UBC LIFE SCIENCES STARTUP COMPETITION 2017

Tesseract Technologies

A leap in treating brain aneurysms

Team members

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1. Executive Summary

Every 30 minutes a person dies from the rupturing of a weak blood vessel in the brain. Current treatments are expensive (more than $200,000 per surgery) and cumbersome (10+ hours). This puts hospitals under incredible strain to reduce costs while maintaining patient outcomes. By using a soft polymer based biocompatible material instead of platinum wires we can make the surgery safer, 5 times cheaper and 4 times faster. Initial seed funding will occur through government grants and start-up competitions. By partnering with practicing medical professionals and manufactures we decrease the time to develop the product. This way we plan to de-risk the venture for future investors. Our revenue will come from product sales to health agencies or out-licensing to big manufacturers. By partnering with identified medical research laboratories, we plan to effectively generate data required for the FDA approval. Thus, we expect to achieve the break-even point to occur within 7 years.

2. Market Analysis

2.1 Problem

Brain aneurysms occur when sections of brain arteries fill with blood and balloon, as shown in Exhibit A. If untreated, the aneurysm will rupture, causing: stroke, brain damage, or death. The chance of suffering an aneurysm increases at older age. Due to an aging world population, prevalence of aneurysms will increase, putting huge pressure on healthcare services. The state of the art of aneurysm treatments are expensive and arduous. Material costs constitute over 50% of the cost of surgery.

2.2 Market Need

Due to the expected massive rise in cerebral aneurysm occurrences and their high costs; private hospitals and government health providers such as “Vancouver Coastal Health” will need a cost-effective, reliable, and rapid treatment to adequately care for patients.

2.3 Market Size

Around 0.5-6% of the world population suffers from cerebral aneurysms. The US market (which accounts for 50% of the global) for aneurysm coils was valued at $640 million USD in the year 2015 and is expected to reach a value of $1.2 billion USD by 2024.

3. Competition

3.1 How is the problem addressed today

There are currently two existing methods to deal with brain aneurysms:

1. Open brain surgery; where the aneurysm is physically clipped.
2. Endovascular repair, where a platinum coil or stent is inserted in the affected blood vessel through a femoral artery in the thigh using a flexible tube.10 - 50 coils are inserted depending on aneurysm size. More details are shown in Exhibit A.

3.2 Major players

The 4 major players in the global neurovascular intervention market are: Stryker, Medtronic, Terumo and DePuy Synthes. Stryker corporation is the key leader with 30% of the market due the acquisition of Boston Scientific Corporation in 2010. All companies produce a variation of platinum stents and coils for endovascular repair surgery.

3.3 Competitive Advantage

Procedure	Clipping	Coiling	Our technology

			(estimated)
Material cost (USD)	20,000	80,000	**1,000**
Operation cost (USD)	120,000	80,000	**20,000**
Means of delivery	Open skull surgery	catheter	catheter
Length (hours)	5-7	8	**2**
Cost of postoperative complications (in % of operation cost)	200%	70%	**20%**
Difficulty	High	Medium	**Medium-Low**
Usage	Established	Established	not-established

*Data according to Brain Aneurysms Foundation.

It will take 5-10 years to develop the product (details in section 4), during which time a competing, similar product may be developed. We will also have to convince customers to use our product over established technologies.

Assuming a roughly 4 years advantage with a market penetration of 15-20% (with competition) in North America and the EU (conservative estimate), we expect to create value of at least $250 million per year by 2027.

4. Commercialization Plan

4.1 Science / Technology Overview

We will replace the platinum wires in the coiling procedure with a soft, biocompatible polymer based material. This will allow the procedure to be done in a single step significantly reducing surgery time, which will improve surgery outcome since its success is based on the amount of time taken. The material is also significantly less expensive than platinum which accounts for the majority of the procedure cost.

4.2 Growth Strategy

IP is owned by the team members, who were inspired by the thesis of Yuta Dobashi to develop the material and method in privately rented facilities.

Stage 1 (1-1.5 years): Develop reputation, partner with identified medical professionals, raise funds through entrepreneurship competitions and government funding to develop the prototype, incorporate, and file provisional.

Stage 2 (2-3 years): Raise Series A funding from Venture Capital firm. Contract animal trials with research lab, develop network of potential clients, manufacturing partners and investors. Use data to file PCT patent.

Stage 3 (3-7 years): Raise Series B funding, carry out clinical trials and obtain FDA (CE Mark) approval for a Class II device (due to similarity with existing technology) through the 510k category. License technology to GMP manufacturer. Enter agreement to conduct R&D while manufacturer conducts sales and production.

