香港城市大學
City University of Hong Kong

BEVATECH:

COUNTERFEIT TEST FOR BEVACIZUMAB

CITYU-HK IGEM TEAM 2024

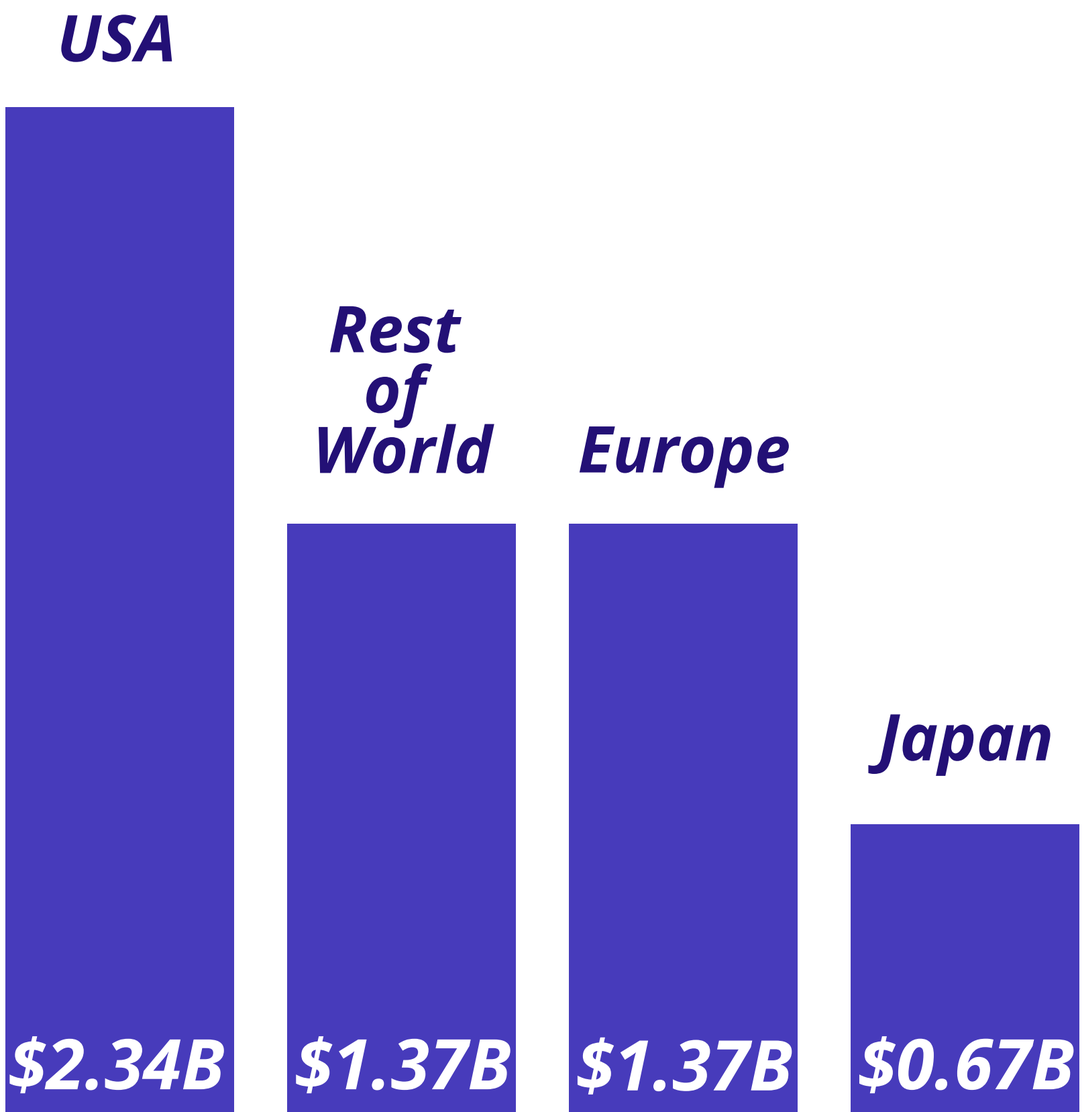
Bevacizumab (©Avastin)

