GENVEC

Developing a pipeline of innovative therapeutics and vaccines that deliver on the promise of gene-based medicine

Corporate Overview

January 2017

Safe Harbor Statement

Statements herein relating to future financial or business performance, conditions or strategies and other financial and business matters, including expectations regarding future revenues and operating expenses, are forward-looking statements within the meaning of the Private Securities Litigation Reform Act. GenVec cautions that these forward-looking statements are subject to numerous assumptions, risks and uncertainties, which change over time. Factors that may cause actual results to differ materially from the results discussed in the forward-looking statements or historical experience include risks and uncertainties, including the failure by GenVec to secure and maintain relationships with collaborators; risks relating to clinical trials; risks relating to the commercialization, if any, of GenVec's proposed product candidates (such as marketing, regulatory, patent, product liability, supply, competition and other risks); dependence on the efforts of third parties; dependence on intellectual property; and risks that we may lack the financial resources and access to capital to fund our operations. Further information on the factors and risks that could affect GenVec's business, financial conditions and results of operations are contained in GenVec's filings with the U.S. Securities and Exchange Commission (SEC), which are available at **www.sec.gov**. The forward-looking statements speak only as of the date of this presentation, and GenVec assumes no duty to update forward-looking statements.

Investment Highlights

- Biotechnology company leveraging its proprietary AdenoVerse™ platform to develop cutting-edge gene-based medicines
- Developing a novel treatment for hemophilia A using PEC (pulmonary endothelial cell) delivery technology
- Exploring opportunities in regenerative medicine, oncology, hematology, infectious diseases, and other cell and gene therapies
- Validating partnerships demonstrating the power and value of GenVec technology including:
  - Novartis: regenerative medicine gene therapy for hearing loss
  - TheraBiologics: neural stem cell therapy for oncology indications

GenVec Pipeline

Program Area and Indication	Partner / Collaborator	Technology Highlights	Development Status			
			Discovery	Preclinical	Clinical	Notes
GENE AND CELL THERAPIES						
Hearing Loss and Balance Disorders	NOVARTIS	Regenerative medicine gene therapy				First gene therapy for hearing; Phase1/2 clinical trial ongoing
Oncology	THERABIOLOGICS	*Ex vivo* engineered neural stem cells				2nd generation product to enter the Phase 1 trial in 1H2017
Hemophilia A	Washington University in St. Louis	PEC delivery + gene editing				Proof of principle studies ongoing
INFECTIOUS DISEASE VACCINES						
RSV	Available for partnering	Prophylactic vaccine				Proof of principle established in multiple animal models
HSV-2	Available for partnering	Prophylactic and therapeutic vaccine				Proof of principle established in multiple animal models
Malaria	NMRC / NIH-LMIV	Discovery of new Malaria vaccines				Proof of principle ongoing in multiple animal models
FMD	MERIAL	DIVA compatible vaccine				First U.S. conditionally approved FMD molecular vaccine

Opportunity in Hemophilia A

- Genetic disorder causing deficient production of blood clotting factor VIII (FVIII)
  - Approximately 18,000 Americans are living with hemophilia A (approximately 1 in 5,000 births)
  - About 60% of patients have severe disease (producing less than 1% of normal FVIII levels)
- Current therapy relies on prophylactic treatment with blood factors and emergency treatment for bleeding events
- Peak annual costs for treatment per patient per year of approximately $364,000, with average costs exceeding $160,000
- High need for curative approaches that can allow patients to live normally at lower lifetime costs

Competitive Landscape
Treatment of Bleeding Disorders

Stages in the development of products for bleeding disorders

Plasma-derived clotting factors
Developed in the late 1960s into the 1970s;
Significant safety concerns due to prevalence of contamination from viral pathogens

Recombinant clotting factors
Developed in the late 1980s into the 1990s;
Eliminated the safety concerns of plasma-derived products

Extended half-life clotting factors
Recent and ongoing development;
Decreased treatment frequency

The promise for the future: gene therapy and other new agents

Novel therapies and modalities

Notable companies with approved products or products in development in the categories shown above

Shire CSL Behring octapharma	Shire Biogen CSL Behring novo nordisk octapharma BAYER Pfizer	Shire Biogen novo nordisk	BIOMARIN Biogen Spark THERAPEUTICS Pfizer Alnylam PHARMACEUTICALS	uniQure SANGAMO DIMENSION THERAPEUTICS BAYER

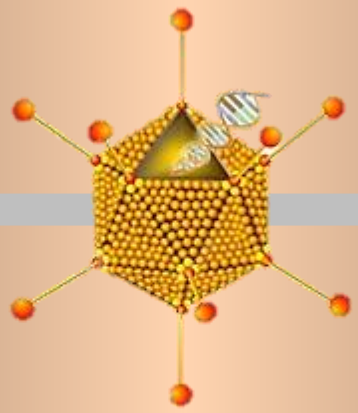
Gene Therapy for Hemophilia
Rationale

- Monogenic disease, with a clear correlation between circulating blood clotting factor levels and severity of disease
- Even small increases in blood clotting factor levels from baseline can result in significant clinical improvements
- Gene therapy can potentially provide sustained levels of circulating blood clotting factors to restore normal function
- Potential to eliminate patient dependence on a lifetime of blood clotting factor injections
- While promising, choice of vector and target organ has presented challenges, particularly for hemophilia A

Portfolio of Technologies

Combination Provides Correction of Genetic Disorders

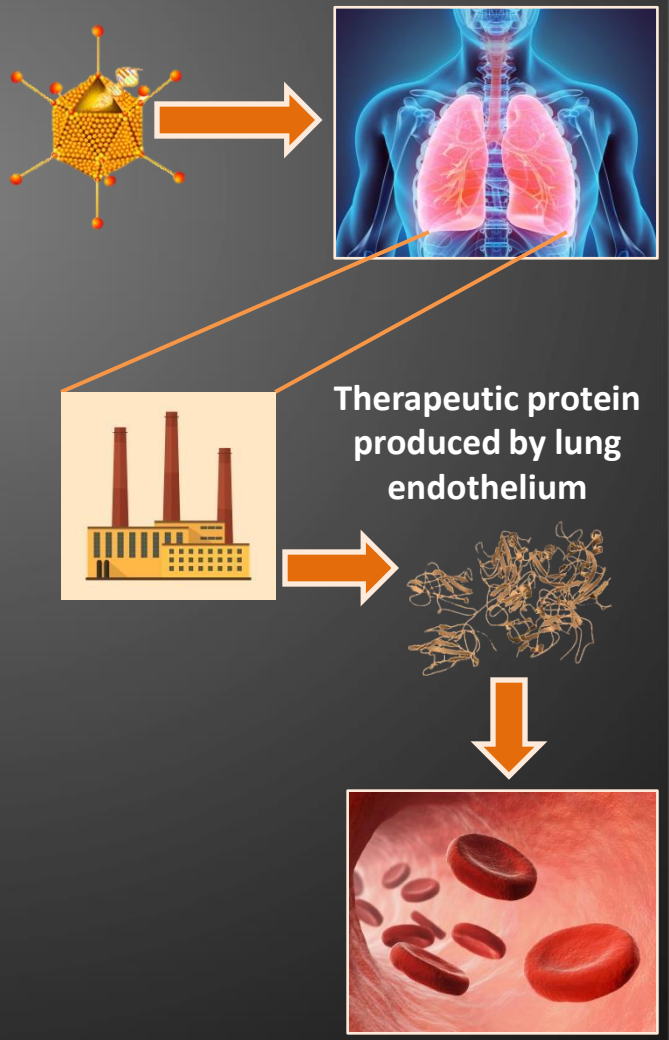
Key technologies	Proprietary product design incorporating all the key technologies	Advantages
PEC delivery		Harnessing lung for protein expression
Gene editing		Therapeutic gene durable expression
AdenoVerse™ vectors		Systemic administration



