



An 80% owned operating unit of
Nostrum Pharmaceuticals, LLC

We are a micro-cap biotechnology company focused on the clinical and commercial development of Generx [Ad5FGF-4], a Phase 3 angiogenic gene therapy product candidate for the treatment of refractory angina due to advanced coronary artery disease.



Investor
Presentation



"Enhancing the Heart's Natural
Angiogenic Healing Process"

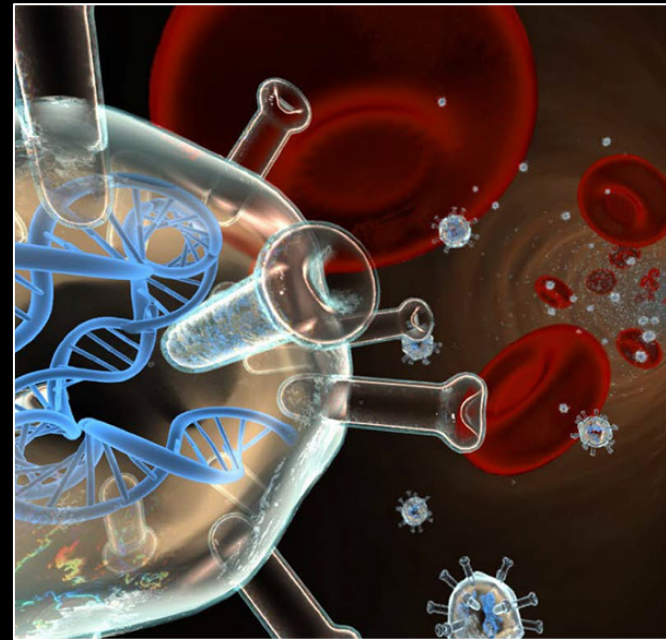
FORWARD-LOOKING STATEMENTS

The forward-looking statements in this presentation are based on expectations and assumptions as of the date of this presentation. Except as required by law, the company does not assume any obligation to update forward-looking statements contained herein to reflect any change in expectations, whether as a result of new information future events, or otherwise. Each of these forward-looking statements involves risks and uncertainties and actual results may differ materially from these forward-looking statements. Many factors may cause differences between current expectations and actual results, including: (a) unexpected safety or efficacy data observed during preclinical or clinical studies; (b) clinical trial site activation or enrollment rates that are lower than expected; (c) changes in expected or existing competition; (d) changes in the regulatory environment; (e) failure of collaborators to support or advance collaborations or product candidates; (f) unexpected litigation or other disputes; and (g) the company's need to raise sufficient additional capital to adequately fund ongoing operations. These risks are not exhaustive, the company faces known and unknown risks, described in the company's periodic filings with the SEC.



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NEW BIOLOGICAL TOOLS



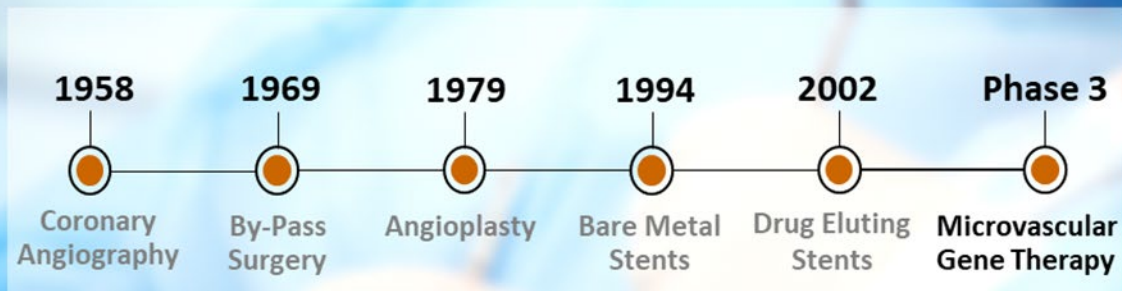
FOR A BRAVE NEW WORLD

GENERX [Ad5FGF-4]

Product Candidate

ANGIOGENIC GENE THERAPY

Advances in Coronary Revascularization



GENE THERAPY PIPELINE

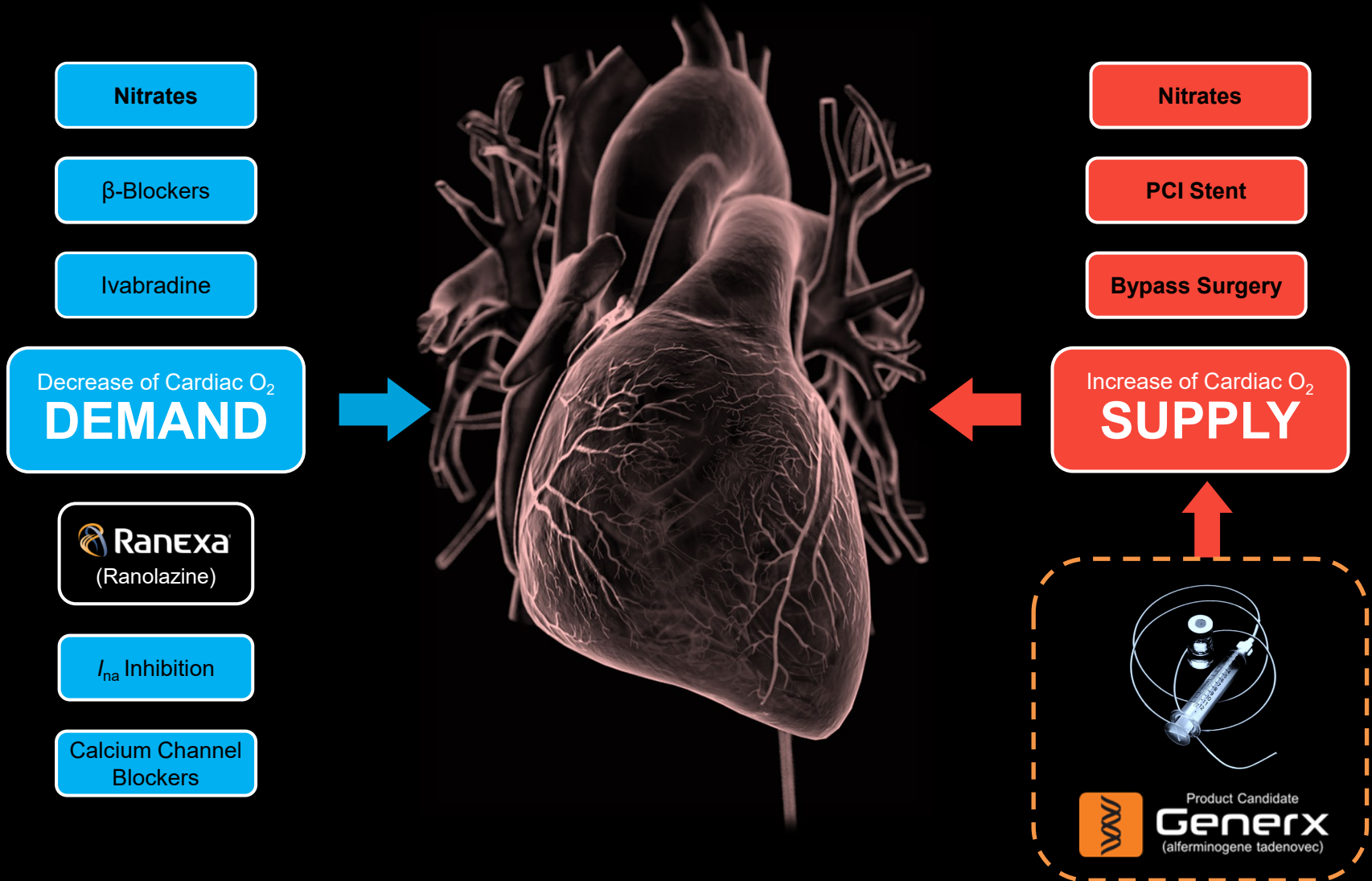
Candidate	Medical Indication	Gene Construct	Candidate Selection	IND-Enabling	Phase 1-2	Phase 3
Generx	Refractory Angina	Ad5FGF-4	[Progress bar spanning Candidate Selection, IND-Enabling, and Phase 1-2]			
Generx	Cardiac Syndrome X	Ad5FGF-4	[Progress bar spanning Candidate Selection and IND-Enabling]			
Generx	Congestive Heart Failure	Ad5FGF-4	[Progress bar spanning Candidate Selection and IND-Enabling]			
Generx-v	Moyamoya Disease	FGF-4	[Progress bar in Candidate Selection]			
Generx-v	Cerebral Ischemia	FGF-4	[Progress bar in Candidate Selection]			



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COMPARATIVE MECHANISMS OF ACTION

Myocardial Ischemia/Refractory Angina



ANGIOGENESIS: FINDING NEW WAYS TO HEAL

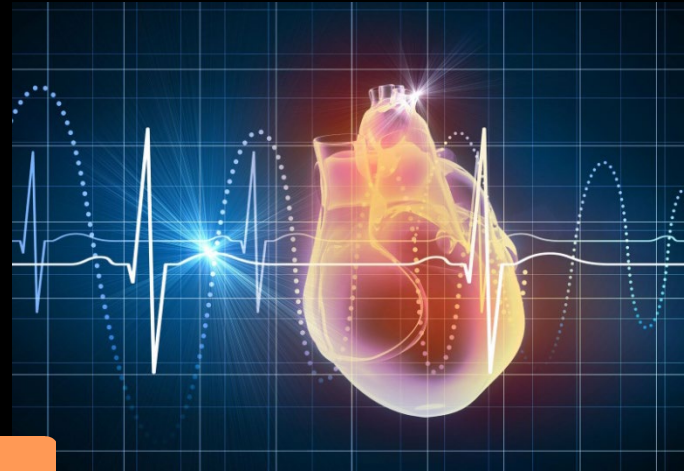


Product Candidate
Generex
(alferminogene tadenovec)

