

# Lecture #3

# Market

Aims:

- Go through an example case study on Theranos
- Get an idea on HOW to get market and competitor data for your innovation

# Course content and schedule 2025

Lecture #/Date	Topic	Details	Seminar tasks
1/ 11.09	<b>General Introduction</b>	Aims of the course, expectations, tasks and assessments General proceeding	Watch Elisabeth Holmes Documentary (Theranos story)
2/ 18.09	<b>Roadmap from academic idea to startup</b>	template business example, Learn about all the steps needed to translate a scientific idea into a startup and what your pitch deck should include => Focus on Value proposition and Business model	Define customer value proposition, USPs and business model (= <b>business example</b> ) of Theranos <b>Grouping and assignment of individual presentations</b>
3/ 25.09	<b>Market analysis</b>	Market size, competitors, customer models, growth and scalability,	Introduction into ( <a href="#">GlobalData</a> ), Find market data on your business example & group innovation
4/ 02.10	<b>Corporate planning</b>	Business models, exit strategies, website & visibility,	Define business example of your group innovation, define markets and competitors
5/ 9.10	<b>Business examples</b>	<b>Business examples 1-4</b> , detailed feedback	
6/ 16.10	<b>Intellectual property and other legal issues</b>	<b>Business examples 5-8</b> Patents – facts, data bases, examples Concept of freedom to operate, regulatory hurdles, etc.	Find & analyze patents in your field
<b>23.10 – no lecture!</b>			
7/ 30.10	<b>Timelines &amp; initial steps</b>	<b>Business examples 9-12</b> Milestones and finance plan from idea to startup/product	Prepare milestones and financial plan for your startup idea
8/ 06.11	<b>Finalizing the pitch deck</b>	<b>Business examples 13-16</b> Recap: Detailed analysis of individual case studies, last year's best group pitch and TheraMe pitch	Finalize pitch deck
9/ 13.11	<b>How to secure funding</b>	<b>Business examples 17-20</b> Public funding programs, investments, venture capital, EPFL programs	
11/ 20.11	<b>Guest speaker Daniel Alpern (Alithea)</b>	<b>Business examples 21-24</b> Real-world EPFL startup insight	<b>Prepare Executive Summary and commercial potential in C4Lformat</b>
12/ 27.11	<b>Guest speaker Luc Henry (Limula)</b>	Real-world EPFL startup insight	
13/ 04.12	<b>Pitches Groups A (e.g. 4-6)</b> <b>Feedback Groups B (e.g. 1-3)</b>	10min pitches with non-presenting students to provide written feedback	<b>Prepare written feedback on other group's pitches</b>
14/ 11.12	<b>Pitches Groups B (e.g. 1-3)</b> <b>Feedback Groups A (e.g. 4-6)</b>	10min pitches with non-presenting students to provide written feedback	
11.12 at 10:15 am	<b>Trophy Award &amp; Feedback</b>		

# Next steps

## Group formation

1. Form groups of **4** people and submit the form <https://forms.gle/1YrXCR6bwyShDmw69>
2. Each group should choose two preferred presentation slots in the provided form.
3. Groups must complete the form by next Friday (**September 26th**).
4. We will assign and announce the final groups on Monday (**September 29th**).
5. If you can't find 4 people as a group, let the TA know at the next course.

## Presentations

1. Everyone must email us their Business Example (company name is sufficient) by **October 2nd**. This helps us avoid duplicate company selections.
2. For the pitch, groups must send us their chosen topic by **November 13th**.
3. Groups wanting feedback on their pitch slides should send them to the TA at least **3 days before** their presentation.
4. Submission of executive summary (C4L format) and group pitch slides at least **the night (23.59h) before your presentation**

# Prepare your business example

(first presentations in 2 weeks from now!)

