Recoding For The Future
January 2021 Company Presentation
Forward-looking Statements

These slides and the accompanying oral presentation contain forward-looking statements and information. The use of words such as “may,” “might,” “will,” “should,” “expect,” “plan,” “anticipate,” “believe,” “estimate,” “project,” “intend,” “future,” “potential,” or “continue,” and other similar expressions are intended to identify forward-looking statements. For example, all statements we make regarding the initiation, timing, progress and results of our preclinical and clinical studies and our research and development programs, our ability to advance product candidates into, and successfully complete, clinical studies, the timing or likelihood of regulatory filings and approvals, and the timing and likelihood of entering into contracts with payors for value-based payments over time or reimbursement approvals, and our commercialization plans for approved products are forward looking. All forward-looking statements are based on estimates and assumptions by our management that, although we believe to be reasonable, are inherently uncertain. All forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from those that we expected. These statements are also subject to a number of material risks and uncertainties that are described in our most recent quarterly report on Form 10-Q, as well as our subsequent filings with the Securities and Exchange Commission. Any forward-looking statement speaks only as of the date on which it was made. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.
Our True North

THE FACES

WHY?

- Authentic
- Courageous
- Humble
- Caring
- Transparent

THE STORIES
4 for 4: A Decade of Advancing Programs Through the Clinic to Deliver Life-Changing Medicines to Patients

**LentiGlobin for TDT**

HGB-206 Group C: Complete resolution of severe VOEs post-LentiGlobin treatment

**LentiGlobin for SCD**

Lenti-D CALD

**CRB-401 A Phase I Study of bb2121**: Best response

All 15 patients with a CR who had a qualified assessment were AIRD negative by NGS.

**Long-term Follow-up, LTF-303: Maintained durable transfusion independence with long term follow-up**

Subject 2001: first patient treated in STARBEAM 1 treatment

1 year after LentiGLO

2 years after LentiGLO

Representative untreated patient

**Robust Platform**
2020 Silver Lining: De-risked “Valley Crossing” and Ready to Deliver for Patients Across All Products

POC Data “Ted Talk”

Deliver to Patients “Valley of Reality”

- Reg Approval
- Scale / Globalize
- P&R / Bus Model
- Educate / Deploy
- Mature Pipeline

Mature & Lever “Double Down”

- 2010-2017
- 2018-2021
- 2022-2025

2020 - The Foundation is Laid

- **Data**: Consistent, durable, differentiating
- **Regulatory**: Clarified and de-risked execution plan
- **Capabilities**: Clinical and commercial manufacturing established
- **Pipeline**: Platform built, INDs on the horizon
- **Financial**: Well funded, revenues coming
- **Team**: Battle tested & digging in
Unlocking Value for Patients and Shareholders

bluebird plans to separate into two companies

**Optimize Needs**
Support differentiated strengths and strategic needs

**Sharpen Focus**
Drive deeper commitment and capability to deliver on significant catalysts ahead

**Dedicated Leadership**
Fit for purpose and 100% committed therapeutic area expertise

**Simplify Ops**
Remove complexity and double down differentiated culture

---

**BLUE SGD**

- SCD
- TDT
- CALD
- Pipeline

- Deliver 3 potentially-curative products to patients
- Prove commercial model
- Scale, leverage, expand the product platform

**BLUE ONCO**

- 2121/7
- NextGen MM
- NHL
- AML
- Solids

- Launch ide-cel to deliver for MM patients
- Advance MM earlier lines & next-gen
- Optimize product engine. Deliver 1-2 INDs per year
Launching Two Independent, Fully Integrated Commercial Stage Companies

Spin out bluebird oncology

Create two independent publicly traded companies

Anticipated tax–free transaction to close by EOY 2021

With ~$1.3B in cash, intent is for both companies to have sufficient runway at separation

BLUE SGD: CEO - Andrew Obenshain
Exec Chair - Nick Leschly

BLUE ONCO: CEO - Nick Leschly
Chair - Dan Lynch
SGD Snapshot

Deliver For Patients Now.
Opportunity to Unlock Value with Increased Focus on Path to Patients & Commercialization

**SGD Principles**

**FOCUS:** Execute near-term catalysts. Filings & launches.

**DELIVER:** Prove commercial model. Novel pricing and reimbursement model for revenues in EU and US.

**GENERATE:** Optimize COGS and reduce costs. Leaner operations fit for commercialization.

**EXPAND:** Leverage & expand. Current indications and future expansion.

**Execute to Plan**

- Dedicated leadership and team
- Refined scope and reduced operational complexity
- Well-funded through anticipated major inflections
- Enhanced strategic flexibility and optionality to optimize potential
A highly leverageable commercial model through anticipated milestones: additional geographies, label expansion and new product approvals

ZYNTEGLO
- U.S. BLA filing, all ages and genotypes
- TDT EU expansion

ALD
- U.S. BLA filing
- EU approval

SCD Preparation
- U.S. market preparation
- Infrastructure in place
- CMO network ready to deliver

