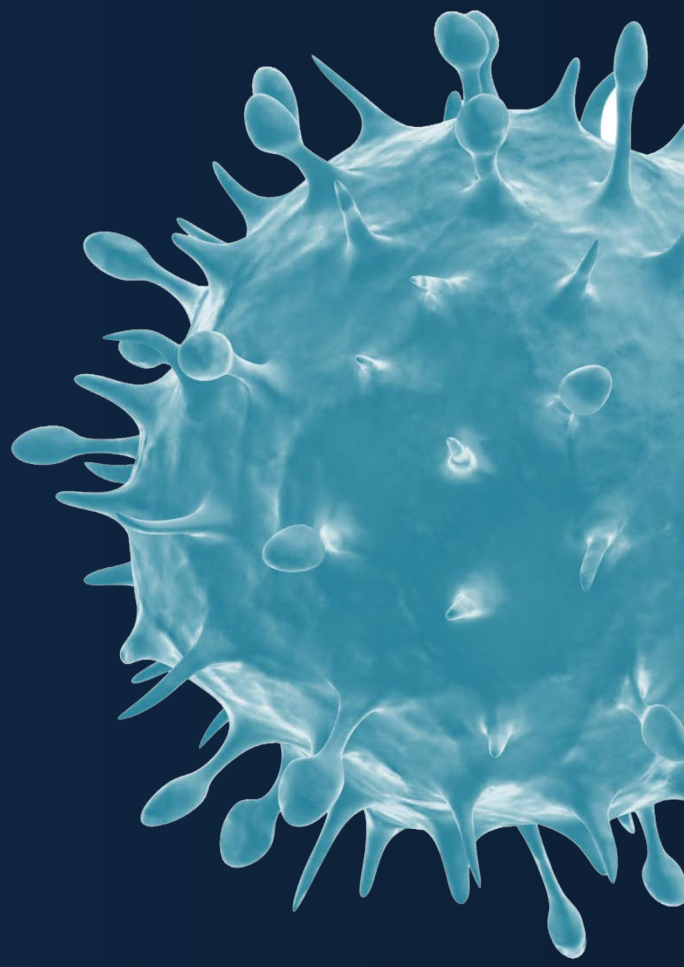
Genocea

Therapeutics at the Forefront
of the T cell Revolution



May l 2017

Safe Harbor Statement

This presentation contains “forward-looking” statements that are within the meaning of federal securities laws and are based on our management’s beliefs and assumptions and on information currently available to management. Forward-looking statements include information concerning our possible or assumed future results of operations, business strategies, financing plans, competitive position, industry environment, potential growth opportunities, potential market opportunities and the effects of competition.

Forward-looking statements include all statements that are not historical facts and can be identified by terms such as “anticipates,” “believes,” “could,” “seeks,” “estimates,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “should,” “will,” “would” or similar expressions and the negatives of those terms. Forward-looking statements represent our management’s beliefs and assumptions only as of the date of this presentation. Our operations involve risks and uncertainties, many of which are outside our control, and any one of which, or combination of which, could materially affect our results of operations and whether the forward-looking statements ultimately prove to be correct. Factors that may materially affect our results of operations include, among other things, those listed in our Annual Report on Form 10-K, our Quarterly Report for the first quarter of 2017 on Form 10-Q and other filings with the Securities and Exchange Commission (“SEC”). Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in the forward-looking statements, even if new information becomes available in the future.

You may get copies of our Annual Report on Form 10-K, Quarterly Report on Form 10-Q and our other SEC filings for free by visiting EDGAR on the SEC website at http://www.sec.gov.

T cell Revolution Underpins Vital New Therapies for Patients

T cells:
Key to new paradigm

Immuno-oncology

T cells drive anti-cancer effect:

- Checkpoint inhibitors
- Cell therapy (CAR-T / TCR)
- Cancer vaccines

Infectious Disease

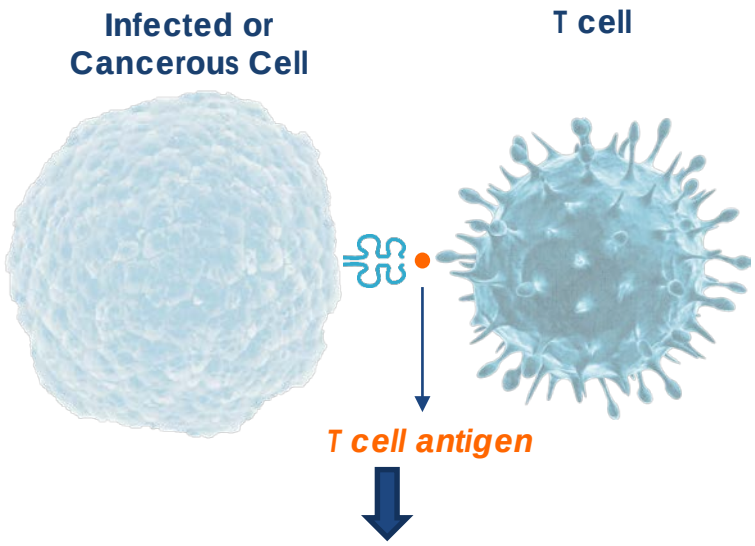
T cells drive treatments for chronic infections:

- HSV (genital herpes)
- EBV (Epstein Barr)
- HBV (Hep B)
- HPV (Human papilloma)

Driving response to best antigens – the targets – of T cells essential to furthering the T cell revolution

T cell Revolution Still in its Infancy

Complexities of T cell immune system



Optimal T cell antigens extremely challenging to find

- (Up to) thousands of candidates
- Diversity – the "right" antigen(s) may vary
  - Per person
  - Per T cell type