- **Problem 1-2 slides**
- **Solution and USP 1-2 slides**
- **Business model 1-2 Slides**
- **No market data – this is required for the group pitch, *only***

Previous **individual case studies** included:

**CARBIOS – Enzymes powering the circular economy (Moodle)**

**ALGENOL – harnessing the sun to fuel the world (Moodle – failed startup)**

**Do we have any Theranos case studies for discussion?**

**theranos**

# Groups & example innovations

Previous (hypothetical) **group innovations** included:

**REDinal – epi-retinal implants to restore vision (Moodle)**

**Limitation:** 2-year lifespan, surgical intervention required

**Breath analyzer for early detection of cancer**

**Limitation:** Not able to discriminate cancer types and stages

**RoboDoc: Robot assisting medical diagnosis**

**Limitation:** No human interaction, no invasive procedures

# Defining your market

## Commercialization

1. What is the **USP**? **Is there a market and how big is it?**
2. How do I address my **customers**, what is the **business model**, is it **scalable**?
3. What is needed (**time, budget and resources**) to develop a minimal marketable product (**MMP**)?
4. Do I have **patent protection** and **freedom to operate**? Any other **legal or regulatory hurdles**?
5. How to secure **funding**?



**The total economic cost of cancer is 1.14 trillion US\$/year**

**Annual sales in the field of cancer diagnostics are 160 billion US\$/year**

**Annual sales of cancer diagnostics in Switzerland are ??? US\$/year**

**Pancreatic cancer accounts for only about 3% of all cancers**



How do I get MY market potential out of all these numbers and infos?

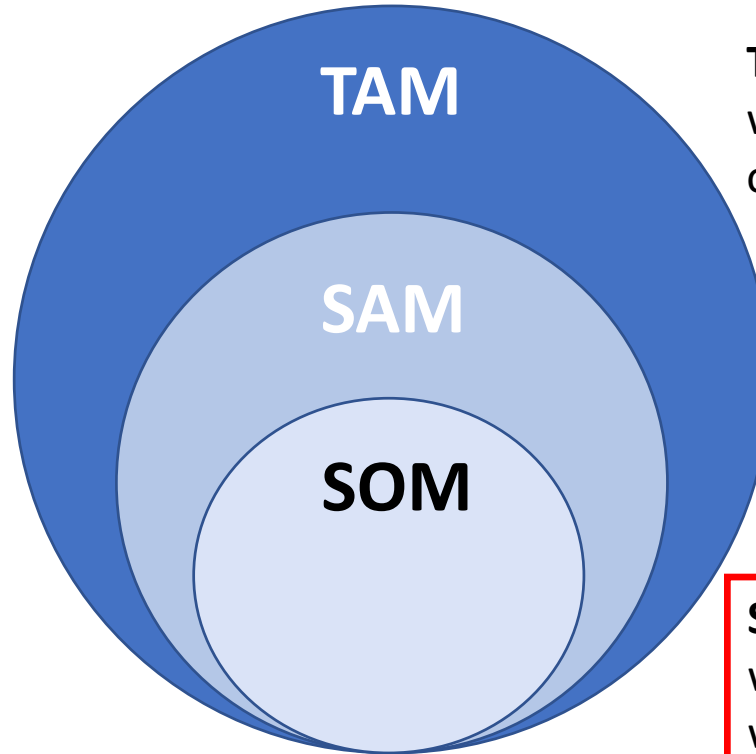
=> Today's lecture on market analysis

**How would YOU calculate the market for diagnostics/assays for personalized colorectal cancer therapy?**



# Total global market ≠ your market

**SAM** = Serviceable Addressable Market, e.g. portion of the TAM that could finally be serviced based on your business model (e.g. a specific market share in specific countries for specific indications)



**TAM** = Total Addressable Market, e.g. worldwide market for in vitro diagnostics in oncology, assuming a 100% market share

**SOM** = Serviceable obtainable market, e.g. what you can realistically capture and serve with your resources

## Desired market data

**Worldwide market size & growth** (what is the ultimate commercial potential of your product)?

**Size of initial market niche** (initial commercial potential)?

Worldwide **competitor sales**, total sales in your initial market niche, market share of **#1 competitor** (what sales can be expected)?