ZYNTEGLO:
- U.S. approval and launch

ALD:
- U.S. approval and launch

Expansion
- Manufacturing enhancements
- Continued geographic expansion

2023+ Gene-Therapy Leadership
- U.S. SCD launch
- Platform scale: Clinical, Commercial, Manufacturing
- Geographic and indication expansion
- Product optimization (RTC, mobilization)
- Next generation research (in-vivo LVV)

ZYNTEGLO
- TDT available in Europe

SCD:
- U.S. BLA filing
- Launch ready

DELIVER for PATIENTS
Vision to Set the Standard for Successful Gene Therapy Commercialization

2020 2021 2022 >2023
Foundational Building Blocks in Place with a De-risked Business Plan

TODAY’S STRATEGIC FOUNDATION...

- Durability of Clinical Data
- Regulatory Clarity
- Manufacturing Network
- Commercial Infrastructure
- Pricing and Reimbursement Model
- Advocacy & Relationships

... CREATES ROADMAP FOR FUTURE SUCCESS

- SCD approval and launch
- TDT approval and launch for all ages and genotypes
- CALD approval and launch
- Multiple label expansion opportunities
- Reduced toxicity conditioning (Forty Seven/GILD)
- Enhanced mobilization (Magenta)
- Continued geographic expansion
- In-Vivo therapies
- Platform Scale (Commercial, Manufacturing, Clinical)
Transformative Treatments. Compelling Business.

*Multi-billion dollar market opportunity*

**Manufacturing and Commercial Leverage**

**Eligible Patients Anticipated on Label**

**Meaningful competitive advantages in TDT and SCD:**

- Significantly longer safety follow up
- Significantly longer durability data
- Regulatory clarity
- Experience with manufacturing scale-up
- Commercial infrastructure in place
- SCD efficacy that will be extremely difficult to improve upon
Oncology Snapshot

Launch Time.
ide-cel Just
The Beginning.
Oncology Vision: Taking Flight

1. **LAUNCH**: Deliver ide-cel for multiple myeloma patients

2. **DISRUPT**: Advance multiple myeloma into earlier lines and next-gen therapies

3. **CREATE**: Optimize product engine to deliver 1-2 INDs per year

4. **CRACK the solid tumors code**: Deliver differential layered tech portfolio with best of breed partners

5. **BUILD & PARTNER**: Mobilize cutting edge capabilities to enable launch goals (e.g., manufacturing)

**Obsessed with disruptive next-gen product cycle to create cures for cancer patients**
Unlocking the Full Potential for Cellular Therapy in Oncology

Complex problem.....

.....demands a multi-part solution

Platforms & Technology

Rules “The Rosetta Stone”

Ecosystem

Clinical & correlative data educating biological hypothesis

World-class LVV, mRNA & DP manufacturing capabilities

Broad integrated tech & Cellular process development enables designed solutions

Targets

Heterogeneity

TME

Escape

Access

Cancer cells

Cancer-associated fibroblasts

Extracellular Matrix

Tumor-promoting immune cells

Tumor-suppressing immune cells
One-to-Many Strategy: Recoding Traditional R&D

Nextgen Product Cycling Engine Designed to Rapidly Build, Test, Learn, and Improve
Oncology: Deep Pipeline of Potentially Transformative Medicines

<table>
<thead>
<tr>
<th>PRODUCT CANDIDATES</th>
<th>PROGRAM AREA</th>
<th>PRECLINICAL</th>
<th>PHASE 1/2</th>
<th>PHASE 2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ide-cel (bb2121)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa: Multiple Myeloma ≥3 Prior Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-2: Multiple Myeloma Second Line (1 Prior)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-3: Multiple Myeloma Third Line (2-4 Prior)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-4: MM First Line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRB-401: Multiple Myeloma ≥3 Prior Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-7: Multiple Myeloma Combinations Basket Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-8: Multiple Myeloma 1-3 Prior Lines (2L Registrational)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KarMMa-9: Multiple Myeloma NDMM (Registrational)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bb21217*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRB-402: Multiple Myeloma ≥3 Prior Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NG MM CAR T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NextGen CAR T - 4 approaches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROGRAM CANDIDATES</th>
<th>PROGRAM AREA</th>
<th>PRECLINICAL</th>
<th>PHASE 1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC1 TCR**</td>
<td>Merkel Cell Carcinoma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bbT369</td>
<td>bNHL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DARIC33</td>
<td>Pediatric AML</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DARIC NextGen</td>
<td>Adult AML</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAGE-A4 TCR</td>
<td>MAGE-A4+ve Solid Tumors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Early Programs</td>
<td>Ovarian (UNC – Academic Collab)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1-2 INDs in 2021 and 2022

Our pipeline combines first near commercial MM CAR T cell product (ide-cel) and fast follower (bb21217) with multiple highly differentiated and internally developed candidates entering clinical testing

*ide-cel (bb2121) and bb21217 development in collaboration with BMS; MAGE-A4 development in collaboration with Regeneron and Medigene.
Delivering to Patients: Our Broad and Deep Approach in Multiple Myeloma

Advancing into earlier lines of therapy and continuing to innovate

Nextgen Approaches Focused on Solving Meaningful and Definable Problems to Disrupt MM Care and Ide-cel

1. Memory-like T cells (bb21217)
   - Improve Durability
   - Nextgen technology

2. Process Innovation

3. Alternative chassis
   - Allogeneic approach
   - Best in class efficacy
   - Potency Improvements

Approaches can be combined & are applicable across portfolio.

