Brooklyn ImmunoTherapeutics

A platform company in cell, gene-editing & cytokine therapies

mRNA Engineered Cell & Genetic Medicines

January 2022

Disclaimer

This presentation is intended to provide summary information about the business of Brooklyn ImmunoTherapeutics, Inc. ("BTX"). The information in this presentation is in no respects complete, comprehensive or exhaustive, and it should be read in conjunction with BTX's public filings with the Securities and Exchange Commission, including information set forth in those filings under "Risk Factors" and similar headings.

Forward-Looking Statements. Certain statements presented below on pages 4, 8-11, 13, 16-17, 19, 21-22, 24-28 and 30 are forward-looking statements for purposes of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are any statements that are not statements of historical fact and may be identified by terminology such as "expect," "plan," "potential," "project" or "will" or other similar words. Forward-looking statements are based on current beliefs and assumptions that are subject to risks and uncertainties and are not guarantees of future performance. Actual results may vary significantly from BTX's expectations based on a number of risks and uncertainties, including but not limited to the following: (i) the evolution of BTX's business model into a platform company focused on cellular, gene editing and cytokine programs; (ii) BTX's ability to successfully, cost effectively and efficiently develop its technology and products; (iii) BTX's ability to successfully commence clinical trials of any products on a timely basis or at all; (iv) BTX's ability to successfully fund and manage the growth of its development activities; (v) BTX's ability to obtain regulatory approvals of its products for commercialization; and (vi) uncertainties related to the impact of the COVID-19 pandemic on the business and financial condition of BTX, including on the timing and cost of its clinical trials. BTX cannot guarantee any future results, levels of activity, performance or achievements. The industry in which BTX operates is subject to a high degree of uncertainty and risk due to variety of factors, including those described in BTX's public filings with the Securities and Exchange Commission, including its Current Report on Form 8-K filed with the Securities and Exchange Commission on January 5, 2022 and any subsequently filed Quarterly Reports on Form 10-Q for a more complete discussion of these factors and other risks, particularly under the heading "Risk Factors." BTX expressly disclaims any obligation to update forward-looking statements after the date of this presentation.

BTX is Led by a Strong, Experienced Management Team

Brooklyn ImmunoTherapeutics

Howard Federoff MD, PhD
Chief Executive Officer and President

Brain Neurotherapy Bio
EINSTEIN Albert Einstein College of Medicine
Aspen NEUROSCIENCE
Georgetown University
UNIVERSITY of ROCHESTER
UCI Health
MGT MEDGENESIS THERAPEUTIX INC

Kevin D'Amour PhD
Chief Scientific Officer

VIACYTE Regenerating Health
SALK INSTITUTE FOR BIOLOGICAL STUDIES
UCSD

Roger Sidhu MD
Chief Medical Officer

AMGEN
celldesignlabs
Kite A GILEAD Company
ROIVANT SCIENCES

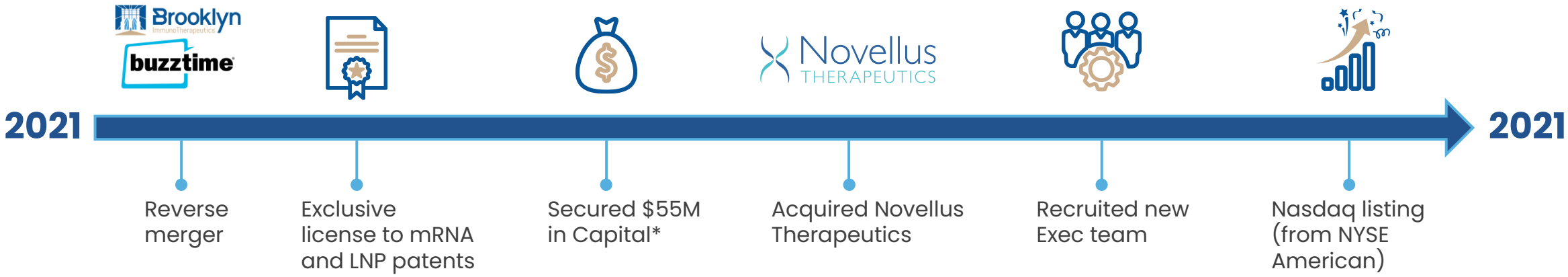
Jay Sial MBA
Chief Administrative Officer

UCI Health
Aspen NEUROSCIENCE
LOYOLA MEDICINE
HealthCare
Jefferson Health
HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

