In the U.S., between 2010 and 2030 there will be a ~80% increase in the number of people age 65 or over.

This segment of the population will increase from 40 million to more than 72 million individuals.

The challenge is just as great, or even greater in Europe and Asia.
As we age, we spend more on healthcare due to the increased incidence of certain diseases.

Average Annual U.S. Per Capita Healthcare Expenditures by Age

Key drivers in cost increases:

- Increased incidence, impact of chronic disease
  - Heart disease, cancer, stroke, pulmonary disease, diabetes, osteoporosis
- Significant burden associated with seriously ill
  - 1% of most seriously ill account for >25% total healthcare expenditures
- From 2006-2030, it is estimated that:
  - People in the age range 65-74 years will increase from 6% to 10% of the total population
  - People 75+ will increase from 6% to 9% of the total population and continue to grow to 12% by 2050

The Aggregate Economic Impact of an Aging Population

+ If costs per capita remain constant over the next 20 years (i.e. NO INFLATION) the increase in aggregate healthcare costs will still be substantial.

Source: www.census.gov
+ RM treatments have the potential to dramatically shift the cost curve for conditions that are more prevalent in an aging population.

Major Areas of Need / Opportunity:

- **Cardiovascular Disease** ➔ Myocardial Infarction, Congestive Heart Failure, Vascular Disease / Critical Limb Ischemia
- **Hematopoietic Conditions** ➔ Oncology/GVHD, Inherited Genetic Deficiencies
- **Inflammatory & Immune Disease** ➔ Diabetes, IBD, RA, Lupus & others
- **Neurological Injury & Disease** ➔ Stroke, TBI, Parkinson’s, Multiple Sclerosis, Cerebral Palsy, Orphan Neurological Conditions, Spinal Cord Injury
- **Ocular Disease** ➔ Age-related Macular, Stargardt’s Macular Dystrophy, Retinitis Pigmentosum, Glaucoma, Corneal Transplants
- **Orthopedic Conditions** ➔ Trauma, Age-related Degeneration
- **Pulmonary Disease** ➔ COPD, ARDS
- **Renal Disease**
RegenMed and Key Therapeutic Areas: Statistics

The potential savings from regenerative medicine treatments for the United States in terms of reducing the direct costs associated with chronic diseases have been estimated at approximately $250 billion a year.*

Cardiovascular Disease
• 100 million U.S. people afflicted
• $316 billion – U.S. aggregate direct costs

Diabetes
• 25 million U.S. people afflicted
• $175 billion – U.S. aggregate direct costs

Stroke
• 795 thousand U.S. people afflicted each year
• $73 billion – U.S. aggregate direct costs

Alzheimer’s
• 35.6 million U.S. people living with the disease
• $200 billion – U.S. aggregate direct costs

Age-related Macular Degeneration
• 1.8 million U.S. people afflicted
• $255 billion – global direct costs

Parkinson’s Disease
• 1 million + U.S. people afflicted
• $23 billion – U.S. aggregate direct costs

Spinal Cord Injury
• 275 million U.S. people afflicted
• $40.5 billion – U.S. aggregate direct costs

Peripheral Arterial Disease (PAD)
• 10 million U.S. people afflicted
• $4.4 billion – U.S. aggregate direct costs

Source: ARM Annual Report
Regenerative Medicine (RM) is a revolutionarily field focused on development and application of cell-based therapies & related technologies to enhance the natural healing process, and/or replace or regenerate organs and tissues. RM is focused on addressing the underlying clinical problem, and doing it cost effectively – not just providing palliative care.

- **Cell Therapy** — Using cells therapeutically to repair function to bodily tissue or organs. The two dominant forms of cell therapy are autologous (using one’s own cells) and allogeneic (donated cells).
- **Tissue Engineering** — Creating new organs, and tissues to replace or repair existing organ function.
- **Medical Devices** — Using cell-based products for medical purposes in patients, in diagnosis, therapy or surgery.
- **Drug Discovery** — Using bioassays created from different cell sources to create highly accurate drug discovery platform models for understanding disease states, and for testing of traditional pharma compounds.
- **Small Molecules and Biologics** — Using RM technologies along with conventional drug discovery techniques to develop new small molecule and biologic drugs that can selectively modulate the body’s own naturally occurring stem cells for therapeutic purposes.
Regenerative Medicine (RM) is a revolutionary field focused on translating fundamental knowledge in biology, chemistry and physics into materials, devices, systems and a variety of therapeutic strategies which augment, repair, replace or regenerate organs and tissues.
The Regenerative Medicine (RM) industry comprises service and manufacturing companies, tools and non-therapeutic products, cell and tissue based therapies, regenerative compounds and devices and biopharmaceuticals.

