

# Venture capital supports valuable health technologies by accident, not by design

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# Outline

- Why innovation policies support venture capital (VC)
- Our 5-year fieldwork on health technology development in academic spin-offs
- What kinds of technology-based ventures VC supports?
  - Three levels of congruence
- Aligning innovation policies with the concerns of healthcare systems

# Venture Capital (VC)

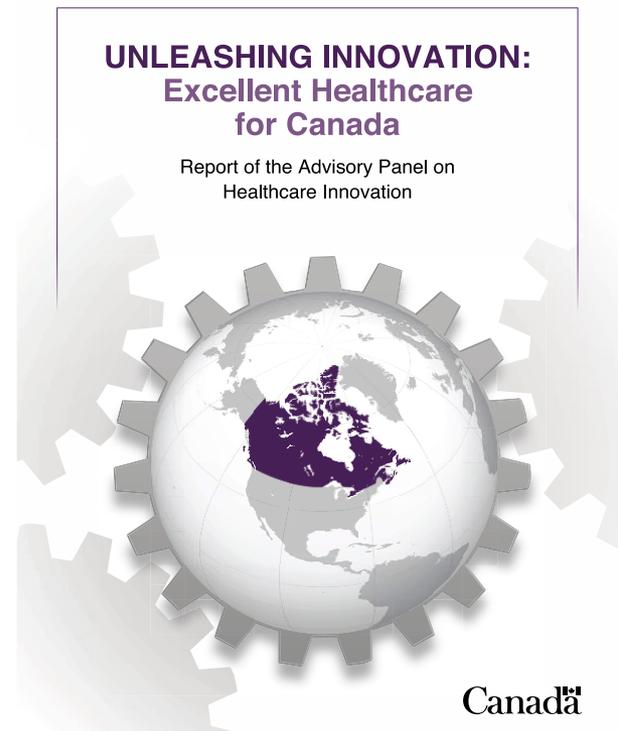
- ❑ VCs commit financial resources for a period of time to small firms with **few tangible assets** that rarely generate revenues at an early stage
- ❑ What makes VC risky is the “**illiquid**” nature of the investment
- ❑ A “**liquidity event**” or “**exit**” enables VCs to recoup their investments and generate a return:
  - ❑ Acquisition by another company
  - ❑ Initial Public Offering (IPO) provides the ability to sell shares to the public

# Risks and returns

- Most ventures fail
- 21.9% of US ventures created b/w 1991 and 2000 survived after 5 years (Song et al., 2008)
- **Investment portfolio** expected to yield above 20% returns
- Top 25 percentile of UK firms generated returns ranging from 50% to 78% between 2003 and 2009
- Bottom 10 generated returns ranging from -14% to 0% (Pierrakis, 2010)

# North American and European countries actively seek to increase the size of their VC markets

- Industry “has the potential to **create prosperity** while helping Canada’s healthcare systems to deliver **higher quality or more cost-effective care**” (2015: 98).
- VC available to Canadian life sciences firms more than doubled b/w 2001 and 2010
  - Average amount per firm **↑** from \$2.6 to \$7.4 million
  - Medical device firm = \$2.5 million (Tucker et al., 2011)



# A five-year fieldwork on academic spin-offs

Optical molecular imaging device for breast cancer screening/characterisation

Computer-assisted navigation system to support minimally invasive orthopaedic surgery

Labour decision-support software

Catheter-based cryoablation for arrhythmia disorders

Home monitoring for chronically ill patients

Interviews (n=34)

Document analysis (n=612)

Focus groups (n=19)

Press coverage analysis (n=814)

# Health innovation is a collective action

The development of a new health technology involves a large number of actors. These actors intervene at different stages in the development pathway according to their expertise, values, objectives, professional and organizational roles, responsibilities and constraints, and according to the established norms and ways of doing things in their respective domains. The commercialization of a given innovation is the outcome of transactions and knowledge-based exchanges between actors.

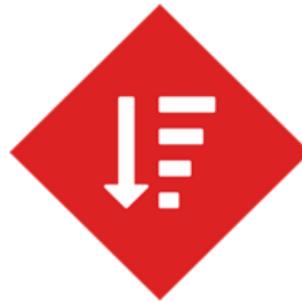
Click on one of the actor icons to learn more



The Designers



The Investors



The Regulators



The Policymakers -  
Innovation / R&D



The Media

What kinds of health  
technology-based ventures  
VC supports?

