# Real Life™

**Jonathan Thomas, PhD**
Interim President
ICOC Presentation
January 25, 2024

CIRM
CALIFORNIA'S STEM CELL AGENCY

Alliance for Regenerative Medicine

# 2024 State of the Industry Briefing

## Achieving a new normal

Tim Hunt, CEO, Alliance for Regenerative Medicine
January 8, 2024 | Biotech Showcase

CELL GENE

STATE *of the* INDUSTRY BRIEFING

# Today's agenda

## Industry Update

**Tim Hunt**, CEO, Alliance for Regenerative Medicine

## Expediting the Development of Cell and Gene Therapy

**Peter Marks**, M.D., Ph.D., Director, Center for Biologics Evaluation and Research, FDA

## A Seminal Moment Arrives for Gene Therapy and Sickle Cell Disease – What's Next?

**Gbola Amusa, M.D., CFA,** Partner, Chief Scientific Officer, Chardan *(Moderator)*

**Samarth Kulkarni, Ph.D.,** Chairman and CEO, CRISPR Therapeutics

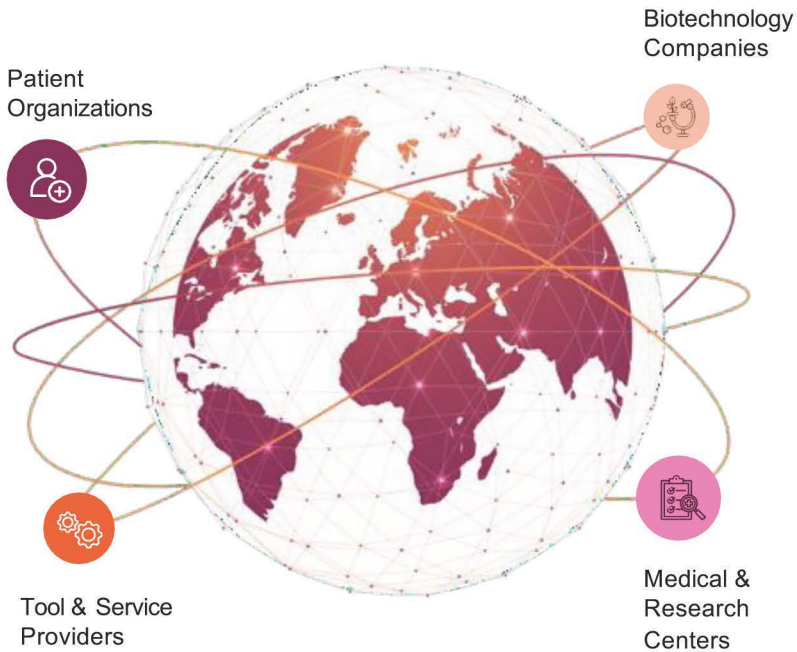
**Andrew Obenshain,** CEO, bluebird bio

# ARM is the Global Voice of the Cell & Gene Therapy Sector

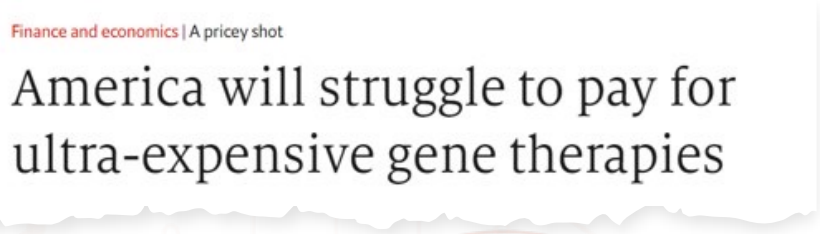
A non-profit advocacy organization representing 400+ members worldwide