Sandra Gurrola
VP of Finance

STRATAGENE An Agilent Technologies Division
metabasis
buzztime

BTX Transforms into Regenerative Medicine Company with Platform Technology



** Runway into 2023*

Leveraging In-licensed Patent Portfolio to Advance Medicine

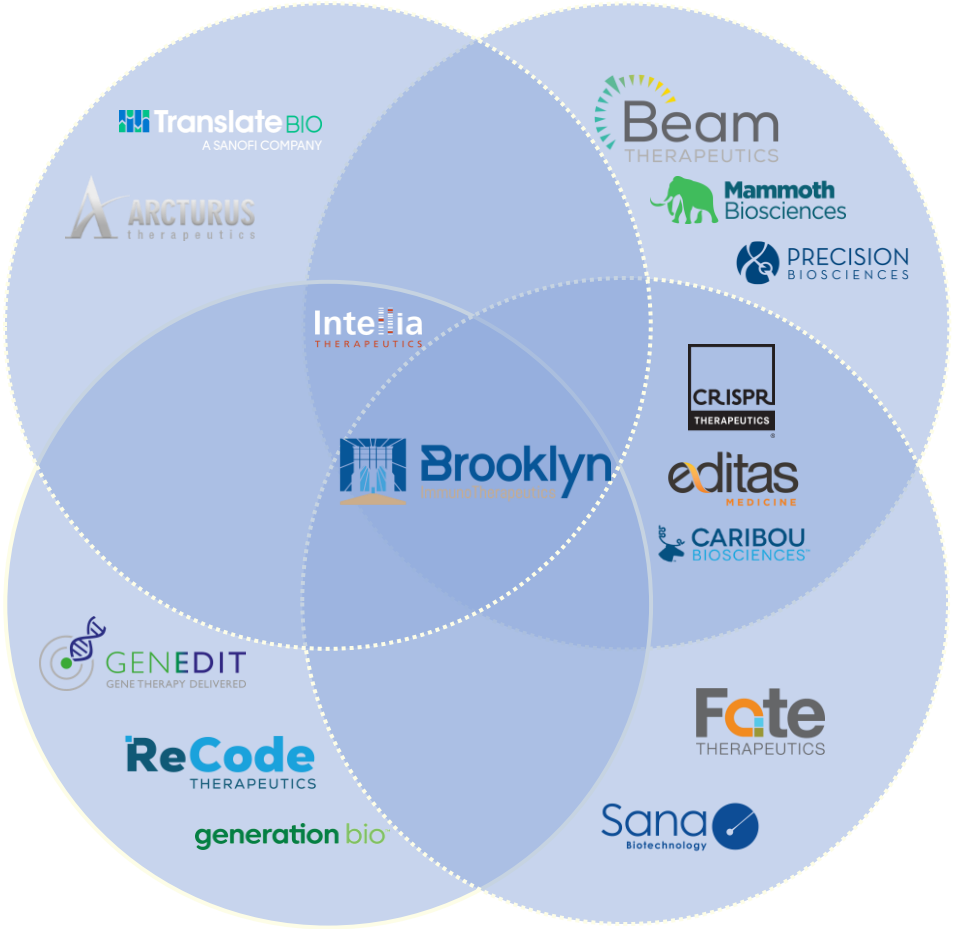
- BTX has an exclusive license from Factor Bioscience to a portfolio of granted patents around mRNA-based cell engineering that will provide a competitive advantage
- Major platform components:
  - mRNA Cell Reprogramming (25 patents, extensive cellular data)
  - mRNA Gene Editing (15 patents, extensive cellular data)
  - NoveSlice™ Gene-Editing Protein (15 patents, extensive cellular data)
  - ToRNAdo™ mRNA Delivery (4 patents, extensive cell and animal data)

NoveSlice™ and ToRNAdo™ are trademarks of Factor Bioscience Limited.

BTX has a Broad Technology Landscape

mRNA therapeutics

In Vivo gene editing

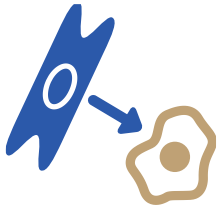


Non-viral genetic medicines

iPSC-derived therapies

Footnote: doesn't represent ex vivo gene editing space

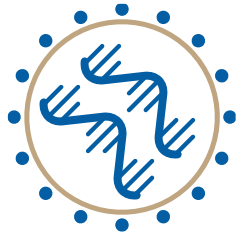
BTX's Licensed mRNA-Based and LNP Technologies



