



PepVax, Inc. has developed a novel DNA-based drug delivery and development platform, called SMARTmid™, to make safer and more effective autologous drugs using a “Trojan Horse” approach

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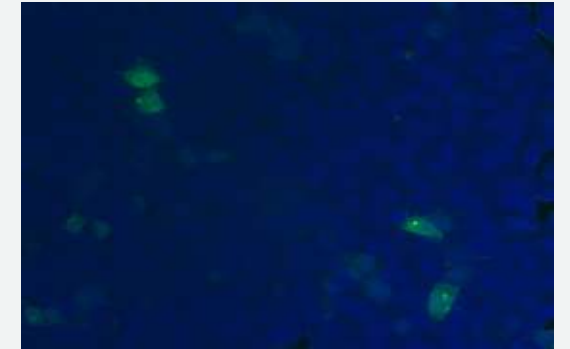
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Overview

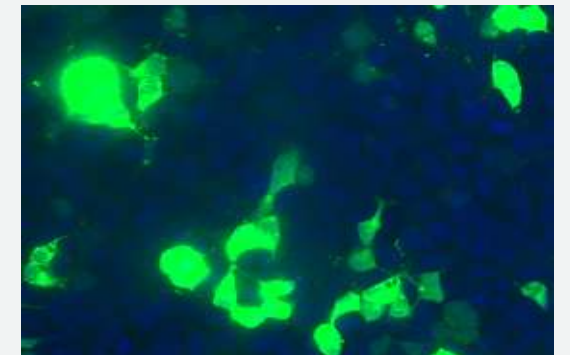
PepVax, Inc. has developed a potent drug delivery system for nucleic and amino acid-based (NAA) drugs called SMARTmid™

- Can “manufacture” required proteins, antibodies, and DNA/RNA inside patient.
- Can boost immune response for existing and newer technologies
- Regulatory and Capital efficient

Seed: \$2 MM to finish development and establish collaborations



Commercial Plasmid



PepVax Plasmid

A comparative analysis

Current precision medicine approaches have problems.

SMARTmid™: Autologous

PepVax DNA Plasmid Technology

Desired NAAs
“manufactured”
inside the patient

Potential to be
more effective

Broad
applicability

Current approaches: Allogeneic

In Precision Medicine

Cell Therapies
Gene Therapies
Immunotherapies

Problems:

Long production
timeline
High toxicities
Low efficacy rates
Narrow applicability

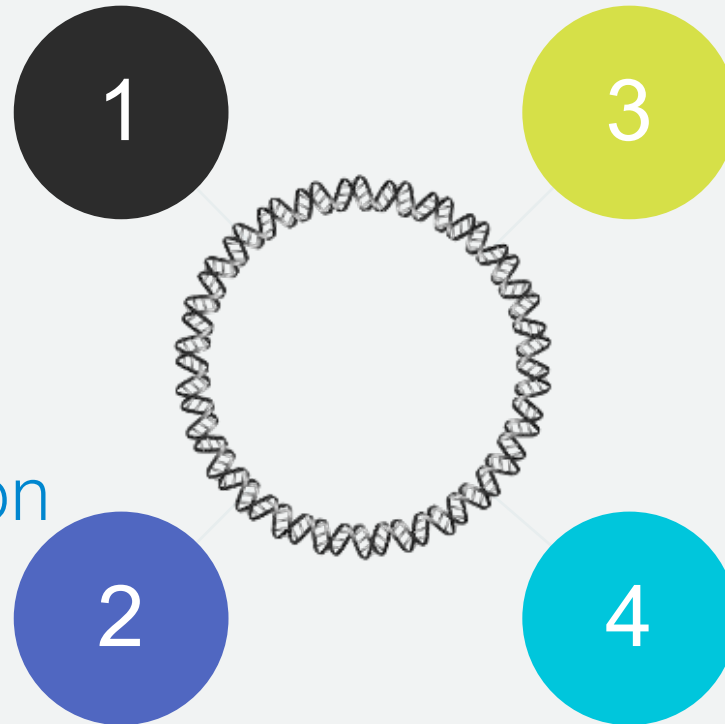
Our Technology: SMARTmid™ DNA

- **NAA**

We can add sequences for any NAA of interest to “manufacture” or create immune responses for boosts, such as vaccines.

- **Nuclear Localization**

SMARTmid™ DNA plasmid technology will localize the treatment for increased effectiveness with lower doses and decreased the side effects.



- **Protein Signaling**

In-built Protein Transportation Signaling provides a holistic immune response through both T-cells and B-cell antibodies.

- **Inbuilt Adjuvant**

In-built adjuvant enhances the immune reaction by attracting the right tumor-targeting cells.

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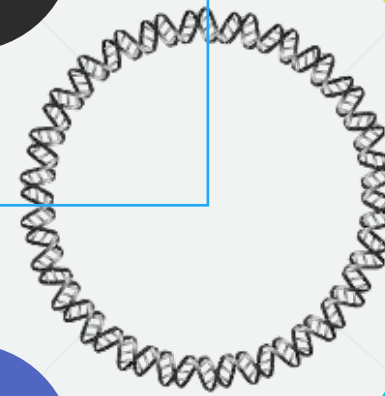
- **Nuclear Localization**

SMARTmid™ DNA plasmid technology will localize the treatment for increased effectiveness with lower doses and decreased the side effects.



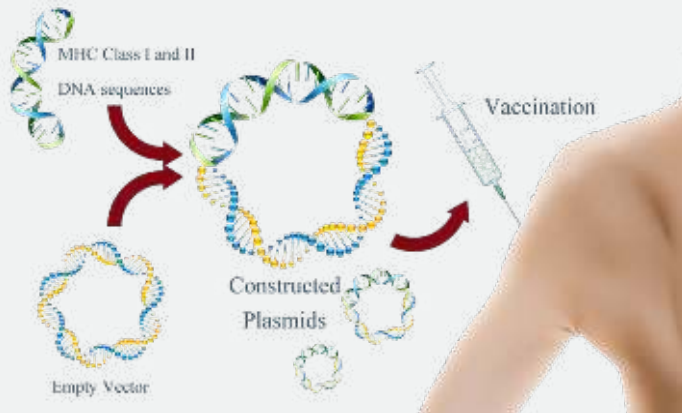
- **Inbuilt Adjuvant**

In-built adjuvant enhances the immune reaction by attracting the right tumor-targeting cells.