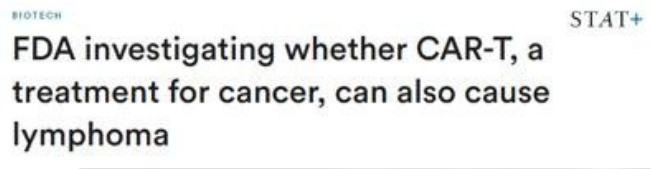
## OUR FOCUS

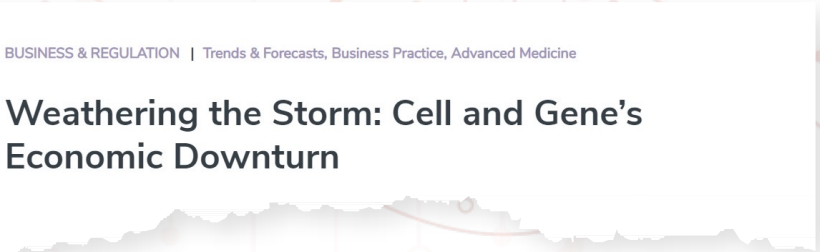
- Convening the sector
- Advancing the field through data and analysis
- Engaging key stakeholders
- Enabling the development of advanced therapies
- Modernizing healthcare systems

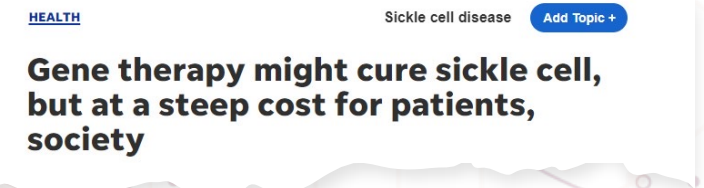


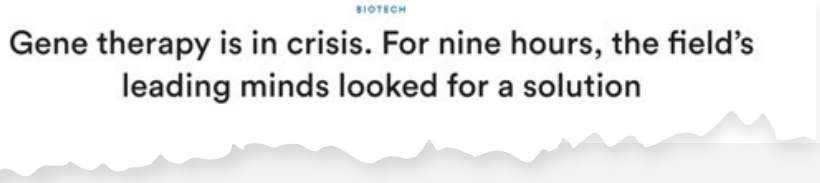
# 2023 headlines sometimes highlighted our challenges



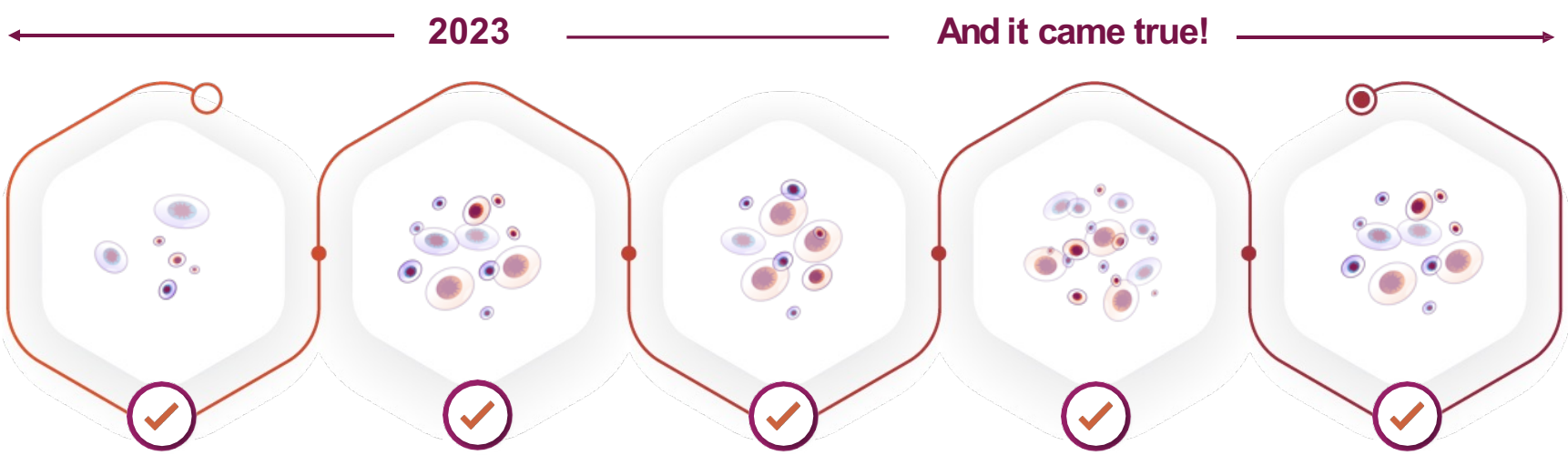

# The reality is CGT is maturing, achieving a ‘new normal’

# Breakthroughs are becoming the norm

# 5x5x5 comes true

In the *five* years from late 2017 through 2022, the FDA approved *five* gene therapies for rare genetic diseases