Cell reprogramming

Gene editing

mRNA and LNP are tools to make engineered cell medicine

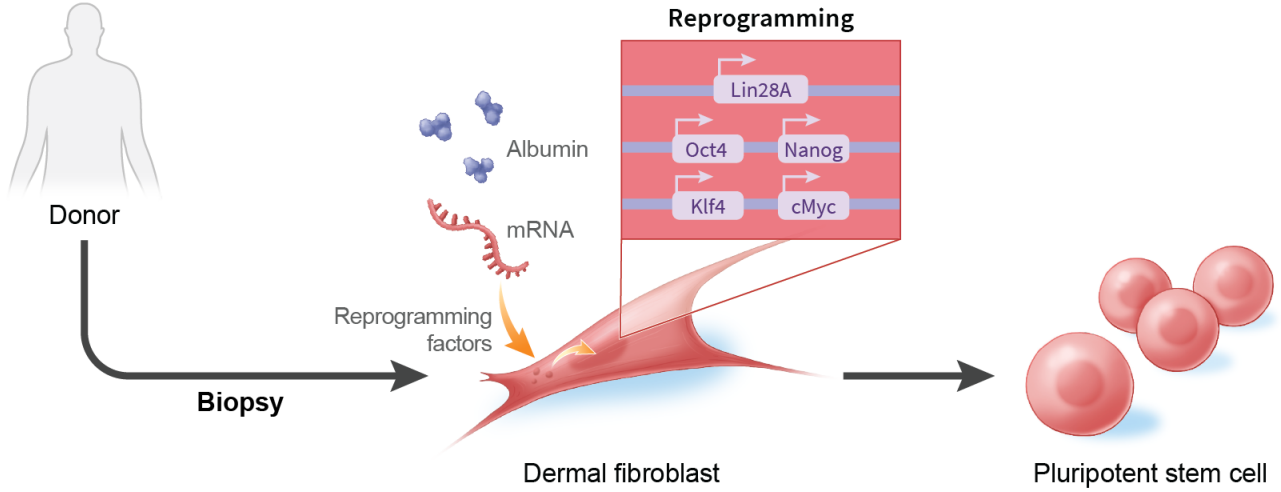


Nucleic acid delivery

mRNA and LNP are the drug as in vivo gene-editing medicine

The Foundational mRNA Cell Reprogramming Platform

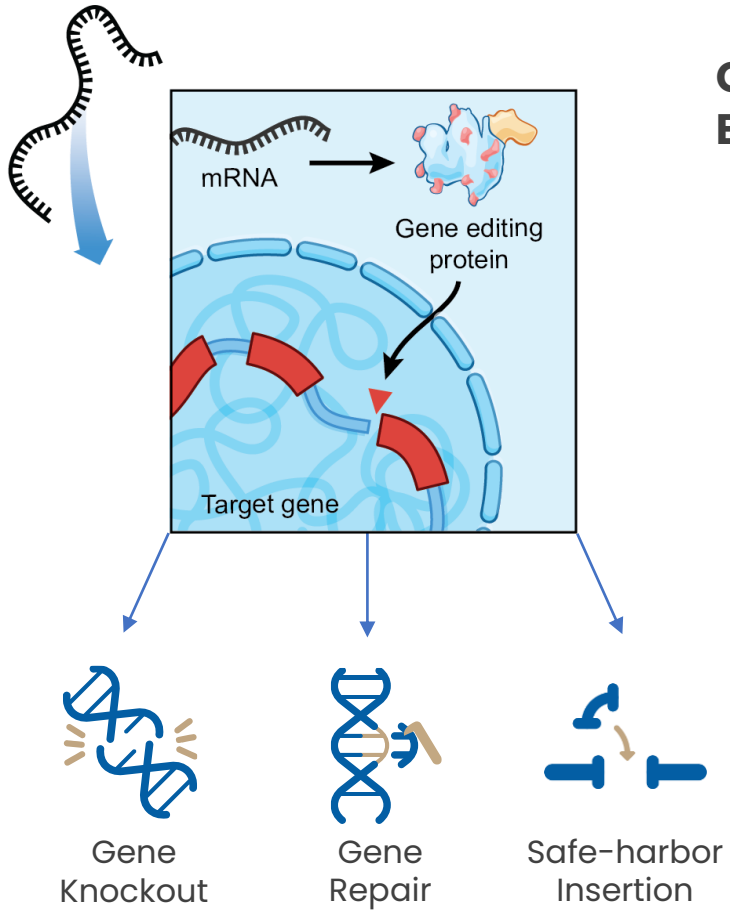
- Highest efficiency generation of iPSC:
  - 5 factors, rapid protein expression
  - Low toxicity, high percentage transfected
  - Custom reprogramming media
- Safe: no chance of genome integration
- Can combine reprogramming with gene editing to streamline autologous therapies in genetic disease
- Extensive in-licensed patent protection



Unique mRNA-Based Delivery of a Novel Gene Editing Platform

Use of mRNA for Delivering Gene - Editing Proteins

- Rapid, high expression (efficiency)
- Transient expression (specificity)
- Amenable to non-viral delivery
- No risk of vector insertion
- Multiple in-licensed patents cover mRNA encoding CRISPR, TALEN, ZFN, etc



Chromatin Context-Sensitive Gene Editing Endonuclease

- Novel nuclease (clear IP landscape)
- High specificity (36-40 base site)
- Blocked by histone modifications (specificity)
- Unlimited genomic sites (no PAM)

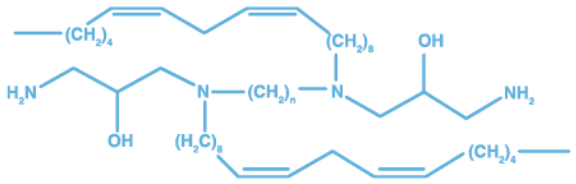
Novel Lipid with Effective mRNA Delivery In Vitro and In Vivo

Novel, single lipid component LNP

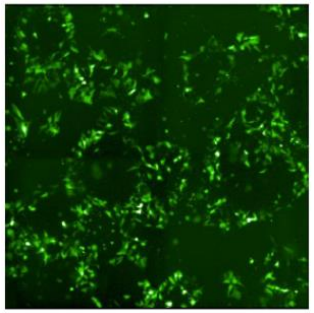
- Novel lipid, composition of matter IP
- Low toxicity enables repeated transfection
- Cargo delivery directly to cytosol without processing via endosomal pathway
- Efficient transfection in context of serum
- Transfection of many cell types demonstrated

U.S. Pat. No. 10,501,404

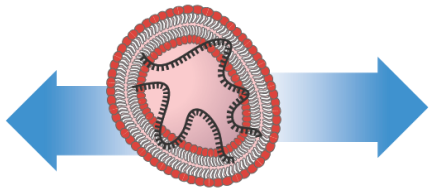
A compound of Formula (I)



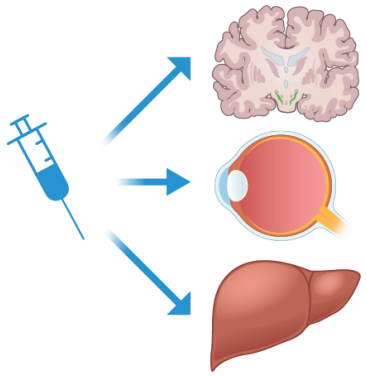
Wherein n is 1, 2, 3, 4, 5, 6, 7, 8, 9,10, 11, 12, 13, 14, or 15.