PEC Delivery Platform

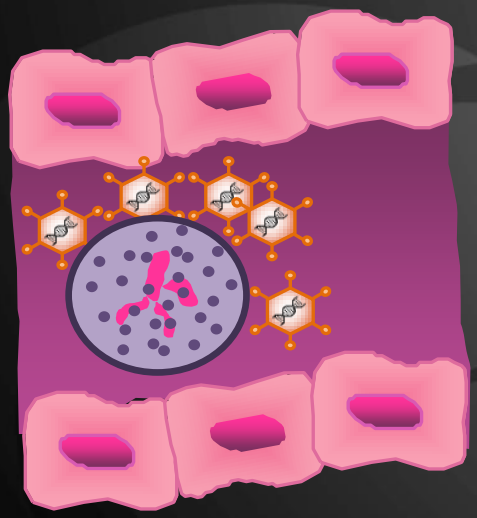
New Paradigm for Molecular Medicines

- Allows for specific gene therapeutic delivery into the lung endothelium via AdenoVerse™ vectors
- Lung endothelium is turned into a surrogate long-term production factory for therapeutic proteins
- Can be used to address multiple unmet medical needs (hemophilia, passive immunotherapies, etc.)
- PEC delivery combined with AdenoVerse™ vectors can:
  - Limit liver toxicities observed with systemic administration of more traditional gene therapeutics
  - Provide long-term production of native proteins

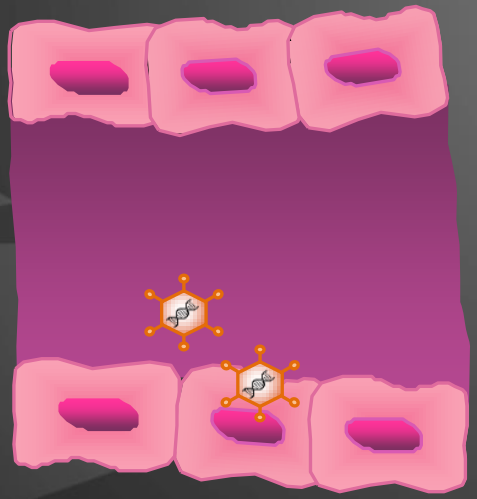


PEC Delivery Platform

Mechanism of Action

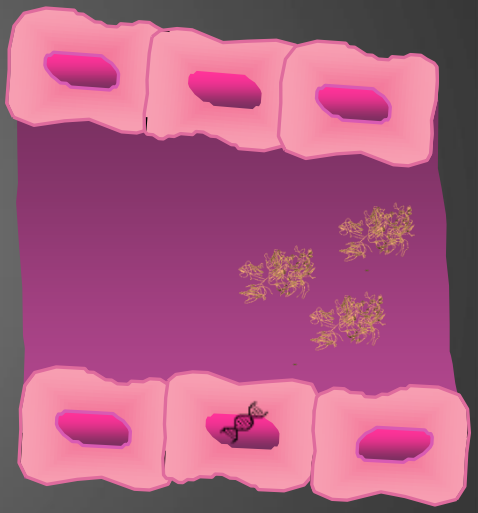


Step 1: Loading of granulocytes with adenovectors



Step 2: Hand-off of adenovectors to lung endothelial cells

Step 3: Endothelial cell transduction and gene integration

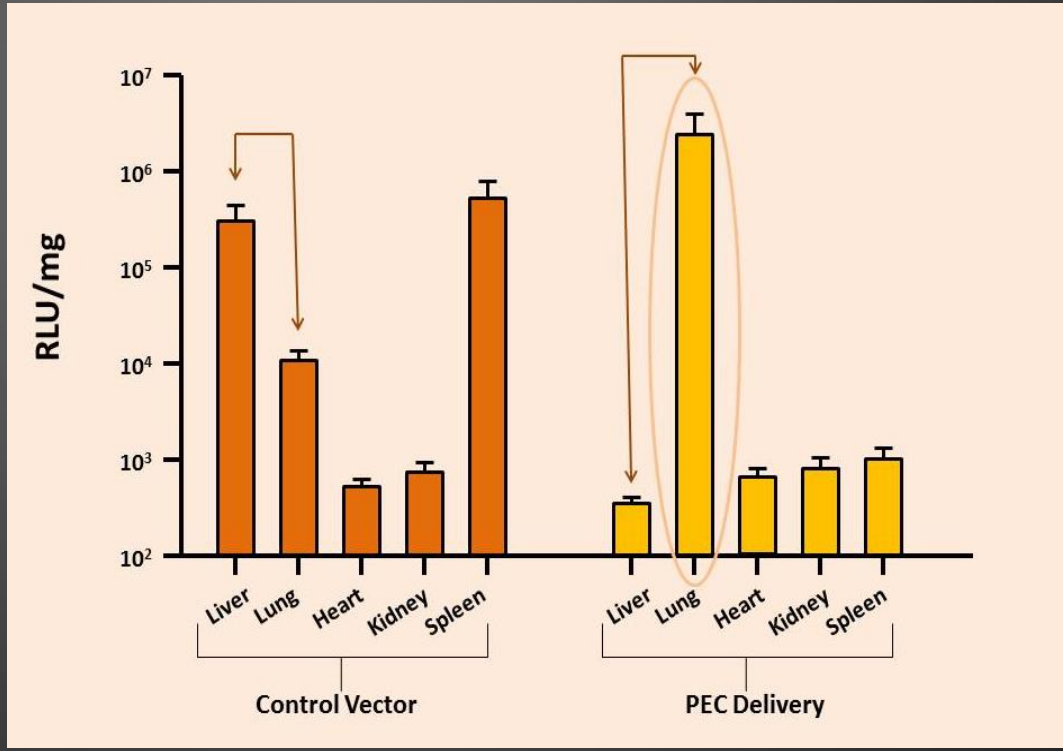


Step 4: Therapeutic protein production and secretion into blood stream

Lung Endothelium Targeting

PEC Technology

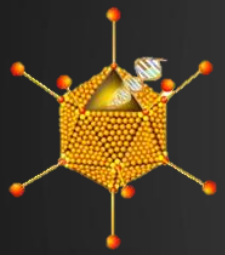
- Upon systemic administration in mice, a preferred distribution to the lung was observed
- Technology developed by David Curiel at Washington University in St. Louis
- GenVec has an exclusive option to PEC technology