Stage 4: Our analysis shows that we require around $8,000,000 in Venture Capital investment. We expect to start sales in 6-7-year time and break even in 7 years. Assuming 20% market penetration, we expect $250,000,000 sales per annum by 2027. More details are shown in Exhibit C.

4.3. Milestones

Milestones, including key risk and contingencies are included in the Exhibits B and D.

5. Financial Plan

5.1. Financial Needs and Justification

5.2. Fundraising plan

Item	Goal, ($000)	Fundraising Plan (sources of money)	Financial Needs (uses of money)
Stage 1	**$230**	Start-up competitions (LSI, BCIC) Government funds (IRAP, NSERC or Genome B.C)	Legal, accounting, insurance fees - $60,000 Space rent - $20,000 R&D - $50,000 Remuneration(salaries) - $100,000
Stage 2	**$2000**	Series A Venture Capital investment	Animal trials - $100,000 Legal, accounting, insurance fees - $110,000 Hiring personnel - $500,000 Space rent, - $90,000 R&D - $800,000 Remuneration - $400,000
Stage 3	**$6000**	Series B Venture Capital investment Our big med-tech partner companies like Stryker	Clinical trials - $2,000,000 Legal, accounting, insurance fees - $200,000 Hiring personnel - $1,000,000 Space rent - $150,000 R&D - $1,500,000 Remuneration - $600,000 Misc. - $550,000

More details regarding the finance projections are given in Exhibit C.

5.3 Exit strategy

- Develop product, license IP and obtain revenues through out-licensing and royalties
- Undergo M&A with bigger companies who directly compete with our technology (i.e. Terumo, Stryker)

6. Team

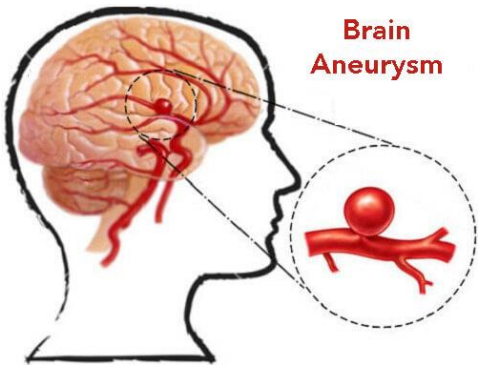
Our Team: Mirza Saquib Sarwar (Financial Officer), Vasilii Triandafilidi (Business Officer), Yuta Dobashi (Scientific Officer) and Thanos Kritharis (Operating Officer). Detailed background for each member is given in Appendix E. When incorporated, we are to divide part of shares equally between us and use a vesting plan to distribute the remaining part with time.

Expansion Plans (advisor): We have identified 3 neurosurgeons with 15+ years of experience and are already in contact with one for partnership. For device development, we will need practicing physicians, a radiologist and a pathologist as advisors.

Expansion Plans (hiring): We have identified corporate and patent lawyers to help us protect our IP. Finances will require us to contract and eventually hire an accountant. We have identified medical research labs in Russia and Canada to contract for animal trials. For product development, we will need a catheter specialist.

Appendix

Exhibit A. Brain Aneurysms and available methods of treatment categorized by cost and complexity of the procedure. Figures from Brain Aneurysms Foundation.



Coiling is performed by a neuro-radiologist or endovascular surgeon. This process is guided with the use of computer-aided X-ray scanners.

1. The femoral artery is accessed through a tiny incision in the thigh
2. a thin hollow tube or sheath is inserted into the artery wall
3. a catheter which is inserted and guided by a guidewire through the artery and up towards the brain.
4. A micro-catheter is then introduced through the larger catheter and used to deliver coils into the sac of the aneurysm
5. The coils cloth the aneurysms preventing it from further bursting and bleeding

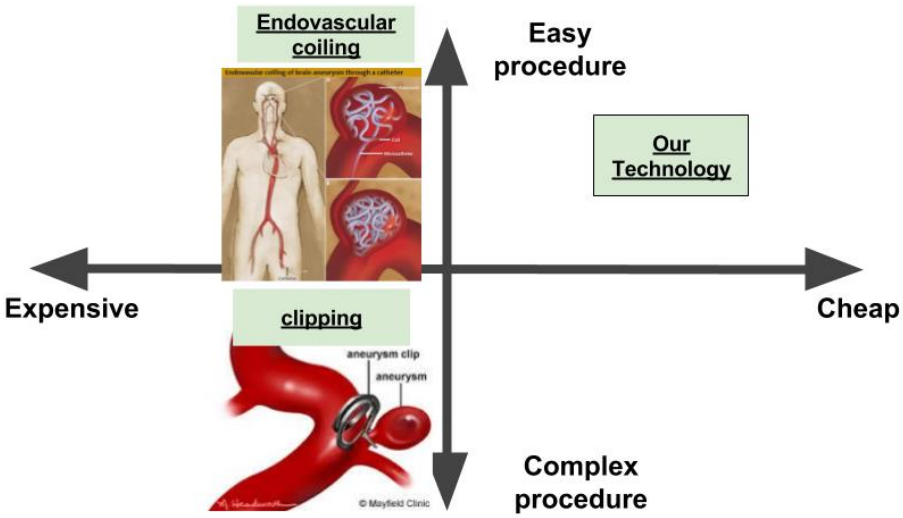


Exhibit B. Milestones of implementing the plan and detailed commercialization Plan