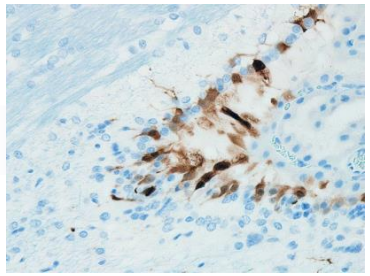


iPS cells



ToRNAdo™ with mRNA





Platform Technology Deployed in Four Regenerative Medicine Pillars

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Pillar I

Allogeneic Stem Cell Platform (iMSC)

- ARDS
- Bone marrow transplant failure/poor function
- Solid tumors

Pillar II

Autologous, Gene Edited Platform

- Hemoglobinopathies
- Opportunities in many genetic diseases

Pillar III

Autologous iPSC Platform

- Paroxysmal nocturnal hemoglobinuria
- Partnership opportunities

Pillar IV

In Vivo Gene Editing Platform

- Transthyretin amyloidosis
- Stargardt disease
- Non-syndromic hearing loss
- Opportunities in many genetic diseases

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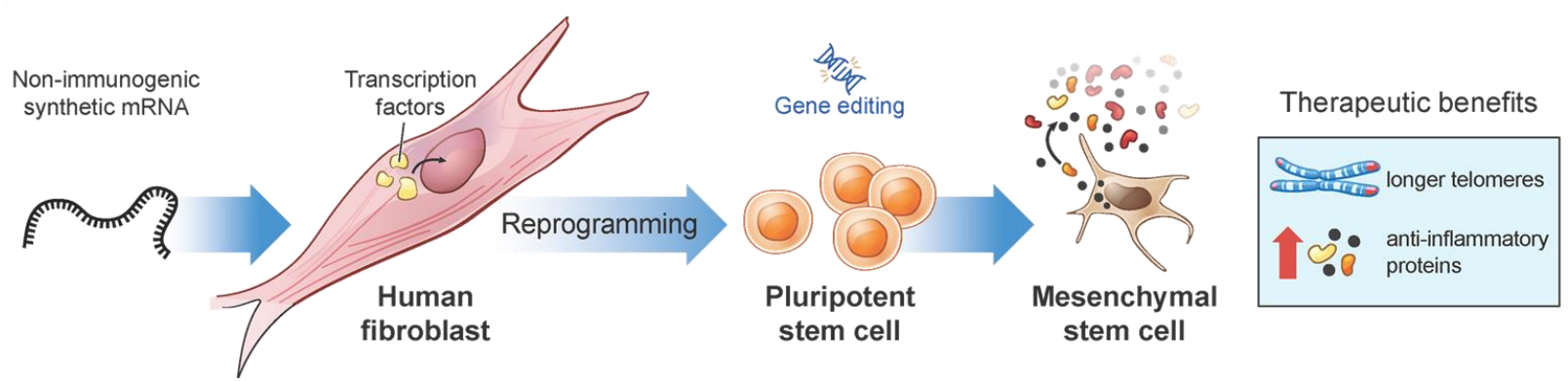
Allogeneic iMSC Therapies

Allogeneic iMSC Product Platform

iPSC-derived Mesenchymal Stem Cells (iMSC)

- Low risk of toxicity, proven across many clinical studies
- Low immunogenicity, no need for immunosuppressive drugs
- Leveraging decades of work with MSC process development and manufacturing
- A single Drug Product can be used across multiple and varied indications
- iPSC can be gene edited to program the iMSC with additional properties, expanding indications
- MSC therapies have had inconsistent clinical efficacy due to product heterogeneity