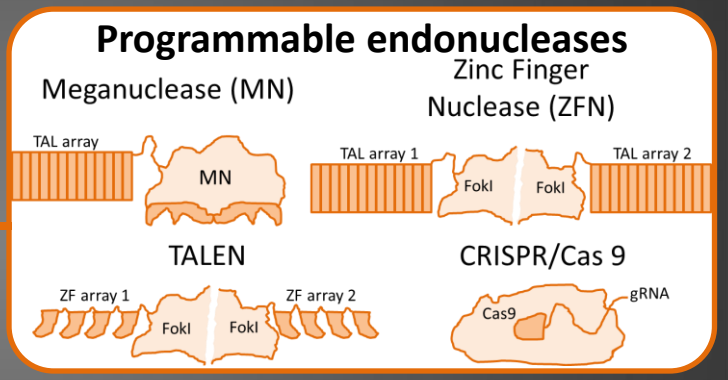
Gene Editing Technologies

Tools to Perform Genome surgery

Delivery of the complete gene editing payload to targeted cells



Nuclease expression



Target cell genome DNA

Precise double-stranded break created

Therapeutic gene

Integration of the therapeutic gene

Durable expression via permanent addition of the therapeutic gene sequence

Gene Editing AdenoVerse™

High Level of Complementarity and Technological Fit

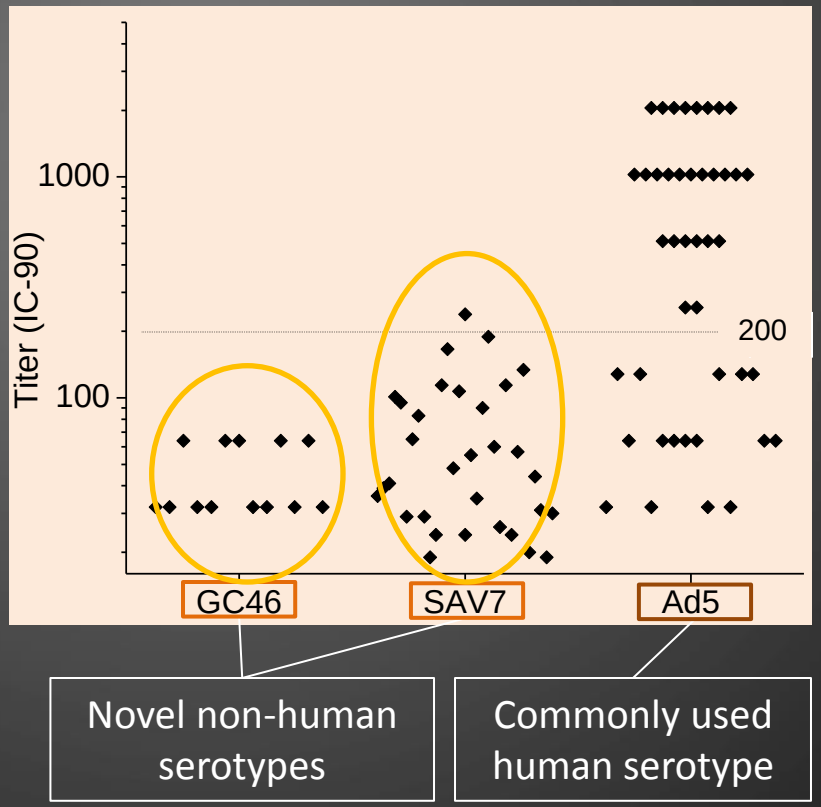
GenVec's AdenoVerse platform provides a unique set of solutions for the key Gene Editing field requirements

Gene Editing Requirements	AdenoVerse Platform Solutions
"Hit and run" (limited off-target effects)	Non-integrating vector: • Transient nuclease expression minimizing potential off-target cuts • Reduced chromosomal positional effects and risk of insertional mutagenesis
Large Capacity	Delivery of large payload (up to 12Kb): • All the components in a single vector • Multiple expression cassettes
Low Immunogenicity	• AdenoVerse vectors can be designed to have low immunogenicity properties

Systemic Administration

Proprietary AdenoVerse™ Platform Solutions

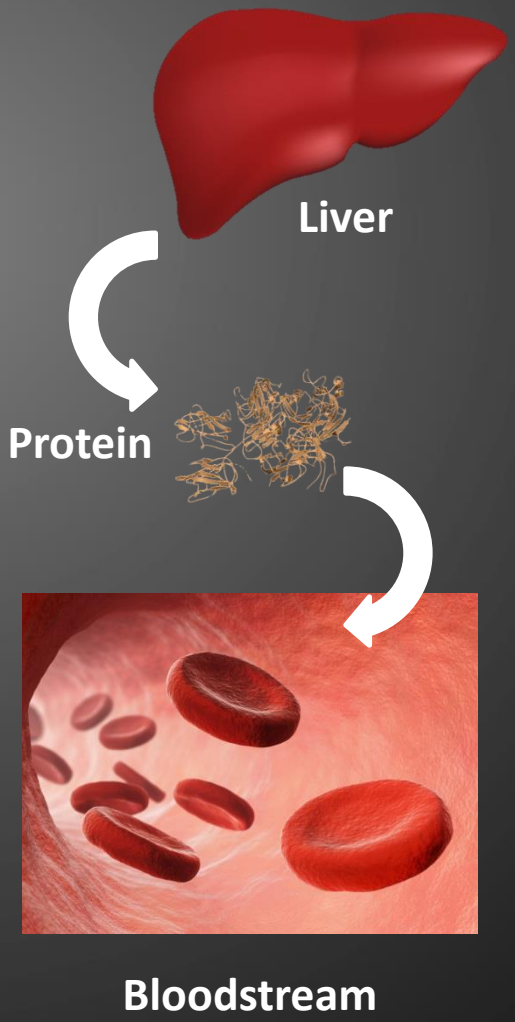
- Systemic administration has been a long-standing challenge for gene therapeutics
- GenVec's AdenoVerse platform addresses this hurdle
  - No-to-low sensitivity to pre-existing neutralizing antibodies
  - Reduction of liver sequestration, minimizing hepatotoxicities



Blood Proteins

Key Mediators of Biological Function

- Blood consists of cellular components (platelets, red and white blood cells) and plasma
- Plasma is a liquid, which contains numerous proteins
- Many important proteins are synthetized by the liver
- Hepatic proteins are involved in many functions:
  - Coagulation (blood factor, fibrinogen, complement, etc.)
  - Metabolism (apolipoproteins)
  - Carrier (albumin, transferrin, etc.)
  - Hormonal (hepcidin, thrombopoietin, etc.)



PEC Technology Applications

Examples of Potential Indications

Bleeding disorders	• Hemophilia A (FVIII) • Hemophilia B (FIX)
Metabolic disorders	• Type 1 diabetes
Respiratory diseases	• Alpha 1-antitrypsin deficiency • Chronic obstructive pulmonary disease
Anemia	• Erythropoietin deficiency
Passive Immunizations	• Anti-pathogen or anti-toxin agents

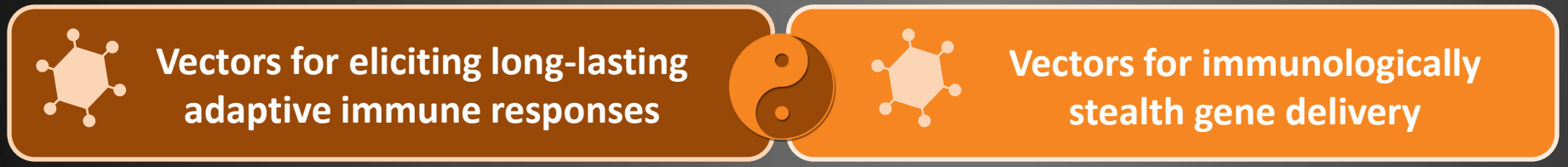
Hemophilia A Program
Next Steps

- Select preferred AdenoVerse™ platform vectors for systemic administration
- Construct program vectors incorporating PEC delivery technology
- Show proof of principle pulmonary endothelial cell delivery in *in vitro* and *in vivo* models
- Identify leads for pre-clinical development