Optimizing T cell immune responses

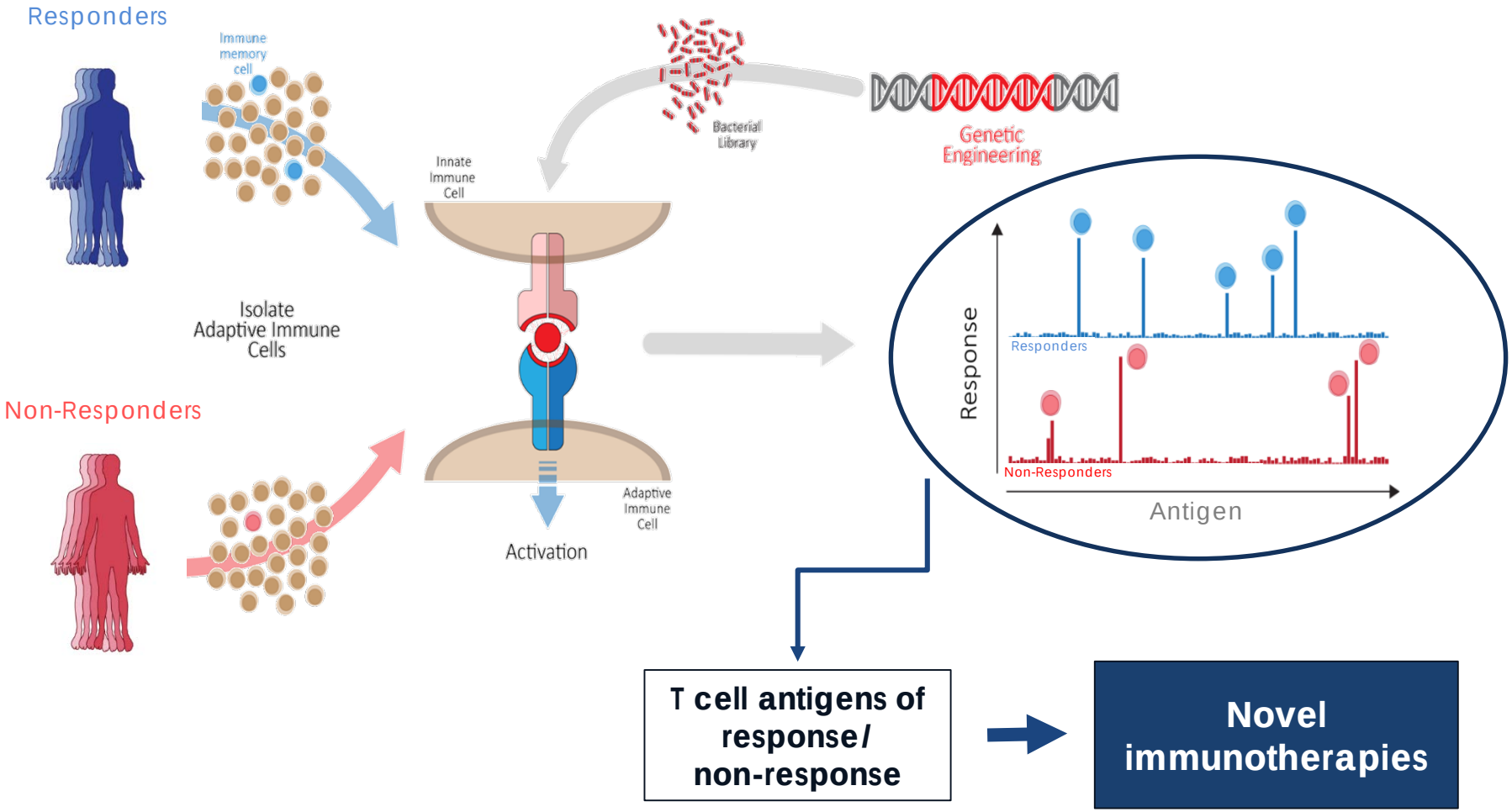
Immunotherapy strategies to date

Known, predicted antigen(s) + Adjuvant/ delivery to T cells

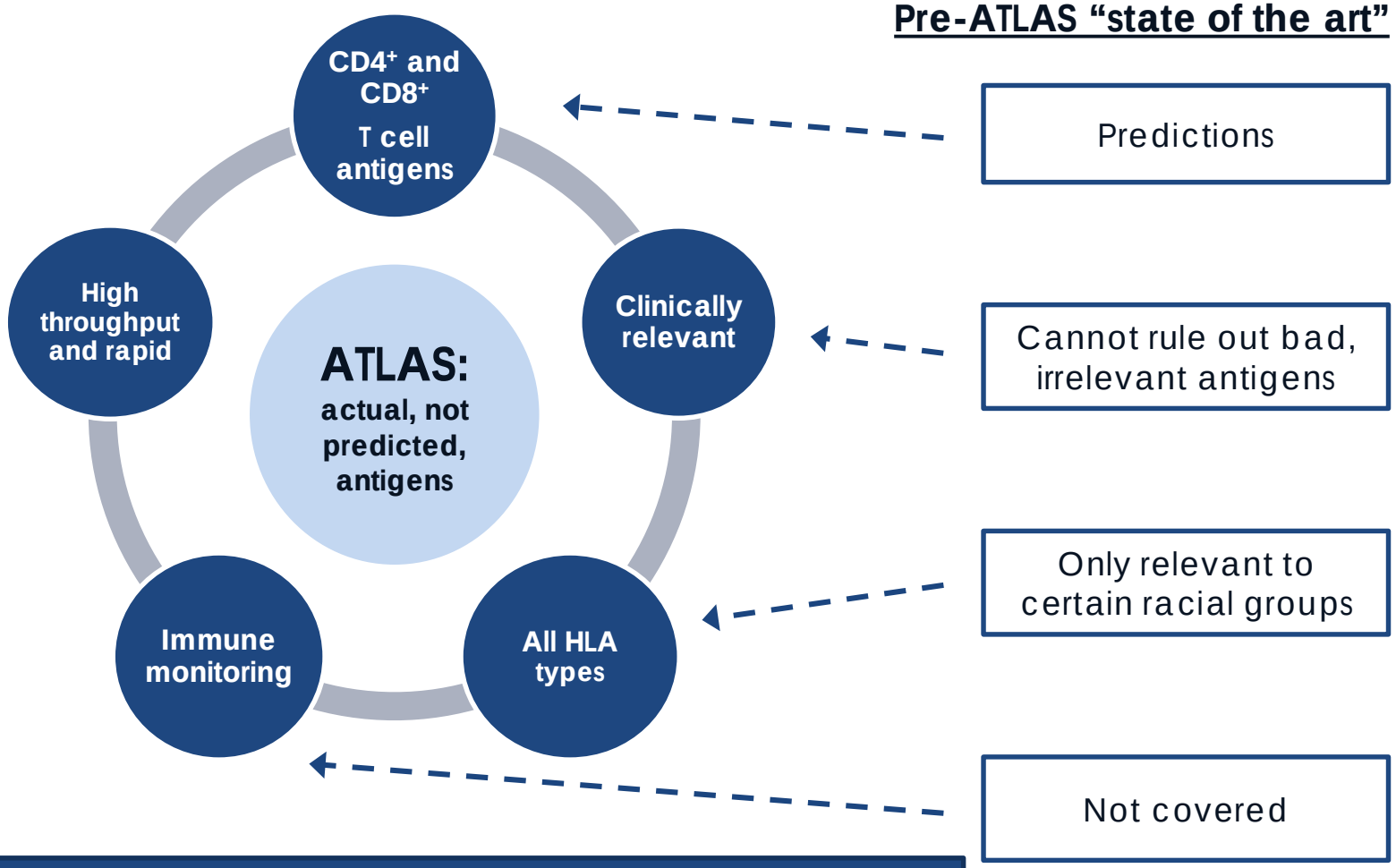
Immunotherapy strategy – ideal

Right T cell antigen(s) + Adjuvant/ delivery to T cells

ATLAS Uncovers the T cell Antigens of Clinical Response



Better T cell Antigens Can Enable Better Therapies



Only ATLAS finds actual T cell antigens, provides panoramic perspective on patient immune responses

