# Mechanism of Action of a Fully Human Anti-Thymocyte Globulin, SAB-142, for the Treatment of Type 1 Diabetes

Christoph Bausch, PhD
EVP & Chief Operating Officer

December 10th, 2025

# Disclosure & Forward-Looking Statements

I am an Employee at SAB BIO

The material in this presentation has been prepared by SAB Biotherapeutics, Inc., doing business as SAB BIO ("SAB") and is general background information about SAB's activities current as of the date of this presentation. This information is given in summary form and is not intended to be complete. Information in this presentation, including financial forecasts, should not be considered advice or a recommendation to investors or potential investors in relation to holding, purchasing, or selling securities or other financial products or instruments and does not take into account any particular investment objectives, financial situation or needs.

This presentation may contain forward-looking statements including statements regarding our intent, belief, or current expectations with respect to SAB's businesses and operations, market conditions, the exercise of outstanding warrants for cash, results of operations and financial condition, capital adequacy, specific provisions, and risk management practices. Readers are cautioned not to place undue reliance on these forward-looking statements. SAB does not undertake any obligation to update any information herein for any reason or to publicly release the result of any revisions to these forward-looking statements to reflect events or circumstances after the date hereof to reflect the occurrence of unanticipated events unless required by law. While due care has been used in the preparation of forecast information, actual results may vary in a materially positive or negative manner and the presentation may contain errors or omissions. Forecasts and hypothetical examples are subject to uncertainty and contingencies outside SAB's control. Past performance is not a reliable indication of future performance. The forward-looking statements contained or implied in this presentation are subject to other risks and uncertainties, including those discussed under the heading "Risk Factors" in SAB's most recent Annual Report on Form 10-K filed with the U.S. Securities and Exchange Commission (the "SEC") and in subsequent filings and reports that SAB makes with the SEC from time to time, including but not limited to SAB's Registration Statement on Form S-3 (File No. 333-289992) declared effective by the SEC on September 30, 2025, and the prospectus contained therein.

Unless otherwise specified, information is current at the date hereof. Except as otherwise required by law, SAB disclaims any intention or obligation to update or revise any forward-looking statements, which speak only as of the date they were made, whether as a result of new information, future events or circumstances or otherwise.

# Rabbit ATG:

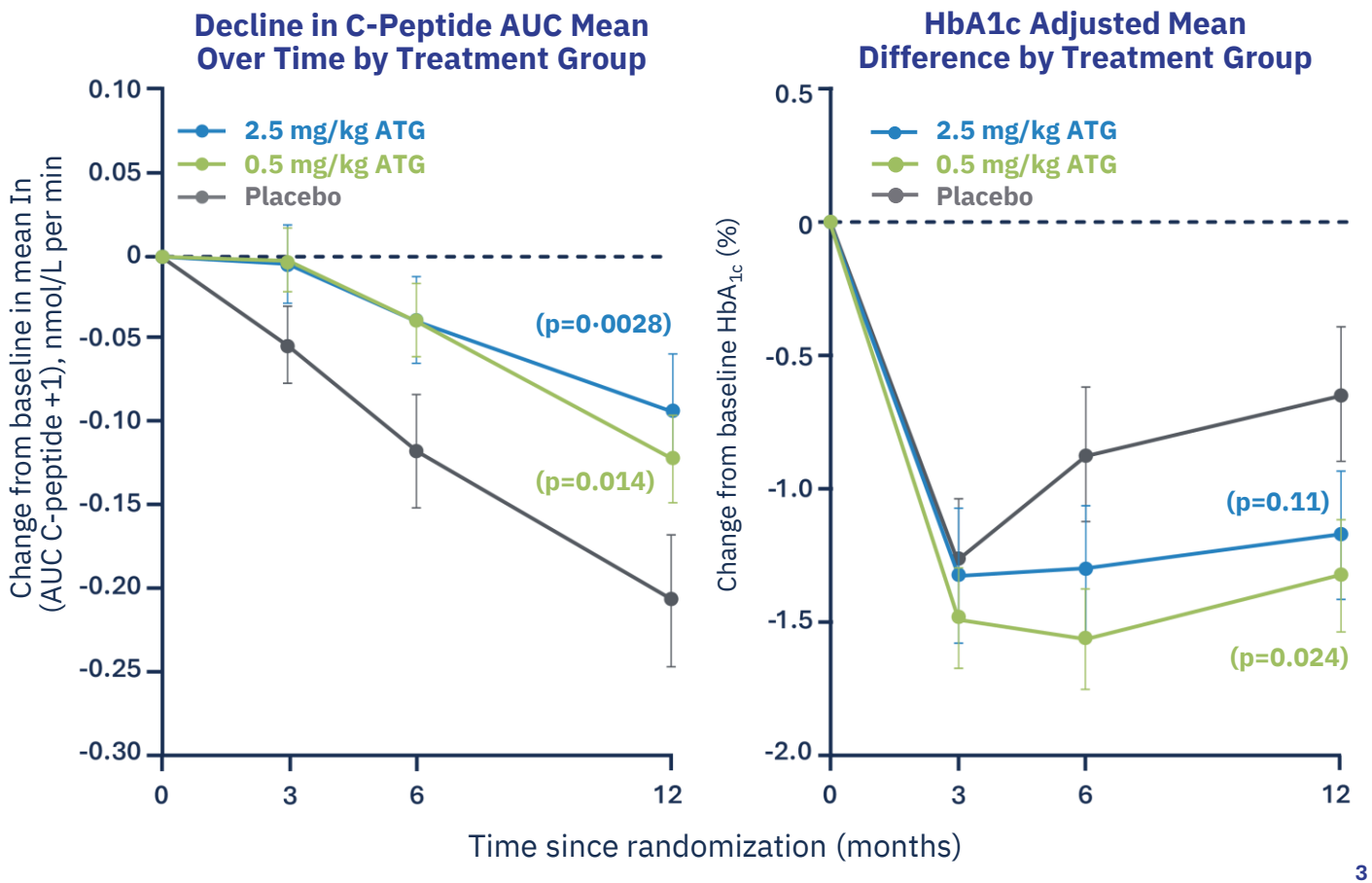
**MELD-ATG Clinical Study:** Minimal Effective Low Dose of Rabbit ATG* Preserved C-Peptide in New Onset T1D 1 year post-treatment