Potentially First Approved BCMA CAR-T Blockbuster... CAR-T PDUFA: 3/27/21
bbT369: Multi-layered Enhancements to Deliver Improved Potency and Patient Outcomes in bNHL

Product designed to overcome mechanisms thought to limit efficacy of existing CAR T therapies and mediate potent anti-tumor activity with the goal of driving deep and durable responses in B-NHL patients.
CD33 Targeted Regulatable CAR T (DARIC33)

**Problem**
- Substantial unmet need in AML
- Proximity of disease to HSCs = hematopoietic risk
- *CAR T cell that spares HSCs could transform AML*

**Hypothesis**
- Targets are well described/validated, but...
- ...aggressively targeting AML requires ‘pausing’
- *DARIC enables drug-controlled ON/OFF state*

**Solution**
- **Regulated targeting**

**Challenge**
- Disease cells similar to & proximal to HSC
- HSC

**RAJI-CD33 tumor model**
- DARIC33 + RAPA
- DARIC33 (NO RAPA)
- UTD control

**Graphs**
- **Strict rapamycin dependence**
  - EC<sub>50</sub> = 100 pM

- **RAJI-CD33 tumor model**
  - Total Flux (p/s)
  - Days Post Tumor
  - DARIC33 + RAPA
  - DARIC33 (NO RAPA)
  - UTD control
Earlier Product Concept: Superior MAGE-A4 TCR + TGFβ Switch Receptor*

Product Concept

- Engineered TCR with enhanced potency
- Switch Receptor neutralizes TGFβ
- Switch Receptor activates IL12R signaling

Validating Data

MAGEA4 TCR + Switch Receptor provides tumor control in a human melanoma mouse model

*In collaboration with Regeneron and Medigene
BLUE Oncology Vision: An Innovative Cell Therapy R&D Company with First-in-Class BCMA Potential Blockbuster

1. The Cornerstone
First Approved BCMA CAR-T with Blockbuster Potential

2. The Crown Jewel
IND Engine: Lighting the Fuse on Un-incremental Treatments

3. BLUE Oncology
By 2025, the leading oncology cell therapy company
- Significant and growing ide-cel revenue
- Path to financial sustainability
- Strategic optionality
Time to Run in 2021...
Significant Near-term Catalysts Ahead for Each Company

- ZYNTEGLO geographic expansion into additional countries
- ide-cel (bb2121) MM PDUFA, U.S. approval and launch
- ide-cel KarMMa studies progressing and evolving
- bb21217 data update EOY
- 1-2 INDs in 2021
- 1-2 INDs in 2022
- LentiGlobin for SCD U.S. BLA submission (late 2022)

A HIGHLY LEVERAGEABLE PLATFORM AND COMMERCIAL MODEL

- 3 products successfully to market
- Global footprint
- Path to profitability and capital markets independence

BEST IN CLASS PROGRAMS & THERAPIES

- Multiple products and next-gen innovation
- Multiple shots at disruptive treatments for patients
- Strategic optionality

5-Year Vision
Financial Overview: Launching Each Business from a Position of Financial Strength

**JAN 2021**

- **Strong starting position**
  - $1.3B cash
  - $0 Debt
  - Significant R&D cost share support from oncology partners (BMS/Regeneron)
  - Global rights to SGD products
  - Emerging commercial products and revenues

**Q2 / Q3**

- **Deliver on Major Milestones**
  - ide-cel approval and launch (US)
  - CALD launch (EU)
  - TDT and CALD Filings (US)

- **Preparing For Separation**
  - Shape each business to be fit for purpose
  - Establish leadership teams and boards
  - Ensure each business has sufficient cash runway to achieve value-creating milestones in 2022 and beyond

**SEPARATION ~EOY 2021**
Re-shaping bluebird to Deliver over Next Five Years

**MAXIMIZE IMPACT**
- Deliver deeper therapeutic expertise
- Disruption and focus favors patients

**ENGAGE AND ENABLE**
- Optimize diverging business needs
- Operational simplification & focus
- Rejuvenated and committed

**DELIVER VALUE**
- Strategy clarity and optionality
- Dedicated value creation

**The Next 5 YEARS**
**START NOW**
Simple Vision; Profound Mission

**RADICAL CARE**
We care in a way that’s intense and truly sets us apart.

**THIS IS PERSONAL**
Gene therapy is about saving lives one person at a time. And we are, each of us, personally all in.

**PIONEERS WITH PURPOSE**
We’re exploring new frontiers for the sake of patients.