ATLAS Has Produced Multiple Promising Vaccine Candidates

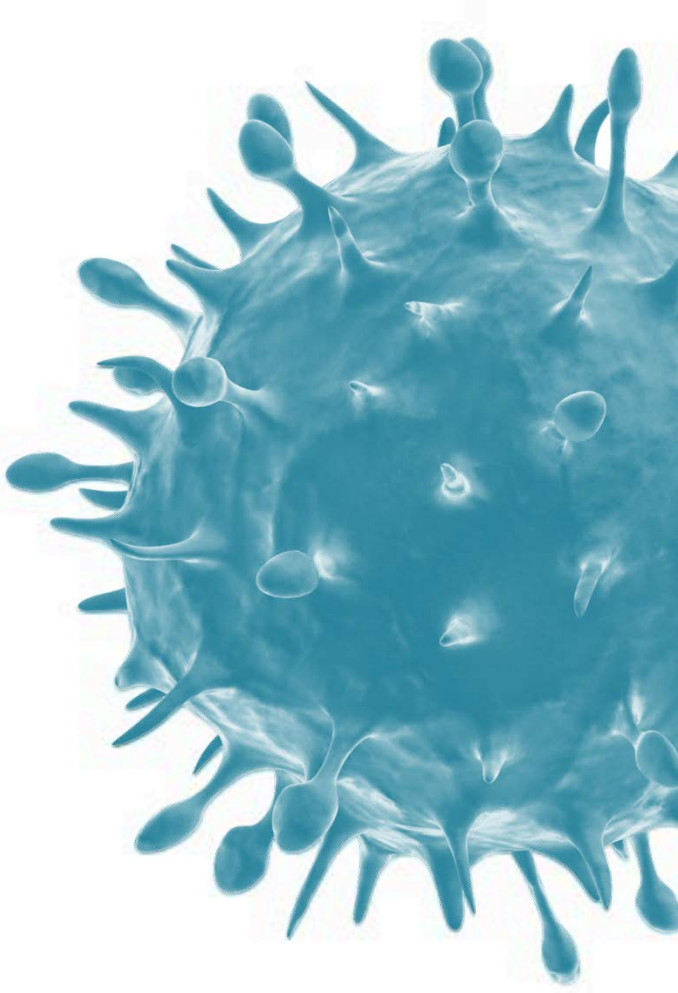
ATLAS™

Better products through better T cell antigen selection and vaccinology

	Now	End 2017
GEN-003 for Genital Herpes	• Phase 2b • First-ever therapeutic vaccine for chronic infection	• **Phase 3 ready**
Immuno-oncology	• Collaborations with leading academics • EBV research program	• **IND filed for Neoantigen-based vaccine(s)**

GEN-003

Genital Herpes Immunotherapy

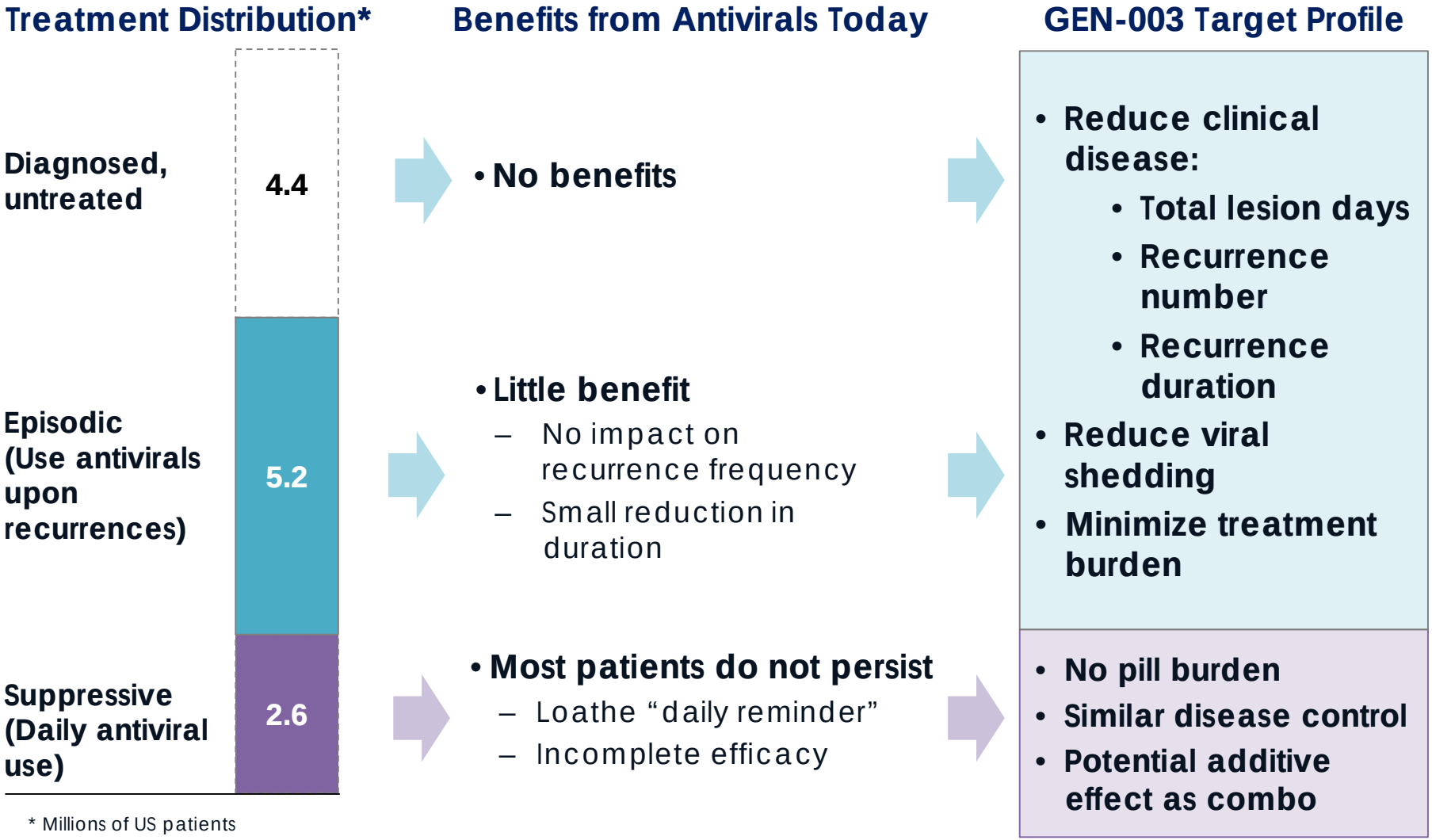


GEN-003: Phase 3-Ready Program with Blockbuster Potential

- Large unmet patient need in a disease of epidemic proportions
  - Potential ~$2 billion global revenue opportunity*
- 3 successful clinical trials to date
  - Clinical efficacy demonstrated against multiple endpoints reflecting patient unmet need
  - Sustained virologic efficacy
  - Durable for at least 2 years
  - Comprehensive dose exploration; consistent efficacy at selected dose
  - Safety profile appropriate for therapeutic setting
- Multiple 2017 milestones
  - Q1: End of Phase 2 meeting
  - Mid-year: 12-month Phase 2b data
  - Q4: Phase 3 ready