MELD-ATG replicated results from Haller's TN19 study with ≤2.5 mg/kg with statistically significant C-peptide preservation and glycemic control

Thymoglobulin
Anti-thymocyte Globulin (Rabbit)

MELD-ATG

## ATG has consistently reproduced clinical data demonstrating preservation of C-peptide and improvements in glycemic control






*(Mathieu et al., Lancet. 2025 Sep 18:S0140-6736(25)01674-5)*

*Mathieu C, Wych J, Hendriks AEJ, Van Ryckeghem L, Tree T, Chmura P, Möller C, Casteels K, Danne T, Reschke F, Šmigoc Schweiger D, Battelino T, Johannesen J, Rami-Merhar B, Pieber T, De Block C, Evans M, Hilbrands R, Bosi E, Willemsen RH, Basu S, Pulkkinen MA, Knip M, Cnop M, Nitsche A, Schulte AM, Niemöller E, Peakman M, Wilhelm-Benartzi C, Gillespie D, Overbergh L, Mander AP, Marcovecchio ML; INNODIA. Minimum effective low dose of antithymocyte globulin in people aged 5-25 years with recent-onset stage 3 type 1 diabetes (MELD-ATG): a phase 2, multicentre, double-blind, randomised, placebo-controlled, adaptive dose-ranging trial. Lancet. 2025 Sep 18:S0140-6736(25)01674-5. doi: 10.1016/S0140-6736(25)01674-5. Epub ahead of print. PMID: 40976248.

SAB BIO

# SAB-142
## Pre-clinical data

SAB-142 binds to CD2, CD3, CD4, and CD8 receptor surface markers similar to rATG

Data generated by Judith Leitner from the laboratory of Peter Steinberger lab based on published methodology.