What is the **market value of your competitor** (what future value of the company can be expected)?

# Worldwide market size and growth in the field of cancer diagnostics

## Hits when using ["cancer diagnostics" market] as a search term in Google:

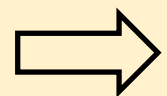
The global cancer diagnostics market is expected to grow from **\$156.27 billion in 2020** to \$170.21 billion in 2021 at a compound annual growth rate (**CAGR**) of **8.9%**. (ReportLinker)

The global cancer diagnostics market size was valued at **USD 144. 4 billion in 2018** and is expected to register a **CAGR of 7.0%** over the forecast period. (Grand View Research)

Market size: **USD 163.84 Billion in 2020**, Market Growth: **CAGR of 6.3%**, Market Trends: Increasing number of private diagnostic laboratories (Reports and Data)

The global Cancer Diagnostics Market was pegged at **\$168.60 billion in 2020**, and is estimated to reach \$280.59 billion by 2028, growing at a **CAGR of 6.9%** from 2020 to 2028. (Allied Market Research)

Can be complemented by searches on professional data bases on business numbers such as **Global Data, Statista, Crunch Base**



**Worldwide market size & growth ≈ USD 160 billion per year, 7% CAGR**

# Definition of Compound Annual Growth Rate (CAGR)

(modified from Wikipedia)

$$\text{CAGR}(t_0, t_n) = \left( \frac{V(t_n)}{V(t_0)} \right)^{\frac{1}{t_n - t_0}} - 1$$

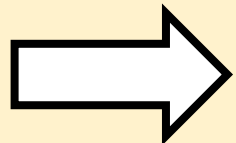
where  $t_0$  is the initial value,  $t_n$  is the end value, and  $t_n - t_0$  is the number of years.

## Example

Year-End	2004-12-31	2007-12-31
Year-End Revenue	9,000	13,000

Therefore, to calculate the CAGR of the revenues over the three-year period spanning the "end" of 2004 to the "end" of 2007 is:

$$\text{CAGR}(0, 3) = \left( \frac{13000}{9000} \right)^{\frac{1}{3}} - 1 = 0.13 = 13\%$$



Provides you with an averaged "smoothed" rate for exponential growth and corresponds to the exponential growth rate for a period of one year.

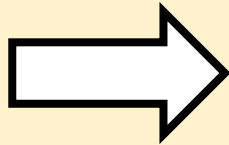
# Definition of AAGR

The Annual Average Growth Rate is defined as follows:

$$\text{AAGR} = [(\text{Growth Rate})_y + (\text{Growth Rate})_{y+1} + \dots (\text{Growth Rate})_{y+n}] / N$$

y = specific year (starting point of the period of interest)

N = total period in years



Not applicable to exponential growth (use CAGR instead)

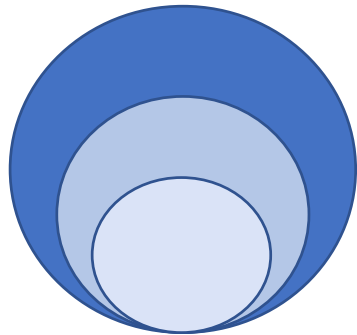
# Worldwide market size and growth in the field of *in vitro* cancer diagnostics

Hits when using ["in vitro cancer diagnostics" market] as a search term in Google:

Cancer IVD Market size was valued at **\$17,728 million in 2020** and is anticipated to reach \$22,430 million by the end of 2026 growing at a **CAGR of 6.0%** during the forecast period 2021-2026. (industryarc.com)

Oncology segment held around **USD 19.2 billion in 2021**... (gminsights.com)

The global cancer diagnostics market in terms of revenue was estimated to be worth **17.2 billion in 2021** and is poised to reach \$26.6 billion by 2026, growing at a **CAGR of 11.5%** from 2021 to 2026 (marketsandmarkets.com)