Last year, we forecast that it could approve *five* gene therapies for rare genetic diseases in 2023 alone



# 2023: A breakthrough year of approvals in the US

## Therapies approved in the United States

Casgevy (Vertex Pharmaceuticals and CRISPR Therapeutics)

Condition: Sickle cell disease

Lantidra (CellTrans Inc.)

Condition: Type 1 diabetes

Omisirge (Gamida Cell)

Condition: Patients undergoing stem cell transplant for blood cancer

Vyjuvek (Krystal Biotech)

Condition: Dystrophic epidermolysis bullosa

Elevidys (Sarepta Therapeutics)

Condition: Duchenne muscular dystrophy

Lyfgenia (bluebird bio)

Condition: Sickle cell disease

Roctavian (BioMarin Pharmaceutical)

Condition: Hemophilia A

## Therapies approved in the European Union

Hemgenix (UniQure and CSL Behring)

Condition: Hemophilia B

# Interim 2023 Data: The sector's foundation is strong



| 2023 | North America | Asia Pacific | Europe | Total |
|---|---|---|---|---|
| Developers | 1,088 | 859 | 495 | 2,526 |
| Clinical Trials | 972 | 790 | 358 | 1,894 |
| Investment* | $8.1B | $2.1B | $1.2B | $11.7B |

GlobalData.

*Reflective of full-year 2023 data

# 2024 regulatory outlook: Up to 17 possible US & EU approvals

## Decisions pending

**5** (H1 2024)

**2** (H1 2024)

**7** Total decisions pending

+

## Submissions pending

**3**

**2**

**5** Total submissions pending

+

## Submissions possible

**3**

**2**

**5** Total submissions possible

=

Up to 17 possible approvals across the US and EU in 2024

**5X5X5 becomes '10 in 2'?**
**5 more rare genetic disease gene therapy approvals possible in US**

# Potential 2024 milestones

**First-ever approval** of adoptive cell therapy for solid tumor (US) and first US approval of allogeneic T-cell therapy

**Additional therapies** to treat hemophilia A, hemophilia B, and dystrophic epidermolysis bullosa

In 2019, the FDA predicted it would **approve 10-20 therapies per year** starting in 2025

☑ Tracking to 2025

# Value for patients and society

# Does this sound familiar?*

"The most expensive drug sold in the United States."

"[The price] threatens to put this promising treatment out of reach of many patients, even those who are well-insured."

One patient advocate said she was "appalled" by the price.

Policymakers react to drug prices, calling them "exorbitant…akin to ransom."

# It should… but it's not about gene therapy

| When did this happen? | Which company was it? | What medicine was it? | How much was the price? |
|---|---|---|---|
| **1991-1992** | **Genzyme** | **Ceredase (Gaucher's disease)** | **$300,000+ per year** |

**Healthcare systems have adapted before, and they are adapting right now… and we will work through these challenges yet again.**

*Source: ***Inside the Orphan Drug Revolution*** by James A. Geraghty

# ARM's Gene Therapy for Patients & Society (GPS) Framework

01 Target devastating, often deadly diseases

02 Target incredibly expensive diseases

03 Are highly effective

04 Often save healthcare systems money

05 Are affordable… even before taking into account cost offsets


# Target devastating, often deadly diseases

The average life expectancy for rare diseases targeted by approved gene therapies is **~40 years** – HALF the normal lifespan

**Examples**

**Sickle cell disease:**
45 to 55 years

**Cerebral adrenoleuko-dystrophy:**
10 years

**Duchenne muscular dystrophy:**
22 years

02

# Target incredibly expensive diseases

The lifetime cost of the standard of care for most rare diseases targeted by approved gene therapies is several million $