- ❑ Picking likely winners, “de-risking” deals at the outset
- ❑ Pushing ventures to reach key milestones swiftly to avoid additional financing
- ❑ Maintaining a dominant position until the liquidity event, e.g. a seat at the Board of Directors
- ❑ Tech design priorities are influenced by time and resource constraints that VCs enforce



What VCs do to fulfill their mandate

## Level of congruence between the mandate of VC and health technology-based ventures

- **HIGH**: Heart ablation catheter
- **MEDIUM**: Labour decision support software
- **LOW**: Home monitoring system

## Heart ablation catheter

### **HIGH** Level of congruence

To develop a catheter that can identify cardiac cells causing arrhythmia and neutralise them by delivering extremely cold temperatures

- Cryotherapy could prove safer than the existing radiofrequency-based procedure
- An **international cadre** of investigators conduct clinical studies, refine early versions of the catheter, and contribute to **academic marketing around the world**
- Market approval is first obtained in **Europe to generate sales** as well as clinical data required for market approval in the US
- The procedure **generates revenues for physicians**, and marketing channels already exist

## Labour decision support software

### **MEDIUM** Level of congruence

To turn a predictive mathematical model into software that would improve obstetricians' decisions during labour and delivery

- To predict labour and shoulder dystocia, reduce unnecessary C-sections, and avoid birth-related injuries
- Obstetricians are not **eager to use the system**, and established clinical practices seem hard to change
- Although market approval is obtained in the US, the development of **new marketing channels** is costly
- **Physician insurers** become the key target as purchasers (offering reduced premiums to obstetricians who accept to use the system)

## Home monitoring system

### **LOW** Level of congruence

To develop a computerized system to enable clinicians to support chronically ill patients from a distance

- To reduce unnecessary ER visits and hospitalisations, and empower patients
- The system is developed and evaluated in **collaboration with a regional hospital**
- The **co-design approach** enables generating data on efficacy and responding to users' requests, but it **limits the growth of the venture**
- There is **not a “single” purchaser** for a system that generates “distributed” benefits (to patients, home care providers, hospitals)

## Deals that reduce risks and increase congruence with the mandate of VC

- Innovations that
  - Address very large and reachable markets
  - Enable physicians to generate revenues
- Ventures that are likely to
  - Demonstrate (or signal) rapid growth
  - Be acquired by established medical device manufacturers

## Key implication

- The mandate of venture capitalists may, in principle, prove compatible with supporting ventures that address important health needs
- But this is likely to happen by accident, not by design

Aligning innovation policies with the concerns of healthcare systems?

# Ways forward?

- A matter of cost-conscious purchasing?
  - May have the “potential to increase the **social value** of innovation” by focusing technology developers on “the preferences and **pocketbooks**” of their customers (Robinson 2015)
- A matter of collaboration?
  - “Through Health Canada, in collaboration with Industry Canada, develop a whole-of-government federal strategy to **support the growth of Canadian commercial enterprises in the healthcare field**” (Canadian Advisory Panel on Healthcare Innovation, 2015: 107).

# Institutional forces

- Handling the subtleties associated with the fulfilment of valuable healthcare goals is neither part of venture capitalists' mandate, nor of their worldview
- A “winner” ≠ necessarily a valuable innovation
  - "You can have a great technology that will end up forgotten and you can have something that is **very ordinary but that will be a commercial success.**" (Inv1)

# Conclusion

- VCs' risk-averse logics partly explain why technologies with a marginal clinical value are easily supported and why other types of innovation may never come into existence
- Whereas VC occupies a central position in innovation systems, the values and expertise of “health” actors are largely missing



# Related papers

- Lehoux, P., Daudelin, G., Hivon, M., Miller, F.A., Denis, J.-L. (2014). How do values shape technology design? An exploration of what makes the pursuit of health and wealth legitimate in academic spin-offs. *Sociology of Health & Illness*. 36(5): 738-755.
- Lehoux, P., Daudelin, G., Williams-Jones, B., Denis, J.-L., Longo, C. (2014). How do business models and health technology design influence each other? Insights from a longitudinal case study of three academic spin-offs. *Research Policy*. 43 (6): 1025-1038.
- Lehoux, P., Miller, F.A., Daudelin, G., Urbach, D.R. (2015). How venture capitalists decide which new medical technologies come to exist. *Science & Public Policy*. doi: 10.1093/scipol/scv051
- Lehoux, P., Miller, F.A., Daudelin, G., (2016). The rules of venture capital in medical innovation. *BMJ Innovation*.