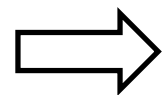


**TAM ~ 18 billion USD, 6-11.5% CAGR (total IVD market in oncology)**

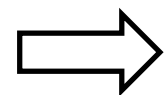
# Use of professional data bases

**Define initial market niche:** What are the annual sales of IVD indicated for colorectal cancer in Switzerland?

The screenshot shows the GlobalData website interface. The browser address bar displays 'https://www.globaldata.com'. The navigation menu includes 'Who We Are', 'Industries We Cover', 'Who We Serve', and 'What We Offer', with 'Who We Serve' currently selected. A search bar is located in the top right corner. The main content area is divided into four columns: 'Who We Serve', 'Corporates', 'Financial Institutions', and 'Professional Services'. The 'Who We Serve' column lists: C-Suite, Innovation and R&D, Market and Competitive Intelligence, Strategic Planning & M&A, Marketing, and Business Development. The 'Corporates' column lists: Investment Banking, Equity Research, Investment Management, and Private Equity & Venture Capital. The 'Financial Institutions' column lists: Management Consulting, Legal & Accounting, and Other. The 'Professional Services' column lists: Academia, Government, and Media & Advertising. A red diagonal watermark reads 'No more EPFL subscription'.



Even with very good data bases you potentially won't find all specific data



In this case try to get rough estimates by (simplified) indirect calculations!

# Calculating an estimate for *in vitro* cancer diagnostics in CH

Total **drug sales in Switzerland** were about **6 billion US\$ in 2019**, of which **16% were anti-cancer drugs**, equaling 960 million CHF (2019 Report of the Swiss Pharma Industry). The worldwide sales of anti cancer drugs in 2019 were 145 billion US\$ (Statista), meaning that the **market share of Switzerland was about 0.66%**.

In a very simplified way, one could hence assume that Switzerland might also have **an approximate 0.66% market share for *in vitro* cancer diagnostics**, whose annual sales were about 18 billion in 2020 (see previous slides). This would correspond to an **estimated volume of about 119 million US\$**.

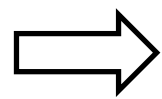
Important note: The total cancer diagnostics market includes tests that are carried out to determine if people have cancer and therefore also includes healthy individuals on whom the TheraMe! business model cannot be applied!

# Calculating an estimate for *in vitro* colorectal cancer diagnostics in CH

Assuming a total annual volume of 119 million US\$ for cancer diagnostics in Switzerland (simplified estimate!) and an even distribution over the different cancer types (strongly simplified estimate), one could calculate the specific market for colorectal cancer as follows:

Target market size = 119 million US\$ x relative colorectal cancer incidence:

Number of cancer incidence <sup>a, b</sup>	Worldwide 2018	USA 2018	Germany 2018	Switzerland 2018	Luxemburg 2018	
All cancer types	18 078 957	2 129 118	608 742	56 506	3 271	
Colorectal cancer	1 849 518	155 098	58 047	4 681 (8.2%)	323	






**Estimated size of the initially targeted marked niche = 119 million US\$ x 8.2% = 9.7 million US\$**

**But what percentage of this market could be realistically captured?**

# What is the market share of the strongest competitor?

**Identify a competitor for benchmarking: Select a successful company with a product to which yours is potentially superior (or at least competitive) and provide all corresponding market and company data!**

# Comparison with existing diagnostic products

System	FDA-approved Companion Diagnostics Tests	FDA-approved Circulating Tumor Cell Count	TheraMe!
Detection of individual resistances	✓	✓	✓
Comparison of 100+ therapy options	✗	✗	✓
Diagnosis before treatment	✓	✗	✓
Diagnosis without prior knowledge/ biomarkers	✗	✓	✓
Direct evidence for efficiency of therapy	✗	✓	✓
Costs per test & patient	~ 1,500-5,800 US\$ 	~350 US\$ 	~2500 US\$* 