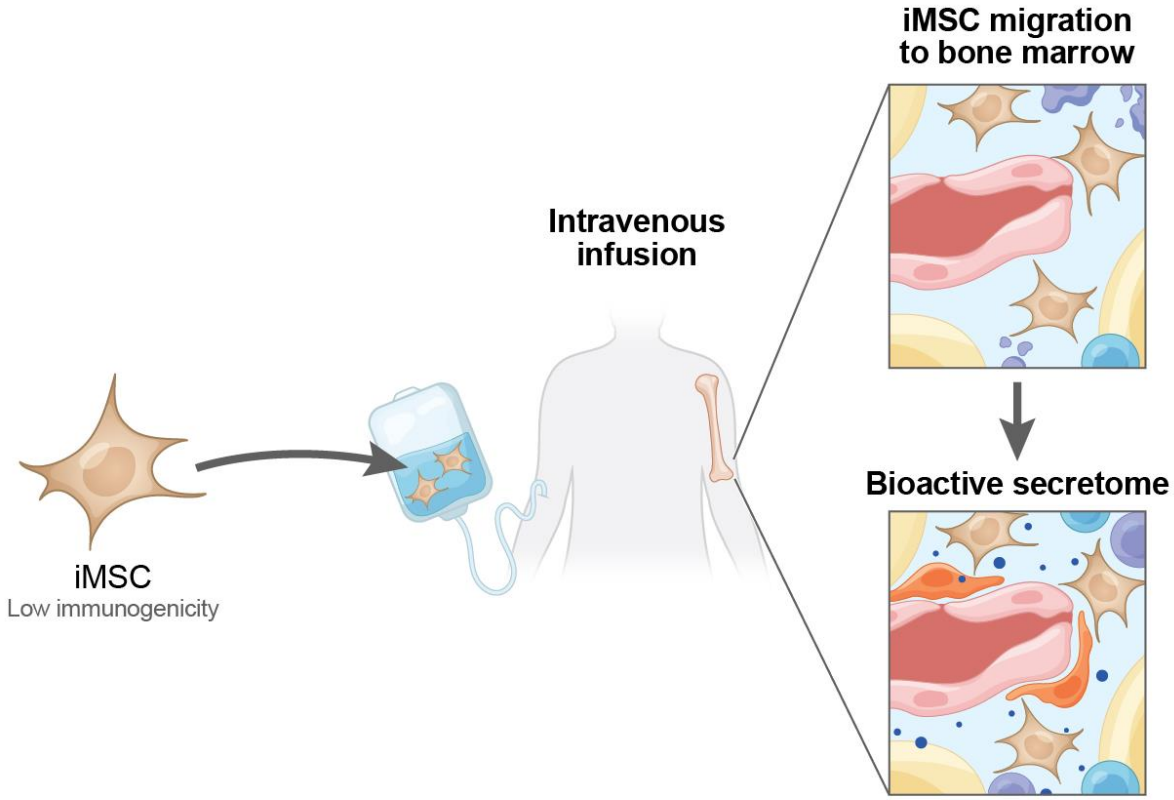


Brooklyn's iMSC Address Issues with Tissue-derived MSC

Historical Issues with MSC field	Tissue-derived MSC	Brooklyn's iMSC
Donor to donor variability	✗	☑
Tissue source variability	✗	☑
Manufacturing variability	✗	☑
Limited or inconsistent characterization	✗	☑
Poor mechanistic understanding	✗	☑
Capacity to precisely genetically modify	✗	☑

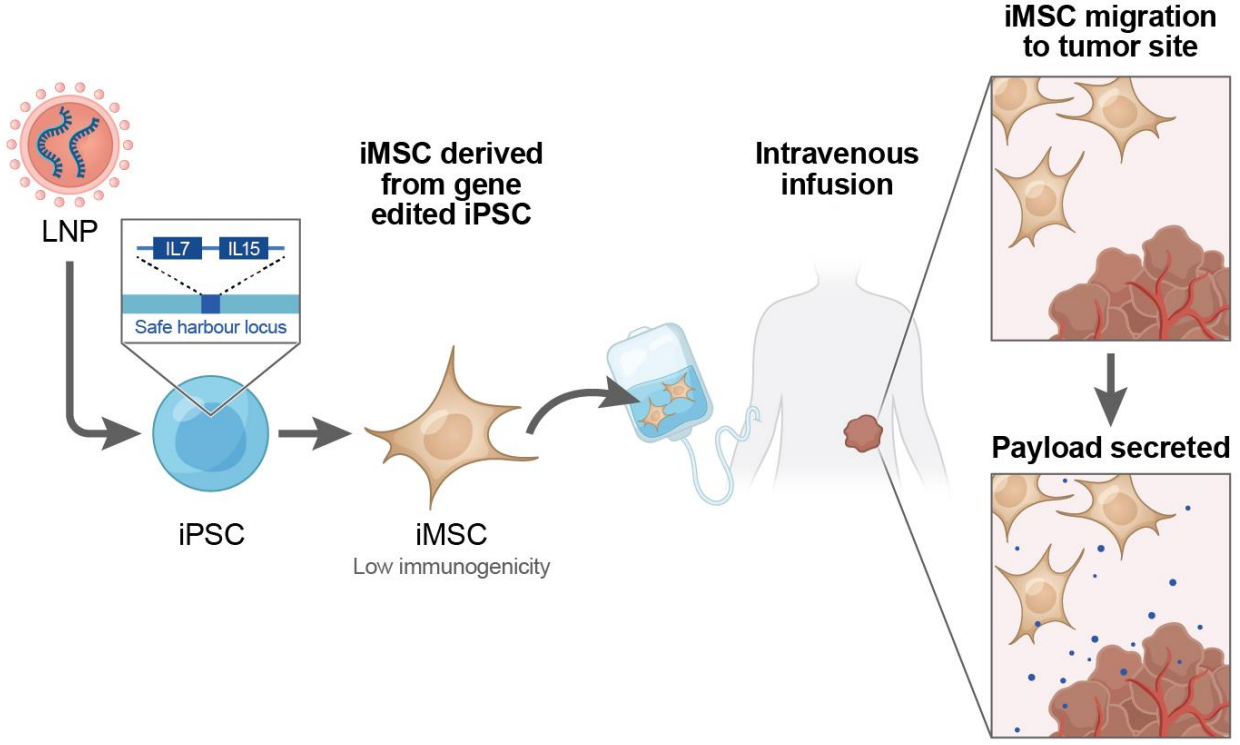
iMSC Application in Graft Failure/Poor Graft Function

- MSCs modulate immunological responses, support hematopoiesis, and repair bone marrow stroma
- Clinical applications in hematopoietic stem cell transplant (HSCT)
  - Treating engraftment failure or poor graft function
  - Promoting HSC engraftment
- Working with world class KOLs in HSCT to focus on best clinical population(s) and trial design
- Anticipate FIH in 4Q-2023



Developing a Family of Gene-edited iMSC Products To Address High Unmet Need Solid Tumors

- Gene-editing iPSC and thorough characterization; followed by differentiation to iMSC
- Multiple engineered iMSC products to deliver agents locally and avoid systemic toxicities
  - IL-7 & IL-15 drive expansion and engraftment
- Combination with CAR-T and checkpoint inhibitors