AdenoVerse™ Platform

Diverse Biological Properties and Broad Applications

A library of adenoviral vectors with diverse and unique biological properties



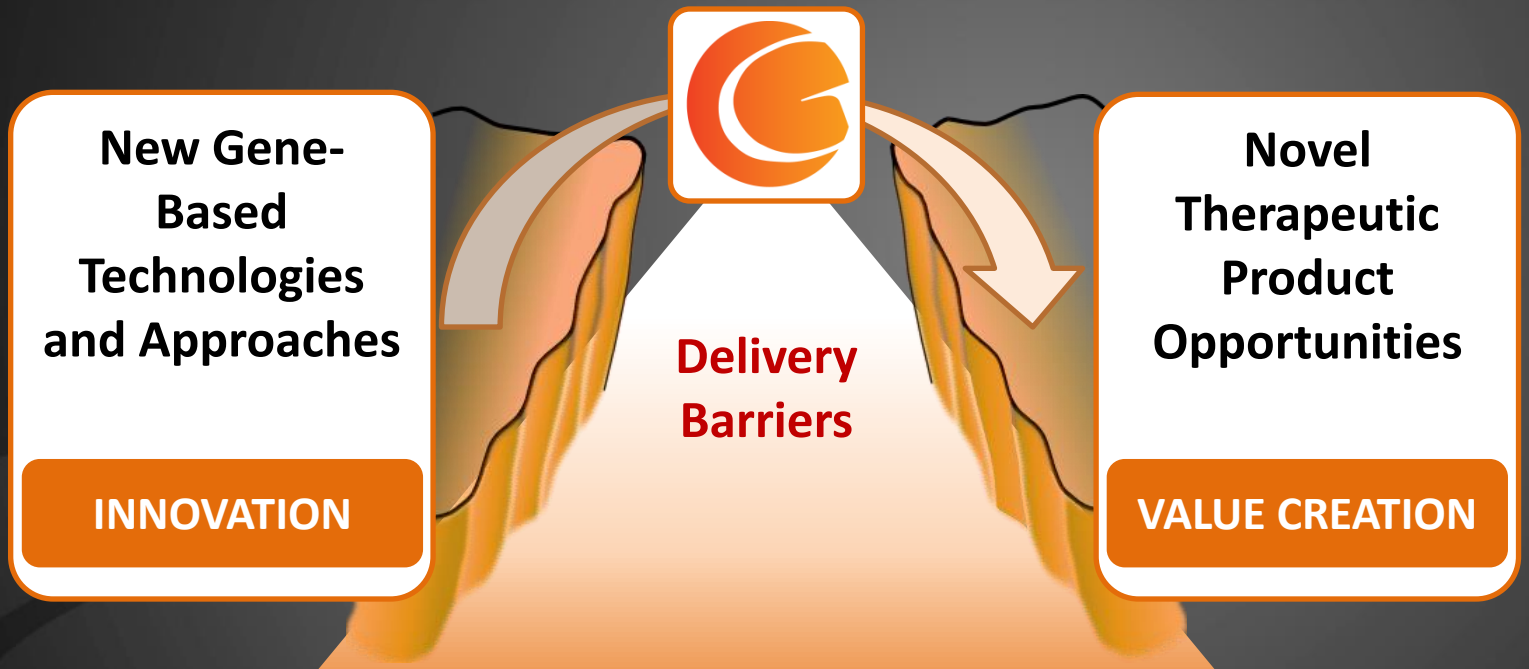
Multiple vectors each suited to a broad range of applications

A large set of therapeutic areas covered by the platform

Proprietary cell lines for efficient manufacturing

AdenoVerse™ Platform

Technology Platform Enabling Therapeutics



The AdenoVerse Platform Solutions

- Vectors enabling delivery of new gene-based technology:
  - Product-focused vector design to deliver payloads to the desired cellular targets
- Translational expertise across a spectrum of diseases:
  - Manufacturing and clinical development

AdenoVerse™ Platform
Advantages

Adenovector Advantages

- Efficient transduction in dividing cells and non-dividing cells
- Non-integrating transgene limits the probability of disturbance of vital cellular genes

AdenoVerse Strengths

- Vectors with no or very low seroprevalence in the human population
- Large packaging capability (up to 12 kb) with multiple expression cassettes
- Improved safety with multiple deletions in vector genomes
- Administered to over 3,000 clinical study subjects
- Scalable platform with efficient manufacturing process and attractive cost of goods
- Strong and expanding IP position

AdenoVerse™ Platform

Overcoming the Known Adenovector Limitations

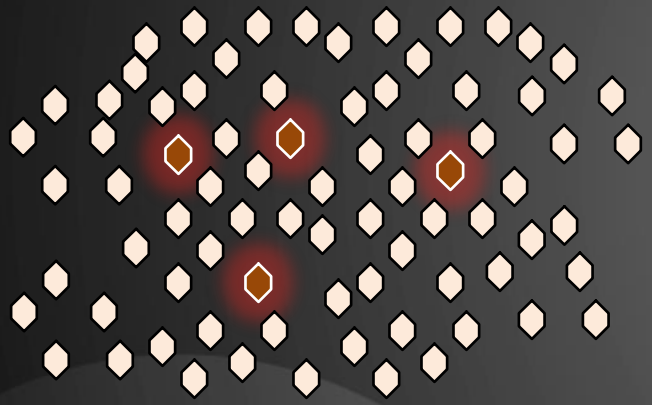
Standard Adenovector Known Limitations	GenVec's AdenoVerse Adenovector Superiority
Pre-existing immunity	Proprietary adenovector backbones from **rare human and non-human primate serotypes** with low to no seroprevalence in the human population
Innate immunity associated toxicity	Adenovector **deleted for E1, E3, and E4 regions**, limiting the expression of viral proteins mainly responsible for innate immune responses
Vector liver sequestration	Some of these adenovectors appear not to be sequestered in the liver and could be suitable for **systemic delivery**

The AdenoVerse platform is the next generation of adenovector technology and has unprecedented potential for new medical treatments

AdenoVerse™ Platform

Identifying Vectors for New Therapeutic Applications

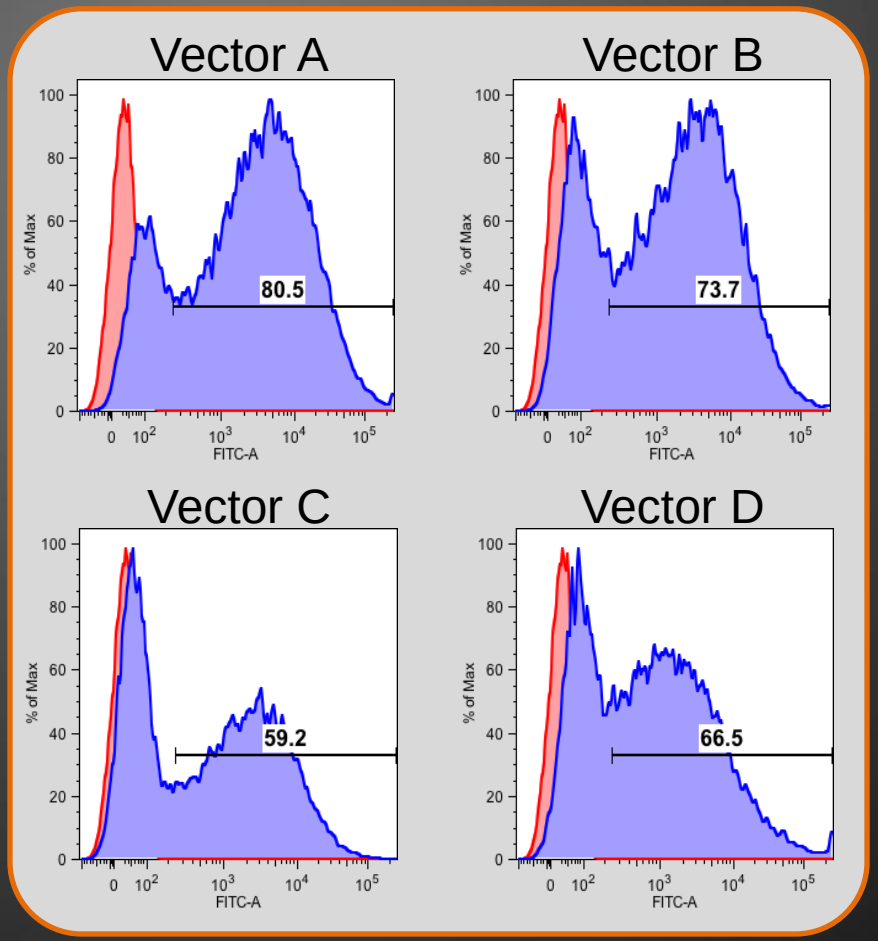
AdenoVerse Vectors



GenVec's Screening Methodology

Vectors with preferred performance characteristics for any given application and unique need