THERAPEUTIC OBJECTIVES



Enhance Physical Exertion



Improve Cardiac Perfusion



Reduce Angina and Medication Usage



Offer New Therapeutic Options

SUMMARY COMMENTARY

- Generx [Ad5FGF-4] will initially be focused on refractory angina, which represents a significant potentially unmet medical need for ~1.2 million U.S. patients with coronary artery disease, representing a potential addressable market of > \$14.0 billion (assuming \$8,000 - \$12,000 pricing range). We believe FDA approval of Generx would be high profile and garner significant worldwide attention.
 - In vitro studies identify FGF-4 as a key biologic regulatory protein that orchestrates the angiogenic growth factor (e.g. VEGF)- mediated cascade of events required for therapeutic angiogenesis.
 - Preclinical studies confirmed and optimized Generx's receptor-mediated uptake and level of transgene expression in the heart and demonstrated an angiogenic mechanism of action (echocardiography).
 - Human clinical studies confirmed Generx's angiogenic mechanism of action, demonstrated increased cardiac perfusion following a one-time treatment (SPECT imaging), and improvements in exercise treadmill testing (ETT).
- The FDA-approved Phase 3 AFFIRM study is designed statistically, based on prior Generx clinical study data, to meet or exceed ETT outcomes that formed the basis for FDA approval of Ranexa.
- Generx angiogenic therapy fits within the current standards of care (administered during a standard angiography procedure), requires no special devices or training.
- Novel anti-anginal therapies are few and far between. With FDA approval, Generx would be the first gene therapy for the treatment of “otherwise healthy cardiac patients”, that would bring the field into mainstream cardiovascular medicine – a truly historic achievement.

CLINICAL & MEDICAL ADVANCEMENT

- FDA Phase 3 protocol approved + amendments for adaptive clinical study design
- FDA Fast Track designation
- Strategic investment by Nostrum Pharmaceuticals
- Preclinical research on Ad5 transfection efficiency improved using transient ischemia delivery technology
- New data supporting safety & efficacy of higher dose level
- Fundamental research on FGF-4 signaling and angiogenic process confirms VEGF interactions
- Advanced data analytics identifying Generx responders
- New simplified cath lab handling process
- A more clearly delineated refractory angina market opportunity based on Gilead's promotion of Ranexa
- Research on limitations of mechanical revascularization supports need for “medical revascularization” Generx therapy



LICENSING AND PARTNERING



Gene Biotherapeutics' gene therapy technology is primarily based on discoveries at Bayer, Schering AG, Collateral and Cardium Therapeutics



华邦健康
HUAPONT LIFE SCIENCES

Gene Biotherapeutics is a strategic partner of Huapont Life Sciences, the sublicensee of Generx in Mainland China



Gene Biotherapeutics has partnered with FUJIFILM Diosynth Biotechnologies for cGMP manufacture of Generx [Ad5FGF-4]



Product Candidate
Generx
(alferminogene tadenovec)

GENERX: REFRACTORY ANGINA FAST TRACK DESIGNATION BY UNITED STATES FDA



“Fast track is a process designed to facilitate the development and expedite the review of drugs to treat serious conditions and fill an unmet medical need. ” - FDA



Generx has been granted
Fast Track designation



INITIAL U.S. TARGETED MEDICAL INDICATION



Product Candidate
Generex
(alferminogene tadenovec)

Refractory Angina

- 1.2 Million Refractory Angina patients in the US, and an estimated >100,000 new cases each year
- 30% of patients diagnosed with angina still have angina following implantation of a PCI stent
- At 6 and 12 months following PCI, 31% and 29% of patients respectively have abnormal stress tests
- 72% survival 9 years after initial diagnosis of Angina
- From 2001-2011, stent procedures in the United States went down ~30% and bypass surgeries went down ~50%



ADDRESSABLE MARKET

Global Summary of Refractory Angina Populations

Region	Refractory Angina (12% of Angina)	Access to Essential Medicine
USA & Canada	1.8 M	0.6 M - 1.8 M ⁽¹⁾
Europe	4.6 M	4.3 M
Central Asia	4.1 M	2.0 M
Middle East	1.5 M	1.0 M
South Asia	6.8 M	2.3 M
East Asia	4.1 M	2.9 M
Pacific	1.2 M	0.8 M
Latin America	1.3 M	0.9 M
Sub-Saharan Africa	1.0 M	0.4 M
Total	26.4 M	16.4 M

(1) Range 0.6 M – 1.8 M [mean 1.2 M]
McGillion et al. Canadian J Cardiology 28: S20-S41 (2012)

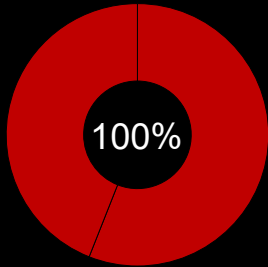


COMPETITIVE PRODUCT PRICING

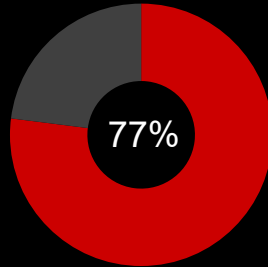
CPT Code	Medical Therapy	Reimbursement Level ⁽¹⁾
33510	Coronary Artery By-Pass Surgery for Myocardial Ischemia	\$48,000
92928	Percutaneous Coronary Interventions Up to Four (4) Stent Placements for Myocardial Ischemia	\$17,800
Pending	Generx Angiogenic Gene Therapy Medical Revascularization for Refractory Angina	Pending
N.A.	Ranexa (Ranolazine) for Treatment of Chronic Angina (Small Molecule Drug Taken Twice Daily)	\$6,000 <i>Per Year</i> <i>(pre-generic drug pricing)</i>
33799	External Counterpulsation (ECP) for Treatment Disabling Chronic Angina (35 Sessions @ \$135)	\$4,375
33140	Transmyocardial Laser Revascularization (TMLR) via Open Chest and Thoracoscopic Surgery for Severe Intractable Angina	\$3,200