Treating 2.2+ Millions Cancer Patients Annually

Covering Different Tumour Types:

Lungs, Brain, Colorectal, Ovaries, Cervical, Kidneys

Market Size of ©Avastin



$5.7B

Total Market Size

$=USD

Source: IQVIA 2023

Developing Countries Account for More Than 20% of Counterfeit Drugs

Cases of Counterfeit ©Avastin

Medical News & Perspectives

March 6, 2013

FDA Warning: New Batch of Fake Bevacizumab Found

Bridget M. Kuehn, MSJ

JAMA. 2013;309(9):864. doi:10.1001/jama.2013.1719

A counterfeit version of the injectable cancer drug bevacizumab that may contain no active ingredient has been distributed to clinics in the United States, according to a US Food and Drug Administration (FDA) alert to physicians. The incident is the latest in a string of cases in which foreign drug distributors have sold counterfeit medications to US medical practices.

Warning over 'counterfeit' drugs that blinded diabetes patients in Pakistan

A total of 68 diabetics completely lost their vision after being injected with, what is thought to be, a bogus version of a well-known drug

Haroon Janjua, IN ISLAMABAD

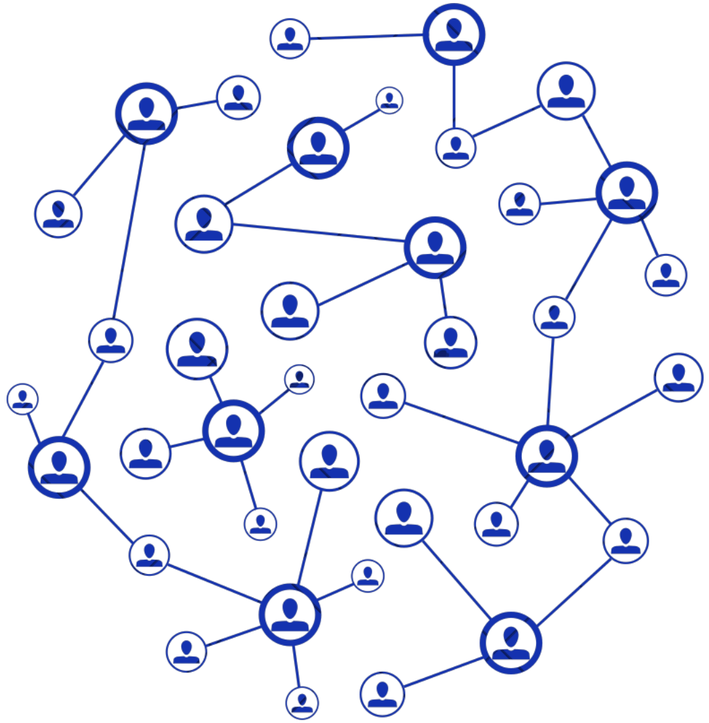
29 September 2023 - 12:15pm

"Incidents of loss of vision in diabetic patients have been reported following treatment with Altered/Dispensed/Diluted Avastin injection," the Drug Regulatory Authority of Pakistan (DRAP) said in a statement.

A rapid, affordable, and precise solution is needed

Causes of Counterfeit Problems in Developing Economies

- Poor Trade Regulation
- Lack of Quality Control
- Insufficient Testing Facilities
- Corruption



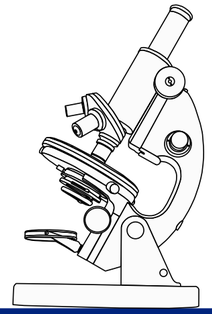
Conventional Method vs Our Solution for Drug Validation