Stage 1 (1-1.5 years):

- Develop reputation and raise funds by applying to government funds (e.g. IRAP, SHRED), start-up competitions (e.g. BCIC, LSI start-up competitions)
- File provisional patent, incorporate
- Rent suitable lab space, obtain necessary equipment and materials
- Connect with our partner catheter specialist, to develop the procedure of delivering the material to aneurysm
- Start R&D of the procedure by 3D printing an aneurysm and testing proposed procedure
- File PCT patent

Stage 2 (2-3 years)

- Once the procedure is developed, connect with the identified medical research lab to conduct animal trials
- Meanwhile build network of manufacturers, doctors and investors
- Once data from animal trials is obtained Raise Stage A funding from VC

Stage 3 (3-7 years)

- form partnership with GMP approved manufacturer, and carry out clinical trials and apply for the FDA (CE Mark) approval
- Hire necessary legal, accounting, and research personnel
- While product is being FDA (CE Mark in Europe) approved partner with established manufacturers to utilize their network and channels for sales
- Once product is approved by government regulations agencies, start sales using channels of our partners

Stage 4:

We expect around $8,000,000 in Venture Capital investment. We estimate for 20% market penetration resulting in $250,000,000 sales per annum and break even time to be 6 years.

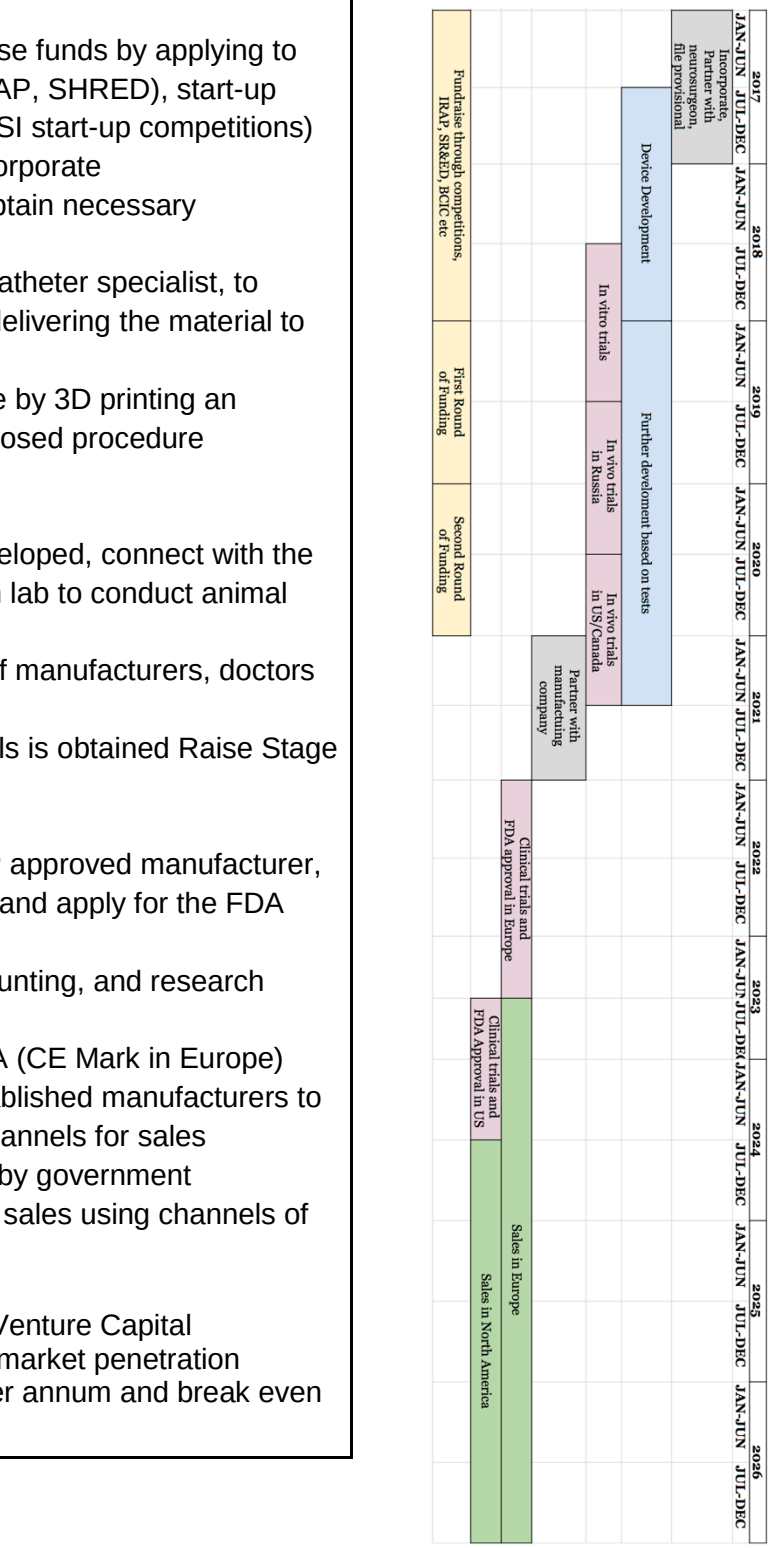


Exhibit C. Financial projections. Predicted financial growth in 10-year period. Break-even point of when the sales become higher than expenses and accumulated earning start to grow is predicted to be around 6 years.

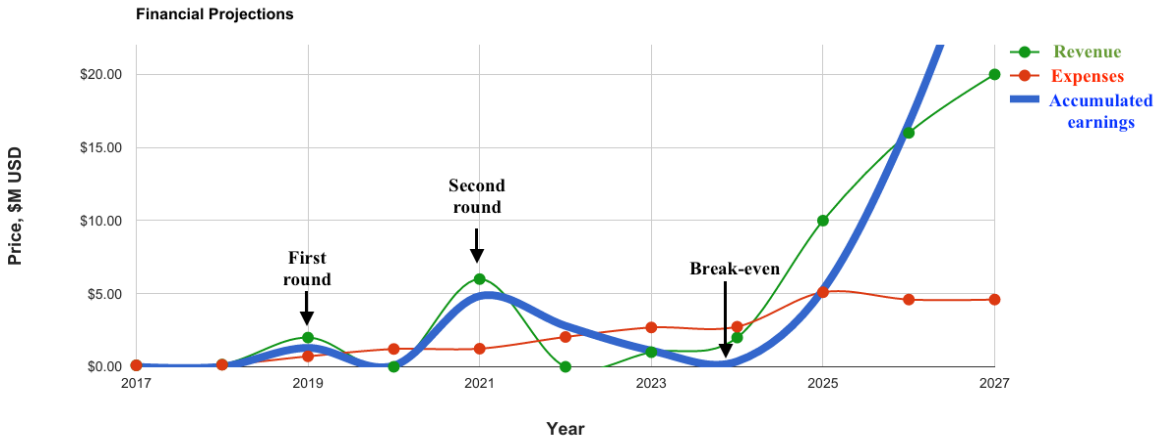