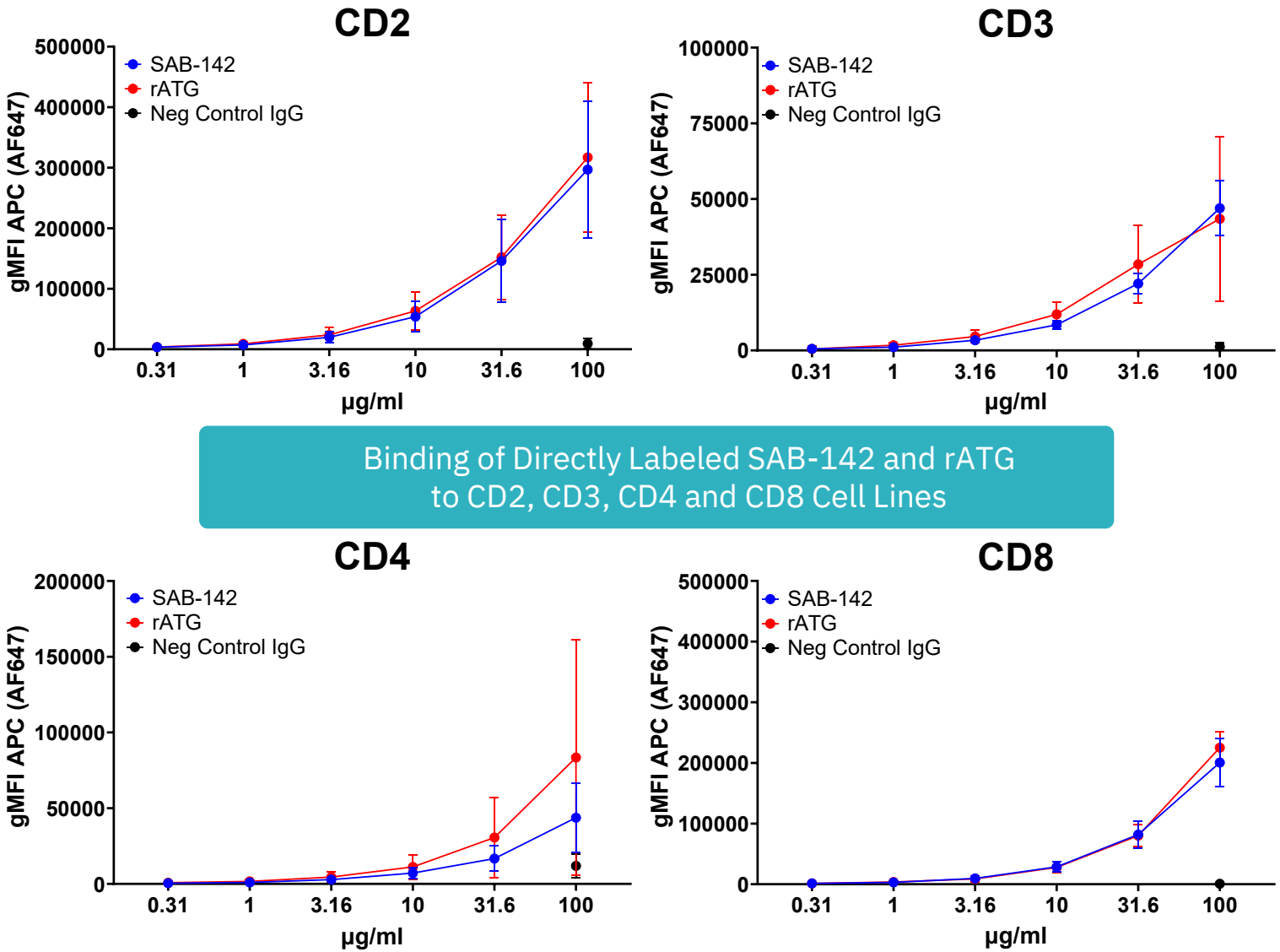
American Journal of Transplantation 2013; 13: 3103–3113
Wiley Periodicals Inc.

doi: 10.1111/ajt.12514

**A Comprehensive and Quantitative Analysis of the Major Specificities in Rabbit Antithymocyte Globulin Preparations**

CENTER FOR PATHOPHYSIOLOGY, INFECTIOLOGY AND IMMUNOLOGY
MEDICAL UNIVERSITY OF VIENNA

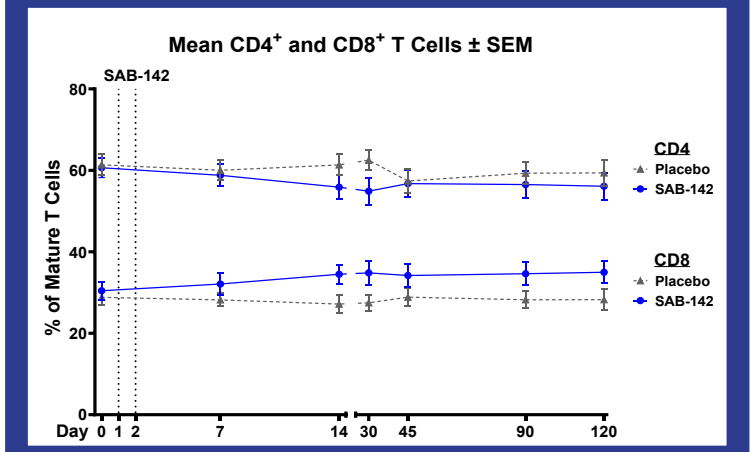
# SAB-142 binds to the same receptors as rATG