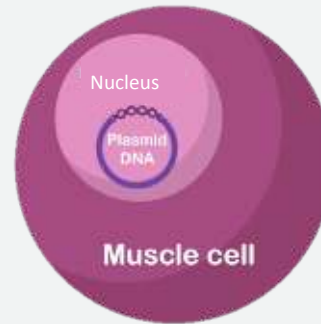
SMARTmid™ Drives Strong Expression

1



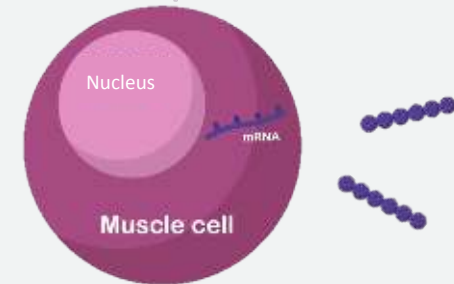
Designed SMARTmid™ DNA vectors delivered intramuscularly for systemic response or intravenously for targeted response

2



Plasmid DNA taken into cells. *Process can stop here for delivery.*

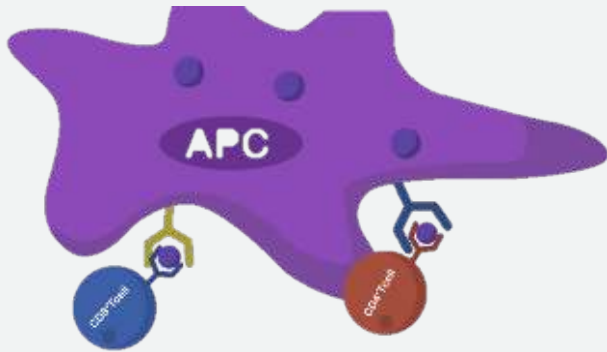
3



Plasmid DNA converted to target proteins for expression. *Process can stop here for "manufacturing"*

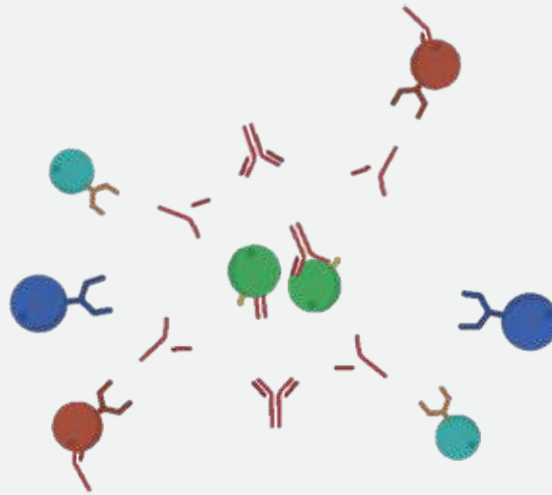
SMARTmid™ Drives Strong Immune Response Against Disease Targets

4



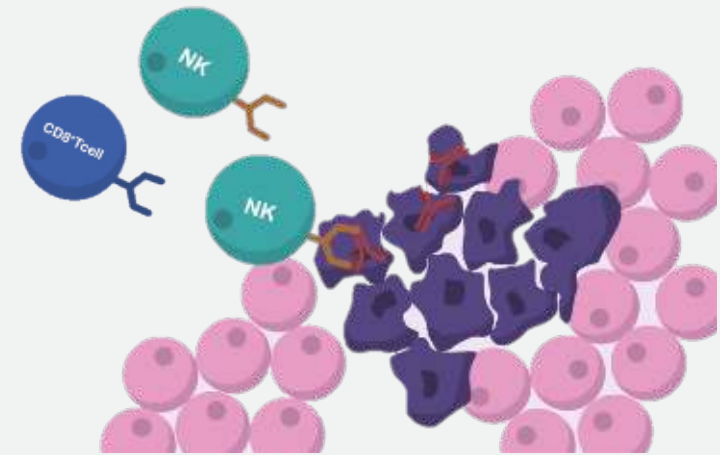
Immune cells recognize proteins as foreign and prepare to attack it