**Examples**

Patient with severe Hemophilia A is over **$21M**

Patient with severe Sickle Cell Disease is **$4-6M**

Patient with Transfusion-Dependent Thalassemia is **$5.4 million**

CBSD Center for Biomedical System Design / NEWDIGS

# Are highly effective

Orphan gene therapies are 3.5 times more likely to be approved once entering Phase 1 trials than average drugs included in BIO's Global Trends in R&D 2023 Report

**Examples**

- **48% higher** success rate in Phase 1 clinical trials
- **65% higher** success rate in Phase 2 clinical trials
- **30% higher** success rate in Phase 3 clinical trials

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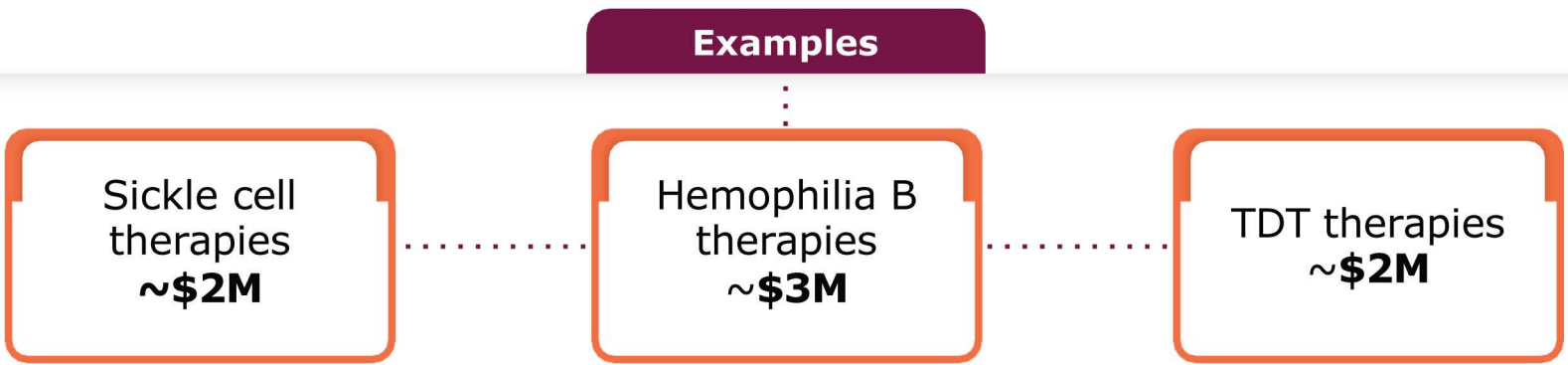
# Often save healthcare systems money

The Institute for Clinical and Economic Review (ICER) confirmed the high cost offsets from durable gene therapies in hemophilia, sickle cell, and other rare diseases



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# Are clearly affordable… even before taking into account cost offsets

NEWDIGS projects US gene therapy revenue to reach $7.5B in 2030

**Context**

- **0.1%** of projected healthcare spending and **1.3%** of projected prescription drug spending in 2030
- Comparable to what Medicare paid for **one diabetes drug** in 2022
- **1.8%** of the economic burden of rare diseases in the US in 2019
- **$1.6M** for a heart transplant (3,500 per year) and **$1M+** for an allogeneic bone marrow transplant (9,950 per year) in 2020