(1) Does not include other related medical costs & expenses

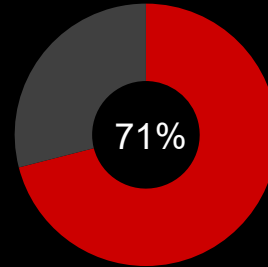
PATIENT PROFILE FOR REFRACTORY ANGINA



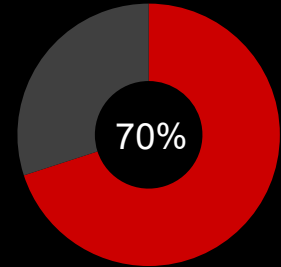
Angina



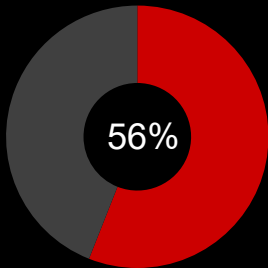
Hypertension



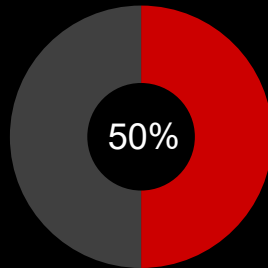
Bypass Surgery



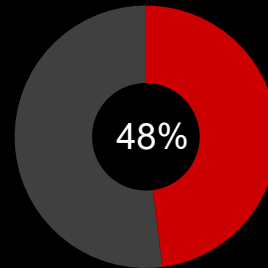
Heart Attack



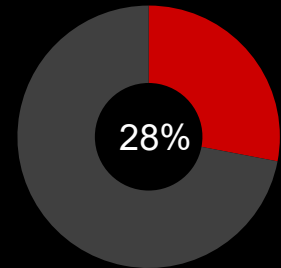
Angioplasty



Congestive Heart Failure



Three-Vessel Disease



Diabetes

AGENT CLINICAL STUDY DATABASE

STRATEGIC POSITIONING

Refractory Angina



Drug
Therapy



Medical
Revascularization



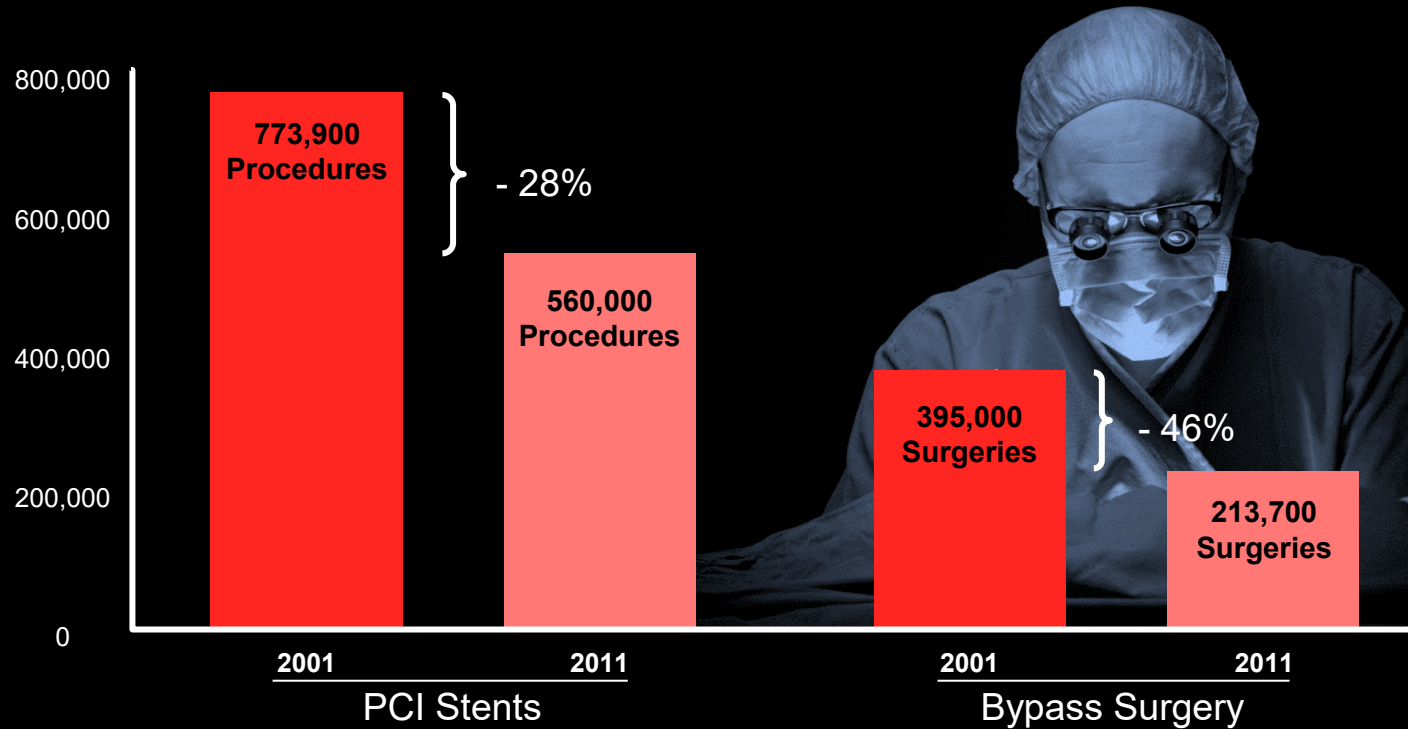
Product Candidate
GenerX
(alferminogene tadenovec)



Mechanical
Revascularization

DIRECTIONAL TRENDS IN ISCHEMIA TREATMENT

Mechanical Revascularization to Increase Cardiac O² Supply



Reasons Contributing to the Decline of PCI Stent and Bypass Surgery Use

- More cautious use of PCI stents resulting from a deeper understanding of risks and side effects
- Multiple studies have found no prophylactic benefit of bypass surgery or PCI in patients with low risk by angiography
- Fractional flow reserve diagnostics determines which vessels to stent and not stent
- Improved understanding of “refractory angina” supported by Gilead’s promotion of Ranexa®

MEDICAL REVASCULARIZATION



Single Treatment During
Standard Angiogram Procedure

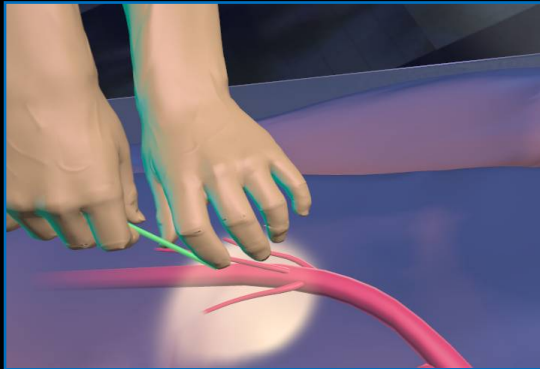
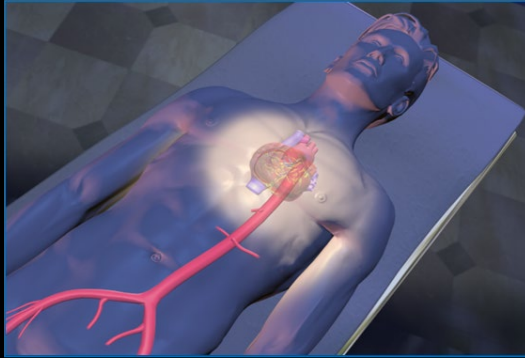


Stimulates Angiogenic
Response within 2-4 Weeks



Product Candidate
Generex
(alferminogene tadenovec)

MEDICAL REVASCULARIZATION

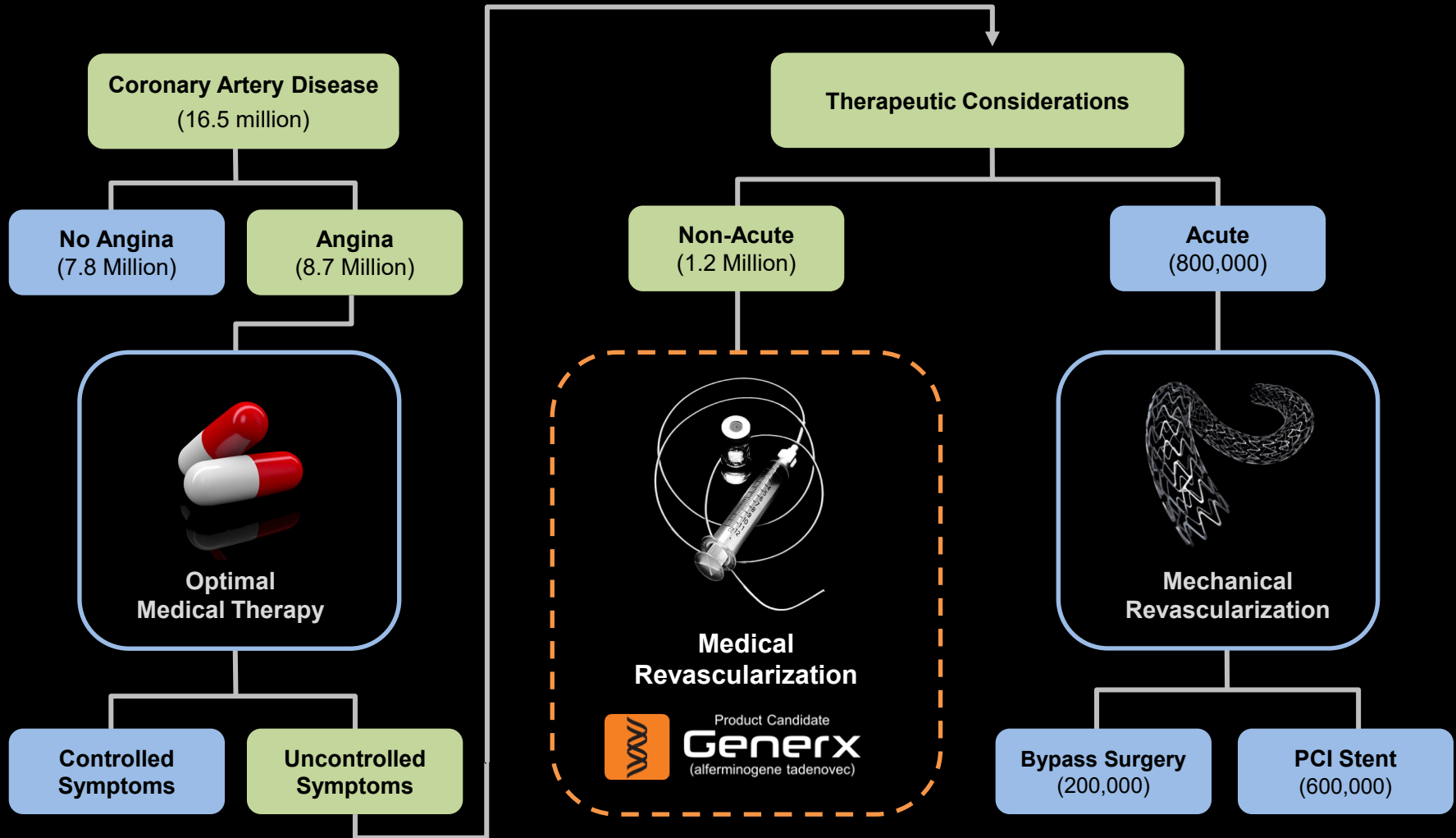


- Initial diagnosis of refractory angina by cardiologist
- One-time treatment administered by interventional cardiologist during a one-hour angiogram-like procedure on out-patient basis
- Uses standard cardiac balloon catheter to deliver Generx into the three major coronary arteries, and cardiac preconditioning to enhance cell transfection
- Therapeutic response in approximately two to four weeks following treatment
- Generx plug and play formulation. Stored at -70°C and simply thawed at room temperature immediately prior to use
- Angiogenic cardiac perfusion response in certain patients approximately equivalent to mechanical revascularization (PCI and CABG)