Exhibit D. Key risks and contingency plan.

Risks	Contingency plan
FDA (CE Mark) approval	Obtain better animal and clinical data. Do more trials by contracting laboratories in different country with cheaper prices (e.g. Russia) and registering international trials
Securing VC capital	Obtain better clinical data, partner with established manufacturer to de-risk the venture
Competition with established industry	Our technology has a possibility to be used as injectable pressure-sensor within the aneurysms for post-surgery monitoring of aneurysms. This will give additional competitive advantage to the venture

Exhibit E. Detailed team information with qualifications

Name	Position	Relevant experience
Mirza Saquib Sarwar https://www.linkedin.com/in/mirza-saquib-us-sarwar-6227283a/	PhD Student, Financial Officer	• Experience in R&D • In the finance committee of university student body looking over an annual budget of $500,000 • Holds several patents in the field of Electrical and BioMed Eng.
Vasilii Triandafilidi https://ca.linkedin.com/in/vtrianda	PhD Stud., Business Officer	• Graduate of UBC ePhD and mini-MBA program; • Experience in team leading (20 people), fundraising, network
Yuta Dobashi https://www.linkedin.com/in/yuta-dobashi-b8057688/	MS Stud., Scientific Officer	• Device level implementation and R&D • Holds several patents in the field of Biomed. Eng. • Experience in collaborating with neurosurgeons
Thanos Kritharis https://ca.linkedin.com/in/athanasios-kritharis-180693a5	BSc Stud., Operating Officer	• 1 year experience in bio-tech start-up • 3 years of experience managing Eng. design team (80 people) in logistics and fundraising ($80,000); • Co-founder of a small business