\*envisaged market price, internal consumable costs = 150 US\$ per screen

## Comparison with existing diagnostic products

Diagnostic Name	Diagnostic Manufacturer	Cancer Type Therapy Trade Name (Generic)	Test / Kit Price \$	CAGR (2015-2025)
FoundationOne CDx	Foundation Medicine	Colorectal cancer Erbix (cetuximab) - BLA	5,800	
Praxis Extended RAS Panel	Illumina	Colorectal cancer Vectibix (panitumumab) - NDA		
Cobas KRAS Mutation Test	Roche Molecular Systems	Colorectal cancer Erbix (cetuximab) - BLA Vectibix (panitumumab) - BLA	160	4.1 %
Therascreen KRAS RGQ PCR Kit	Qiagen Manchester	Colorectal cancer Erbix (cetuximab) - BLA Vectibix (panitumumab) - BLA	200	
Dako EGFR pharmDx Kit	Dako North America	Colorectal cancer Erbix (cetuximab) - BLA Vectibix (panitumumab) - BLA	40	3.4 %

**Let's have a closer look at the history of Foundation Medicine:**

# The history of Foundation Medicine

- **2010:** Founded with a Series A investment of 25 million US\$
- **2012:** First commercial assay marketed in 2012
- **2013:** IPO (NASDAQ:FMI), raising 106 million US\$
- **2015:** Roche acquires 56.3% shares for 780 million US\$
- **2018:** Roche acquires remaining shares for 2.4 billion US\$
- **2018:** 668 employees, 201,4 million US\$ revenue, ~95k kits sold, most important product: FoundationOne CDx at a price of ~5,800 US\$ per kit



**2010**

Company Founded



**2012**

FoundationOne<sup>®</sup>  
launched



**2013**

FoundationOne<sup>®</sup>Heme  
launched



**2016**

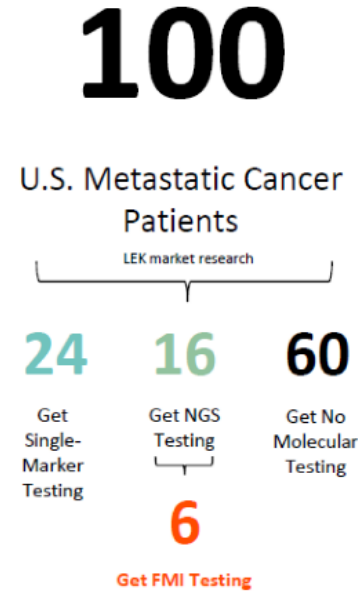
FoundationACT<sup>®</sup>  
launched,  
FoundationFocus™  
CDxBRCA - first FDA-  
approved companion  
diagnostic



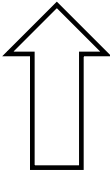
**2017**

FDA approves  
FoundationOne CDx -  
the first broad  
companion diagnostic  
for solid tumors

# The history of Foundation Medicine



FMI is growing faster than market (>50% YoY)



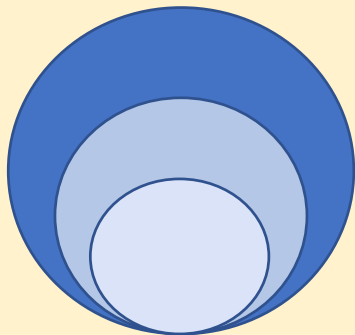
Despite all the success (and support from Roche) only 6% of metastatic cancer patients in the US get tested with an FMI kit!

## Most important facts to extract

- Series A investment = 25 mio US\$ in 2010
- Takeover by Roche (56% just 5 years after company launch, rest in 2018) for a total of 3.18 billion US\$
- Sells kits at a unit price of 5.800 US\$, also in CH
- Sales of 2k kits 2 years after company launch, 95k 8 years after company launch
- 6% of metastatic cancer patients in the US get tested with a FM product

Let's use this data to extrapolate the initial market potential of TheraMe!