Binding of Directly Labeled SAB-142 and rATG to CD2, CD3, CD4 and CD8 Cell Lines

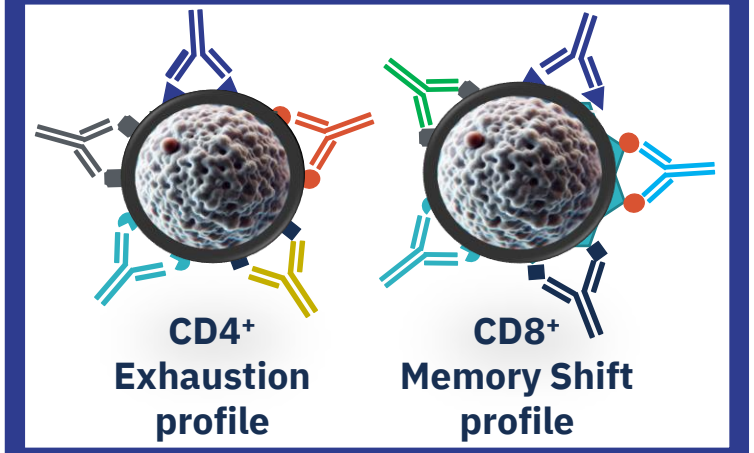
# SAB-142 is a Fully Human, Multi-Specific, Targeted Anti-Thymocyte Globulin (hATG) for Delaying Onset and Progression of T1D




SAB-142 is positioned for safe and reliable re-dosing due to **no sustained lymphodepletion, no serum sickness and no/low immunogenicity**

✓ **Target dosing over 2 days vs. 12-14 days with teplizumab**

SAB-142 has a **competitive dosing regimen** in ambulatory setting




Mechanism of action (MOA) indicates **"exhaustion" and "memory shift" profiles** across multiple T-cells, strongly correlated with C-peptide preservation in rATG clinical studies

SAB BIO

# SAB-142-101
## Phase 1 Study Design

Randomized, double-blind, placebo-controlled, single- and multiple ascending dose, adaptive design clinical study in healthy volunteers and patients with established T1D

**Total n=68 subjects Randomized:**

**HVs n=62**
**T1D patients n=6**

| | |
|---|---|
| **Repeat dosing** | n=8 |
| **4.5 mg/kg** | n=8 |
| **2.5 mg/kg** | N=22 |
| **1.5 mg/kg** | n=8 |
| **0.5 mg/kg** | n=16 |
| **0.1 mg/kg** | n=8 |
| **0.03 mg/kg** | n=6 |

# SAB-142 demonstrated a multi-specific MOA clinically validated for preserving C-peptide and treating T1D

**PD Highlights**

Data demonstrate "MoA" signatures known to correlate with C-peptide preservation and delayed progression of T1D

- Transient cytokine increase likely activating T-cells
- Treg preservation
- Treg activation likely contributing to sustained T-cell immunomodulation
- Induced T-cell differentiation shift to a memory phenotype
- Sustained T-cell exhaustion profile

**Shared MoA with effective T1D Immunomodulating drugs:**
**SAB-142 shares beneficial MoA signatures demonstrated for C-peptide preservation and clinical efficacy** with rabbit ATG and teplizumab, both T1D T-cell targeting immunomodulatory drugs

# SAB-142-101
# Phase 1 Top Line

## SAB-142 CD4⁺ T conv Cell Single Exhaustion Markers

SAB-142 induced sustained expression of inhibitory receptors (PD-1 and TIGIT) on CD4⁺ T conv cells indicative of an exhausted phenotype.

SAB-142: combined 1.5 and 2.5mg/kg HV cohorts

## SAB-142 CD4⁺ T conv Cell Dual Exhaustion Markers

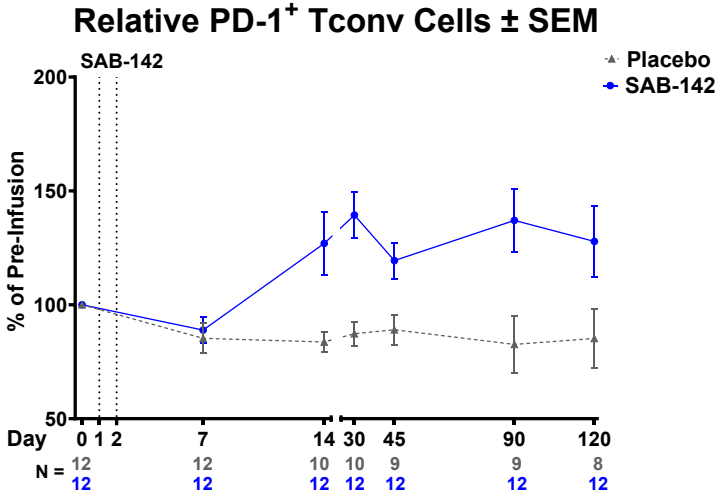
SAB-142 induced persistent expression of co-inhibitory receptors on CD4⁺ T conv cells.