5



Strong immune response is generated against protein target throughout the body

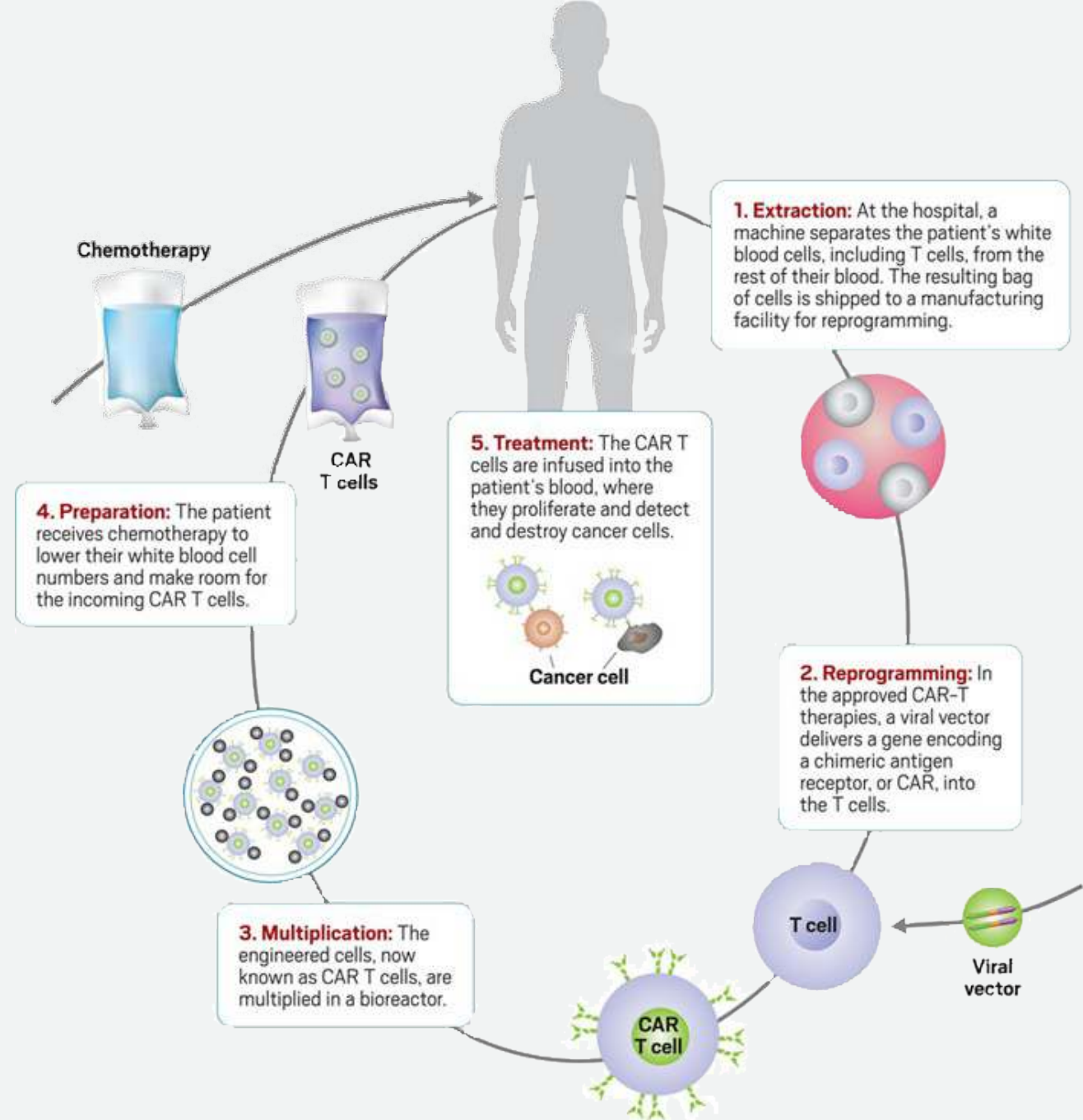
6



Immune killer cells attack antigen-positive diseased cells and destroy them

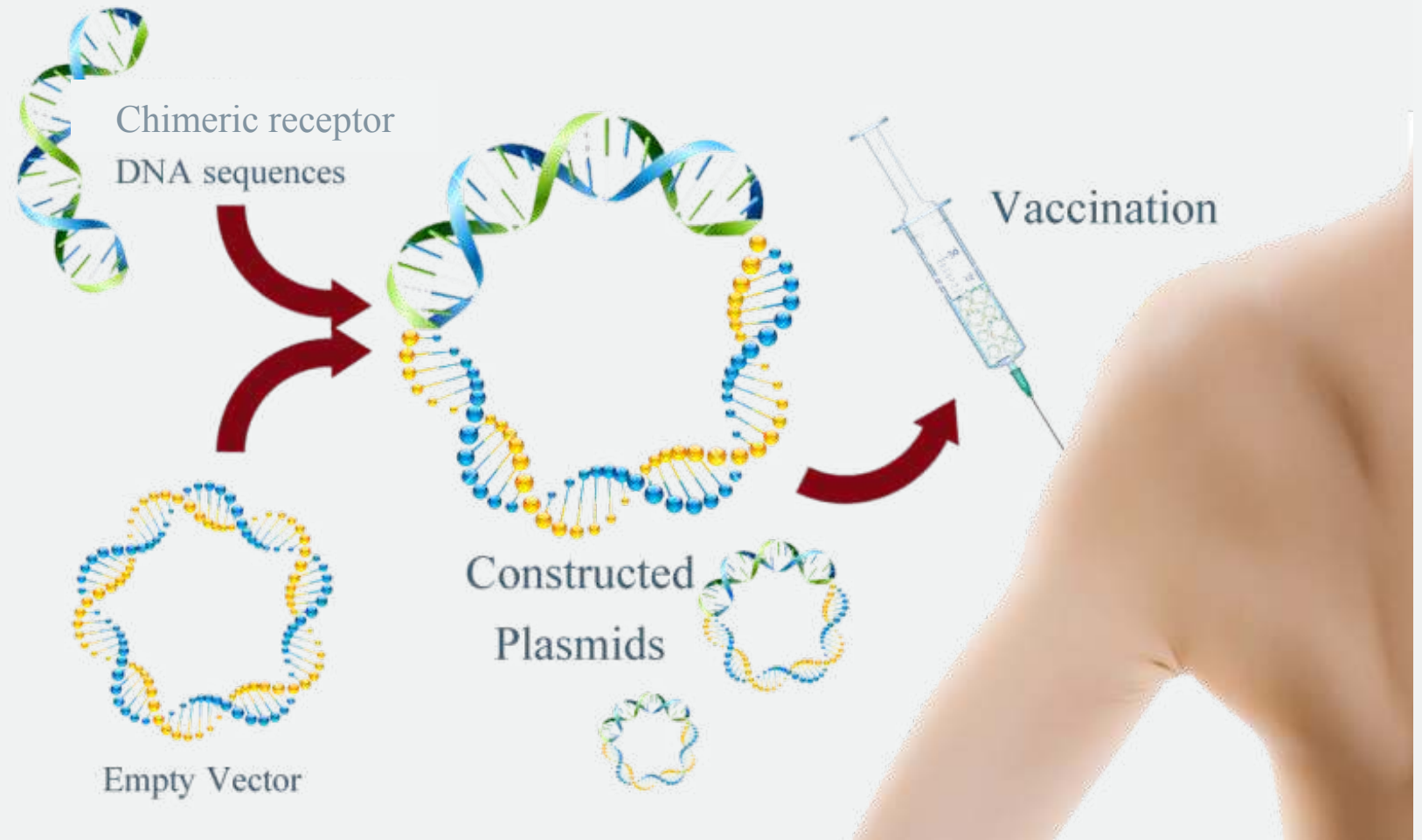
Example: Allogeneic CAR-T

The current approach for CAR-T development is highly invasive, painful, and has a long production timeline for *ex vivo* engineering