Country	# new colorectal cancer diagnoses/year	# of potential tests (6% patient reach)	Potential annual sales according to FMI kit price
CH	4681	281	1.6 mio US\$
D	58 047	3483	20 mio US\$
US	155 098	9306	54 mio US\$



**TAM ~ 18 billion USD, 6-11.5% CAGR (total IVD market in oncology)**

**SAM ~ 76 million USD (6% of all colorectal cancer patients in CH, D & US)**

**SOM ~ 1.6 million USD (6% of all colorectal cancer patients in CH)**

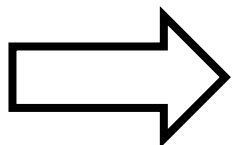
# Market size and potential sales

Analyzing YOUR potential market is always based on estimates and assumptions. Depending on the data source, you will even get very different numbers from professional market analysts. To get a realistic idea, it is therefore very useful to perform **complementary analyses and calculations**:

- **Identify the total size of your target market using different databases and internet searches** (are the numbers I need already publicly available?)
- **Calculate the market size indirectly** (e.g. multiply the relative incidence of your targeted cancer type with the total sales to get an estimate on indication-specific sales)
- Look at the **sales of your main competitor(s)**
- **Ask potential customers** (especially for B2B models they will have good data!)

Total size of targeted market, still has to be multiplied with expected market share/penetration

Probably mirrors your market potential better

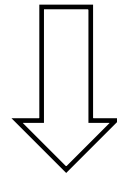


In the very best case you should end up with coherent numbers for the different approaches. If not, rather go with the worst case estimate!

# Isn't this disappointing?

**The total economic cost of cancer is 1.14 trillion US\$/year**

**Annual sales in the field of cancer diagnostics are 160 billion US\$/year**



**SOM ~ 1.6 million USD (6% of all colorectal cancer patients in CH)**



# Growth and scalability

- **Expanding on additional markets** (requiring additional approvals, but easy in e.g. additional EU countries once marketed in a single EU country)
- **Expanding to different tumor types** (warning: this requires additional clinical trials!)
- **Expanding to different business models** (e.g. making use of the acquired data for biomarker discovery)
- **Launching advanced generations of the technology** (note that this probably does not result in more tests per patient, but potentially in a higher revenue)

# How to calculate potential market sizes in the health sector for entirely new approaches?

## QALY = Quality-Adjusted Life Years:

- If e.g. a drug extends survival by one year, then its QALY value is 1.
- If a drug or clinical intervention makes blind people see for five years, then the QALY value is often estimated to be 5 times 0.3 (difference between blind and seeing) = 1.5

How much are the health care systems willing to pay for 1 QALY?

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Determining the efficiency path to universal health coverage: cost-effectiveness thresholds for 174 countries based on growth in life expectancy and health expenditures