Drug Sample

1-2 days

Laboratory

3-8 hrs



Validation

1-2 hrs

Result

***Costly**, Time Consuming, Require Particular Devices and Operator*

Our Method

Drug Sample

1 mins

Test Strip

15 mins

Result

Low Cost, Rapid, and No Lab Required

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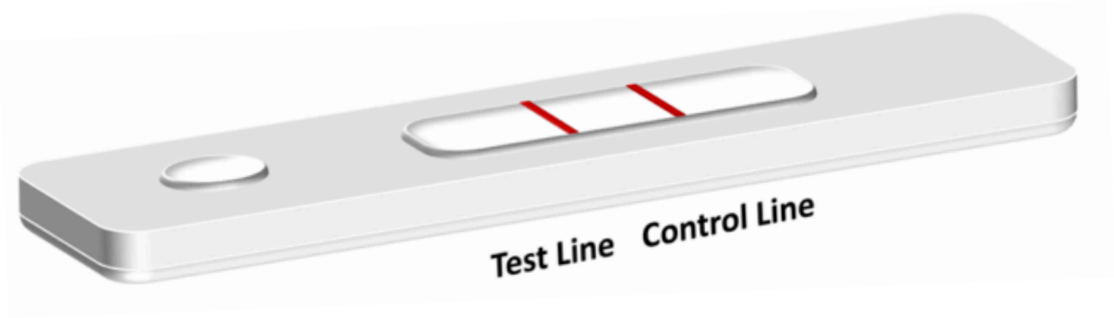
Our Solution

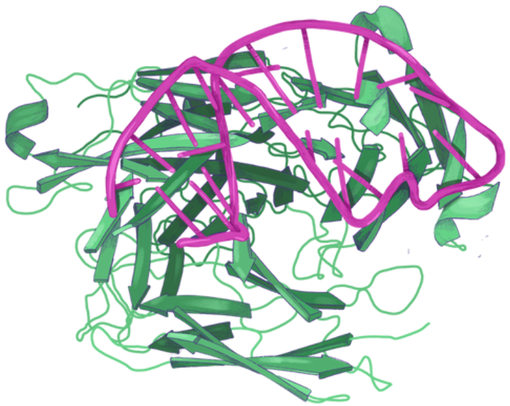
- Low-cost
- Rapid results
- Simple to use
- No laboratory equipment
- Large-scale manufacturing

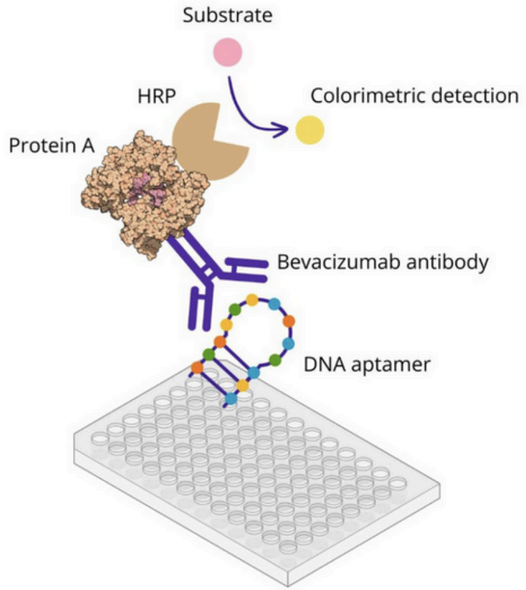
Express Test for the Validation of Bevacizumab (©Avastin)