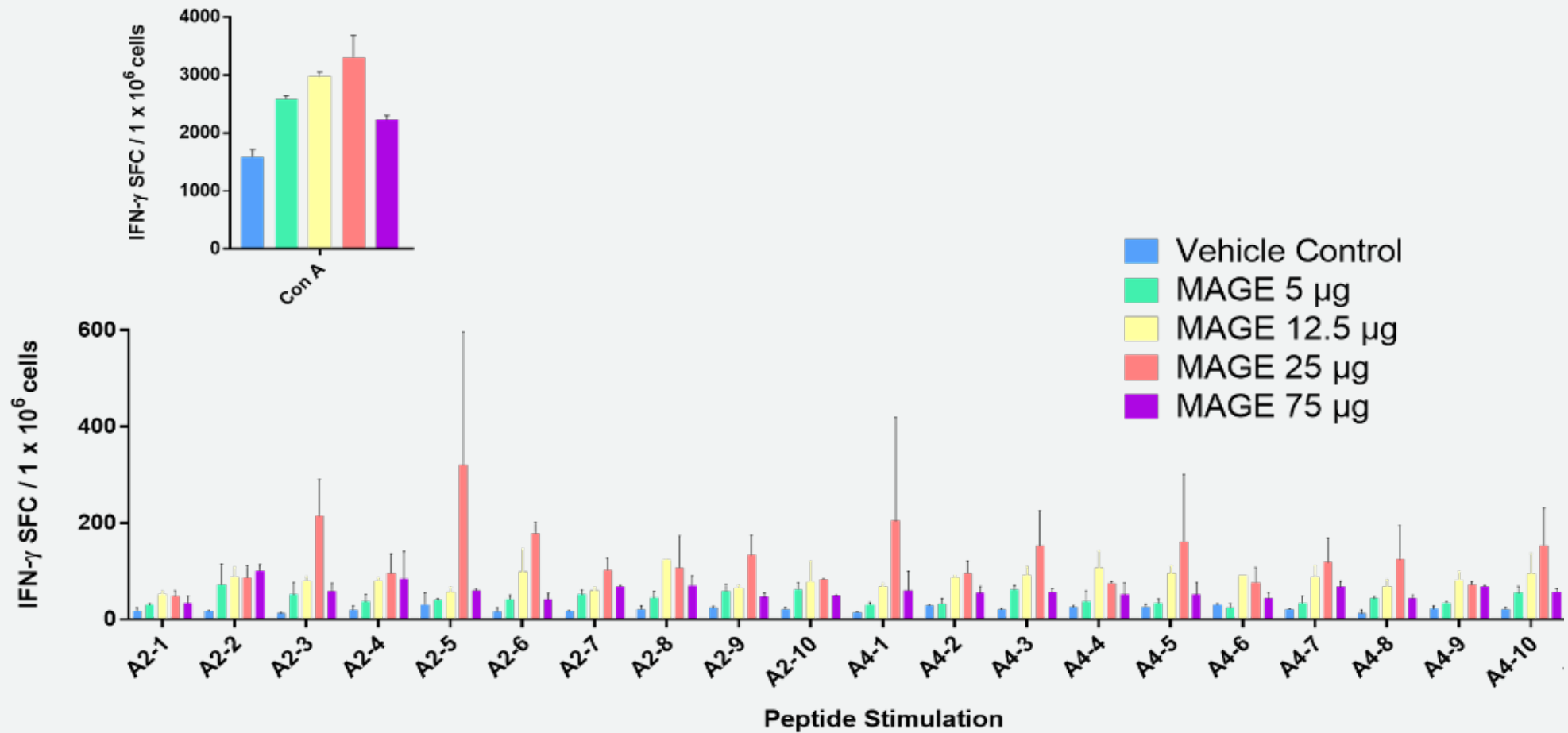


Example: Autologous CAR-T

Instead of using viral vectors to transfect T-cells from patients, we can use SMARTmid™ to transfect T-cells directly into the patient's lymph nodes, making the process safer and more effective.

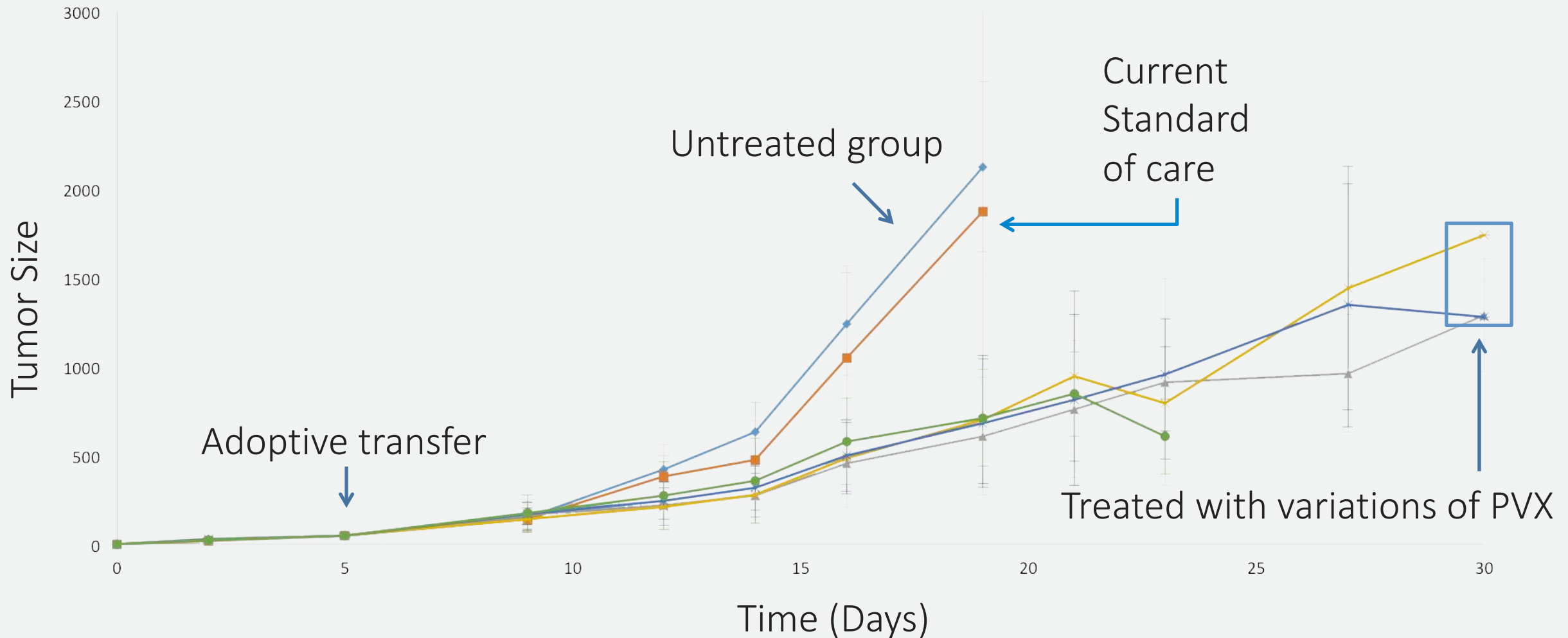


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Proof of Concept accomplished:
 Strong CAR-T cell Production using SMARTmid™