*Source: Genocea market research

Millions Infected with Genital Herpes Need a New Treatment Option

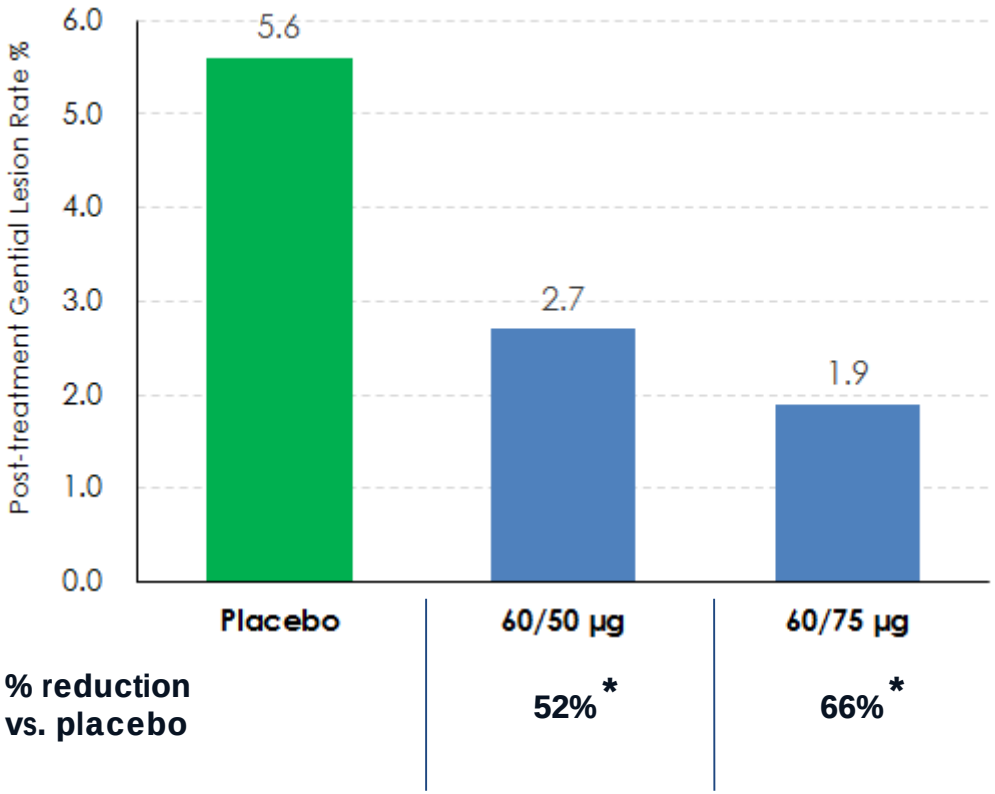


* Millions of US patients

Source: Genocea market research

Phase 2b: GEN-003 Significantly Reduces Genital Lesion Rate vs. Placebo

Median Genital Lesion Rates[(1)] Post Treatment Over 6 Months After Last Dose



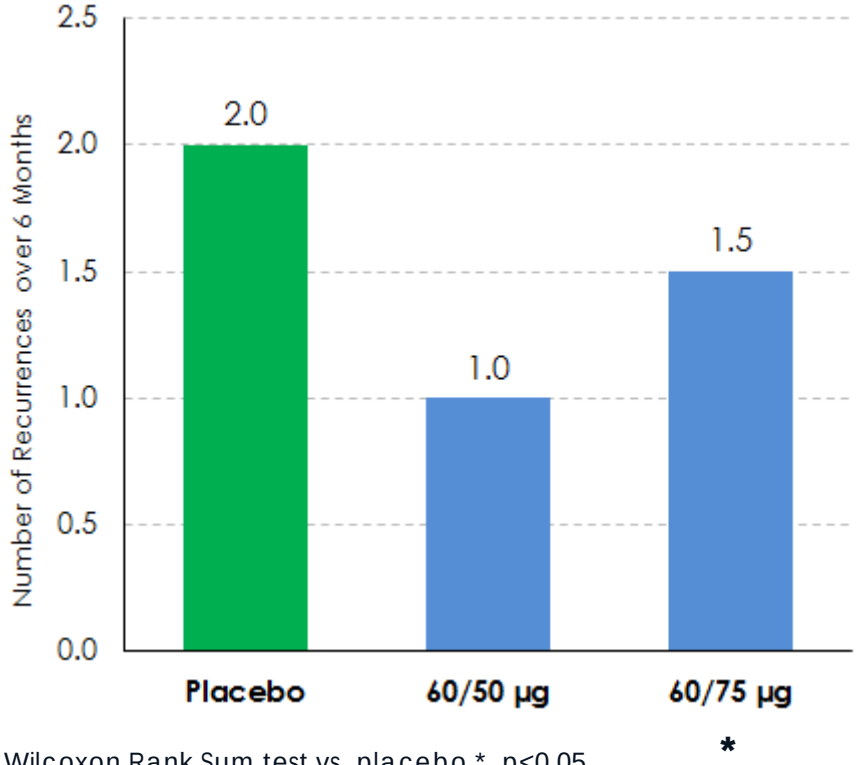
- **Significant efficacy vs. placebo**
- Lesion rate is % of all days with visible lesions reported by subjects
- Endpoint captures durable impact on clinical disease
- Planned Phase 3 Primary Endpoint

Wilcoxon Rank Sum test vs. placebo * $p<0.05$

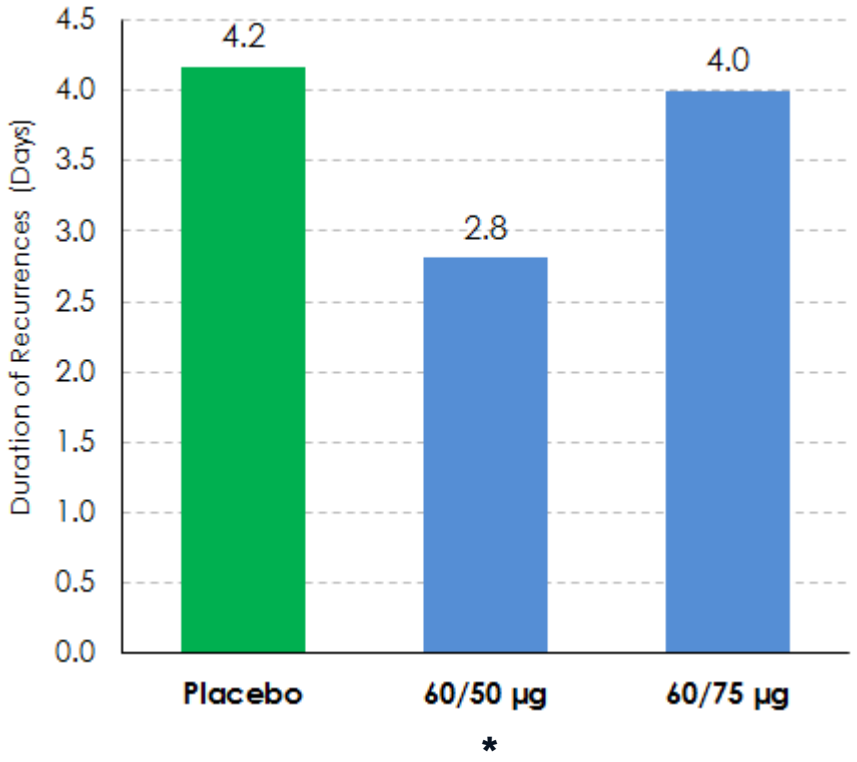
Notes: (1) Days with visible lesions divided by total days