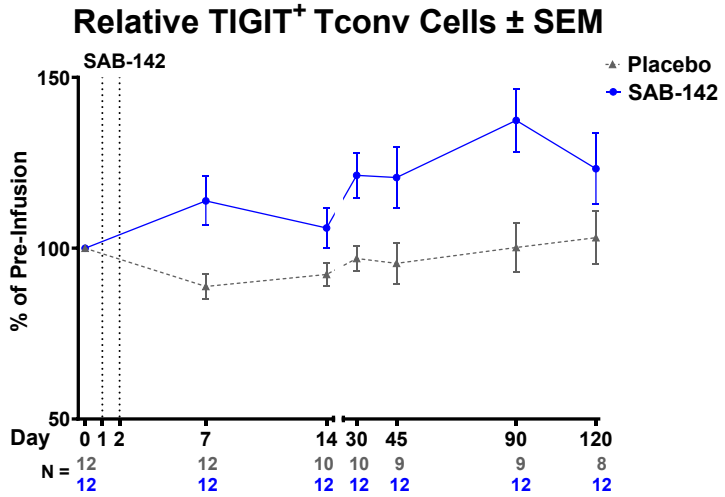
## CD4+ Exhaustion is correlated with C-peptide preservation

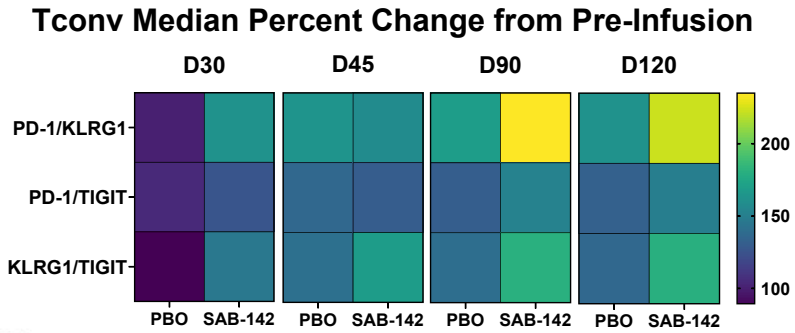
Low-dose ATG induced sustained expression of co-inhibitory receptors (PD-1, KLRG1) on CD4⁺ cells indicating exhaustion-like phenotype which correlates with C-Peptide preservation.

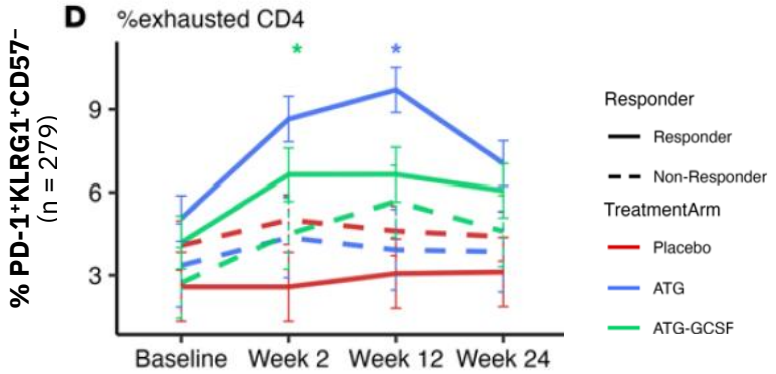
SAB BIO

# SAB-142 demonstrates sustained CD4⁺ T conv cell exhaustion analogous to rATG





JCI insight
CLINICAL MEDICINE

Responders to low-dose ATG induce CD4⁺ T cell exhaustion in type 1 diabetes


Laura M. Jacobsen,[1,2] Kirsten Diggins,[1] Lori Blanchfield,[1] James McNichols,[2] Daniel J. Perry,[2] Jason Brant,[2] Xiaoru Dong,[2,4] Rhonda Bacher,[4] Vivian H. Gersuk,[3] Desmond A. Schatz,[1] Mark A. Atkinson,[1,2] Clayton E. Mathews,[1,2] Michael J. Haller,[1] S. Alice Long,[3] Peter S. Linsley,[3] and Todd M. Brusko[1,2]

[1]Department of Pediatrics, College of Medicine, University of Florida, Gainesville, Florida, USA. [2]Department of Pathology, Immunology, and Laboratory Medicine, University of Florida Diabetes Institute, Gainesville, Florida, USA. [3]Benaroya Research Institute at Virginia Mason, Seattle, Washington, USA. [4]Department of Biostatistics, University of Florida, Gainesville, Florida, USA.