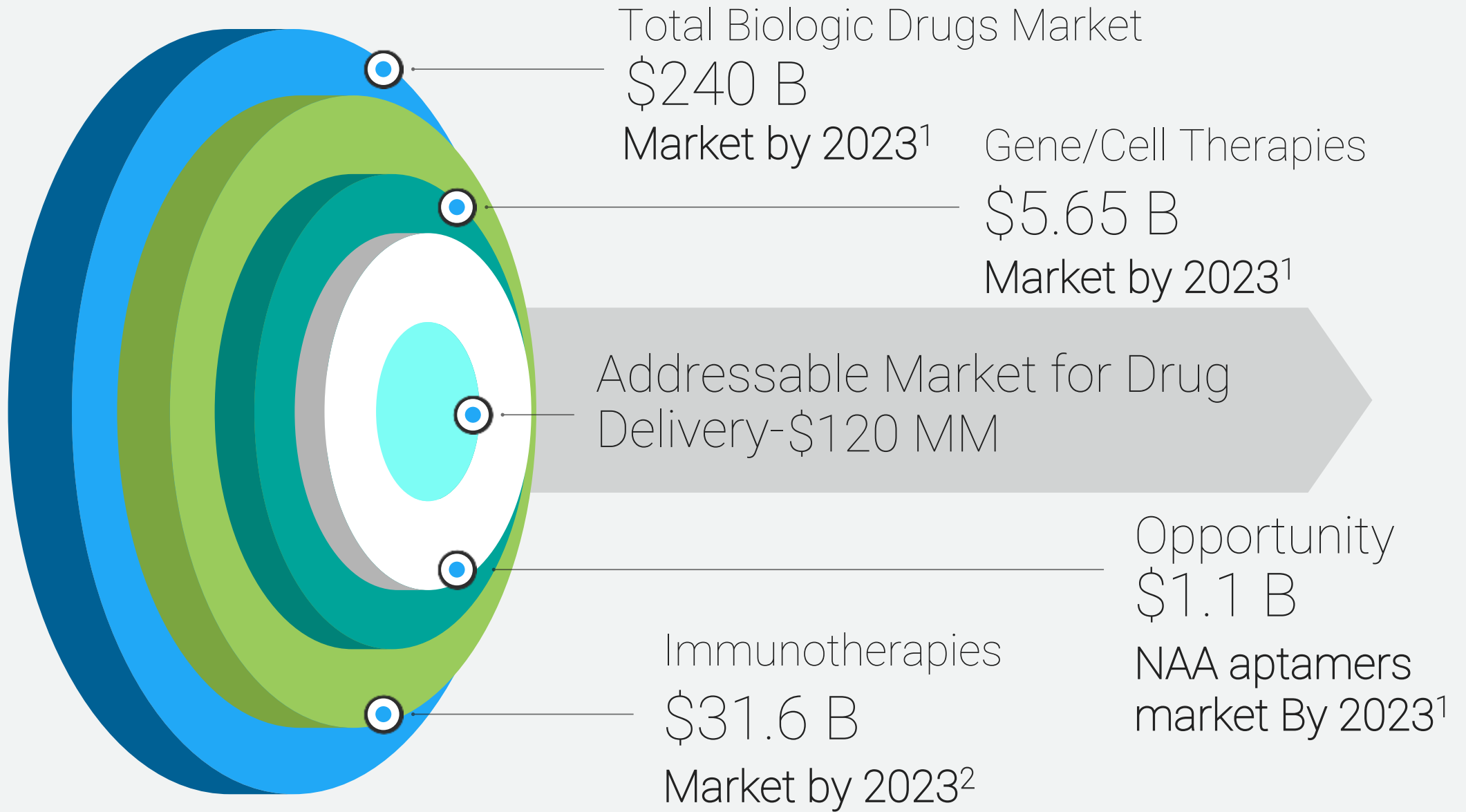
CAR-T production for MAGE A took only 2 weeks instead of 2 months using autologous developmental methods.



Proof of Concept: Anti-tumor activity using SMARTmid™
 In aggressive triple-negative breast cancer, we showed a 45% reduction in tumor growth using autologous CAR-T cells from previous experiment