Phase 2b: GEN-003 Significantly Reduces both the Number and Duration of Recurrences Versus Placebo

Median Number of Recurrences Over 6 Months Following Last Dose



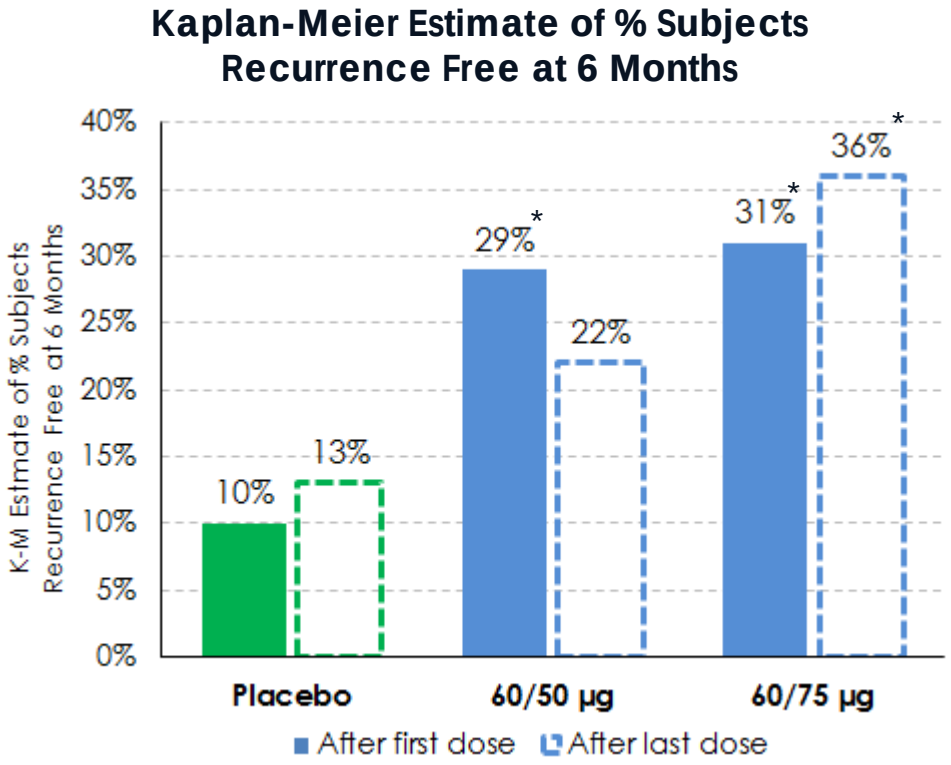
Median Duration of Recurrences Over 6 Months Following Last Dose



Wilcoxon Rank Sum test vs. placebo * $p<0.05$

- Reducing the frequency and duration of recurrences is important to both patients and their caregivers

Phase 2b: GEN-003 Drives Significant Improvement in Number of Subjects Recurrence Free at 6 Months

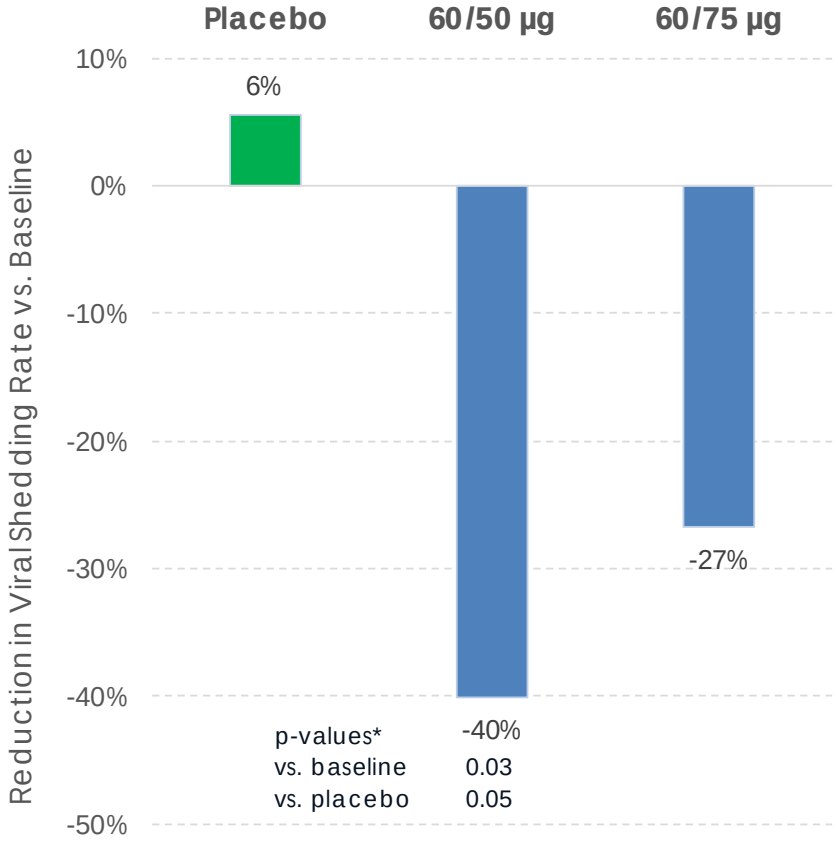


Log rank test vs. placebo * $p<0.05$

- GEN-003 patients 2-3 times more likely to be completely recurrence-free than placebo at 6 months
- GEN-003 efficacy consistent with Phase 2 clinical trial

Phase 2b: Consistent Virologic Efficacy Observed at 60µg per protein / 50µg of Matrix M2