Data from screenings to identify vectors that efficiently transduce cells of interest



Data shown from human primary T cell screening

AdenoVerse™ Platform

Diverse Biological Properties and Broad Applications

A library of adenoviral vectors with diverse and unique biological properties

Vectors for eliciting long-lasting adaptive immune responses

Vectors for immunologically stealth gene delivery

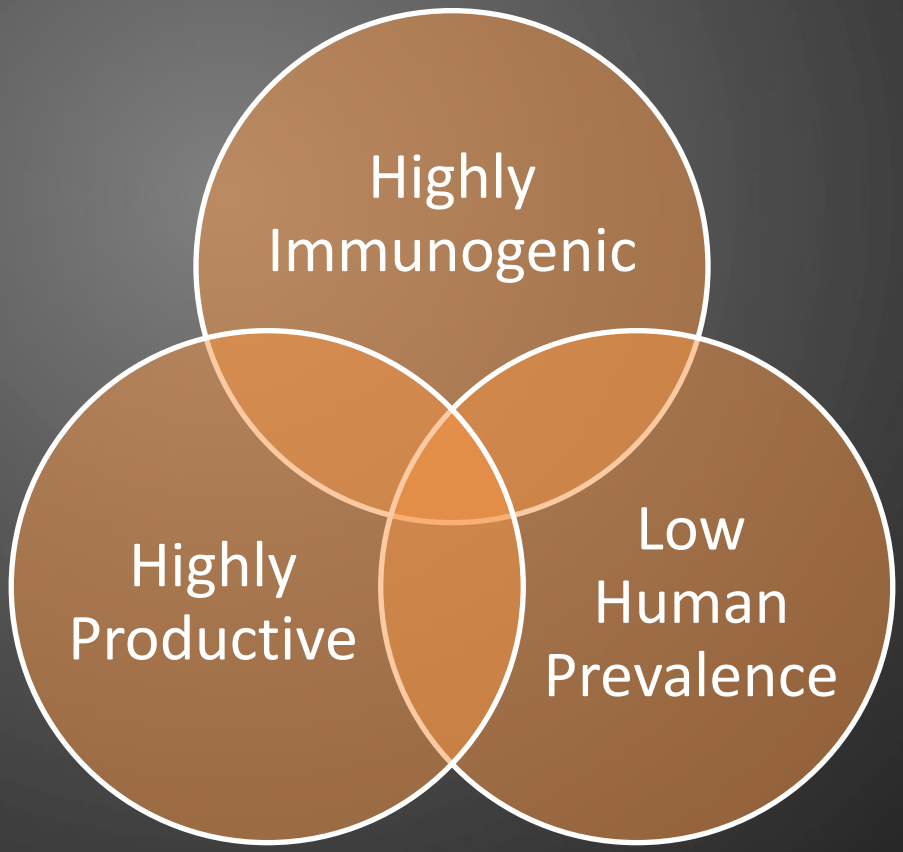
Immuno-therapies	Vaccines Prophylactic & Therapeutic	Oncolytics	Gene Editing	Cell Therapies	Nucleic Acid Therapeutics

✓	Infectious Disease
✓	Oncology
	Otology
	Ophthalmology
	Cardiology
	Neurology
	Rheumatology
	Rare Diseases

AdenoVerse™ Vaccine Applications

Proprietary Vectors, Excellent Performance

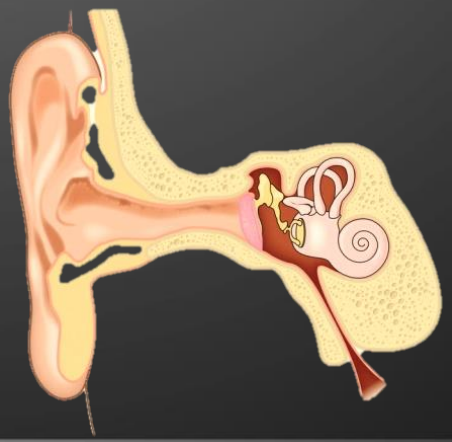
- Validated technology for vaccine applications
- Industry leading vaccine platform for generating T cell responses
- Proprietary novel adenoviral vectors with outstanding properties
- Vectors with distinct advantages for molecular vaccines
  - High-level, durable antibody responses
  - High-level T cell responses
  - Repeat administration boosts responses



Collaboration with Novartis

Addressing Hearing and Balance Disorders

- CGF166 is currently in a Phase 1/2 clinical trial in patients with severe to profound hearing loss
- Currently recruiting patients for the fourth cohort in ongoing Phase 1/2 clinical study
- Safety and efficacy analysis from first three cohorts supports further dose escalation
- Agreement provides GenVec with up to $206.6 million in milestone payments, in addition to royalties on sales



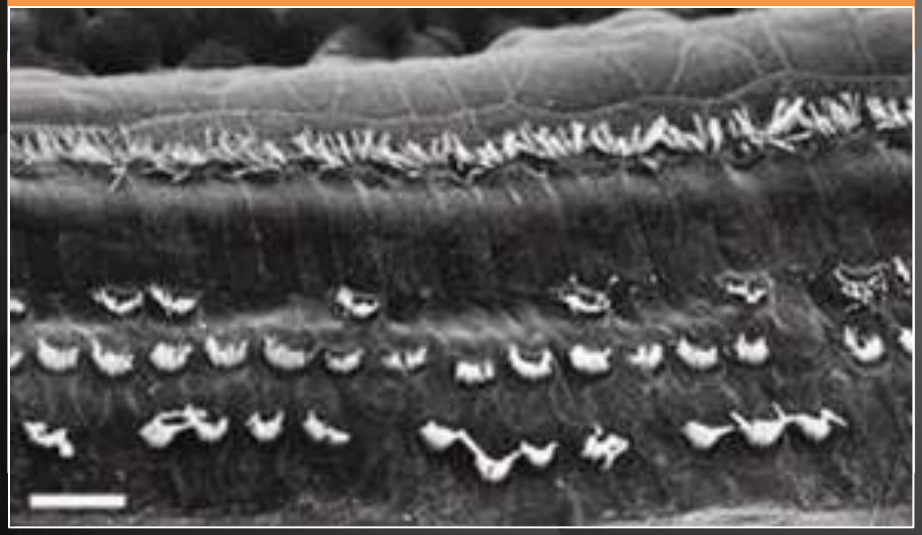
Hearing Loss Market

The Opportunity

- Hearing loss is a multi-billion dollar market opportunity
- Disabling condition with high and increasing prevalence worldwide
- An estimated 1 in 6 adult Americans suffer from hearing loss
- 90% of hearing loss is sensorineural
- No current pharmaceutical treatment options