Advantages

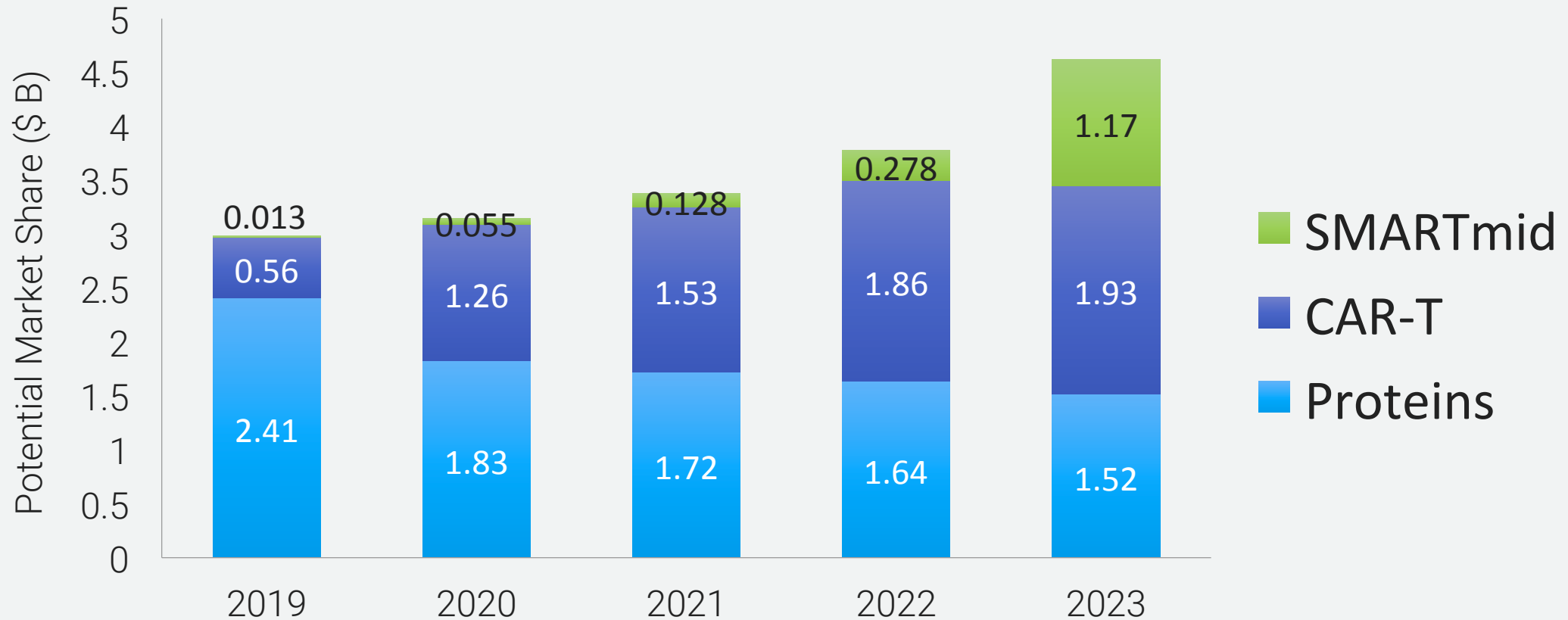
Vectors	Expression	Safety	Stability	Adjuvant	Versatility
viral	✓	✗	✗	✗	✗
mRNA	✓	✓	✗	✓	✗
Current DNA	✓	✓	✓	✗	✗
SMARTmid™	✓	✓	✓	✓	✓



¹Coherent Market Insights Reports (2018)

²Immune Checkpoint Inhibitors Market: Allied Market Research(2018)

Expected NAA Market Share Growth

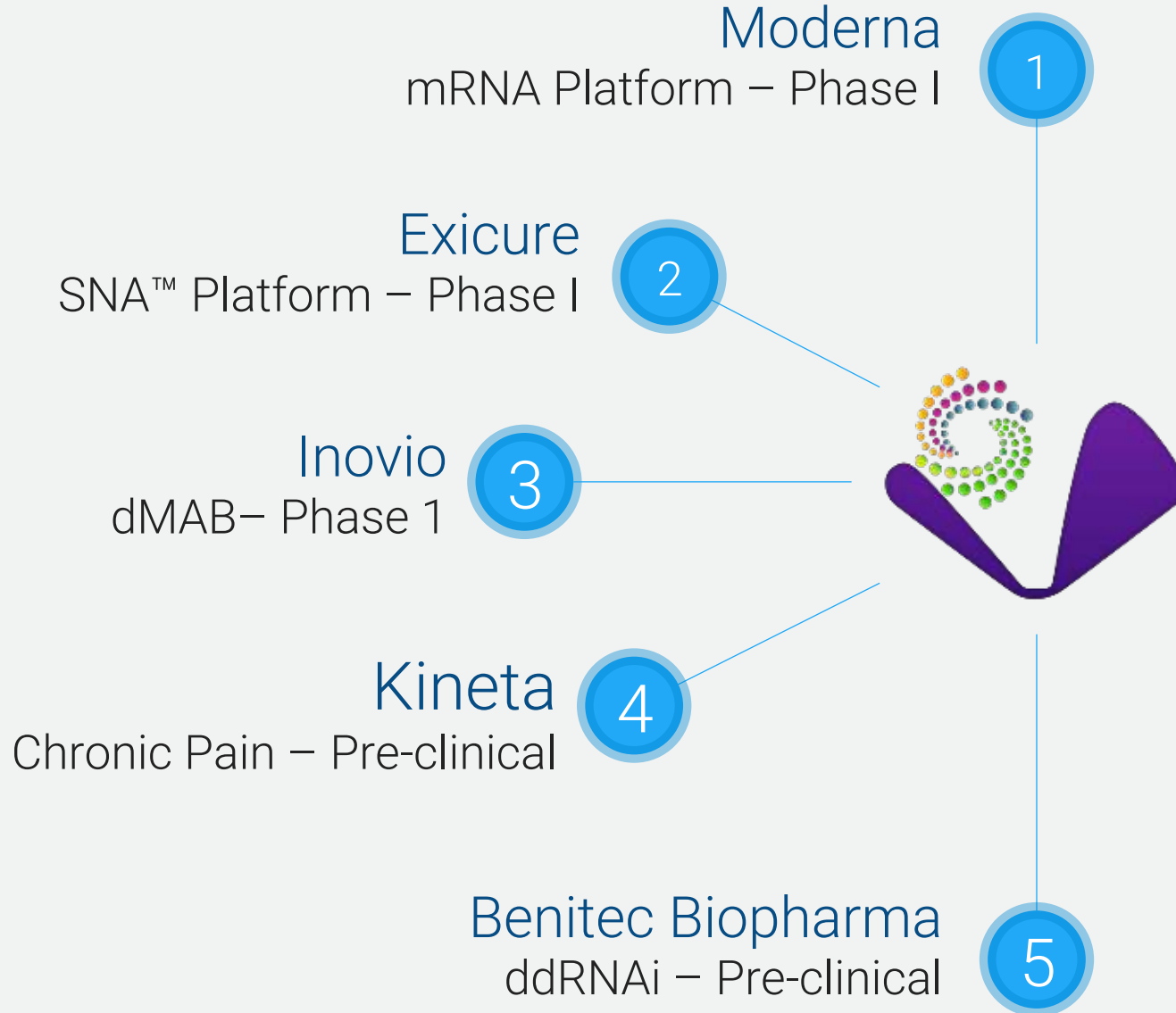


As we continue to grow and work with more companies to develop future applications, the overall research market share of immunotherapy and gene therapy will not only expand to approximately \$5 billion, but our own market potential will continue to grow to over \$1.15 billion by 2023.