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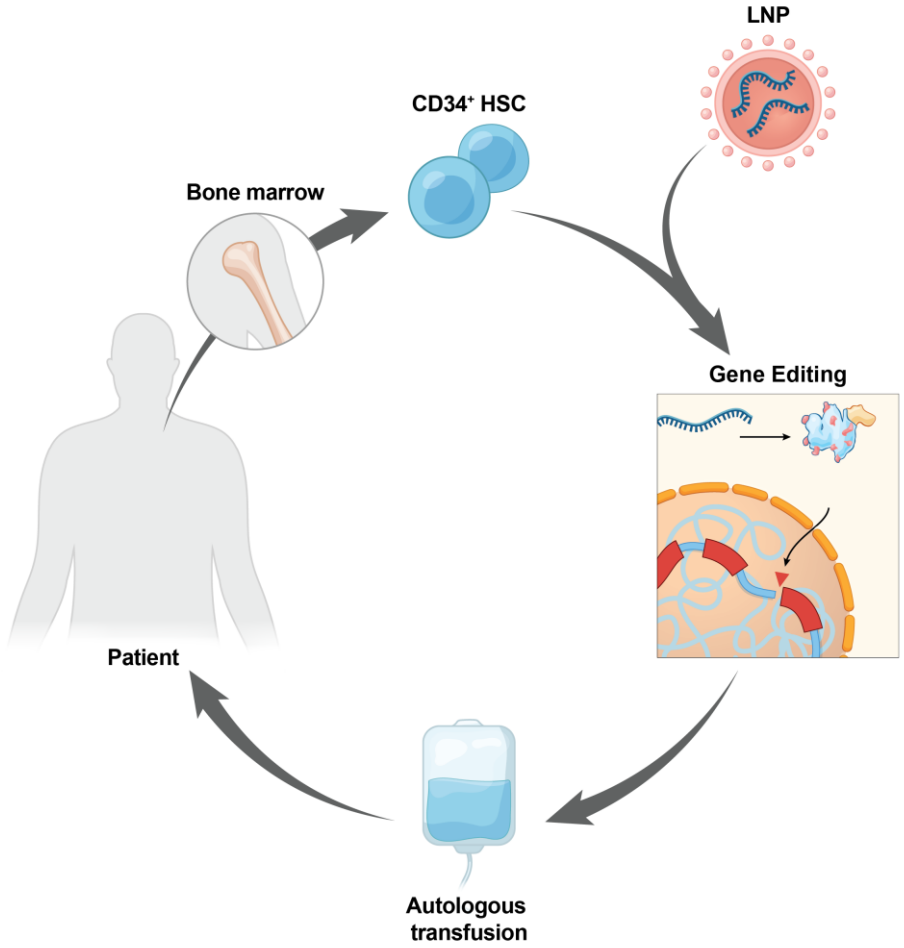
Autologous Cell Therapies

Autologous Cell Therapy, Efficient mRNA Gene Editing

- Autologous HSC-based gene therapy for many addressable indications
  - Hemoglobinopathies
  - Primary immunodeficiencies
  - Congenital cytopenias
- Leverages 30 years of clinical experience and isolation techniques for CD34+ HSC; robust engraftment and safety
- mRNA-based gene editing is less complex than viral methods, safer than integrating viral vectors
- Future partnering possibilities



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Autologous iPSC Therapies

Autologous iPSC Cell Therapy Platform

Licensed technology is the safest, most efficient, and fastest method for iPSC derivation

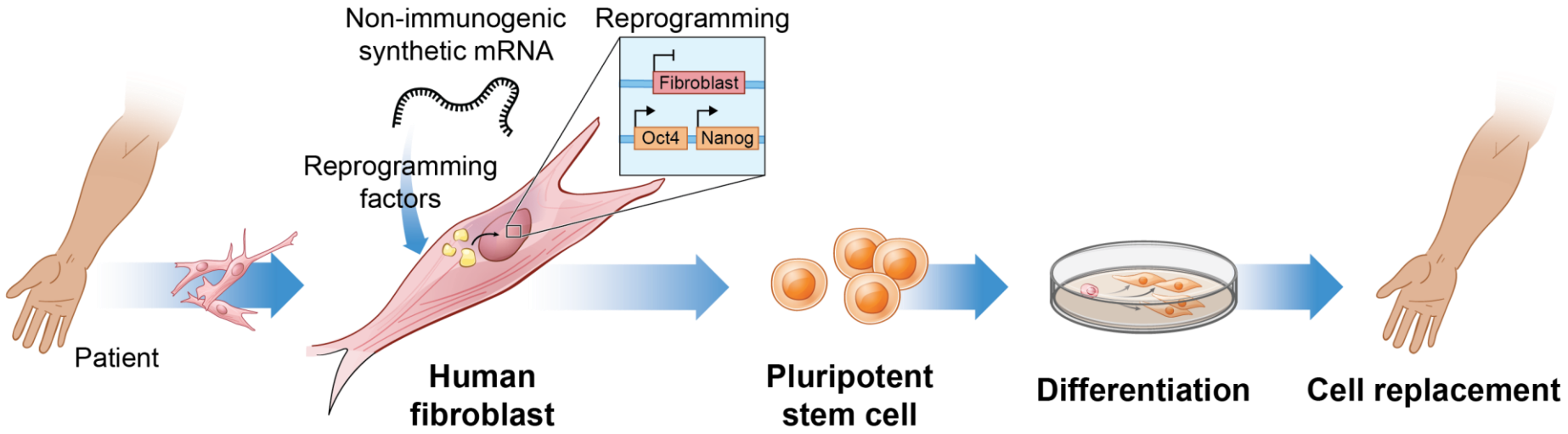
- Safe: Non-integrating method using synthetic mRNA to produce reprogramming factors
- Efficient: Uses LNP for repeated in vitro delivery with low toxicity
- Efficient: Can combine reprogramming and gene editing in single step derivation
- Fast: Reprogramming and iPSC colony formation within 2 weeks