KING'S College LONDON

# SAB-142-101
# Phase 1 Top Line

## Treg preservation

SAB-142 preserves Treg Cells maintaining regulatory immune function.

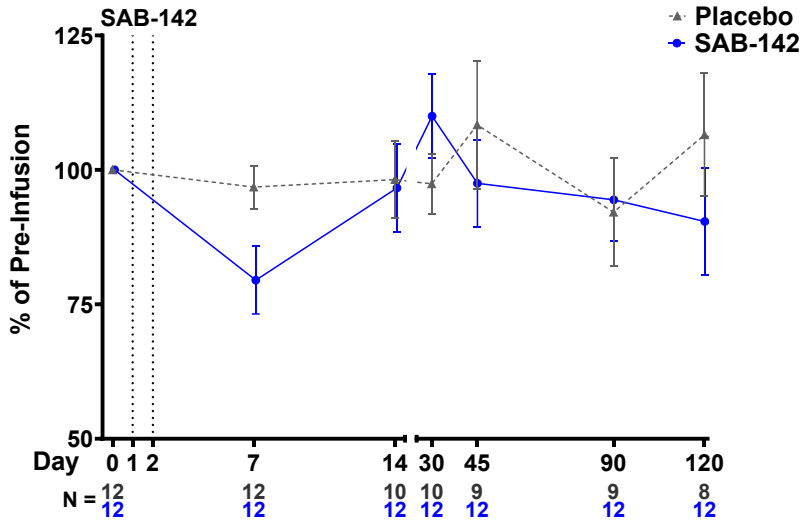
SAB-142: combined 1.5 and 2.5 mg/kg HV cohorts

## Treg activation

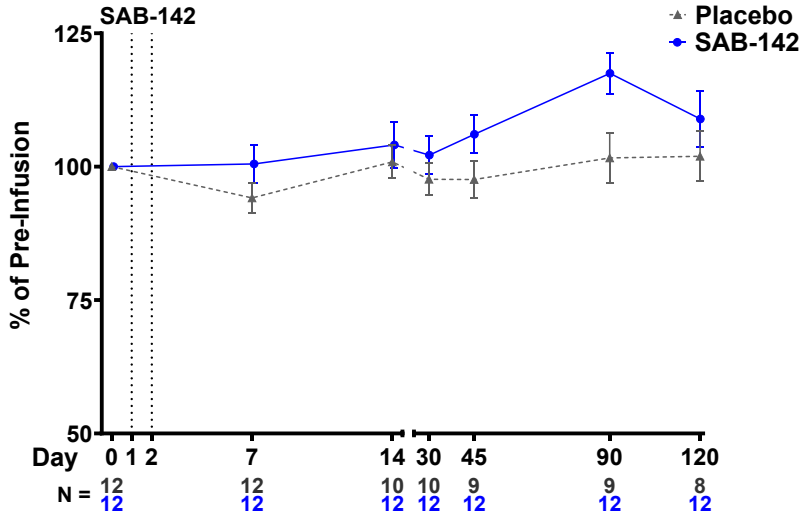
SAB-142 induced expression of inhibitory receptor (TIGIT) on Tregs indicative of potential activation possibly contributing to sustained immunomodulation.