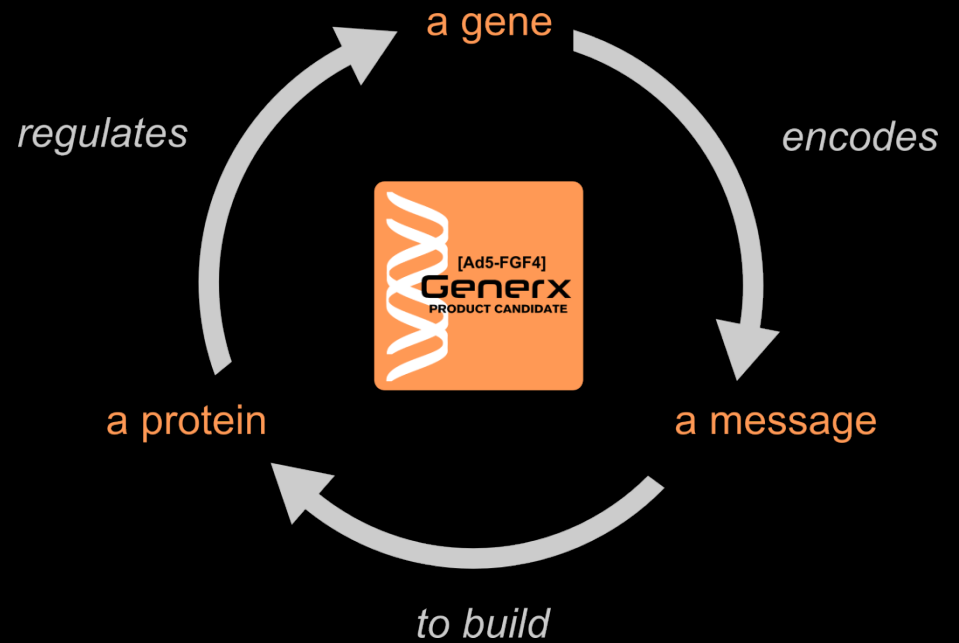
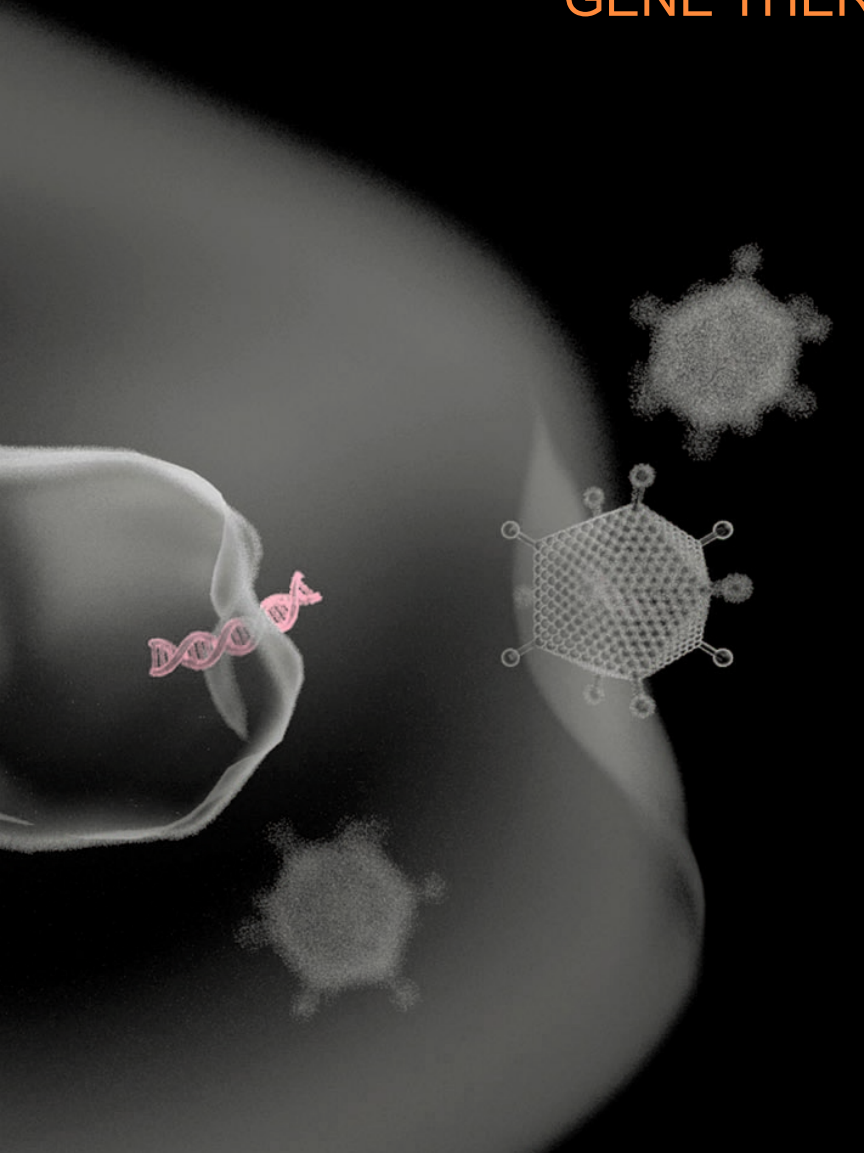


Product Candidate
Generx
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PROPOSED TREATMENT ALGORITHM



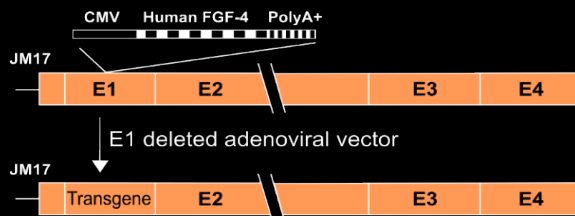
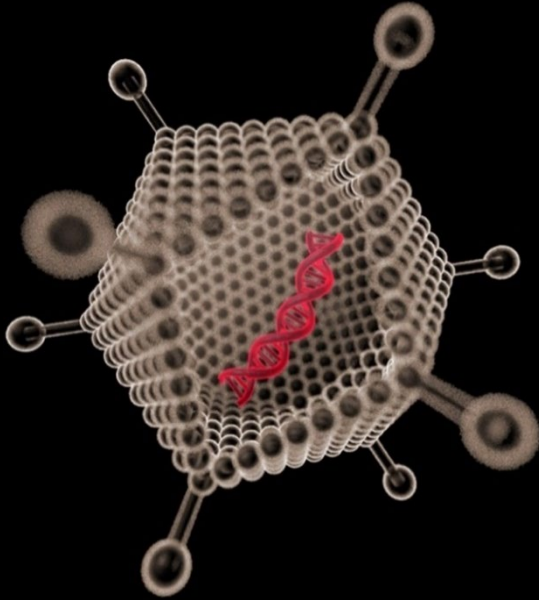
GENE THERAPY VIRAL VECTORS



Adenovirus (Ad)	Short-term, transient gene expression for regenerative healing over 2-4 weeks (i.e. myocardial ischemia).
Adeno-Associated Virus (AAV)	Long-term gene expression to address single point mutations (i.e. sickle cell anemia).

Generx[®] [Ad5FGF-4]

(*alferminogene tadenovec*)



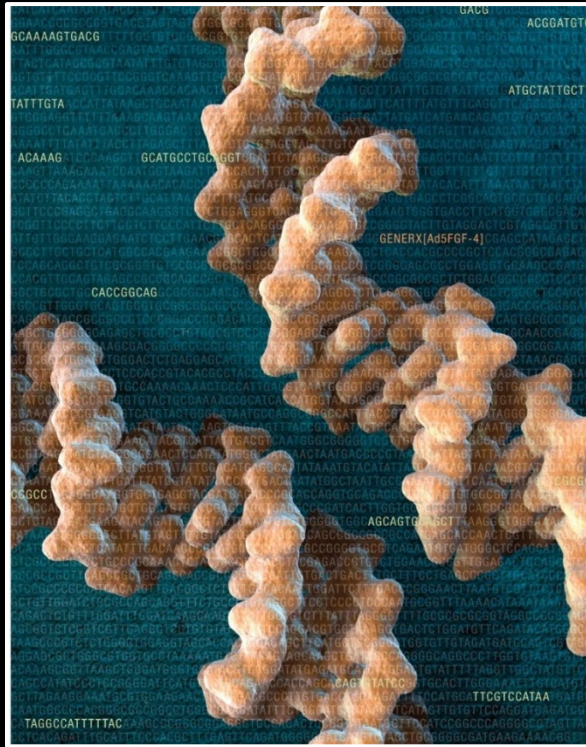
E1 region deleted replication deficient Adenovirus serotype 5 construct with an expression cassette that includes a CMV promoter and the human Fibroblast Growth Factor-4 gene

Adenovector

- Demonstrated Cardiovascular Safety Database with FDA
- FDA Approved cGMP Manufacturing Standards
- High Cardiac Transfection Levels due to New Transient Ischemia Balloon Catheter Delivery Technique
- Transient FGF-4 Protein Expression - Does Not Integrate into Host Genome
- Manufacturing in High Titer
- Easily Manipulated
- Six Year cGMP Stability Data Supports Cost-Efficient Campaign Manufacturing Strategy
- Very Favorable Manufacturing Cost