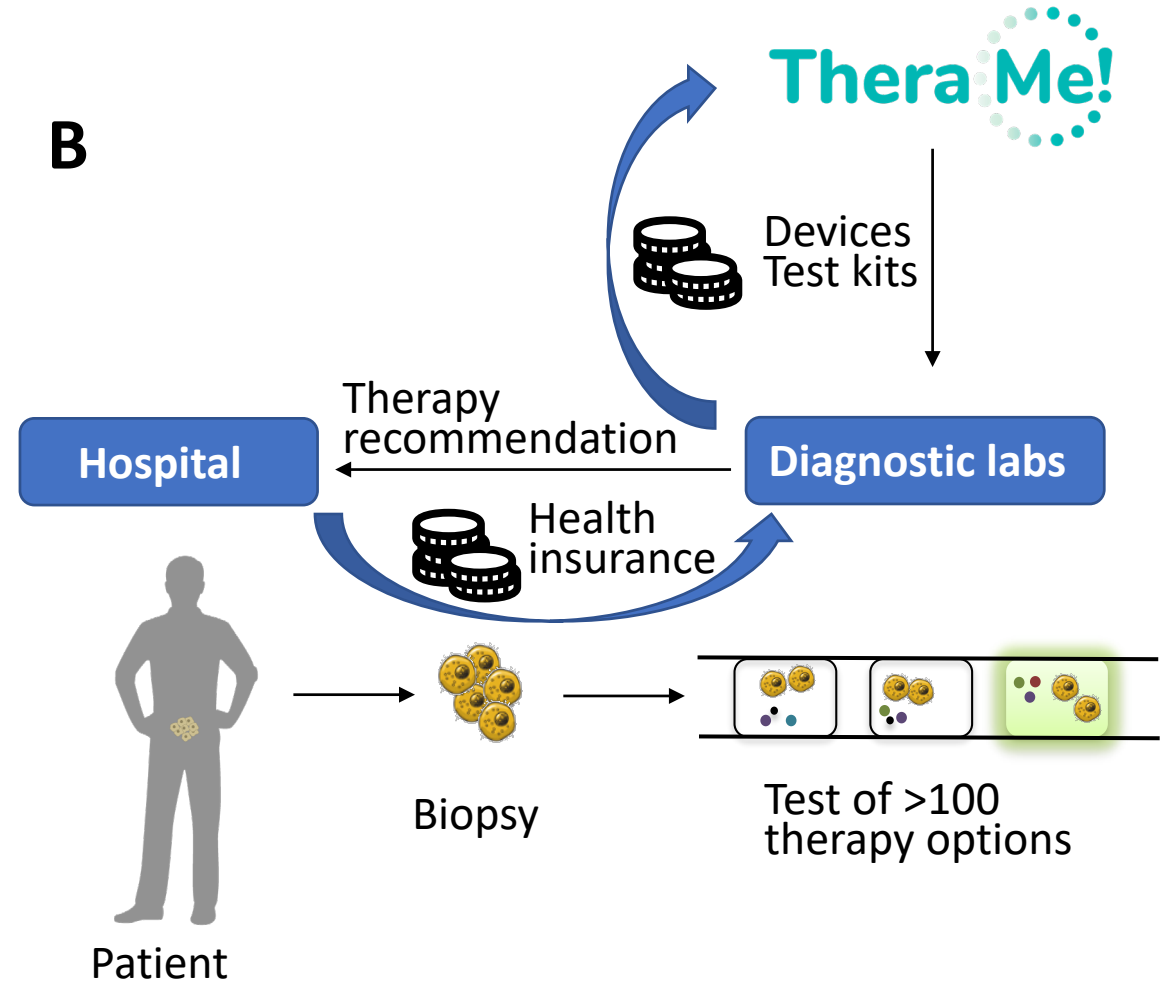
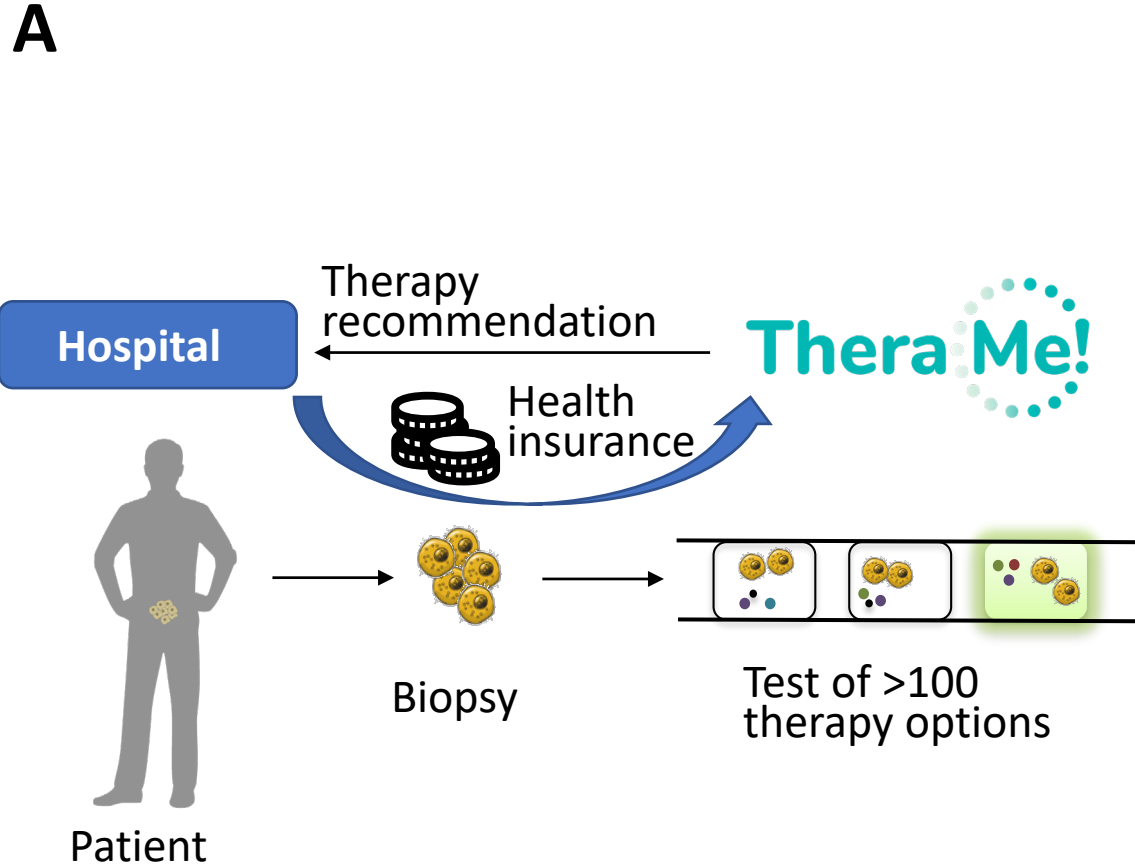
*Andres Pichon-Riviere, Michael Drummond, Alfredo Palacios, Sebastián Garcia-Marti, Federico Augustovski*



