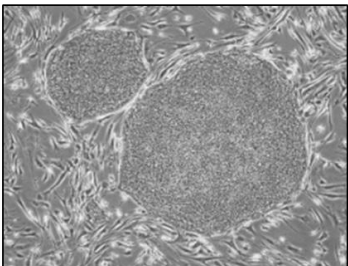
...then plan your approach...

- Find weaknesses
- Establish timeline/budget
- Recruit team
- De-risk technology

Phase 1: Est. Scalable Clinical Grade Process

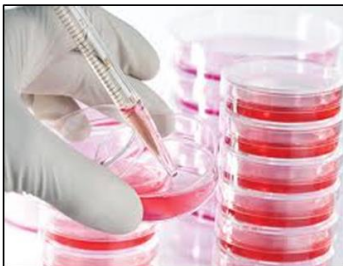
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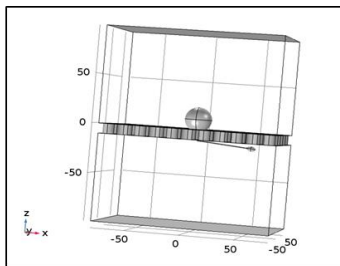
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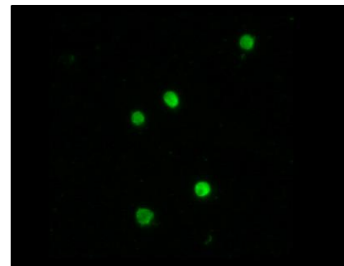
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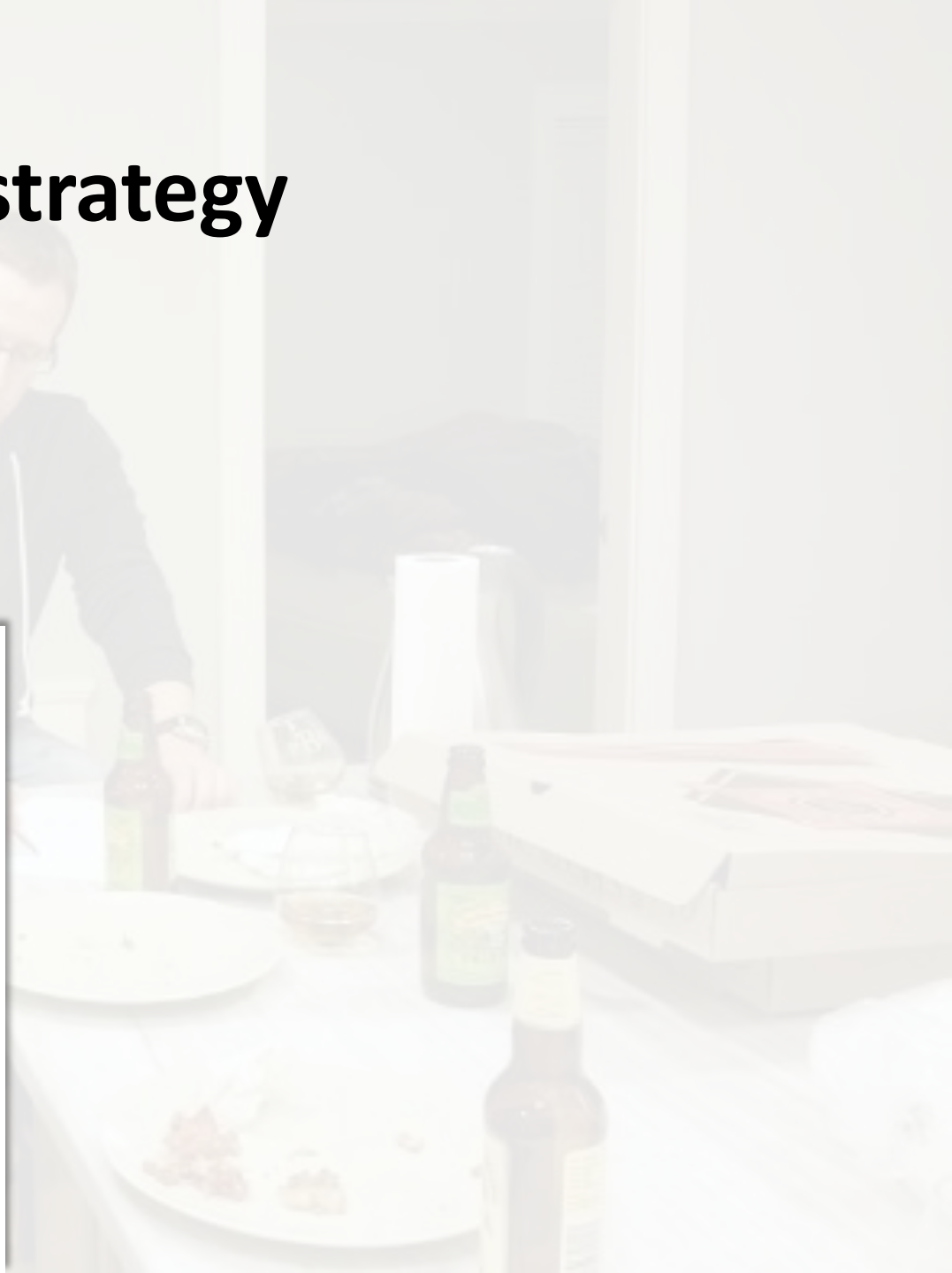
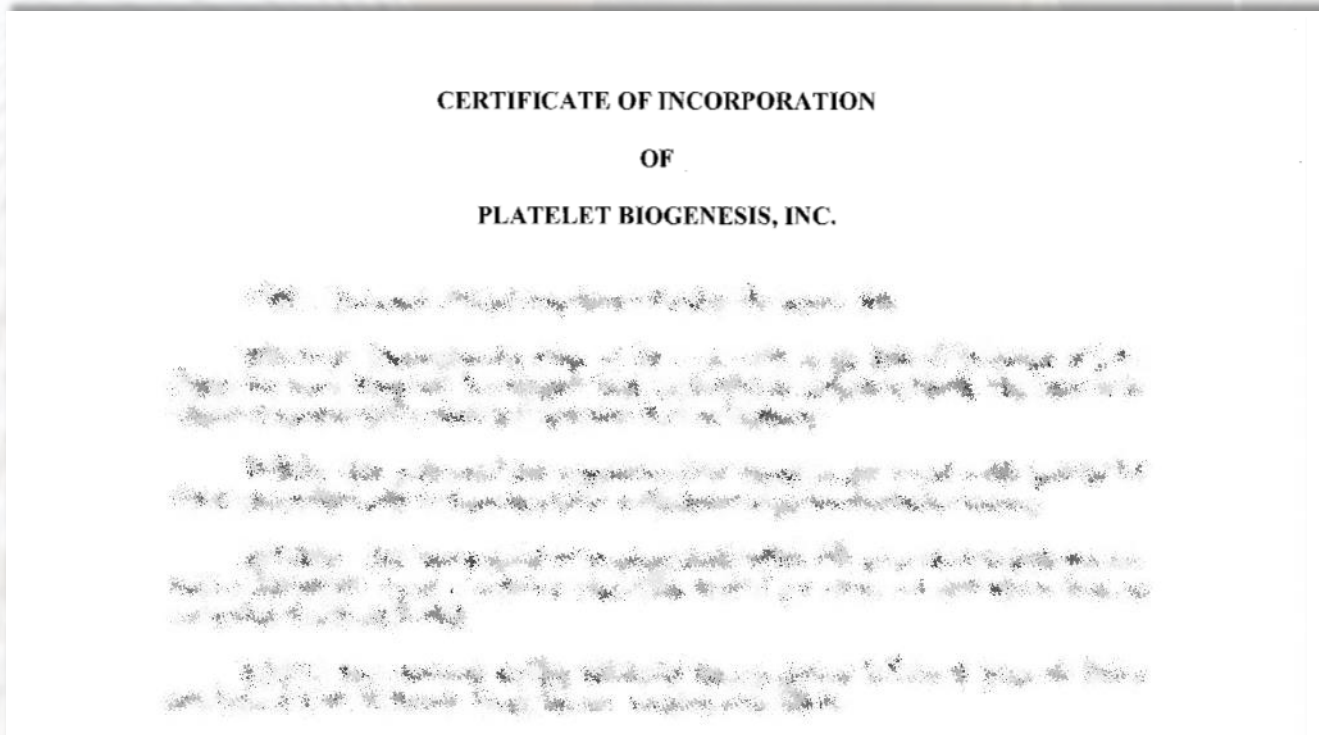
COMMERCIALIZATION

Manufacture and distribute



“...before executing on your strategy

- Raise seed money
- Negotiate intellectual property
- Find private (incubator) space



“...but most of all.