- Services & Manufacturing: 9%
- Tools & Non-Therapeutic Products: 48%
- Regenerative Medicines: 43%
- Cell and Tissue-Based Therapies: 65%
- Regenerative Compounds & Devices: 25%
- Biopharmaceuticals: 10%

Source: ARM Annual Report
A Global Look at the Cell and Tissue Based Therapeutic Sector

- Arguably the most prominent segment of the regenerative medicine industry, this sector includes more than 250 companies developing therapies for almost every imaginable disease or condition.

- There are approximately 300 cell and tissue-based therapeutics commercially available or in clinical development in countries with formal regulatory framework, 55 of which are described and marketed as regenerative medicine products.

- Research conducted by the Alliance valued the top 15 regenerative medicine products, based on revenue generation, to total the following amounts beginning in 2010:
  - $460 million – 2010 (estimated)
  - $730 million – 2011 (estimated)
  - $900 million – 2012 (projected)

- All but one of these 15 products is for skin, wound, bone or cartilage repair, with the exception of Dendreon’s Provenge, approved by the FDA in 2010 for late-stage prostate cancer. The first of these products was brought to market in 1998 and collectively these products have treated over 500,000 patients through the end of 2011.
A Global Look at the Cell and Tissue Based Therapeutic Sector – Industry Snapshot

Cell and Tissue-Based Segment

25%: Percentage of cell and tissue companies which are publicly traded.

Companies and Trials by Location

- Location of Company Headquarters: 25%
- Ongoing Clinical Trials Located Solely in this Region: 20%
- United States: 65%
- Other Countries: 15%
- Europe: 20%

Therapies Being Sold or Tested

- Musculo-Skeletal (Orthopedic): 20%
- Skin/Soft Tissue: 8%
- Diabetes: 10%
- Cardiac: 10%
- Wound/Non-Cardiac Ischemic: 10%
- Oncology: 20%
- Ocular: 2%

Source: ARM Annual Report
Multiple Products Already on the Market

An estimated 500,000 patients have been treated with FDA approved cell therapy products.
A Global Look at the Cell and Tissue Based Therapeutic Sector – Clinical Trial Overview

Products Commercially Available

Clinical Trial Overview

Currently in Early-to-Mid Stage Trials
[Phase I, I/II, II]

Currently in Late Stage Trials
[Phase II/III, III, pivotal]

Source: ARM Annual Report
Major Companies with Regenerative Medicine Programs and/or Partnerships

Johnson & Johnson  Pfizer  Roche
Shire  gsk  genzyme
GlaxoSmithKline  Astellas  GE Healthcare
Baxter  TEVA  Celgene
Companies with Programs in Early- to Mid-Stage Clinical Development
Companies with Programs in Mid- to Late-Stage Clinical Development
Contract Manufacturers, Service Providers and Tools
Companies Investing Heavily in RegenMed
Leading Research Institutions and Translational Centers Focused on Regenerative Medicine
Patient Advocacy Organizations and Foundations

- ALS Association
- ACRO (Association of Clinical Research Organizations)
- Friends of Cancer Research
- GPI (Genetics Policy Institute)
- JDRF (Juvenile Diabetes Research Foundation)
- MissouriCures
- Nebraska Coalition for Lifesaving Cures
- u2fp
- Parkinson's Action Network
- Regenerative Medicine Foundation
- TexasCures Education Foundation
- Alliance Regenerative Medicine
Current Alliance Members

There are currently over 125 member organizations, reflecting over 400% growth since 2009.