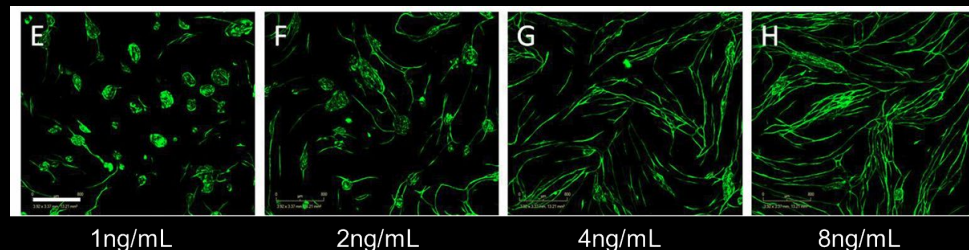


GENERX FGF-4 GENE

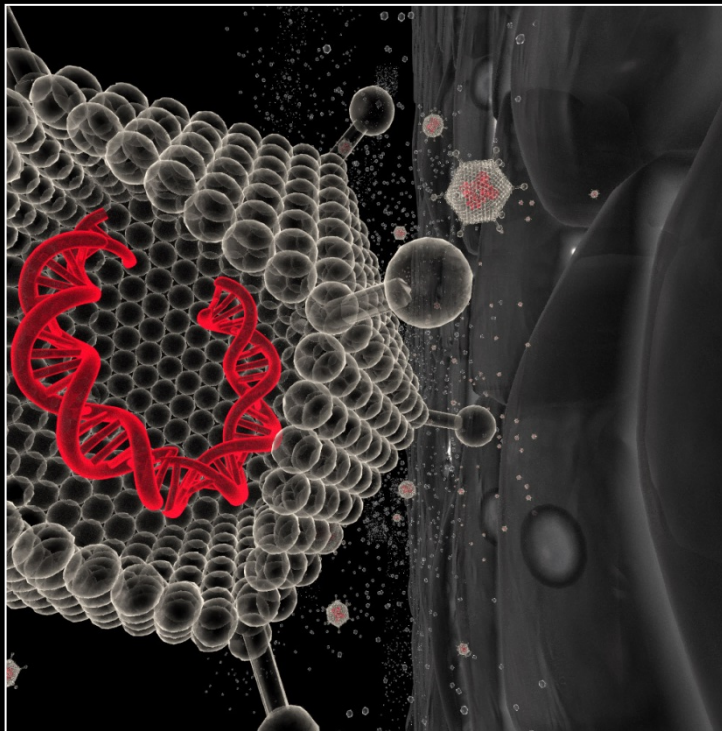


- Regulates angiogenesis & arteriogenesis
- Signal peptide – secreted FGF-4 protein
- Binds to extracellular matrix proteins
- Abundant CAR receptors found in cardiac tissue
- Upstream growth factor that can recruit and stimulate responses in downstream target cells (VEGF, PDGF & HGF)
- Appears to require ischemia induced co-factors to augment the angiogenic process

Visualization of the Angiogenic Process by Endothelial Tube Formation



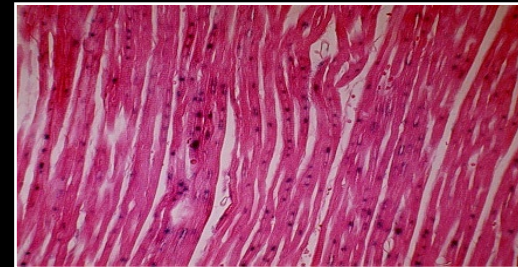
GENERX LEVERAGING CELL BIOLOGY



Bryan Christie Design

Adenovirus serotype 5 delivery vector with an FGF-4 gene construct approaching a CAR receptor within the surface area of the heart.

Receptor-Based Cell Transfection



DNA-Based Delivery

Generx [Ad5FGF-4] binds to Coxsackie-Adenovirus Receptors (CAR) that are abundant in the heart. Transient ischemia dramatically increases cell transfection. The blue dots are marker genes carried by the Ad5 vector that have transfected the cardiomyocytes that stain red. The transfection and expression of the FGF-4 gene is brief (weeks) but the blood vessel growth it stimulates persists.

CLINICAL DEVELOPMENT STUDIES

Study	Country	Phase	Status	Clinical Endpoint	Patients
AGENT-1	United States	Phase 1 / 2 Dose Finding & Safety	Refractory Class 2-3 Angina	Exercise Treadmill Time	79
AGENT-2	North America	Phase 2a Mechanism of Action Study	>9% Reversible Perfusion Defect	SPECT Imaging	52
AGENT-3	North America	Phase 2b/3	Refractory Class 2-4 Angina	Exercise Treadmill Time	416
AGENT-4	Western Europe & South America	Phase 2b/3	Refractory Class 2-4 Angina	Exercise Treadmill Time	116
AWARE & ASPIRE	U.S. & International	Beta Study	Refractory Angina	Exercise Treadmill Time & SPECT Imaging	20
NEW AFFIRM	United States	Phase 3 <i>Fast Track</i>	Refractory Angina	Exercise Treadmill Time	160
[Generx: 542 Placebo: 301]				TOTAL	843

CLINICAL EFFICACY CORRELATIONS

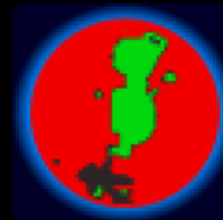
Study	Clinical FDA Regulatory Dossier Findings
AGENT-1 ETT Endpoint (N = 79)	<ul style="list-style-type: none"> - Safe and well-tolerated - Significant improvement in ETT vs. placebo when baseline ETT \leq 10 min (p=0.01 at 4 wk; p= 0.05 at 12 wk) - Treatment Response Correlates to Disease Severity
AGENT-2 SPECT Endpoint (N = 52)	<ul style="list-style-type: none"> - Safe and well-tolerated - Significant cardiac perfusion improvement at 8 wk (p<0.05 vs placebo) similar to CABG and PCI procedures (77% Response rate) - Parallel trends for improvements in angina frequency and NTG use - Data supports improved myocardial perfusion as Generx mechanism of action
AGENT-3 / AGENT-4 Meta-Analysis ETT Endpoint (N=532)	<ul style="list-style-type: none"> - Safe and well-tolerated - In females, High Dose vs Placebo: <ul style="list-style-type: none"> ETT: (pre-specified) 12 wk, p<0.01; 6 mo, p<0.01 Time to ECG Ischemia: 12 wk, p=0.03; 6 mo, p=0.01 CCS Class Improvements: <ul style="list-style-type: none"> 12 wk, p=0.01; 6 mo, p=0.04; 12 mo, p< 0.01 - In AGENT-3, males and females exhibited improvement in CCS class at 12 mo (p<0.05) - Substantial placebo response in men - Treatment Response Correlates to Disease Severity
ASPIRE SPECT Endpoint (N = 11)	<ul style="list-style-type: none"> - New transient ischemia delivery method safe and well-tolerated (86% Response Rate) - Significant cardiac perfusion improvement at 8 wk (p=0.01 vs placebo) similar to AGENT-2 and CABG/PCI

ANGIOGENIC MECHANISM OF ACTION

Cardiac SPECT Imaging

● Perfusion

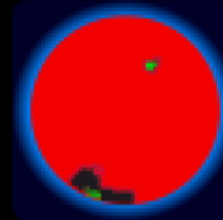
● Reversible Perfusion Defect



Before Treatment



4 Weeks Post-Generx Treatment



8 weeks Post-Generx Treatment



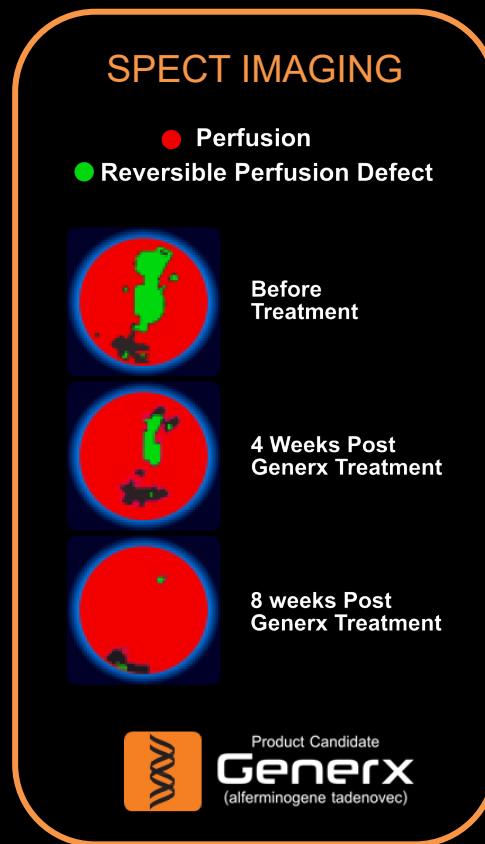
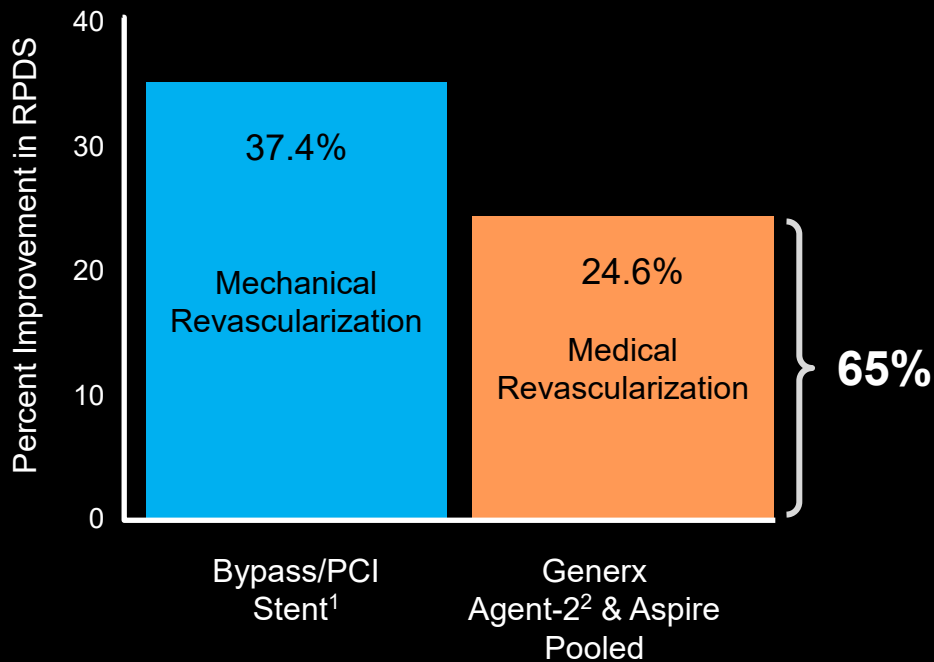
Clinical Study	Number of Patients	Clinical Response	Patient Responders	P-Value
AGENT-2 (3x10 ⁹ vp)	52	+21%	77%	<0.05
ASPIRE (6x10 ⁹ vp)	11	+24%	86%	0.01