The safety, reliability and speed enable autologous iPSC programs

- Efficiency of reprogramming permits low quantity of cells from biopsy and simultaneous correction of gene defects
- Can quickly produce multiple iPSC clones per patient
- Absence of genome integration facilitates screening to identify and characterize a safe clone

Autologous cells from iPSC

- Autologous iPSC / Gene-modified autologous iPSC for:
  - Paroxysmal nocturnal hemoglobinuria (*PIG1A*) – no gene editing required
  - Infectious disease (*CCR5*)
  - Monogenic diseases



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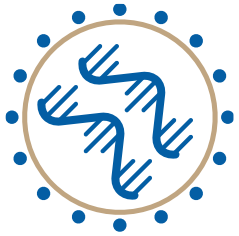
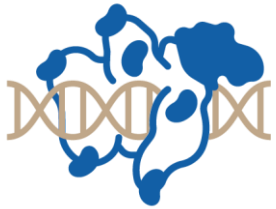
In Vivo Gene Editing Therapies

Genetic Medicine Product Platform

- **Proprietary lipid nanoparticle** for nucleic acid delivery
- Novel lipid with composition of matter IP
- Properties can be tuned to target different cell types and tissues
- Can deliver RNA or DNA; facilitates gene correction approaches

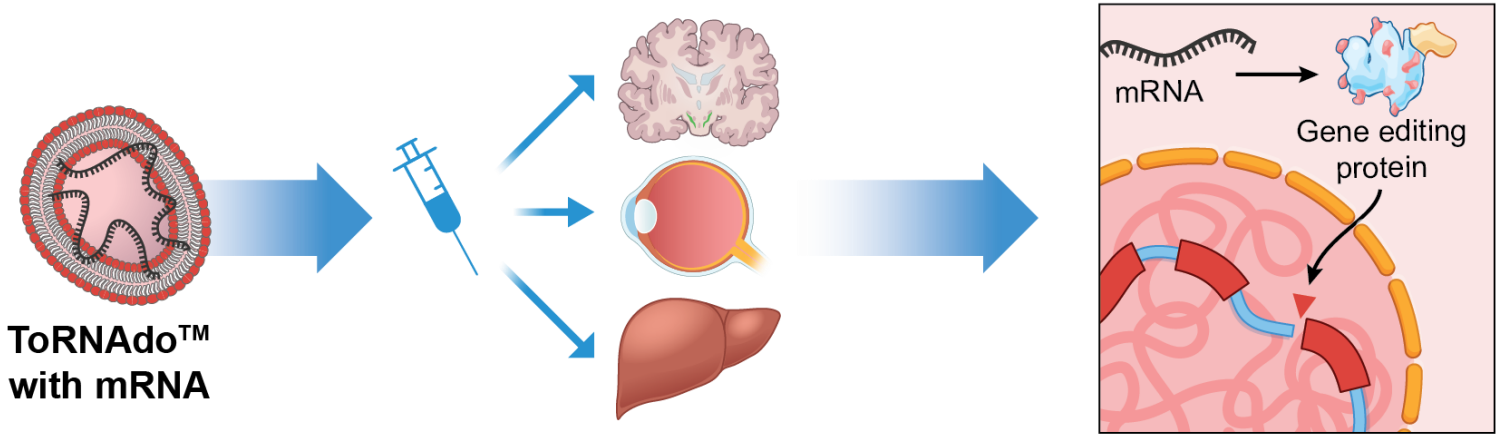


- **Proprietary site-specific nuclease** delivered using mRNA
- Can target any gene through design of protein binding domains
- High specificity to target genomic site
- Achieves high level but transient expression, enhancing safety



Developing In Vivo Gene-editing Products Addressing Rare Disease Indications (Orphan Designation)