**COMPANIES**
- Aastrom Biosciences, Inc.
- Aderans Research Institute
- Advanced Cell & Gene Therapy
- Advanced Cell Technology, Inc.
- Akron Biotechnology, LLC
- Aldagen/Cytomedix
- AlloCure
- AlloSource
- American CryoStem
- Amoryte
- Aposcience AG
- Athersys, Inc.
- AxoGen, Inc.
- Avita Medical
- Baxter
- Beckman Coulter, Inc.
- Becton Dickinson and Company
- Bell BioSystems
- BioLife Solutions, Inc.
- BioSpherix
- Capricor
- Celgene Corporation
- Cell Line Genetics, Inc.
- Cell Therapy Group
- Cellerant Therapeutics, Inc.
- CellGenix
- Cellular Dynamics International
- Cellular Technology Limited
- Celsense Inc.
- Circle Biologics
- Cytori Therapeutics Inc.
- DiscGenics
- EMD Millipore Corporation
- Eqalix
- Fate Therapeutics
- Fibralign
- Fisher BioServices
- GE Healthcare
- Genzyme Corporation, a Sanofi Co.
- Harvard Bioscience, Inc.
- Healthpoint Biotherapeutics
- HemoGenix
- Histogenics
- Humacyte, Inc.
- Intercytx
- Invotech Pty. Ltd.
- InVivo Therapeutics
- iPierian Inc.
- ISTO Technologies
- Johnson & Johnson
- Juventas Therapeutics
- Life Technologies Corporation
- Lonza Group Ltd.
- MaxCyte
- Medistem Inc.
- Medpace, Inc.
- Mesoblast
- MiMedx
- Nanofiber Solutions
- NeoStem, Inc.
- Organogenesis Inc.
- Organovo, Inc.
- Owl Biomedical
- Pathfinder Cell Therapy, Inc.
- PCT
- Pfizer Inc.
- Pharmacell
- Pluristem Therapeutics
- Q Therapeutics
- Regen BioPharma
- ReNeuron Group plc
- RhinoCyte, Inc.
- Roche
- RxGen
- Sangamo BioSciences, Inc.
- Shire Regenerative Medicine
- SironRX
- Sistemec Scotland Limited
- Stem Cell Media, LLC
- StemBioSys, LLC
- StemCells, Inc.
- TAP Biosystems
- Tarix Pharmaceuticals LTD
- Tengion
- Terumo BCT, Inc.
- TiGenix
- Tissue Genesis, Inc.
- UroTiss
- ViaCyte

**FOUNDATIONS/ASSOCIATIONS**
- ACR
- Alpha-1 Foundation
- ALS Association
- Californians for Cures
- Cell Society
- Friends of Cancer Research
- Genetics Policy Institute
- Human Organ Project
- JDRF
- Missouri Cures
- Nebraska Coalition for Lifesaving Cures
- New York Stem Cell Foundation
- Parkinson’s Action Network
- Regenerative Medicine Foundation
- South Texas Blood and Tissue Center
- Student Society for Stem Cell Research
- Texas Cures Education Foundation
- Unite 2 Fight Paralysis

**INVESTORS**
- Asset Management Company
- Kentucky Seed Capital Fund
- Novitas Capital
- Tekesta Capital Partners
- Triathlon Medical Ventures

**RESEARCH INSTITUTIONS**
- California Institute For Regenerative Medicine
- Cleveland Clinic
- Centre for Commercialization and Regen Med
- Johns Hopkins Translational Tissue Engineering
- Northwestern, Comprehensive Transplant Center
- Neural Stem Cell Institute
- Pittsburgh Tissue Engineering Initiative
- Sanford Burnham Medical Research Institute
- Texas Heart Institute
- UC-London, Centre for Stem Cells & RM
- U.Louisville, Cardiovascular Innovation Institute
- Wake Forest Institute for Regenerative Medicine
The Big Picture – View From the Front Lines

2013 Regenerative Medicine
State of the Industry Briefing Panelists

- Susan Solomon, CEO, New York Stem Cell Foundation
- Jeff Jonas, President, Shire Regenerative Medicine
- Matthias Steger, Global Head Research & Technology Partnering, Roche Ltd.
- Robert Palay, CEO, Cellular Dynamics International
- Robert Shaw, Commercial Director - Stem Cell Initiative, EMD Millipore
- Chris Calhoun, CEO, Cytori Therapeutics
- Karin Hehenberger, EVP and CMO, Coronado Biosciences
- Mark Frohlich, EVP Research & Development and CMO, Dendreon
- Gil Van Bokkelen, Chairman & CEO, Athersys, Inc.
2013 Regenerative Medicine
State of the Industry Briefing

January 8, 2013
Geoff MacKay, Chairman, ARM