... **Enjoy the process!**
(otherwise, what's the point?)

For Discovery to yield Economic Value Scientists must Drive Companies

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Science & Society

CellPress

Nothing to lose: why early career scientists make ideal entrepreneurs

Jonathan N. Thon^{1,2,3}

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An entrepreneurial movement within science strives to invert the classical trajectory of academic research careers by positioning trainees at the apex of burgeoning industries. Young scientists today have nothing to lose and everything to gain by pursuing this 'third road', and academic institutes and established companies only stand to benefit from supporting this emerging movement of discovery research with economic purpose.

Nothing to lose

The increasingly limited career prospects at academic institutes due to a fundamental lack of basic research funding and overwhelming excess of talent has resulted in a cheap surplus of young, accomplished, risk-inclined, hard-working, independent team leaders with only a cursory appreciation of their real market value. This is a near limitless resource of paradigm-changing intellectual property, including individuals who are willing to walk through

and 92% of trainees expect to pursue a research-focused career path [1] (Figure 2).

If academia represents intellectual freedom and independence, and industry represents job security and earning potential, then for those capable and willing to pave their own way, entrepreneurship is the best of both worlds. Unlike a traditional academic career, entrepreneurship imposes no rigid promotion structure, no cap on career advancement or flexibility, and no inherent administrative limits on fundraising, hiring, or compensation. By effectively starting from scratch, new companies also bypass the bloated administrative programs that have become synonymous with larger academic institutions, while their often severe budgetary constraints promote leaner business practices that help reduce indirect costs and ensure all costs are directed entirely to advancing the scientific proposal.

This gray space between the traditional definitions of 'academia' and 'industry' is increasingly becoming an epicenter of innovation and new growth as federal govern-

Trends in Biochemical Sciences

CellPress

Scientific Life How Scientists Can Become Entrepreneurs

Jonathan N. Thon^{1,2,3,*} and
Sven Karlsson³

Translating basic research discoveries through entrepreneurship must be scientist driven and institutionally supported to be successful (not the other way around). Here, we describe why scientists should engage in entrepreneurship, where institutional support for scientist-founders falls short, and how these challenges can be overcome.

Why Should Scientists Elect to Advance a Translational Research Program through Entrepreneurship?

Society has recently begun to ask us, its research scientists, to justify our continued existence by translating our discoveries into commercial products faster.

any new technology, work that is actively being commercialized requires substantial validation and process optimization to ensure reproducibility (traditionally considered non-innovative by review committees). Translational research is also less likely to be published until it is more mature. Together, this means that putting efforts into commercializing innovation can reduce the likelihood of being awarded future grants and, thus, puts academic careers in jeopardy.

Financial incentives are also skewed heavily in favor of academic institutions, not investigators. For example, inventors at academic institutions typically will collectively own a percentage ($\leq 25\%$, split among all inventors) of their intellectual property. However, this number is generally just a portion of the royalty rate (typically low single-digit percentage) from the net sales of a product after the employing institution recovers its administrative costs, legal fees, and so on, which usually results in no significant value to the inventor. It is true that the employing institutions assume the cost of filing for the intellectual property rights, but they also recover these costs when intellectual property is

specific gaps in institutional support that we should lobby our academic and funding organizations to fill.

Availability of Protected Space

One of the most important things we need is protected 'third-party' space to advance our discoveries to market, apart from the conflict of interest and intellectual property ownership policies of our parent institution. Particularly at the earliest stages, startups are mostly virtual companies that have no physical space, no employees (beyond the founders who are typically receiving no salary), and no money, which means that the forced separation of company and institution is not as clear cut as institutional conflict of interest policies would like them to be. The identification of temporary third-party space that is isolated from the financial and legal interests of our academic institution would allow us the flexibility to explore commercially interesting ideas, bring in directors and/or consultants, and hire research scientists, while remaining full-time employees at our parent institution. The lack of affordable physical space is a major contributor to 'the valley of death,' the period of time from launching a venture to when it is mature enough to

Pros and Cons of Entrepreneurship

Pros

- Translate discovery into application
- Success unique / reputation
- Huge financial upside
- Expand network
- New/useful skillsets
- Want to disrupt existing systems
- Exciting!

Cons

- Compound low margins of success / reputation
- No job security
- Requires complete commitment / sacrifice
- Huge time requirement
- Don't like to rock the boat