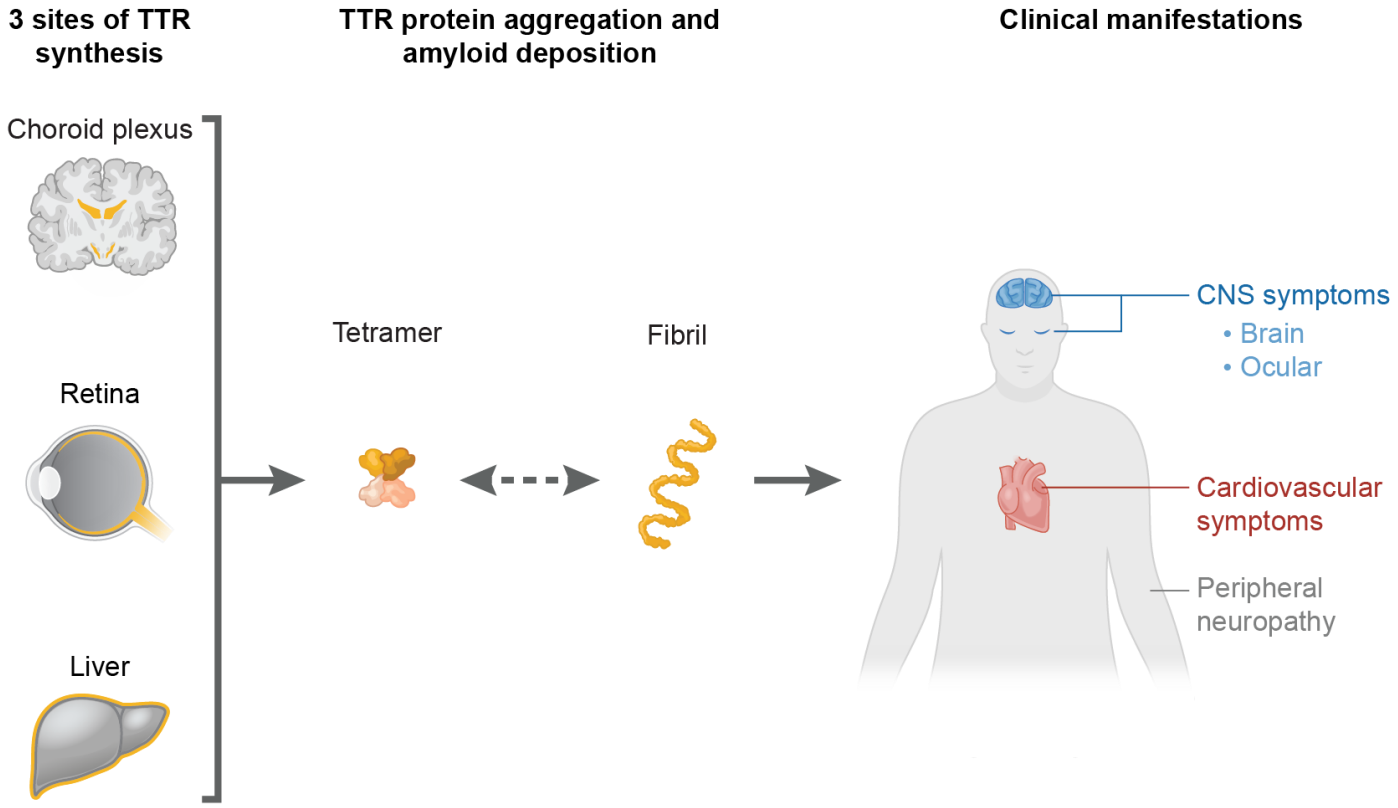
- Direct gene editing in the liver, brain or eye for monogenic disorders
- Ability to knock-out or correct the target gene
- Initial gene target is knock-out of *TTR* for Familial Transthyretin Amyloidosis (ATTR)



ToRNAdo™ is a trademark of Factor Bioscience Inc.

Amyloidosis Caused by Transthyretin (ATTR)

- Caused by misfolded transthyretin aggregating into toxic oligomeric forms
- Death 5-15 years after onset of symptoms is typical
- Non-Familial (200,000-500,000 worldwide)
  - Owing to tissue deposition of normal TTR amyloid
  - Common clinical feature is peripheral neuropathy
- Familial (~50,000 worldwide): BTX Focus
  - Autosomal dominant
  - Owing to mutations in *TTR* (>140)
  - Mutations increase amyloidogenic property



BTX In Vivo Editing Addresses all ATTR Manifestations

	Polyneuropathy	Cardiomyopathy	Retinopathy	Cognitive deficits
Subtype	Observed across subtypes (except leptomeningeal)	Observed across subtypes (except leptomeningeal)	Chiefly leptomeningeal subtype	Restricted mutations + observed across subtypes
Epidemiology	Most common, hATTR and senile (WT) disease	25% of ATTR population over age 80	Rare restricted mutations; small other subsets	Rare restricted mutations; small other subsets
Approved/ R&D synthesis inhibitors siRNA, ASO, CRISPR	☑ **IV/SC** (hepatocytes)	☑ **IV/SC** (hepatocytes)	☒	☒
BTX: in vivo gene editing	☑ **IV** (hepatocytes)	☑ **IV** (hepatocytes)	☑ **Subretinal injection** (Retinal Pigment Epithelium)	☑ **Intracisternal injection** (Choroid Plexus)

BTX can treat all known ATTR regardless of mutation

BTX Cell Therapy and Gene-Editing Pipeline Summary

Indication	Gene targets	Delivery	Discovery	Preclinical	IND-enabling	Clinical	Comments
iMSC: iPSC-derived mesenchymal stem cells							
ARDS (all etiologies)	n/a	I.V. injection					NoveCite program
BMT/HSCT setting	n/a	I.V. injection					
TBD	n/a	I.V. or local					
Solid tumors	IL7, IL15	I.V					
Oncology	Undisclosed	I.V					
Autologous HSC, gene edited							
Undisclosed	Undisclosed	I.V.					
Autologous iPSC-derived cell therapy							
PNH	PIG1A	I.V.					
In vivo gene editing							
Transthyretin Amyloidosis	TTR	IV, CNS, retina					
Stargardt Disease	ABCA4	Retina					

BTX Will Leverage Best In Class mRNA-based Technologies to Deliver Transformative Regenerative Medicines

- Exclusive license to foundational mRNA & gene editing IP
- Diversified product strategy for multiple clinical applications
- Experienced management team with deep expertise in C&GT
- Strong partnership for translational execution and future innovation
- In-licensed patent portfolio offers sub-licensing opportunities

Brooklyn ImmunoTherapeutics

A platform company in cell, gene-editing & cytokine therapies

mRNA Engineered Cell & Genetic Medicines

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