¹Coherent Market Insights Reports (2018)

²Immune Checkpoint Inhibitors Market: Allied Market Research(2018)

Competitive Landscape



Key Differentiator: SMARTmid™ takes the complications of manufacturing and delivery and brings it into one simple system that has the versatility to be used in gene-, cell- and immuno-therapy.

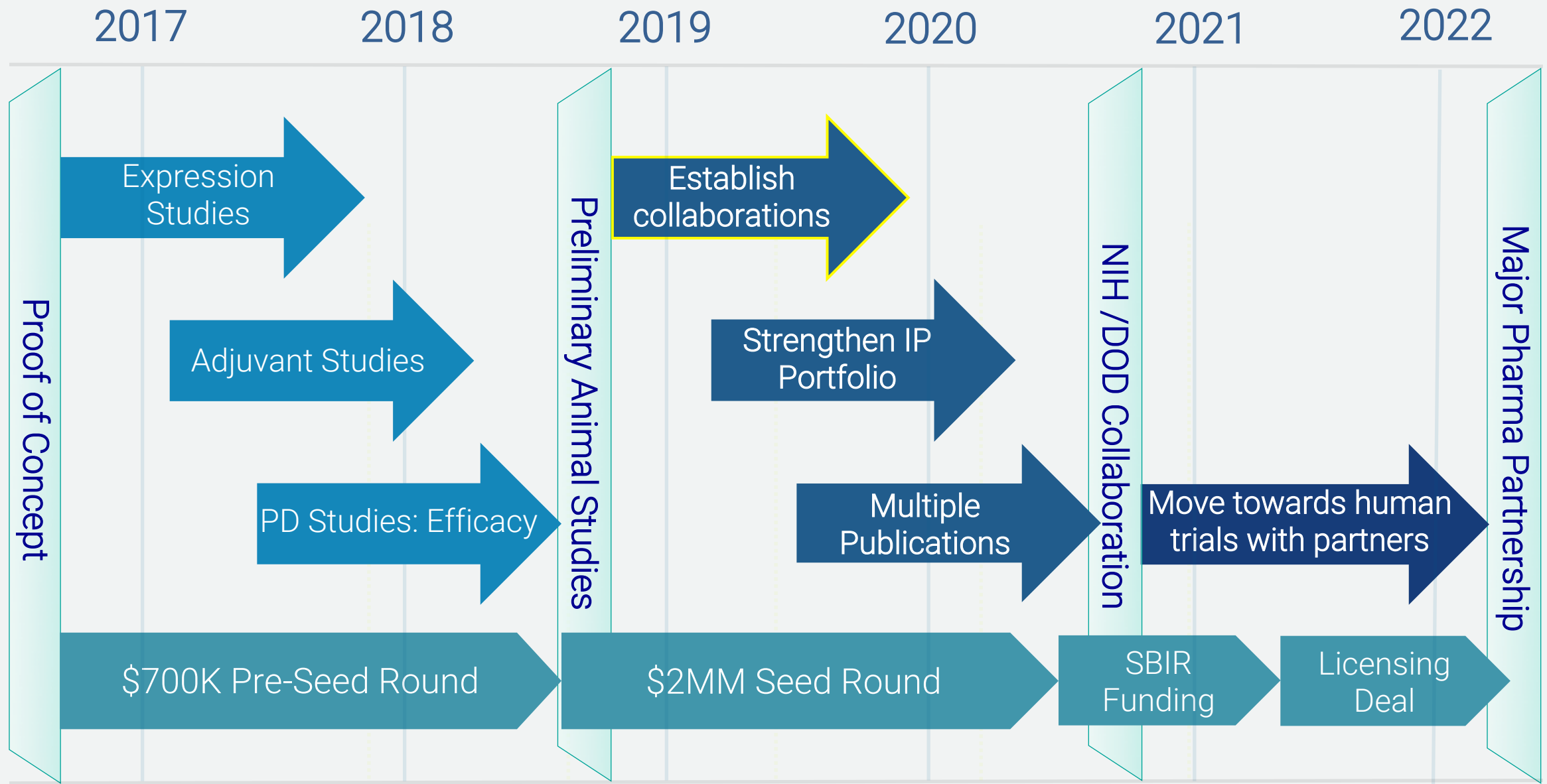
Protection: 1 patent-pending, 2 provisional patents in-house

Go-to-Market Strategy

Pricing and Services

Collaborations with Universities	Partnerships With Startups and smaller firms	Licensing to large pharma
\$10-20K Upfront	\$25-100K Upfront	\$5-10MM Upfront
<ul style="list-style-type: none">○ Grant submission○ Early research○ Build IP Portfolio○ Out-license	<ul style="list-style-type: none">○ Collaborations○ Animal studies○ IND Submission○ Milestone payments○ Royalties	<ul style="list-style-type: none">○ Human trials○ NDA submission○ Commercialization○ Milestone payments○ Royalties

Development Timeline



STARTING POINT

 **Speratum**

Collaboration and licensing for siRNA delivery

 **Loma Linda University**

Collaboration for gene and siRNA delivery

 **Howard University**

Collaboration for small molecule/nanoparticle delivery

FUTURE PLAN

 **Novartis**

Collaboration and licensing for biologics delivery

 **Souzhou Ribo Life Sciences**

Licensing for nucleic acid and RNAi delivery

 **Chimeron Bio**

Licensing for personalized cancer gene therapy

Go-to-Market Efficiency

Regulatory and Capital

FDA	Reimbursement	Capital
<p data-bbox="422 654 835 782">Drug-Device Combination</p> <hr data-bbox="351 829 894 832"/> <ul data-bbox="372 891 835 1129" style="list-style-type: none"><li data-bbox="372 891 835 939">○ Through partners<li data-bbox="372 982 774 1031">○ Focus on CMC<li data-bbox="372 1073 784 1122">○ Aid in IND-filing	<p data-bbox="1098 658 1429 796">Bundled Payments</p> <hr data-bbox="988 829 1531 832"/> <ul data-bbox="1009 891 1498 1253" style="list-style-type: none"><li data-bbox="1009 891 1498 991">○ CPT codes: 96413 or 96365<li data-bbox="1009 1039 1411 1253">○ Coverage for breakthrough and replacing technologies	<p data-bbox="1747 636 2048 796">\$700K To date</p> <hr data-bbox="1625 829 2160 832"/> <ul data-bbox="1646 891 2125 1229" style="list-style-type: none"><li data-bbox="1646 891 2125 991">○ Completed POC animals studies<li data-bbox="1646 1039 2125 1139">○ Identified Regulatory pathway<li data-bbox="1646 1188 2099 1229">○ Generating revenue