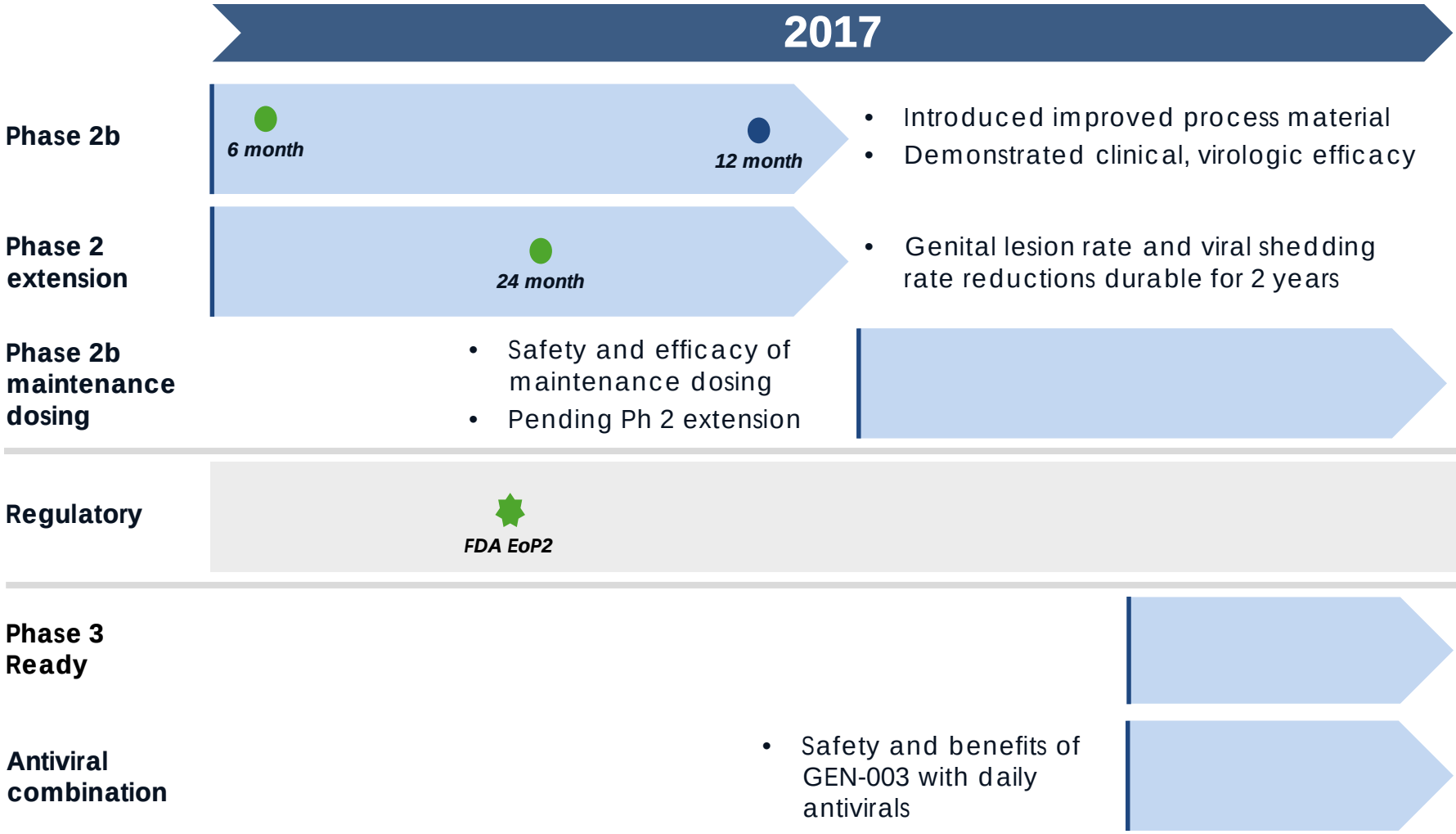
Post-dose 3 Viral Shedding Rate Reduction



- 60/50 dose highly consistent with Phase 2 results
- In prior Phase 2, 60/50 dose continued to reduce viral shedding by up to 66% for at least 12 months post dosing
- 60/50 will be dose in Phase 3

*Poisson model analysis Magaret, Amalia, "Models for HSV shedding must account for two levels of overdispersion" (January 2016). UW Biostatistics Working Paper Series. Working Paper 410.

Phase 2b Clinical Efficacy Data Maintains Momentum to Phase 3 Start



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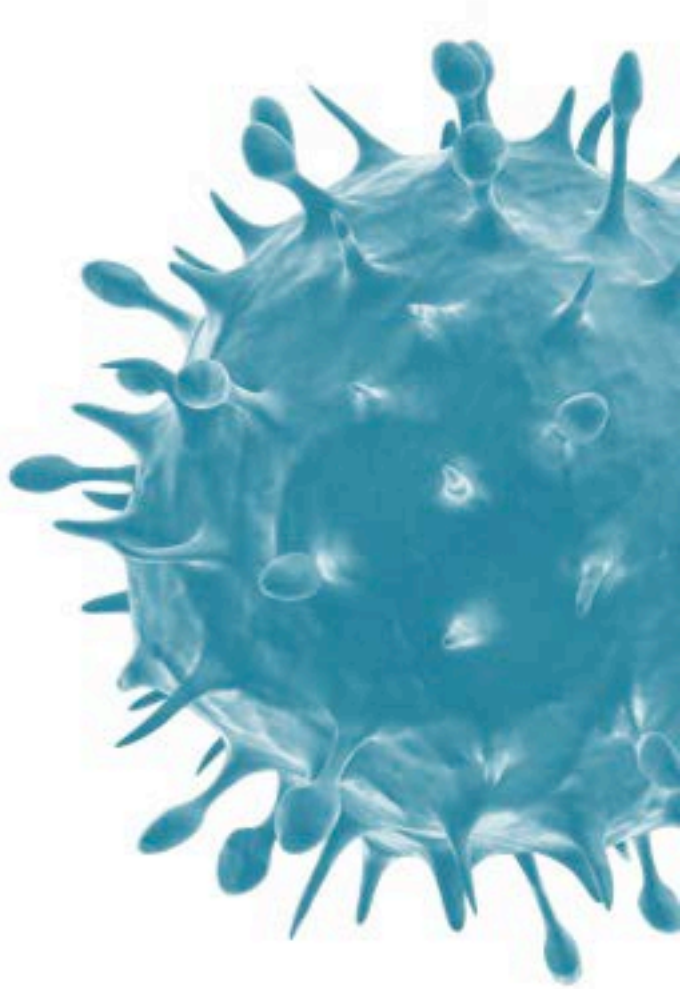
Developing Better Cancer Immunotherapies through ATLAS



Immuno-Oncology: the Incomplete Cancer Revolution

- T cells kill tumors!
  - Checkpoint inhibitors
  - Engineered T cells (CAR-T, TCRs)

- But:
  - Limited response rates
  - Diagnostic tools poorly predict response
  - Current therapies limited by toxicity

The path forward:

1. Cancer vaccines – combined with CPIs – to increase response rates

2. Diagnostic tools to ensure the right patients are treated with CPIs

Industry Continues to Chase Better Algorithms

"...neoantigens represent an optimal target for the immune system and make possible a new class of highly personalized vaccines with the potential for significant efficacy with reduced side effects."