The Problem
Loss of Sensory Cells

Sensory Cells



Causes of Sensory Cell Loss

- Age Related
- Infection
- Drug Induced
- Sound Trauma

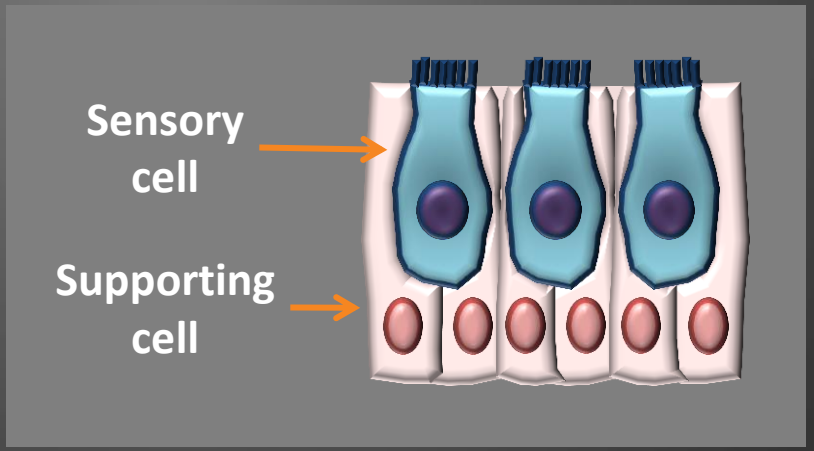
The Solution

Generate New Sensory Cells

Deliver the Atonal gene to the supporting cells using an adenovector

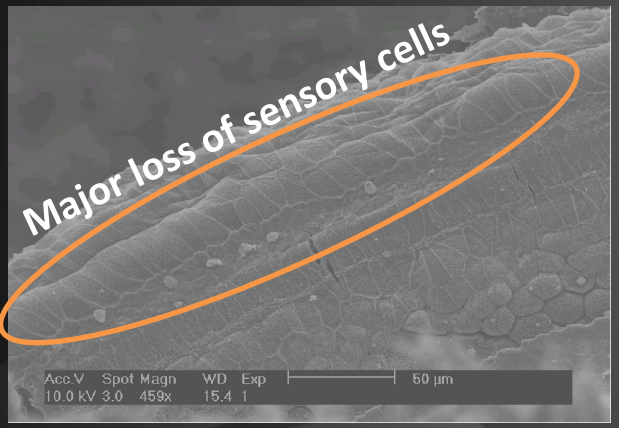
Produce Atonal protein in supporting cells