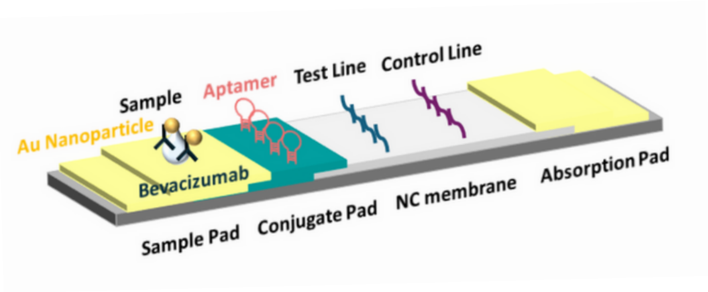


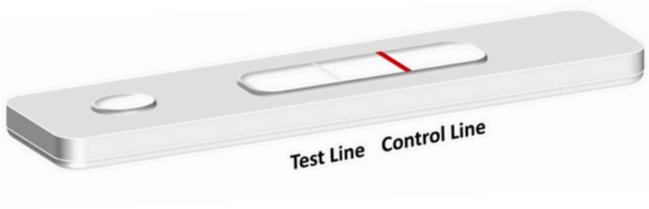
$1.5 per unit

Our Product



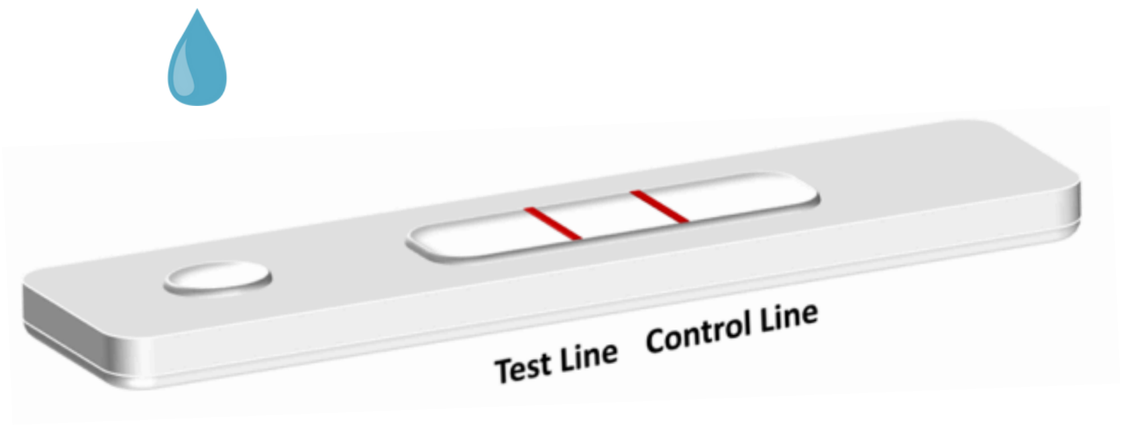




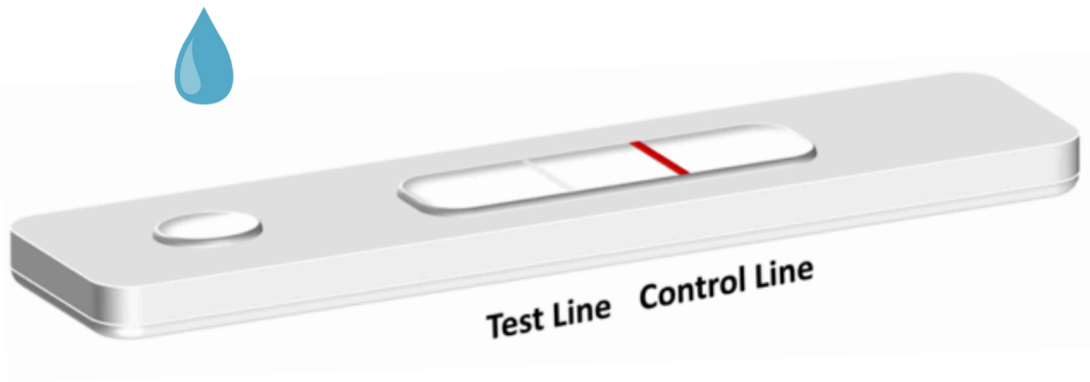


Computer Modeling → Lab Test & Optimization → Product Development → Final Product

Our Product is Simple to Use



Fake Drug (Two Lines)



Valid Drug (One Line)

Distribution Channels

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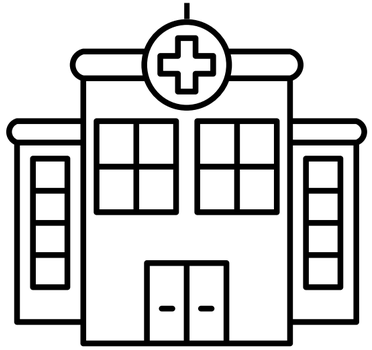
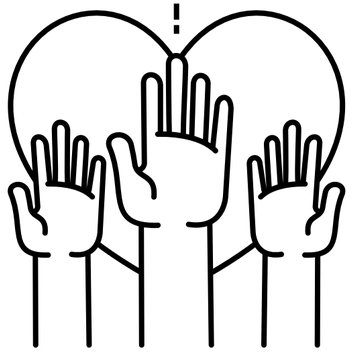
Pharmaceutical Companies