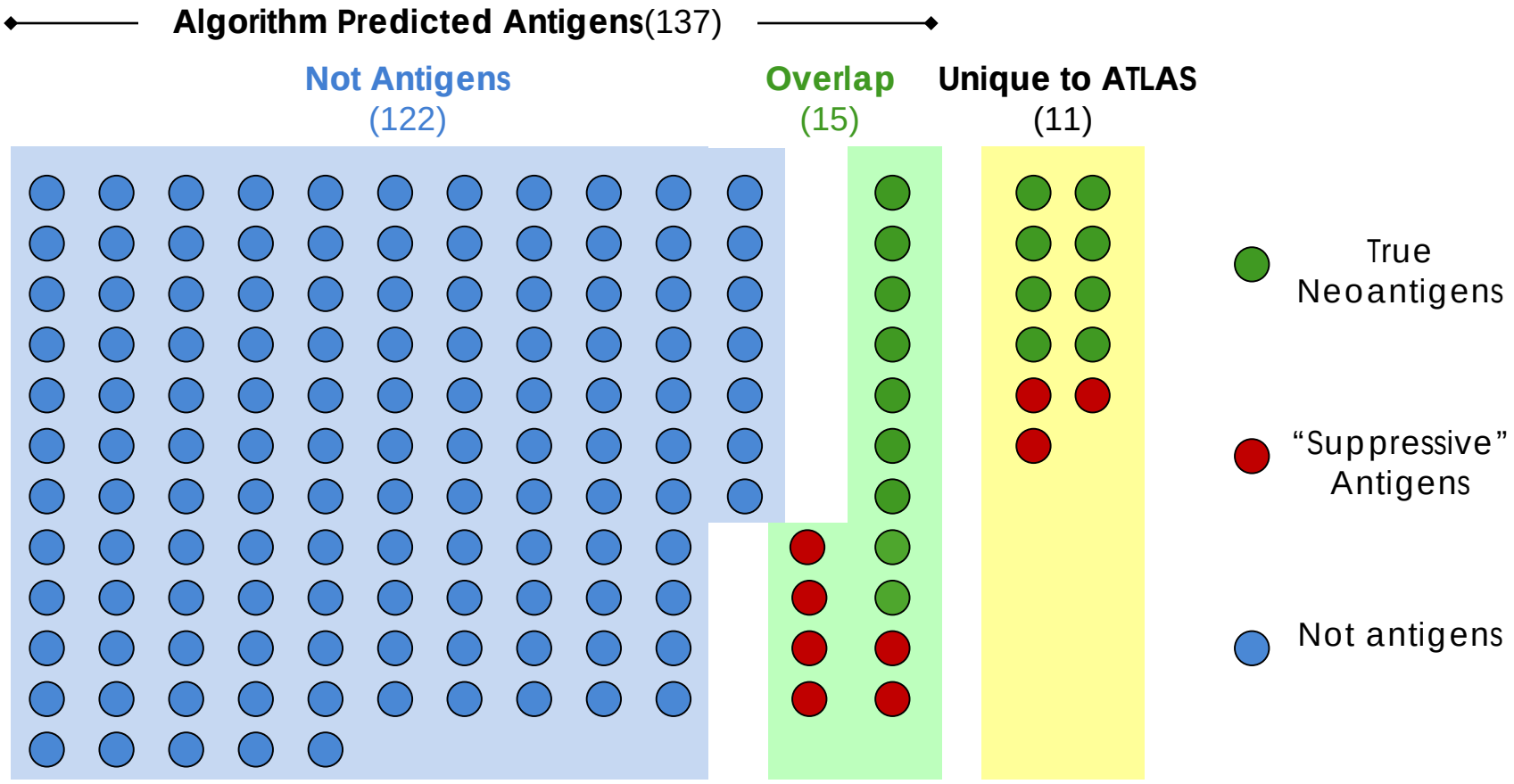
– The Parker Institute, December 1, 2016

- Algorithms are only ~20-30% successful in predicting T cell antigens*
- Consortium created with 30 leading cancer neoantigen research groups from academia and industry
- Goal: to improve the algorithms **to better predict** the neoantigens that should be most visible to the immune system

genocea BIOSCIENCES

*Source: Kreiter et al., Nature (2005)

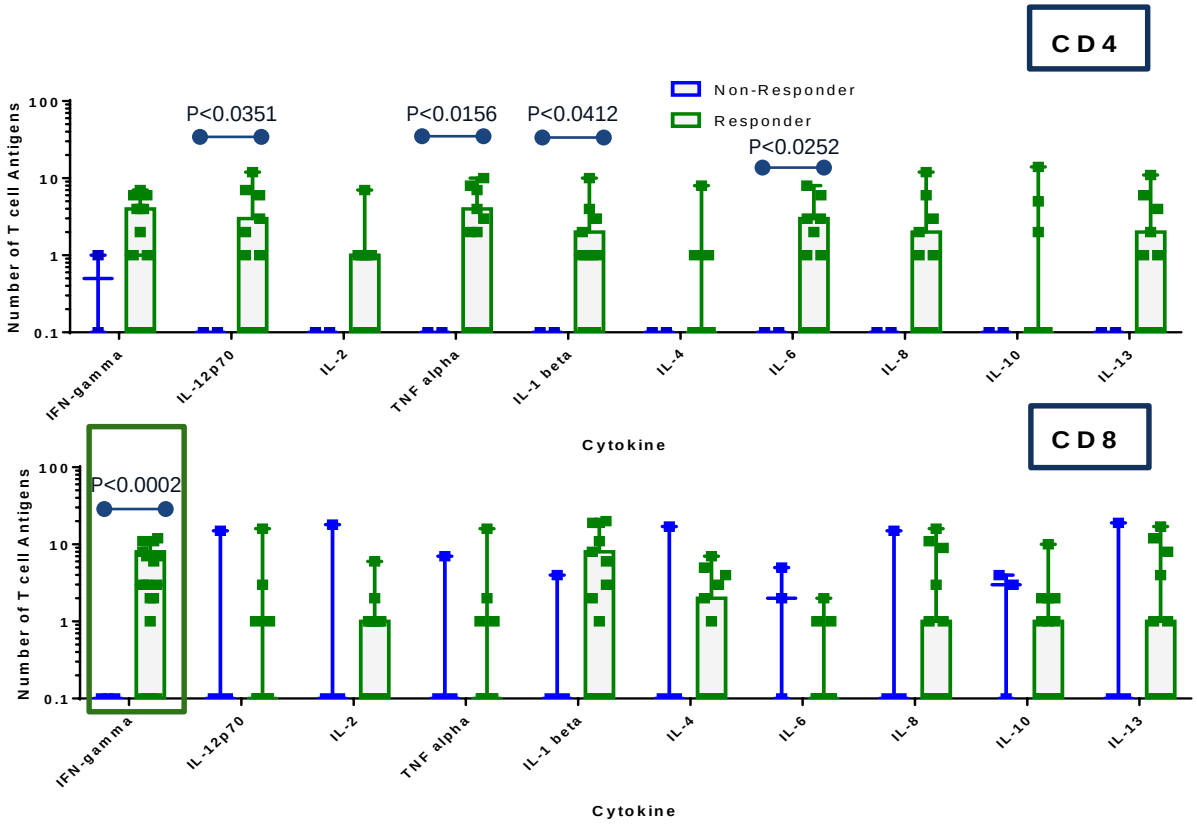
ATLAS Outperforms Algorithms to Find CD8+ T cells Antigens; Uniquely Identifies CD4+ T cells Antigens*