Trigger conversion of supporting cells into sensory cells

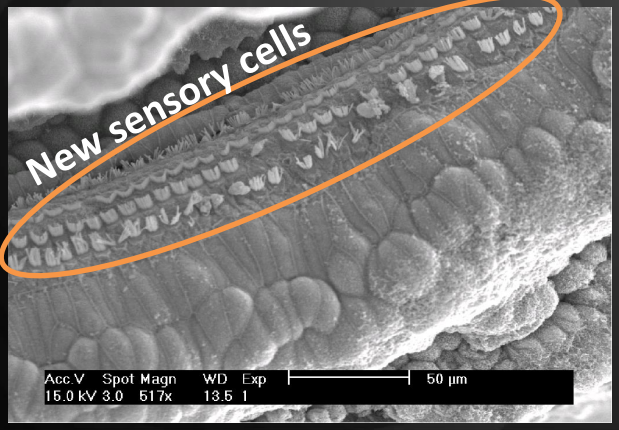


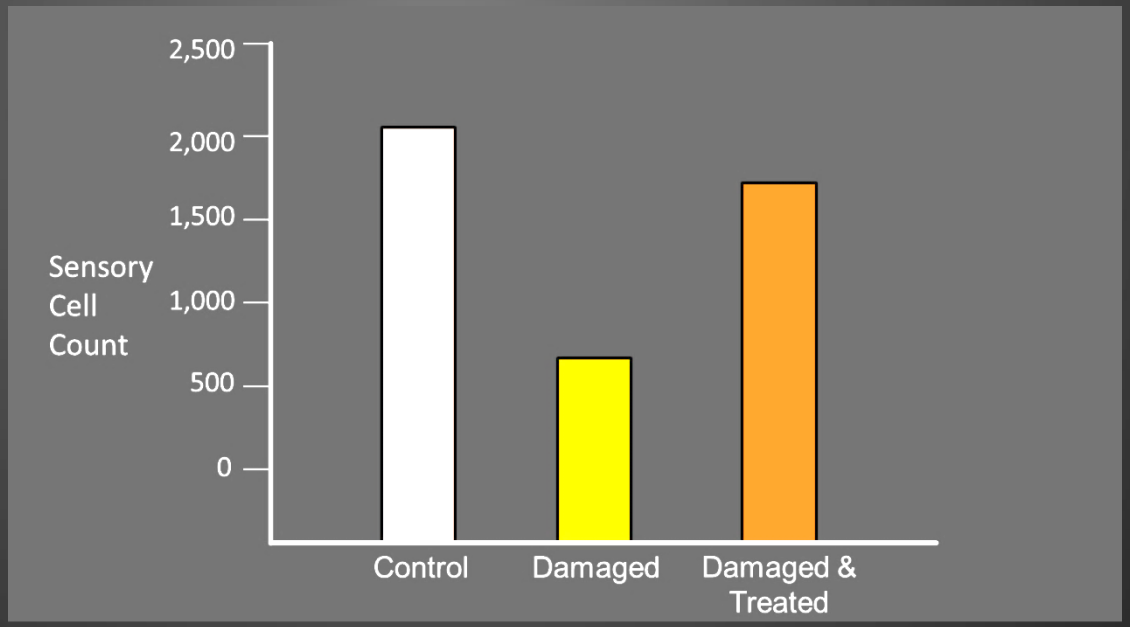
Regeneration of Sensory Cells

Damaged and Untreated



Damaged and Treated

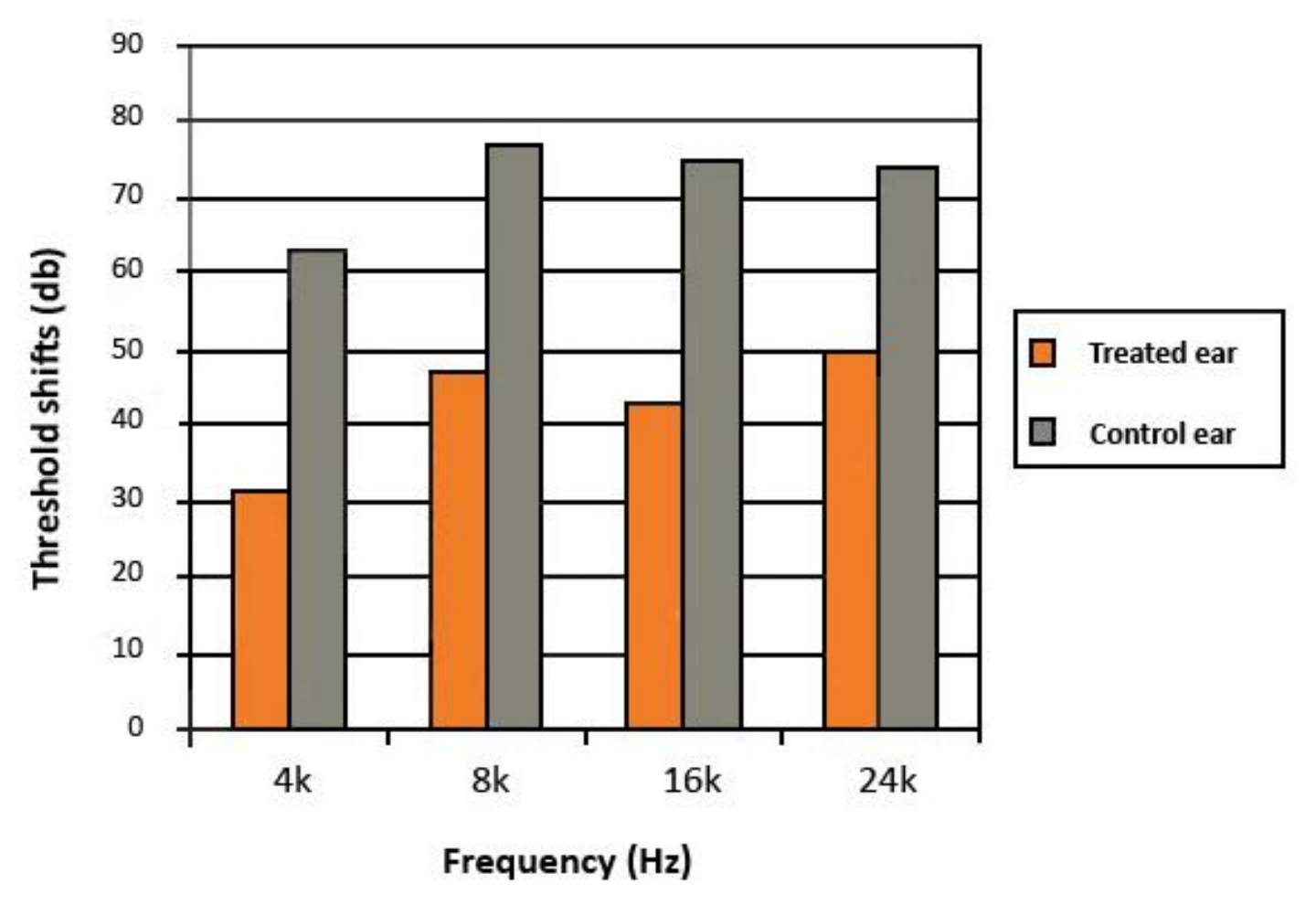




Schlecker et al. Gene Therapy, 2011, 18: 884-890

Izumikawa *et al.*, *Nature Medicine*, 2005, 11(3): 271-276

Restoration of Hearing



Izumikawa *et al*. study, *Nature Medicine*, 2005, 11(3): 271-276

CGF166 Clinical Development
Trial Design

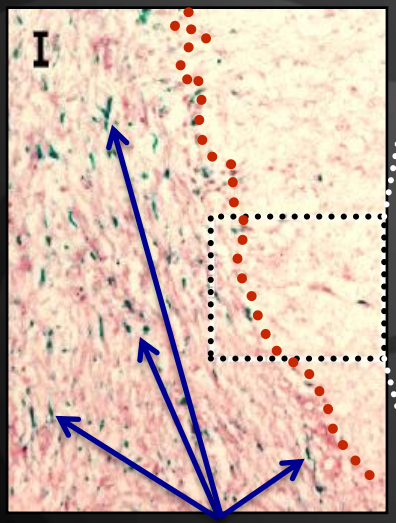
- Multicenter trial of 26 to 45 patients with severe to profound hearing loss

Part A: Safety	• Single, 3-patient cohort • Dose: 20 µl
Part B: Dose Volume Escalation	• 2-5 cohorts of 3 patients each • Dose volume between 30 µl and 90 µl
Part C: Efficacy	• Single cohort of 20 patients at dose determined by Part B • Option to resize

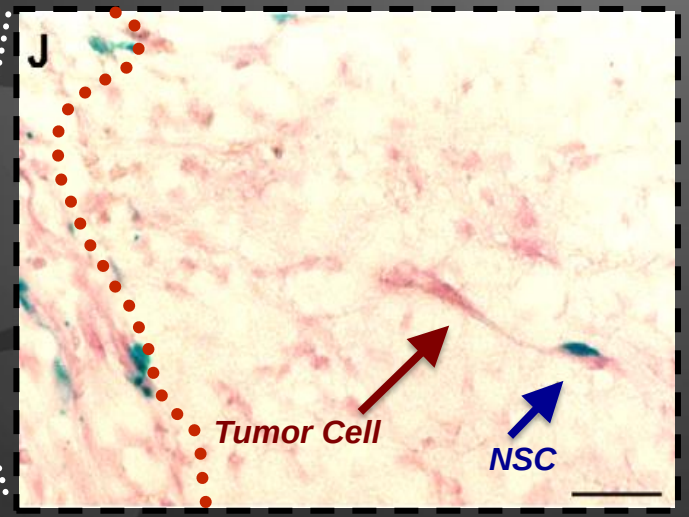
TheraBiologics Collaboration

Neural Stem Cell Therapy

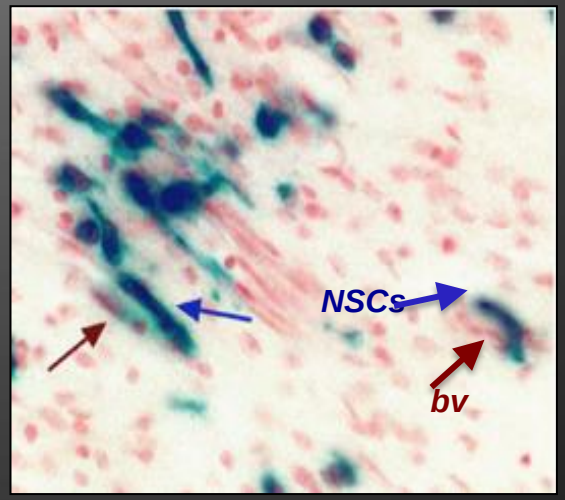
- Second generation adenovector-engineered neural stem cell (NSC) product for the treatment of primary and metastatic tumors
- NSCs selectively target tumor cells and vasculature
- TheraBiologics emerged out of the pioneering neural stem cell research and development of Dr. Karen Aboody at City of Hope



NSCs penetrate main tumor mass



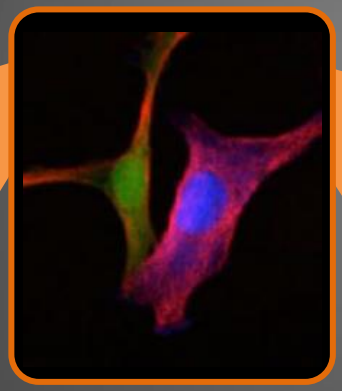
NSCs selectively target invasive tumor cells



NSCs target new blood vessels

Unique Features of NSCs

Two unique and synergistic biological properties make neural stems cells an ideal vehicle for targeted cancer treatment



NSCs

Homing: "GPS-like" tumor site locator

- NSCs navigate towards invasive tumor sites in various tissues, including the brain, post systemic administration
- NSCs exploit tumor angiogenesis as a homing mechanism to locate tumor and metastatic sites