Research Institutions



Hospitals and Diagnostic Centres

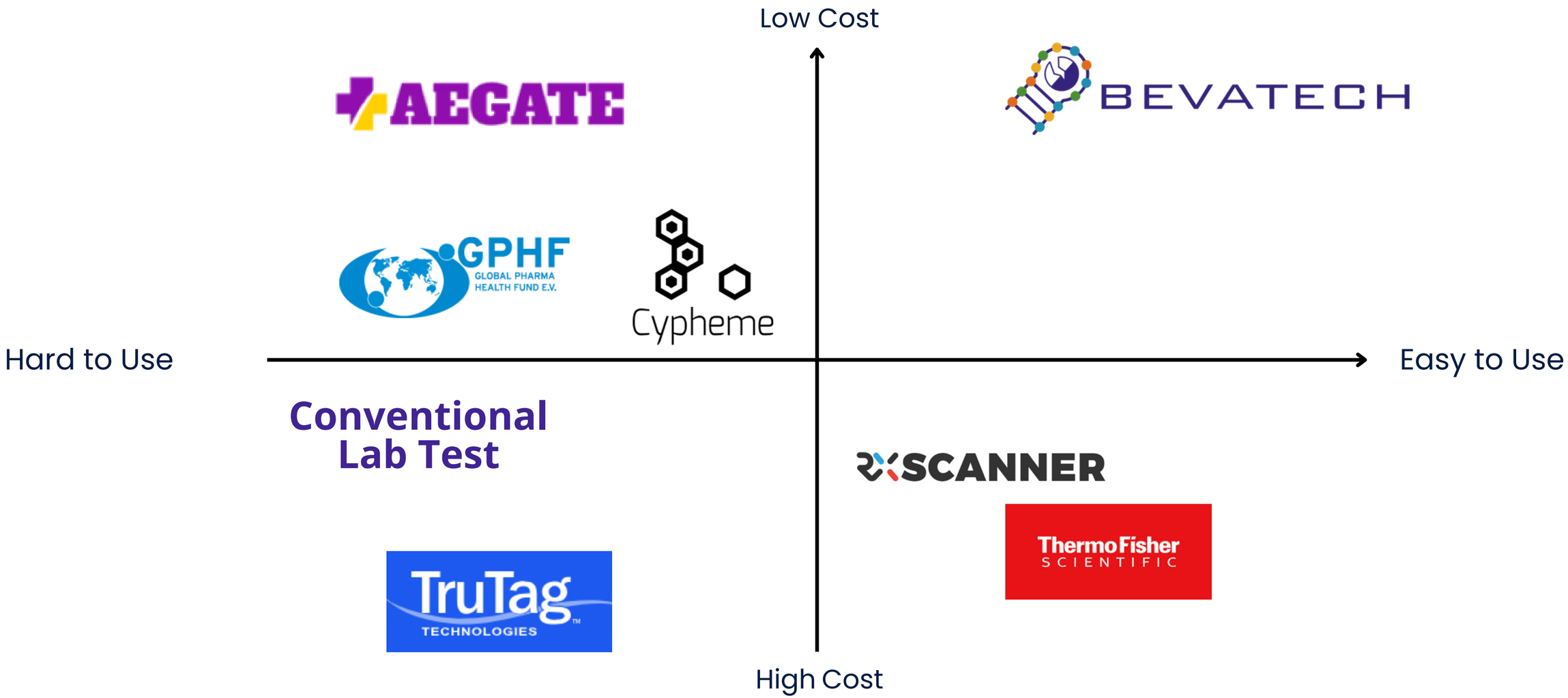


NGOs

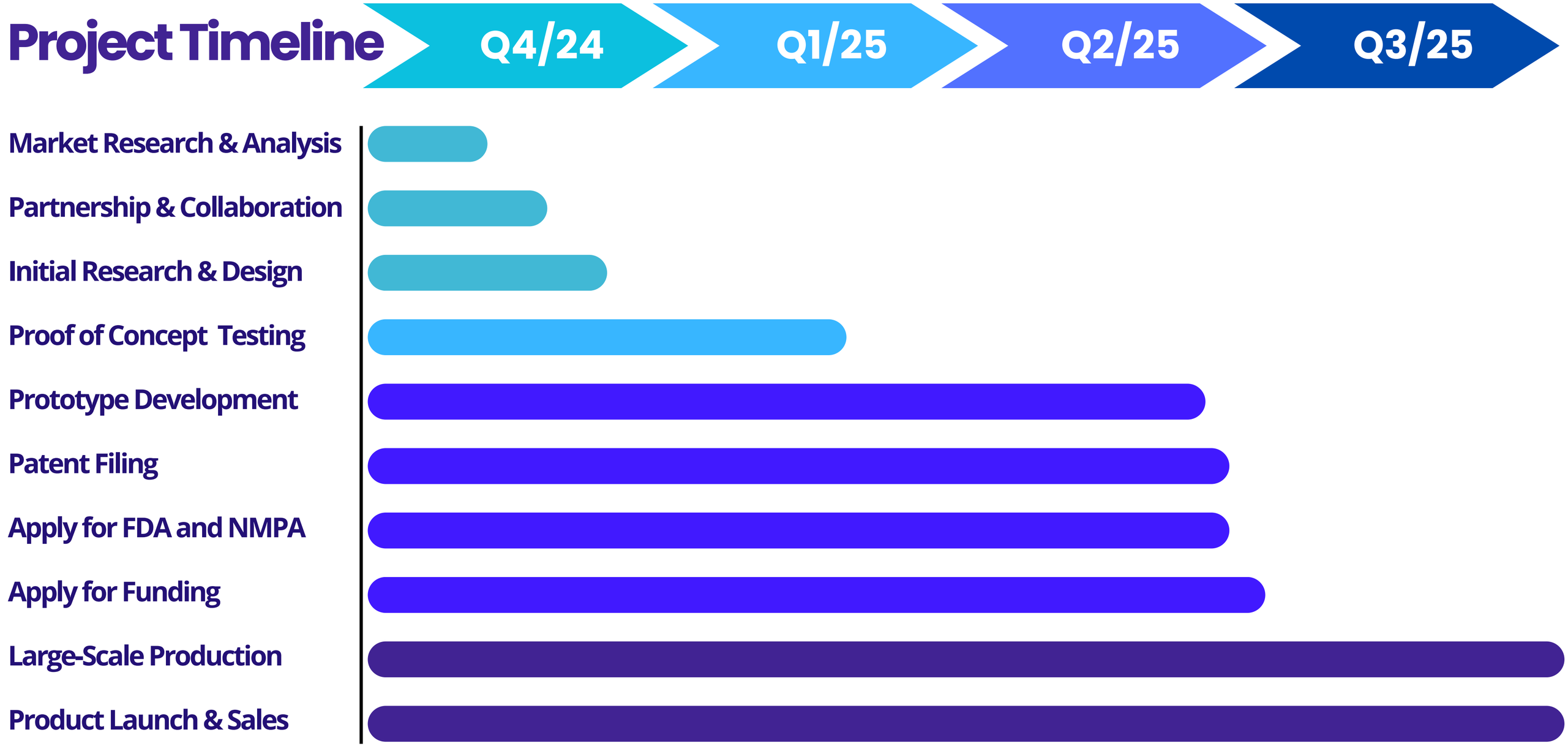
Our Product vs Competitors

Company	Technology	Low Cost	Rapid	User-friendly	Remote-use	Mass Distribution
BEVATECH	Lateral Flow Assay test strip	✓	✓	✓	✓	✓
RXSCANNER	Spectroscopy	✗	✓	✗	✓	✗
AEGATE	Drug packaging authentication	✗	✓	✓	✗	✗
TruTag TECHNOLOGIES	Barcodes for verification	✗	✗	✗	✗	✗