# SAB-142 Preserves and Activates T Regulatory Cells

**Treg ($CD3^+CD4^+CD127^{lo}CD25^+FoxP3^+$) ± SEM**




**$TIGIT^+$ Treg Cells ± SEM**



# SAB-142-101
# Phase 1 Top Line

## T-cell populations stable

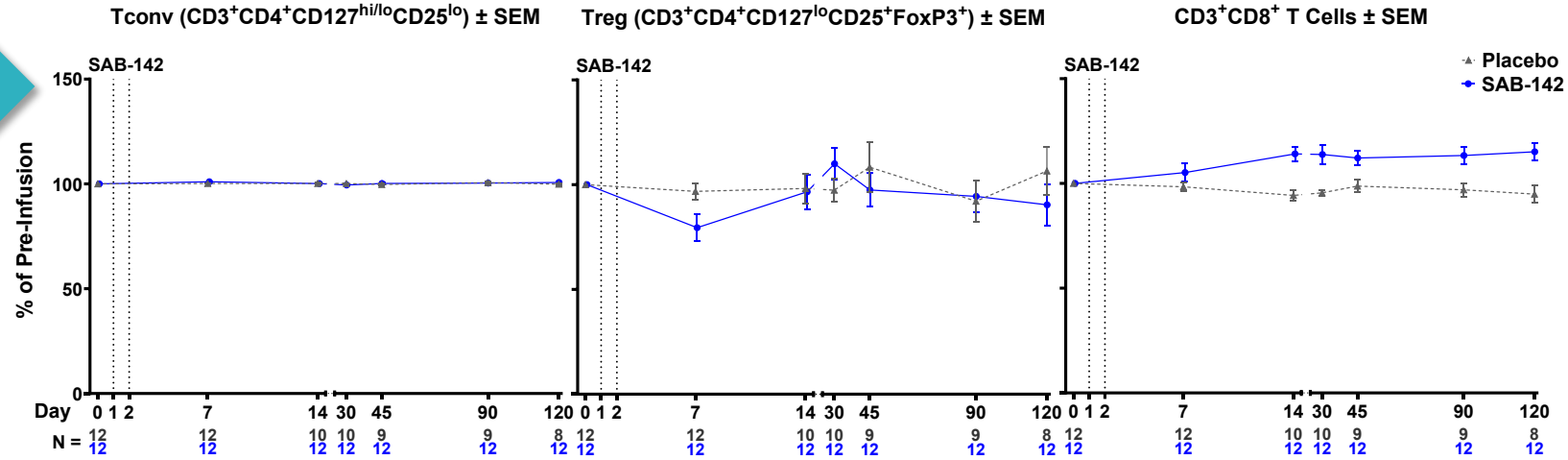
Mean subject normalized plots for CD4+ Tconv, Treg, and CD8+ T-cells indicate generally stable populations among treated subjects and a lack of depletion.

SAB-142: combined 1.5 and 2.5 mg/kg HV cohorts

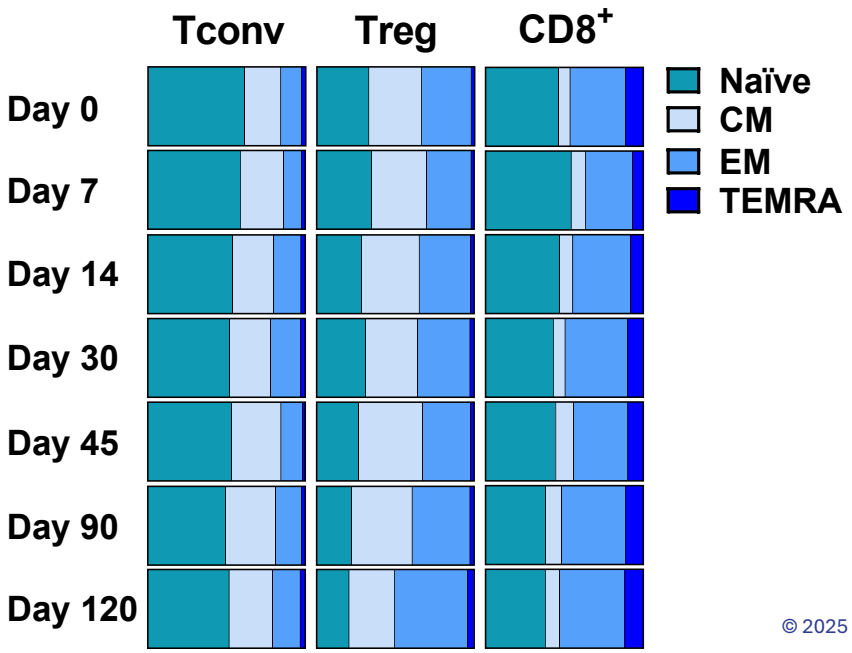
## T-cells shifted to a memory phenotype

Mean frequencies for naïve, CM, EM, and TEMRA demonstrate phenotypic shifts toward various differentiated states with SAB-142 treatment in each cell type.