COMPARISON OF GENERX TO BYPASS OR PCI STENT

Myocardial Perfusion

SPECT IMAGING

Reversible Perfusion Defect at 8 Weeks



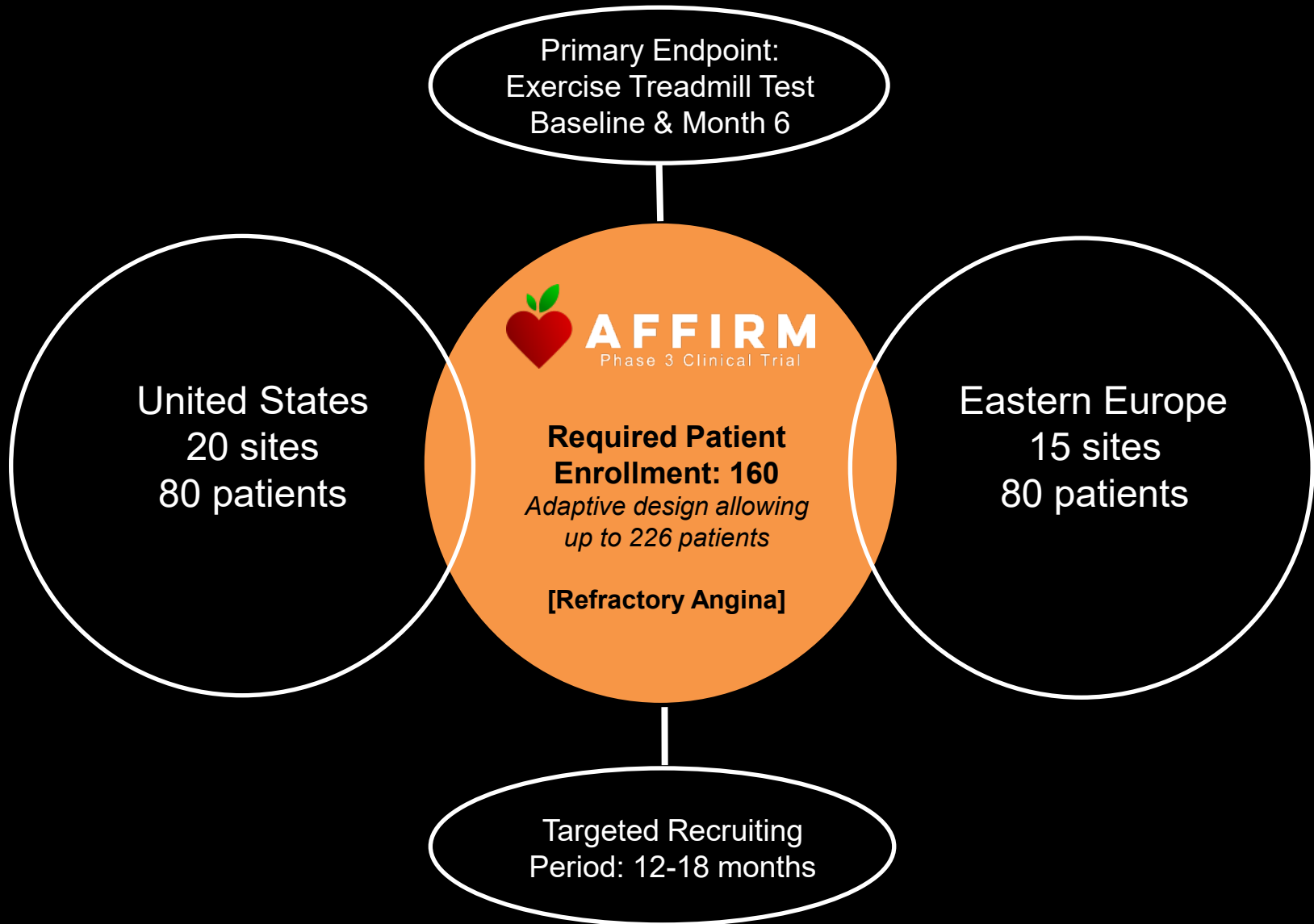
¹ Berman et al. J Nucl. Cardiol 8:428-37 (2001)

² Grines et al., J Am Coll Cardiol. 2003; 42:1339-47

AFFIRM PHASE 3 CLINICAL STUDY



AFFIRM PHASE 3 CLINICAL STUDY & PATIENT RECRUITMENT



PHASE 3 CLINICAL STUDY



RESEARCH TO FIND THE HEALING
POWER WITHIN YOUR HEART



AFFIRM

A NEW PLANNED CLINICAL STUDY FOR
PATIENTS WITH REFRACTORY ANGINA

www.MyRefractoryAngina.com



PHASE 3 CLINICAL STUDY: Ad5FGF-4 ANGIOGENIC GENE THERAPY FOR REFRACTORY ANGINA (AFFIRM)



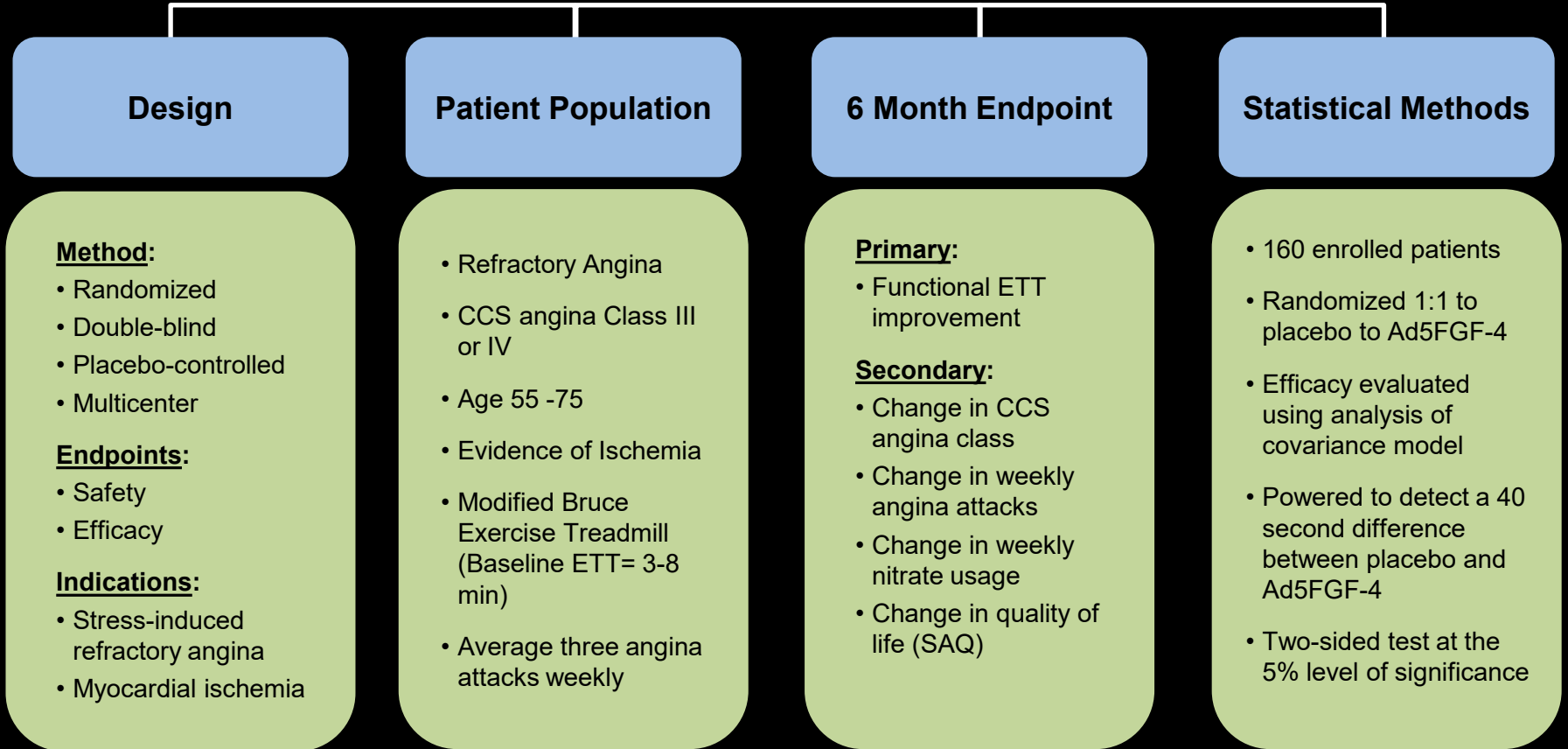
Target Indication: Refractory Angina

- Patients who have a diagnosis of stress-induced myocardial ischemia and angina who are no longer responsive to optimal anti-anginal medical therapy, and who are not candidates for, or continue to experience angina after, mechanical revascularization
- Estimated 1.2 million patients in the U.S.; \$4.0 billion addressable market opportunity
- Prior clinical studies under FDA IND identified increased myocardial perfusion as mechanism of action and identified characteristics of patient responders. FDA dossier includes >2,500 patient years of safety data

Phase 3 AFFIRM Protocol:

- Subject selection, inclusion criteria and endpoints based on responder data from prior studies. Protocol employs optimized delivery method and higher Ad5FGF-4 dose.
- Primary endpoint: Change in angina-limited exercise duration at 6 months. Secondary endpoints: Angina frequency, nitrate usage, angina classification, quality of life