Algorithms missed half the neoantigens found using ATLAS, and could not identify suppressive antigens

*ATLAS also identified CD4+ T cell antigens; algorithms do not model CD4+ T cell epitopes well;
Sample from NSCLC patient with long term response to ICB; collaboration with Tim Chan and Jedd Wolchok, MSKCC

Immunotherapy Biomarkers Proof of Concept Established with Dana Farber Collaboration



- CD4⁺ T cell Responses and IFNγ-secreting CD8⁺ T cells Emerge as Predictors of Response to Therapy

Building Value in Immuno-Oncology

Immunotherapy Biomarkers

- Proof of concept established
- Developing non-invasive diagnostic tools

Checkmate Pharma
Dana-Farber

Neoantigen Vaccines

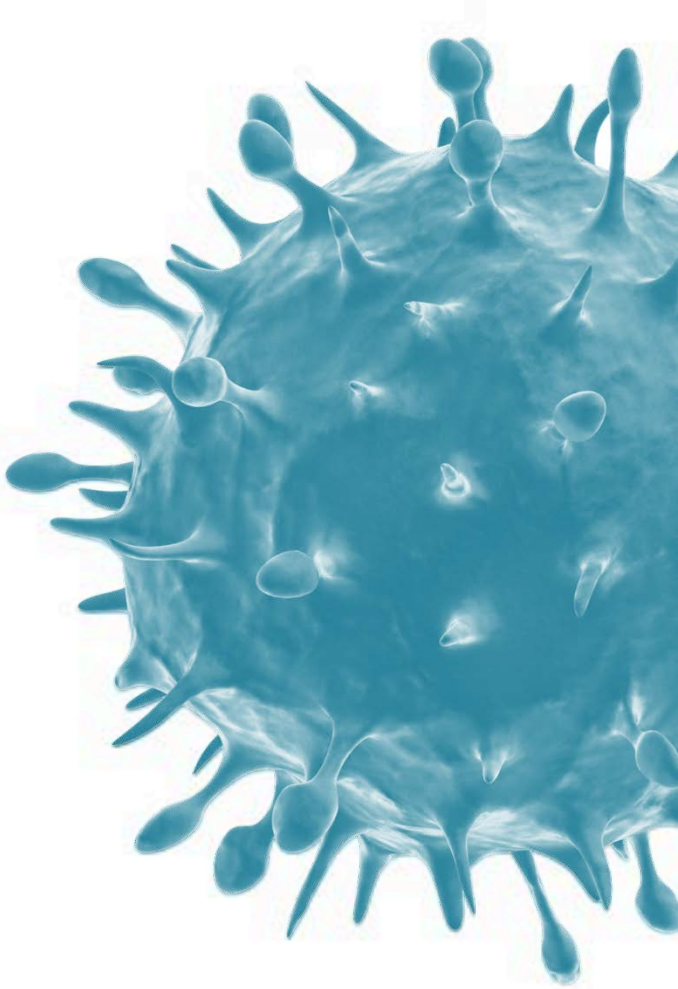
- Proof of concept established
- GEN-009 advancing to IND in 2017

Memorial Sloan Kettering
US Oncology Research

Virus-Associated Cancer Vaccines

- Validating EBV as target
- Internal research ongoing

Genocea Value Proposition



Therapeutics at the Forefront of the T cell Revolution

	DISCOVERY	PRE-CLINICAL	PHASE 1	PHASE 2	STATUS
GEN-003 *Genital Herpes*					• Phase 3 start planned Q4'17
GEN-009 *Personal Neoantigen Cancer Vaccine*					• IND filing in 2H 2017
Epstein-Barr Virus					• Antigen selection in 2017
T cell response profiling in oncology therapeutics clinical trials					• Checkmate • US Oncology • Dana Farber

- Infectious disease programs available for partnering:
  - GEN-004 for pneumococcus (Phase 2), Genital Herpes, Chlamydia (both pre-clinical), Malaria (discovery)
- Sufficient cash into Q1 2018

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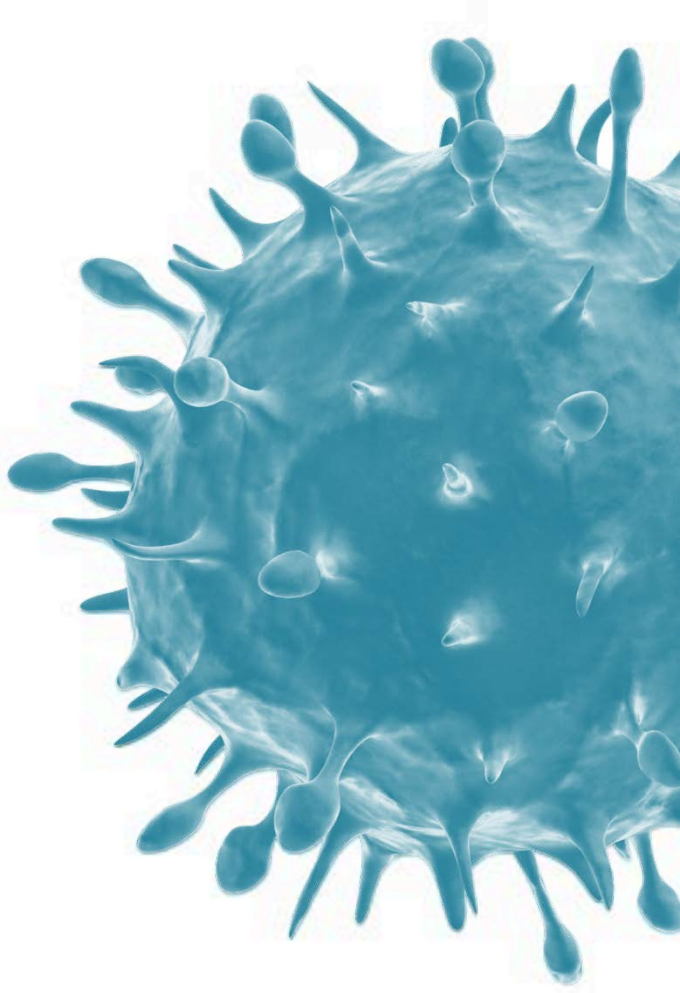

Capital Strength and Structure

- Cash at Q1 2017 – $48.7m
- Funded into 1Q 2018
- Additional capital flexibility
  - Business development
  - $50m ATM facility filed
- Debt facility - $17.0m drawn
- Shares outstanding (05/04/17)
  - Basic – 28.5m
  - Fully diluted – 33.5m