## 1 QALY in US = \$95 958

- **Note that this is much more than e.g. the price for a CDx test, which only provides support for a better treatment, but no direct life extension!**
- **Gives you an estimate on how much the treatment of deadly diseases may cost (averaged – there are outliers!)**

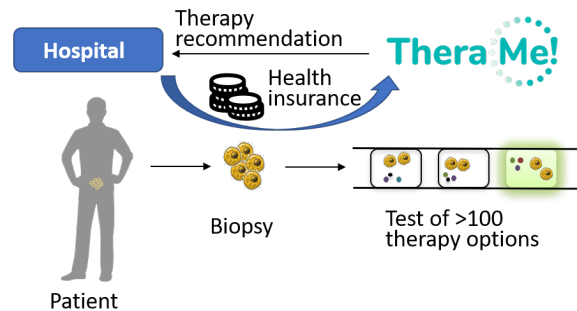
# How to address patients as consumers?



➡ Which model do you prefer and why?

# BIO-490 students tasks for today/ this week

- Select individual case study. Form groups and select an example innovation (hypothetical or real) for the group pitch.
- Develop your example innovation into a first basic value proposition



- Compare it to what is already on the market

System	FDA-approved Companion Diagnostics Tests	FDA-approved Circulating Tumor Cell Count	Thera Me!
Detection of individual resistances	✓	✓	✓
Comparison of 100+ therapy options	✗	✗	✓
Diagnosis before treatment	✓	✗	✓
Diagnosis without prior knowledge/ biomarkers	✗	✓	✓
Direct evidence for efficiency of therapy	✗	✓	✓
Costs per test & patient	~ 1,500-5,800 US\$	~350 US\$	~2500 US\$*

\*envisaged market price, internal consumable costs = 150 US\$ per screen

- Find market data on your innovation and prepare 1-2 nice slides summarizing the most important info:

TAM, SAM & SOM

Good company for benchmarking (“this is the success story of a competitor, but our product is even better”)

# Questions?