# SAB-142 Induces Differentiation from Naïve to a Memory Phenotype



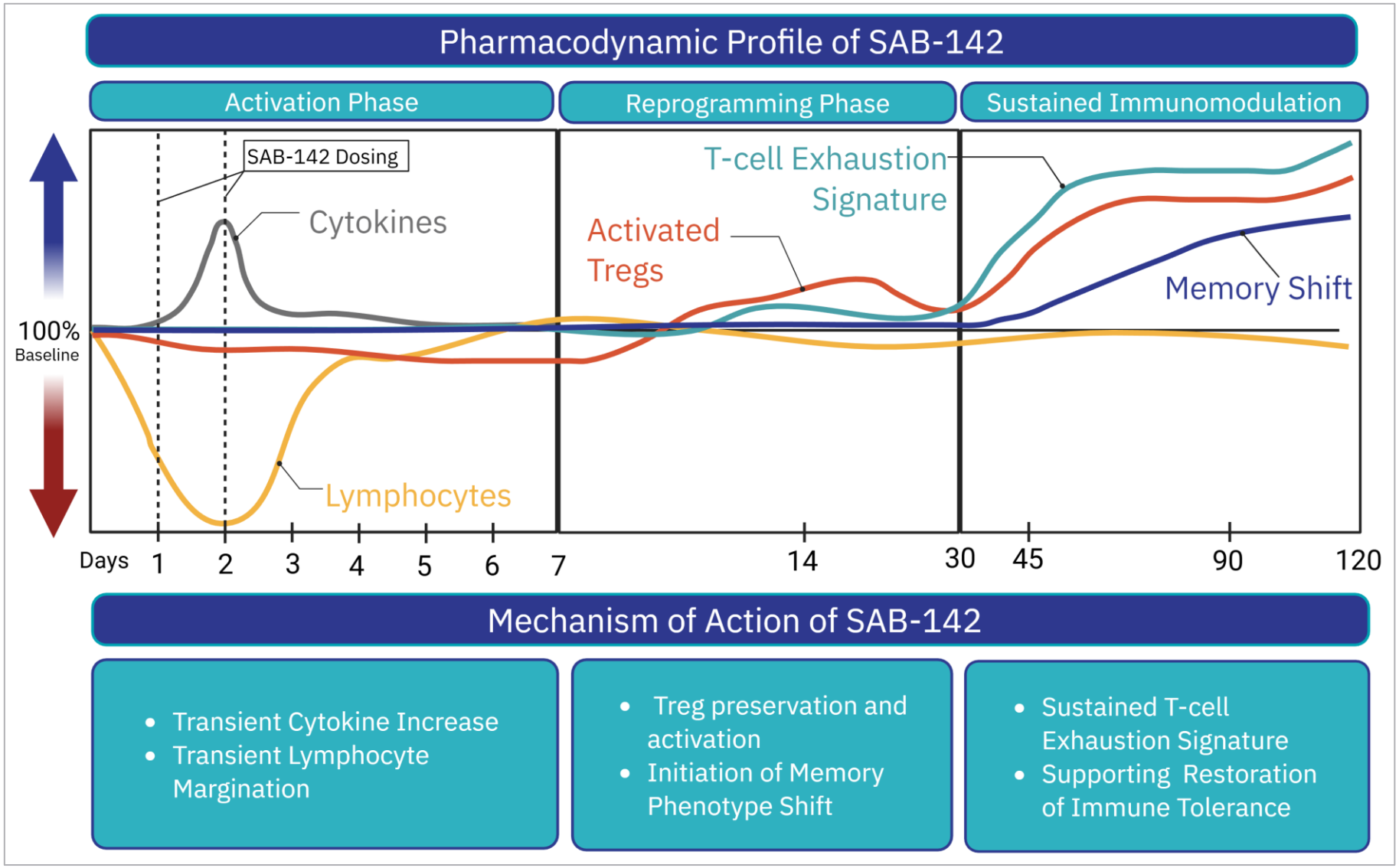

## Mean T-Cell Subset Frequencies



# SAB-142: The Next Generation of Beta Cell Guardians

## *Sustained Immunomodulation without Lymphodepletion*




## Mechanism of Action of SAB-142

- Transient Cytokine Increase
- Transient Lymphocyte Margination

- Treg preservation and activation
- Initiation of Memory Phenotype Shift

- Sustained T-cell Exhaustion Signature
- Supporting Restoration of Immune Tolerance

SAB BIO

SafeGUARD

SAFety and Efficacy of Human Antityhymocyte ImmunoGlobUlin
SAB-142 ARresting Progression of Type 1 Diabetes

ATTD
Advanced Technologies & Treatments for Diabetes

ATTD-ASIA
9-11 DECEMBER 2025
SINGAPORE

## SAFEGUARD Trial has Launched

U.S., Australia, and New Zealand are approved with sites being initiated and submissions under review with EMA and MHRA.

## SAB-142 data in depth at ATTD -ASIA

**Dec 9th,10th, and 11th 2025**

Immunomodulation Without Sustained Lymphodepletion: SAB-142, a Fully Human Anti-Thymocyte Globulin

Safety Profile of SAB-142: A Fully Human Anti-Thymocyte Globulin

Profiling the Binding Specificities of SAB-142, a Fully Human Anti-Thymocyte Globulin, against T cell Surface Proteins

Novel Pharmacokinetic (PK) Assay for Measuring SAB-142, a Fully Human Anti-Thymocyte Globulin

Specimen Quality for Multicenter Clinical Trials: Comparing Novel Blood Preservation Methods to Cryopreserved PBMC

SAB BIO