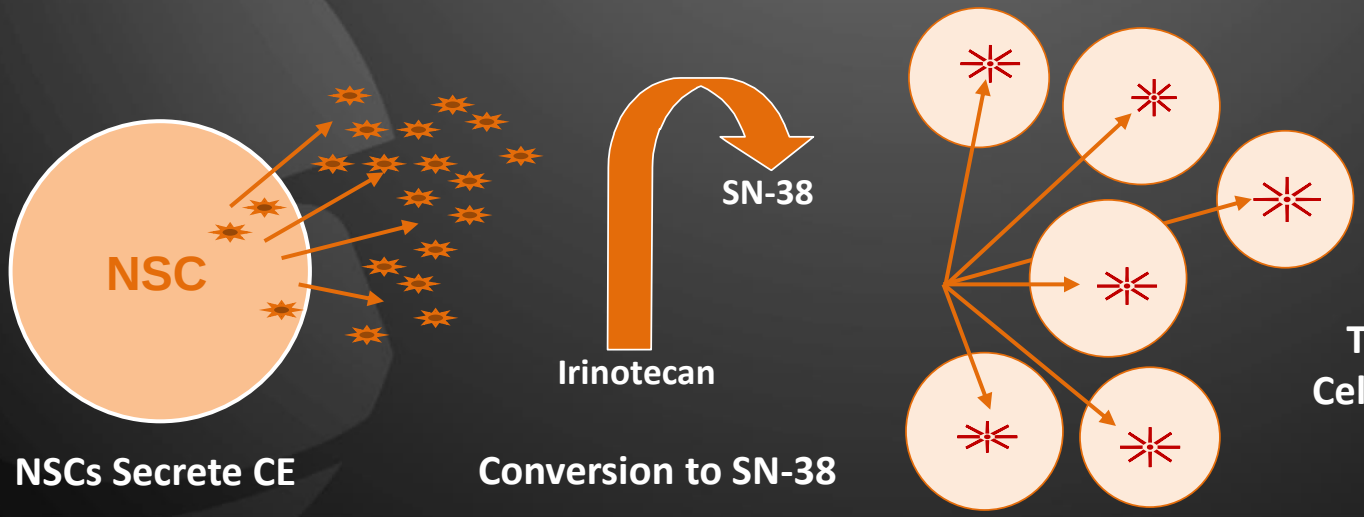
Trojan Horse: Stealth payload delivery

- NSCs can be genetically modified
- NSCs can carry therapeutic payloads to tumor sites, shielded within the NSC carrier
- NSCs retain the tumor homing function upon genetic modification and payload hauling

NSC.CE Product Candidate

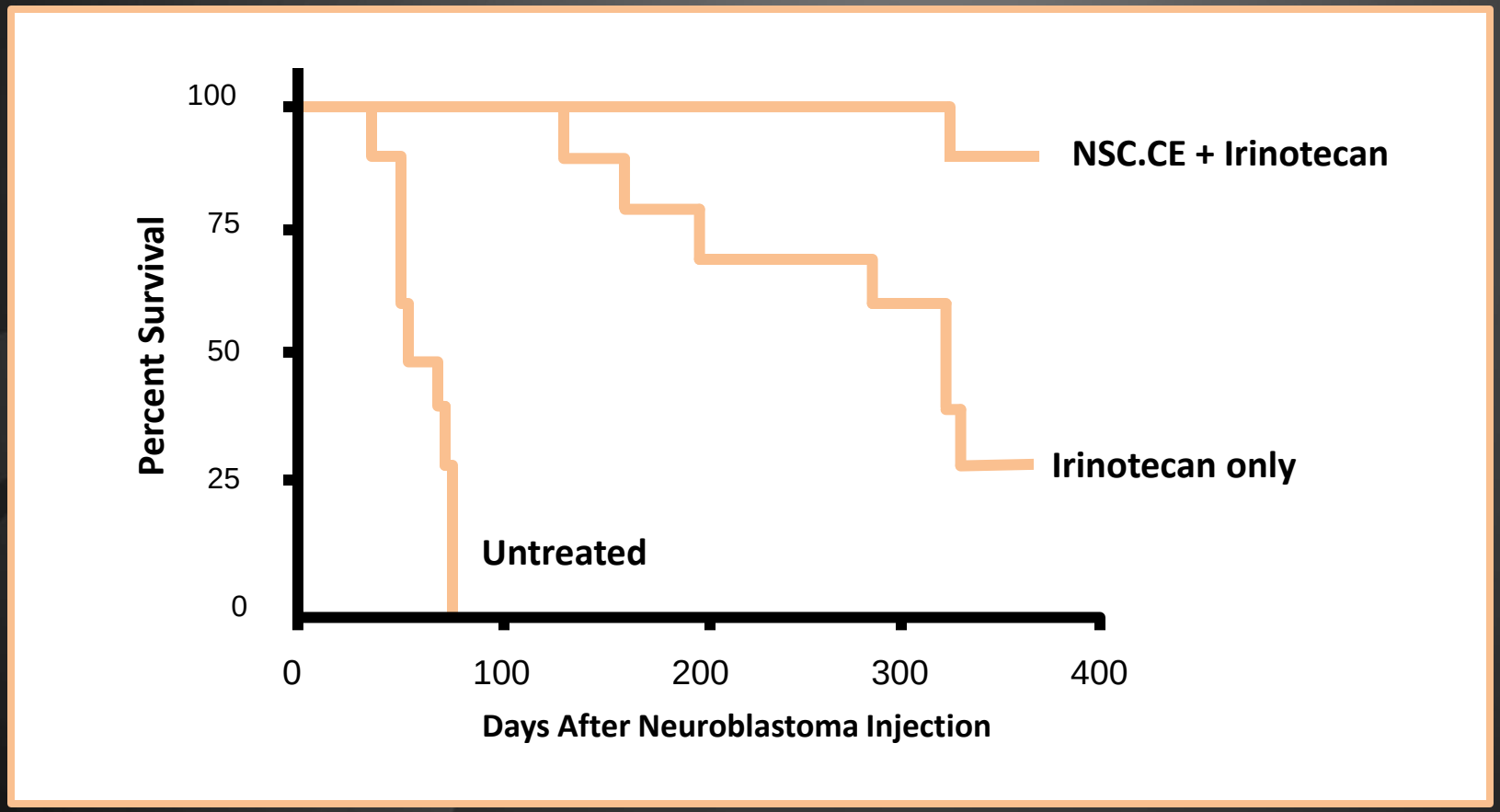
Mechanism of Action: Directed Enzyme Prodrug Therapy

- NSCs are transduced by a proprietary GenVec adenovector to express and secrete carboxylesterase (CE) = NSC.CE
- When administered, these NSCs migrate to tumor sites where they express the CE therapeutic payload within the tumor
- The secreted CE enzyme then provides a radius of action throughout the tumor site to catalyze the conversion of irinotecan to SN-38
  - SN-38 is 1,000x more toxic to tumor cells than irinotecan



NSC.CE Product

Pre-clinical Efficacy in a Neuroblastoma Model



TheraBiologics Data

NSC.CE Program
Current Status

- First indication: Recurrent high grade glioma
  - Phase 1 clinical trial ongoing currently using a first generation product
  - Plan to switch to the second generation collaboration product employing GenVec's adenovector in 1H2017
  - The Phase 1 clinical development is fully funded by grants
- Second indication: Metastatic neuroblastoma
  - Systemic administration of the product
  - Preclinical work ongoing using the second generation product
  - Preclinical development is fully grant-funded
- GenVec and TheraBiologics are working closely together on:
  - Process development for the production of this novel cell therapy
  - Exploring additional grant funding opportunities to support the program

Financial Summary

Common Shares Outstanding[1]	• 2.3 million shares
Exchange: Symbol	• NASDAQ: GNVC
Market Capitalization[2]	• $13.9 million
Cash and Investments[3]	• $8.4 million
Employees	• 15

[1]As of December 1, 2016; [2]Stock price as of January 17, 2017; [3]As of September 30, 2016

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