Competitive Landscape



Project Timeline



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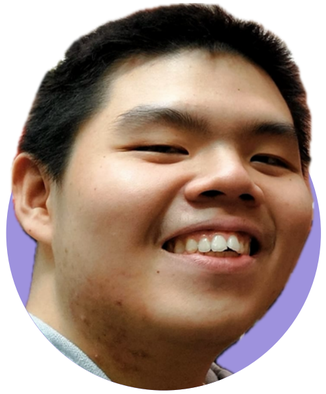

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THANK YOU!

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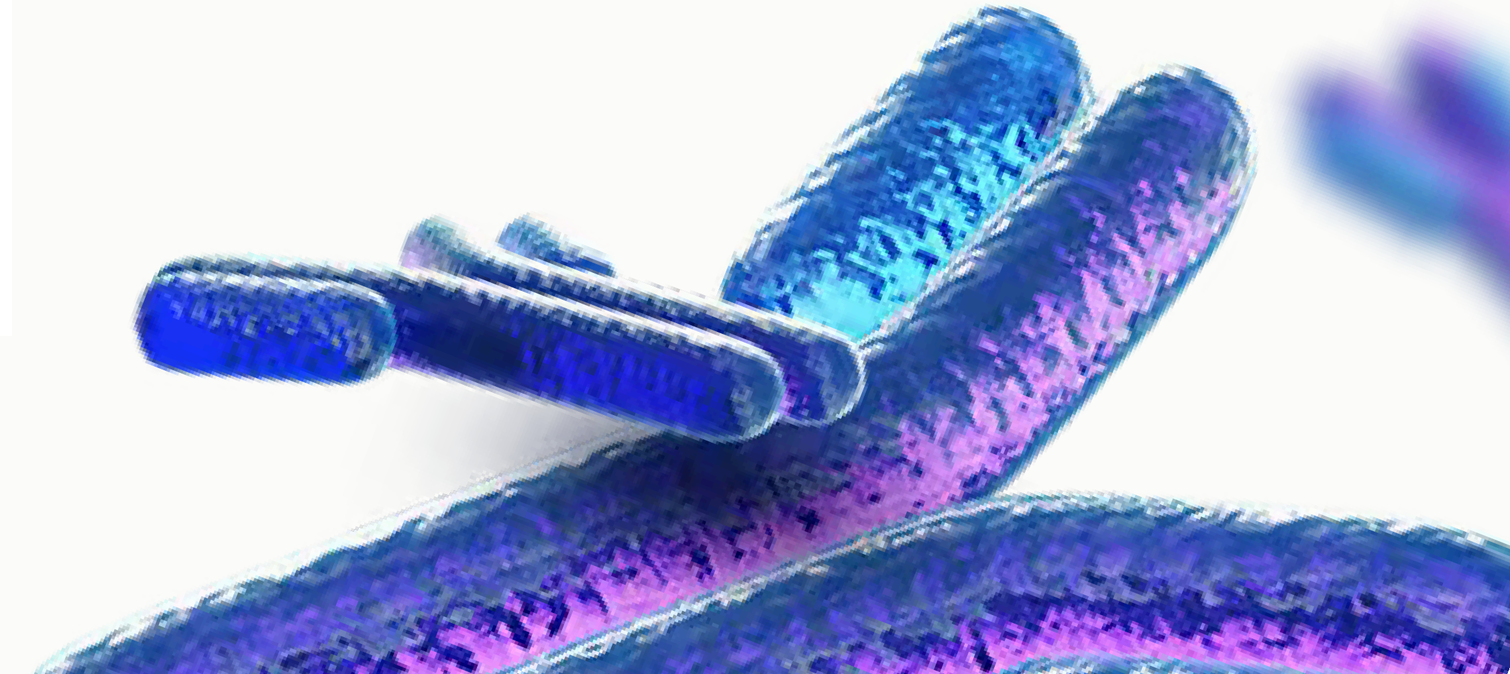

SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
• Cost-Effective • High Specificity • High Sensitivity • User-Friendly • Rapid Results	• Regulatory Complexities • Distribution Channels	• Growing Demand for Counterfeit Drug Detection • Expanding Applications for Other Types of Drugs • Partnerships with Hospitals, Pharmaceutical Companies, and NGOs	• Public Perception and Adoption • Competition from Other Companies • Intellectual property Challenges • Regulatory Challenges

Key Partners

- **Research Institutions:** City University of Hong Kong
- **Pharmaceutical Companies**: Roche, Amgen, Pfizer, Amneal Pharmaceuticals, Celltrion, Fujifilm Kyowa Kirin Biologics, AstraZeneca, Samsung Bioepis(Samsung BioLogics)
- **NGOs:** Médecins Sans Frontières, CARE International, International Red Cross and Red Crescent Movement, BRAC, Aide et Action, Plan International, Save the Children
- **Hospitals and Diagnostic Centers**: Apollo Hospitals, Peking Union Medical College Hospital, Bumrungrad International Hospital

Value Propositions

- **Low-cost**: Only cost $2.25 per unit
- **Rapid results:** Immediate result within 15 minutes from testing
- **Simple to use:** User-friendly design that can be used by anyone intuitively, without any expertise
- **No laboratory equipment:** Do not require any specific tools to operate
- **Large-scale manufacturing :** Able to be produced massively and distributed into different regions in high quantities.

Key Resources

- **Human Resources:** Team of scientists, researchers, and regulatory experts
- **Technology & Product Design**: Synthetic biology tools and equipment for test strip development
- **Partnerships:** Relationships with pharmaceutical companies, NGOs, hospitals, and research institutions

Key Activities

- **R&D**: Development of rapid and sensitive detection methods using modular synthetic biology
- **Regulatory Approvals**: Obtain necessary approvals for test strips in different regions
- **Manufacturing**: Production of test strips
- **Distribution**: Partner with NGOs, hospitals, and pharmacies for distribution
- **Awareness Campaigns**: Raise awareness about drug counterfeiting issues and the availability of test strips
- **Collaborations**: Work with experts and institutions to refine technology

Customer Relationships

- **B2B:** Long-term contracts with hospitals, pharmaceutical companies, and diagnostic centers
- **B2C**: Direct support and educational resources for end-users
- **NGOs**: Partnerships and collaboration on distribution and awareness campaigns

Channels

- **Direct Sales:** Through partnerships with hospitals, diagnostic centers, and pharmaceutical companies
- **Online Sales**: E-commerce platform for direct purchase by consumers in high-risk areas
- **NGO Distribution**: Leveraging NGO networks to distribute test strips in conflict zones and developing countries
- **Healthcare Conferences and Events:** Presenting at industry events to raise awareness and build relationships

Customer Segments

- **Hospitals and Diagnostic Centers:** Looking to ensure the authenticity of their medications
- **Pharmaceutical Companies:** Seeking quality control solutions
- **NGOs:** Working in regions with high rates of drug counterfeiting
- **Patients and Consumers:** Particularly in conflict zones and developing countries

Cost Structure

- **R&D Costs**: Development of detection methods (aptamer optimization) and test strips
- **Manufacturing Costs:** Production of test strips (estimated to be $1.5)
- **Regulatory Costs:** Obtaining approvals and certifications
- **Distribution Costs**: Partnering with NGOs and shipping products
- **Marketing and Awareness:** Campaigns to raise awareness about drug counterfeiting and promote test strips

Revenue Streams

- **Sales of Test Strips**: Direct sales to hospitals, diagnostic centers, and consumers
- **Partnerships**: Revenue from collaborations with pharmaceutical companies
- **Grants and Funding**: Support from health organizations and foundations
- **Licensing**: Licensing technology to other companies or regions

Patent Applications

PRESENT

Patent Research and Guidance

Q4/2024

Consult legal team for patent applications

Q1/2025

Patent Application US & China

Q2/2025

Patent Review

Q3/2025

Patent Granted