PHASE 3 CLINICAL STUDY



CANADIAN CARDIOVASCULAR SOCIETY (CCS) ANGINA CLASSIFICATION

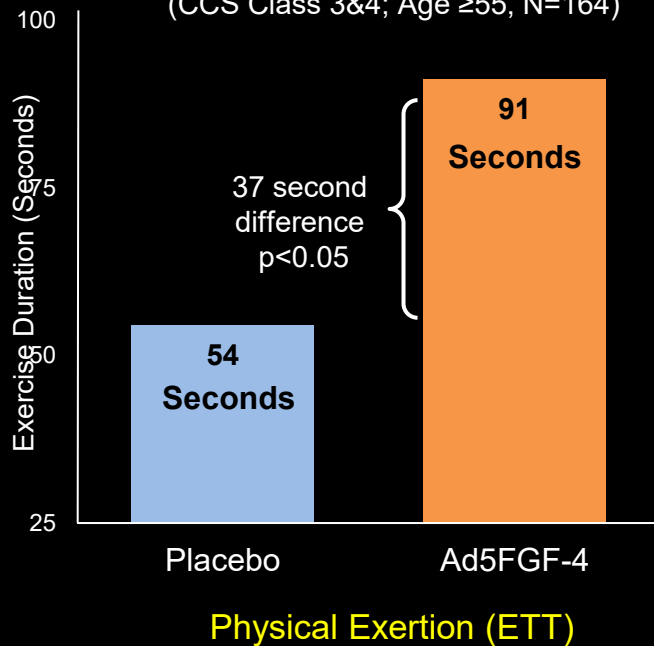
CCS Class	Description
I	Ordinary physical activity does not cause angina, such as walking and climbing stairs. Angina with strenuous or rapid or prolonged exertion at work or recreation.
II	Slight limitation of ordinary activity. Angina occurs during walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, or in cold, or in wind, or under emotional stress, or only during the few hours after awakening. Walking more than two blocks on the level and climbing more than one flight of ordinary stairs at a normal pace and in normal conditions cause angina.
III AFFIRM	Marked limitation of ordinary physical activity. Walking one or two blocks on the level and climbing one flight of stairs in normal conditions and at normal pace cause angina
IV AFFIRM	Inability to carry on ordinary physical activity without discomfort, anginal syndrome may be present at rest

AFFIRM PHASE 3 PRIMARY EFFICACY ENDPOINT

AGENT-3 Clinical Study
Retrospective Analysis¹

Primary Endpoint:

Change from Baseline at Month 6
(CCS Class 3&4; Age ≥55, N=164)



Phase 3 Clinical Design

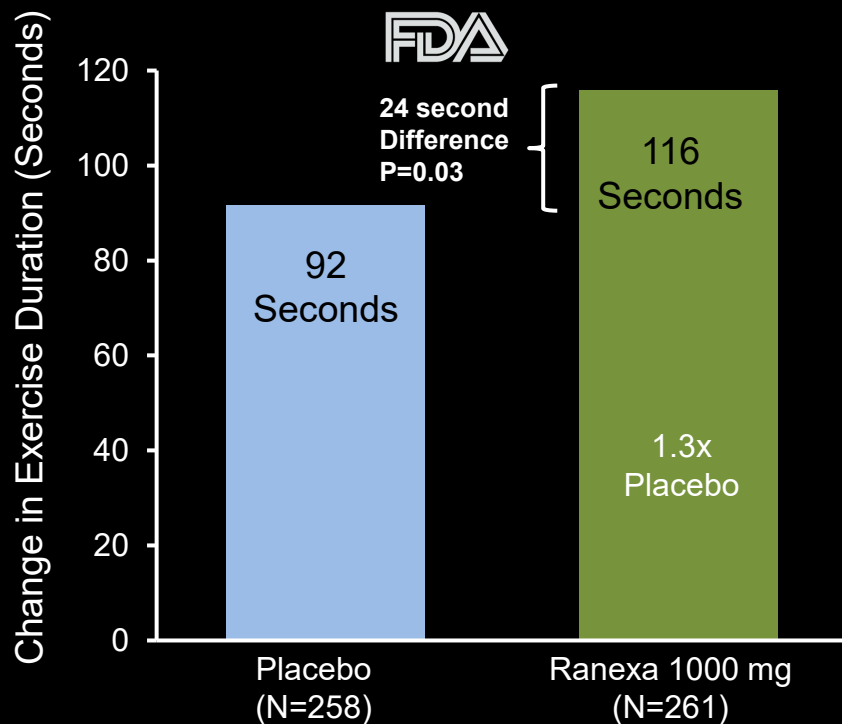
The FDA IND Phase 3 AFFIRM study will include only CCS Classes 3 & 4 and ages 55-75, uses a sample size of 160 patients, and is expected to be powered to detect a difference of 40 seconds between Generx and Placebo in the change from baseline to Month 6.



COMPARATIVE ETT OUTCOMES

Ranexa CARISA Clinical Study

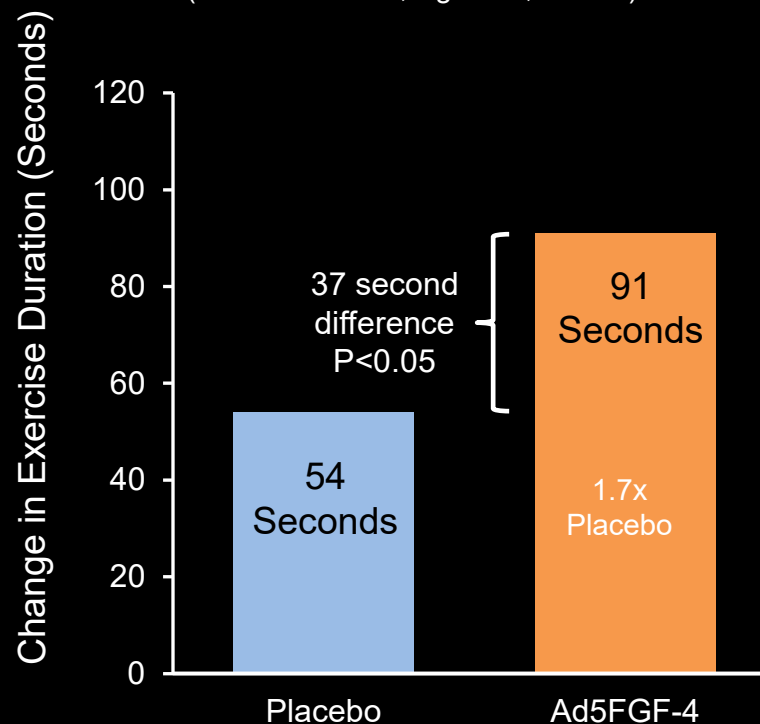
Primary Endpoint:
Change from Baseline at Week 12





Ref: Chaitman et al. Jama 2004; 291:
309-316 (CARISA)

AGENT-3 Clinical Study Retrospective Analysis

Primary Endpoint:
Change from Baseline at Month 6
(CCS Class 3&4; Age ≥55, N=164)



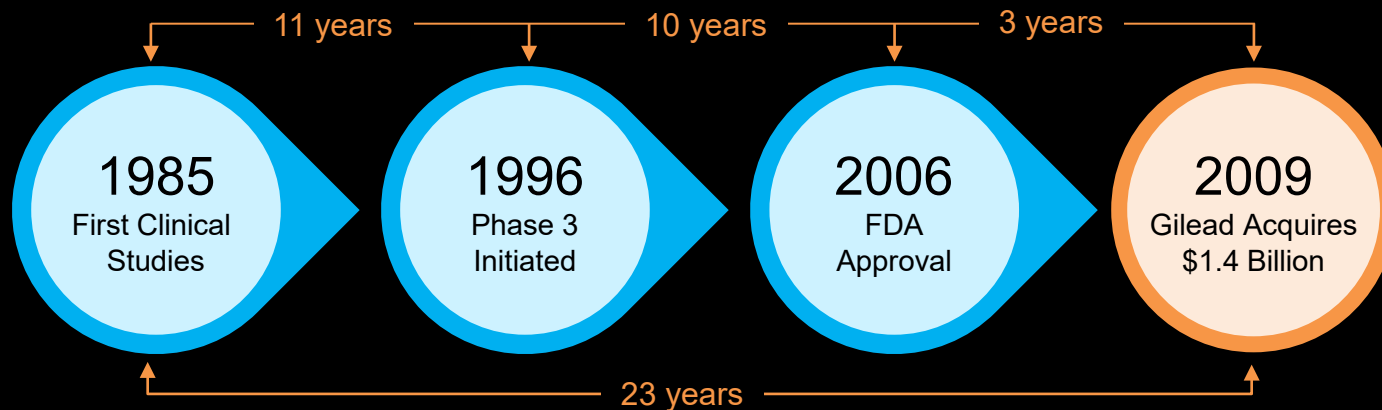
CARDIAC PRODUCT PREDICATE

FACTOR		
Commercial Status	FDA-Cleared Phase 3	FDA Approval: 2007
Medical Indication	Refractory Angina	Refractory Angina
Class of Therapy	Gene Therapy	Small Molecule
Mechanism of Action	Angiogenesis & Arteriogenesis	Metabolic Modulation
Modality	Regenerative Medicine: Increases Cardiac Blood <u>Supply</u>	Symptom Relief: Reduces Cardiac Oxygen <u>Demand</u>
Comparable Therapies	Percutaneous Coronary Intervention (Stents) Coronary Artery Bypass Surgery	Beta Blockers Calcium Channel Blockers
Treatment Regimen	One-Time Delivery via Cardiac Catheter	Twice Daily Oral Tablet
Developer / Marketing & Sales	Gene Biotherapeutics Inc.	Gilead Sciences
Annual Revenues (Patients / Penetration)	Pending Phase 3 Clinical Study and BLA	\$680 Million (200,000 patients / 11.1%)