Financial Data

FY*	2019	2020	2021	2022	2023
Revenue	\$132,168	\$545,352	\$1,159,473	\$2,677,730	\$11,572,976
COGS	\$26,026	\$31,231	\$37,477	\$44,973	\$53,968
Expenditure	\$571,521	\$731,640	\$813,740	\$1,060,434	\$1,294,871
EBITA	(\$465,379)	(\$217,519)	\$308,255	\$1,572,324	\$10,224,138

*PepVax' fiscal year begins in September of previous year (FY 2019 starts in Sept. 2018)

FY 2019 assumes the start of GMP manufacturing and collaboration research costs. FY 2020-2022 assumes regulatory operation, increase in sales force, along with upfront cash flow with licensing deal for SMARTmid™ delivery system.

¹FY 2023 revenue reflects recent licensing done by similar stage company at pre-clinical (Kineta/Genetech Deal worth up to \$359 MM in 2018).

Our Team

40+ years of combined experience in biotechnology



Mahesh

Narayanan, MS

Research and Business, FTE



Anton

Dormer, MD, MS

R&D, FTE



Elton

Norman, Esq., CPA

Finance, PTE



Daniel

Achinko, PhD

R&D, FTE



Our Advisors

25+ IND Filings, 6 NDAs and multiple commercialized products

Advisory Board

PepVax advisory team brings the experience to develop our technology past the regulatory approval process into commercialization



Sunil Joshi

Business Development



Stephen Popielarski

Business Development



George Moonsammy

Regulatory



Angela Lynch

Toxicology



Salvator DeSena

Medical Affairs



Bristol-Myers Squibb

transforming patient care

GlaxoSmithKline

GE Healthcare

Ask

Founder + Family + Friends: \$700K

Current Round: Seed

\$2 MM

Convertible Note / Equity

Proceeds: \$750K towards current operations;
\$1.25 MM towards future development of platform, expand
intellectual property, and establish strong collaborations

Contact Us



Mahesh Narayanan
Primary contact



angel.co/pepvax



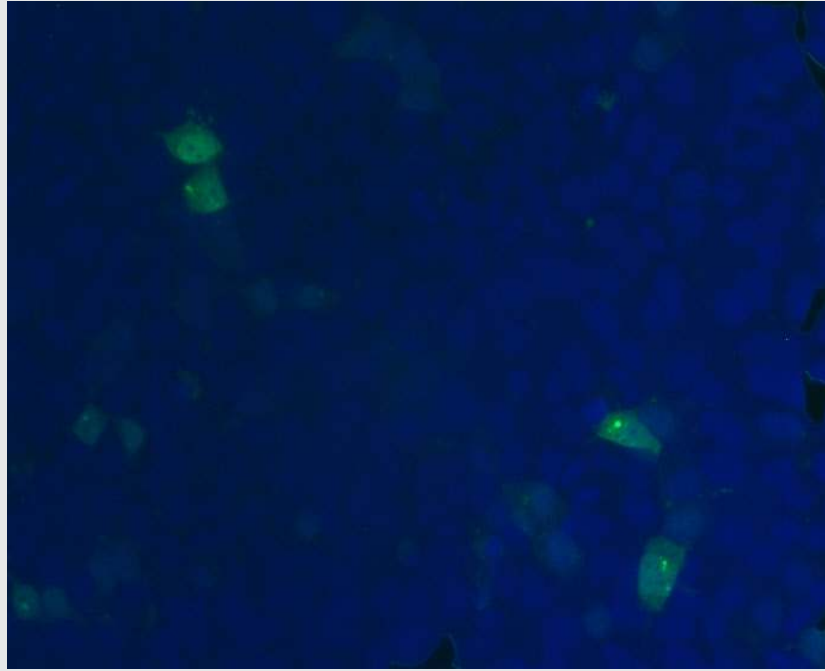
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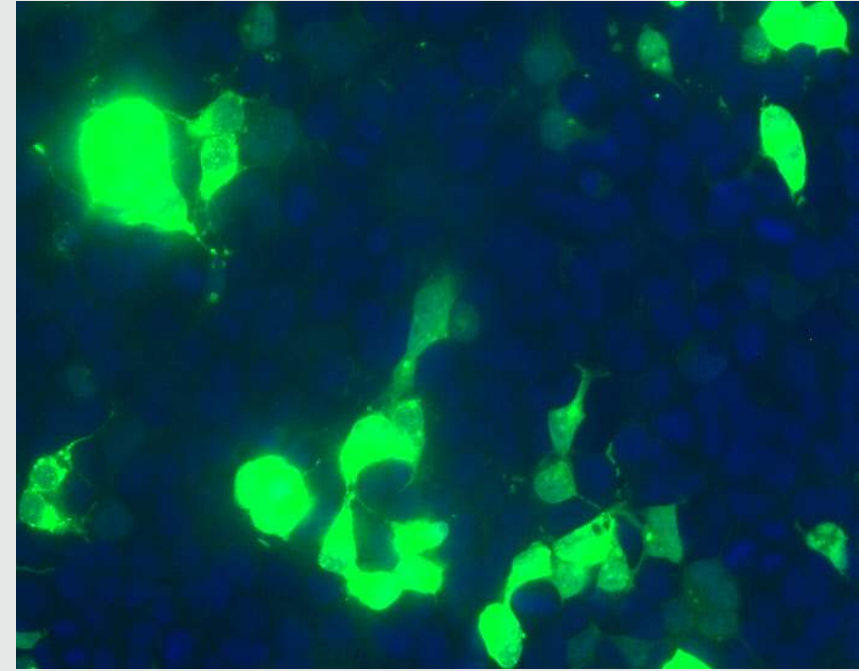
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Appendix



Green Florescent Protein (GFP)
expression using best commercially
available plasmid.



GFP expression using SMARTmid™
DNA shows much greater expression
at same concentration of DNA

26

High protein expression using SMARTmid™