# US Healthcare Systems Are Modernizing

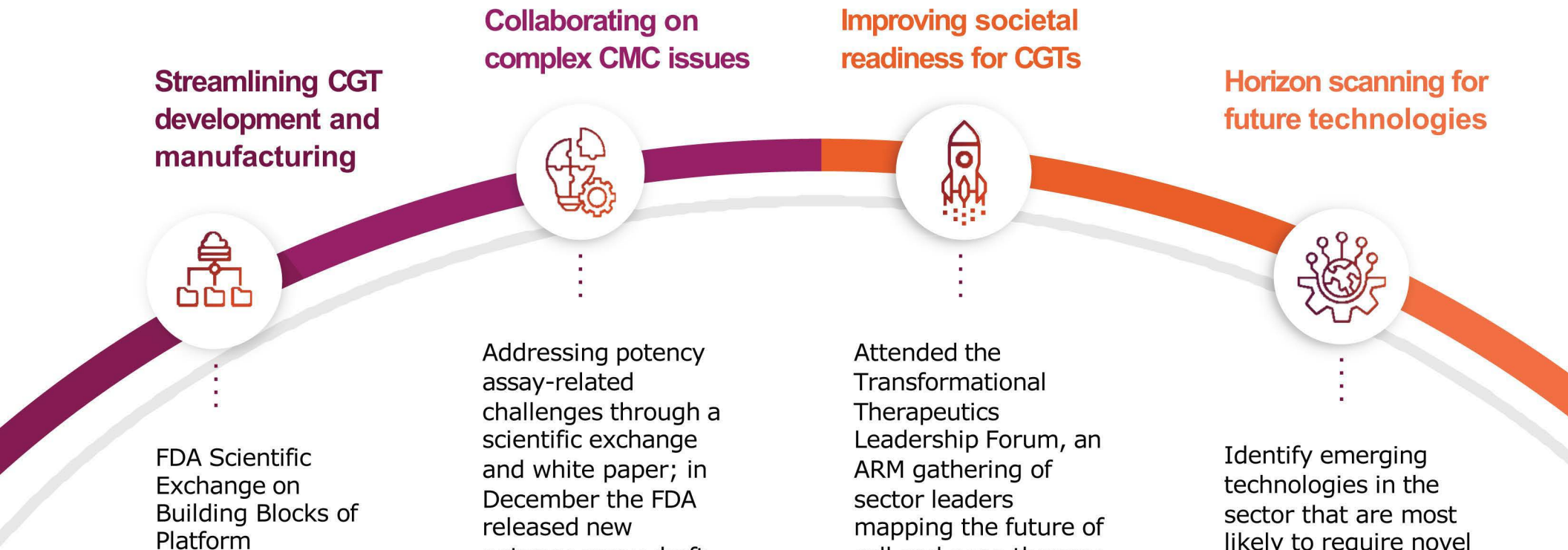
# Center for Medicare and Medicaid Innovation's (CMMI) Cell and Gene Therapy Access Model


- The model will establish a voluntary partnership among CMS, state Medicaid agencies and biotech companies to set up and administer outcomes-based agreements (OBAs)
- This will particularly help smaller states without the resources to administer OBAs
- Originally proposed to begin in 2026, the model is now projected to launch in 2025
- This is a welcome effort to modernize how we pay for cell and gene therapies

# The FDA is modernizing to prepare for the CGT wave

- Established new Office of Therapeutic Products (OTP 'Super Office')
- Nicole Verdun, MD, five months into tenure as the new Director of OTP; hired Rachel Anatol, PhD, as Deputy Director in late Dec.
- Hiring to keep pace: CBER had met 83% of its FY 2023 goal of 132 new hires as of Sept. 30
- Leaning into Accelerated Approval for rare disease gene therapies
- START ("Operation Warp Speed for Rare Disease") pilot program: More early communication with companies

# ARM & FDA are collaborating to prepare for the future



## Streamlining CGT development and manufacturing

FDA Scientific Exchange on Building Blocks of Platform Technologies: AAV, LNP, iPSCs

## Collaborating on complex CMC issues

Addressing potency assay-related challenges through a scientific exchange and white paper; in December the FDA released new potency assay draft guidance

## Improving societal readiness for CGTs

Attended the Transformational Therapeutics Leadership Forum, an ARM gathering of sector leaders mapping the future of cell and gene therapy

## Horizon scanning for future technologies

Identify emerging technologies in the sector that are most likely to require novel solutions for regulation over the next 3-10 years

# Reflections on Sickle Cell Disease


December 8 FDA dual approvals of Casgevy and Lyfgenia: The biggest day in the history of gene therapy

A new technology (CRISPR), a long-overlooked patient population, and the largest patient population to date

Biggest test yet for healthcare system readiness: Up to 20,000 eligible patients, most of whom are covered by Medicaid

# Transforming – and often saving – lives

## Victoria Gray

The New York Times

*"It meant a new beginning. It is more than I ever dreamed of for everything [the symptoms] to be gone."*

Victoria was the first patient to receive the now-approved CRISPR sickle cell disease treatment.

## Tesha Samuels

In 2018, Tesha received an autologous gene therapy transplant. She went from experiencing daily pain and sometimes life-threatening conditions to having minimal or no pain.

# Thank you.

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