GENERX COMPARATIVE VALUATION METRIC

COMPETITOR CASE STUDY: GILEAD'S RANEXA^{®1}

- 1985 Syntex Corporation discovers Ranexa and initiates Phase 1 & 2 clinical studies
- 1994 Roche acquires Syntex and discontinues the clinical development of Ranexa
- 1996 CV Therapeutics acquires Ranexa and begins Phase 3, encounters setbacks from efficacy and safety issues, and refocuses development from classic to “chronic” angina
- 2006 Ranexa approved by FDA as second-line therapy for chronic angina
- 2009 CV Therapeutics is acquired by Gilead Sciences for \$1.4 billion (14x annualized sales)
- 2017 After Phase 4, FDA approved Ranexa for front-line therapy, annualized revenues reach ~\$600 million in U.S. (\$3,000 per year [100x generic beta blocker price] @ 200,000 patients)

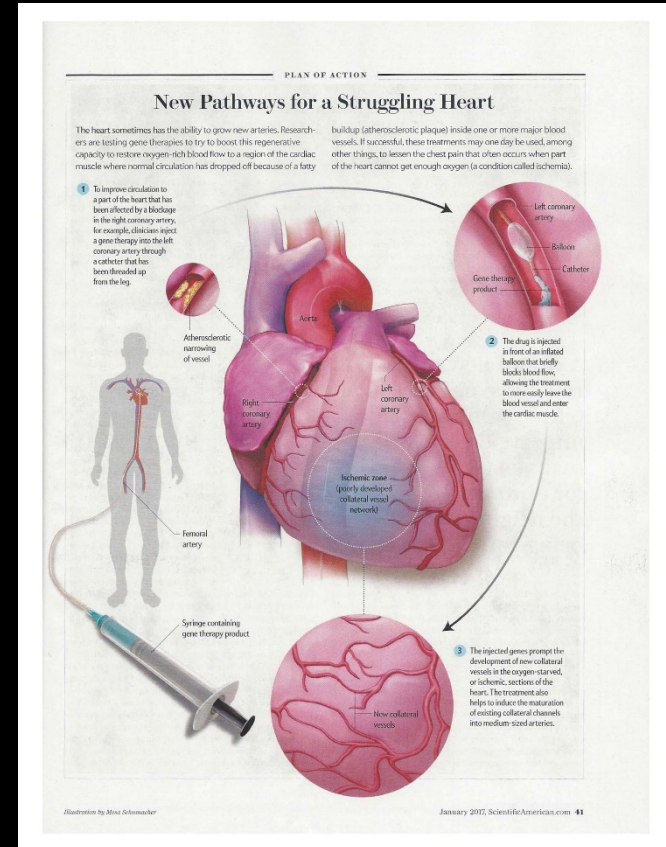


Generx Development Cycle Parallels Ranexa

GENERX [Ad5FGF-4] KEY ACCOMPLISHMENTS

- ✓ Excellent long-term safety data [$>2,500$ patient years]
- ✓ Mechanism of action identified [increased cardiac perfusion]
- ✓ Single clinical dose selected [6×10^9 vp]
- ✓ cGMP manufacturing and testing processes approved by FDA
- ✓ New method using balloon catheter delivery to induce transient ischemia appears safe and supports preclinical findings of increased transfection efficiency
- ✓ Refined characterization of patient responders based on retrospective Generx data analyses [700 patients & 3,000 ETTs]
- ✓ Efficacy response comparable to FDA-approved anti-anginal (Ranexa[®])
- ✓ Favorable gross profit opportunity based on current pricing model
- ✓ Product design offers high potential for integration into the interventional cardiology practice of medicine
- Definitive Phase 3 efficacy, based on ITT patient population, comparable to FDA-approved Ranexa [Benchmark $\Delta + 24$ sec. ETT], and enabling Biologics License Application

PRESS COVERAGE



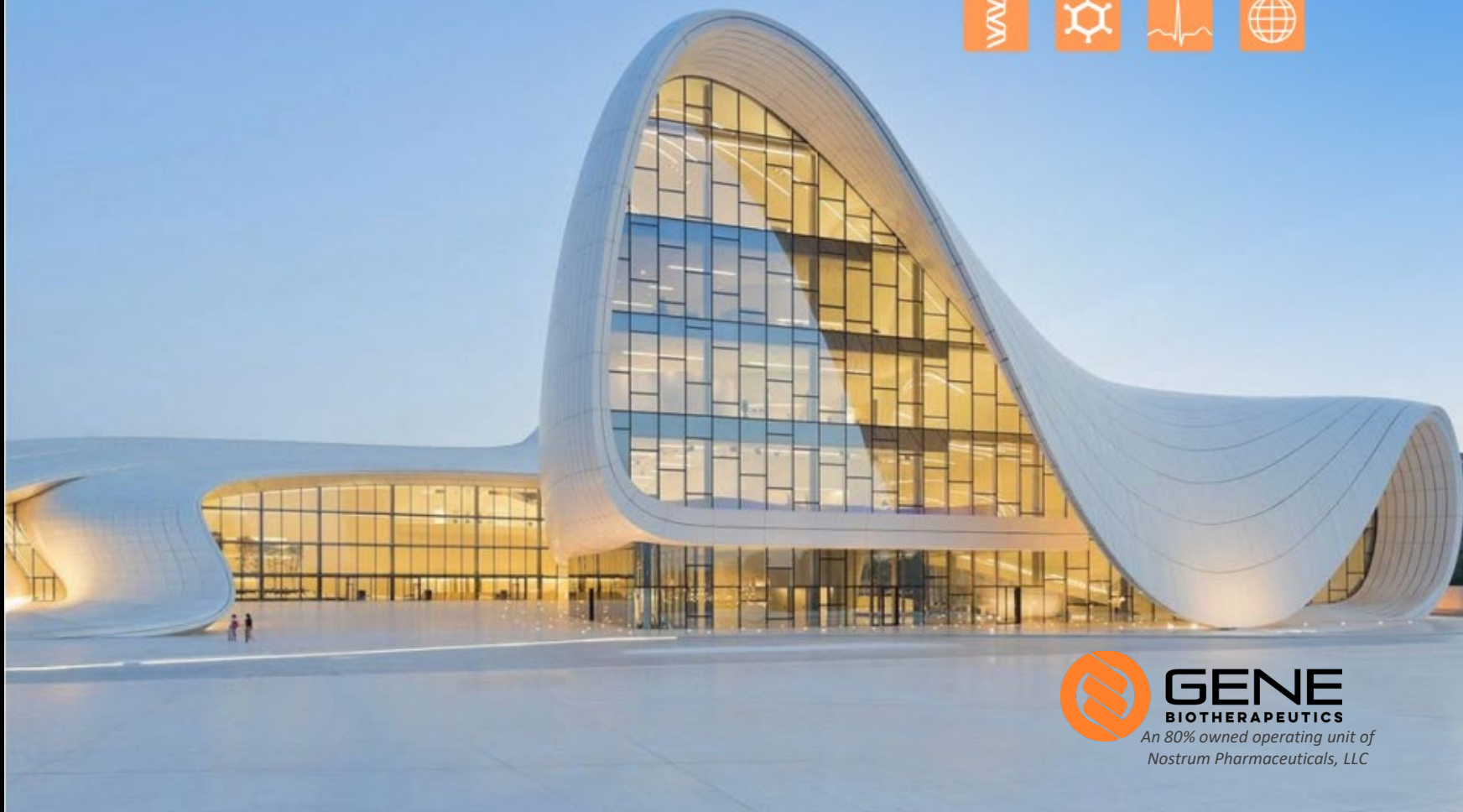
SCIENTIFIC AMERICAN

INVESTMENT THESIS

- **Global Leader in Angiogenic Gene Therapy.** With clinical success, Generx will be the first cardiovascular gene-base therapeutic in the world for a large addressable population.
- **Current Management Team.** Responsible for leading Generx from pre-clinical discovery at the University of California to FDA-cleared Phase 3 clinical study. The team has a century of collective experience in fields of gene therapy, cardiovascular, biologics, and commercial development.
- **Novel Mechanism of Action.** Generx provides new, innovative, angiogenic “medical revascularization” for a large population of well characterized CAD patients likely to respond and benefit
- **Late-Stage Clinical Development.** Four completed clinical studies under FDA IND provided the basis for the Phase 3, fast track, AFFIRM study. Globally, over 650 patients were enrolled, 455 patients treated with Generx, at over 100 medical centers with over 2,500 patient years of safety data
- **Barriers to Entry.** Know-how and trade secrets, plus 12 years of market exclusivity in the U.S under the Patent Protection and Affordable Care Act of 2010. \$250 million technology & capital investment
- **Cost-Effective Manufacture.** Fully-validated cGMP manufacturing process, and product stability enabling cost-effective batch manufacturing. Projected direct manufacturing gross margins > 85%
- **Fits within Current Medical Practice.** Generx is a ready-to-use, one-time treatment, administered by interventional cardiologists during an angiogram-like procedure.
- **Significant Market Opportunity.** Billion dollar addressable market with a significant, clearly defined unmet medical need

Developing New Therapeutics for a Global Market

PRODUCT CANDIDATE
Generx
[Ad5FGF-4]



 **GENE**
BIOTHERAPEUTICS
An 80% owned operating unit of
Nostrum Pharmaceuticals, LLC