PDS Biotechnology

Targeting killer T-cells against cancer

Biologics that Recruit and Activate T-cells in-vivo to Target and Kill Specific Cancers

LD Micro Conference, Los Angeles, CA
Wednesday, December 11th, 2019

Frank K. Bedu-Addo, Ph.D.
CEO, PDS Biotechnology

Forward-Looking Statements

This presentation contains forward-looking statements about PDS Biotechnology Corporation (“PDSB”), and its businesses, business prospects, strategies and plans, including but not limited to statements regarding anticipated preclinical and clinical drug development activities and timelines and market opportunities. All statements other than statements of historical facts included in this presentation are forward-looking statements. The words “anticipates,” “may,” “can,” “plans,” “believes,” “estimates,” “expects,” “projects,” “intends,” “likely,” “will,” “should,” “to be,” and any similar expressions or other words of similar meaning are intended to identify those assertions as forward-looking statements. These forward-looking statements involve substantial risks and uncertainties that could cause actual results to differ materially from those anticipated.

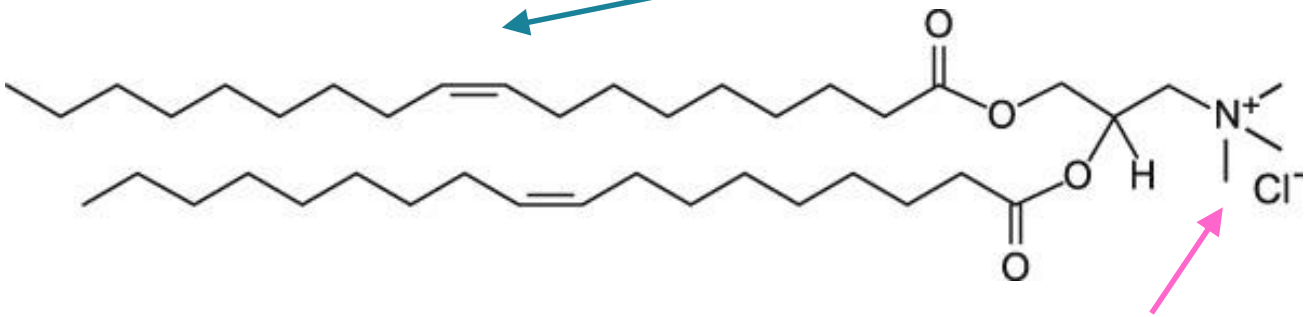
Factors that may cause actual results to differ materially from such forward-looking statements include those identified under the caption “Risk Factors” in the documents filed with the Securities and Exchange Commission from time to time, including its Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date of this presentation. Except to the extent required by applicable law or regulation, PDS undertakes no obligation to update the forward-looking statements included in this presentation to reflect subsequent events or circumstances.

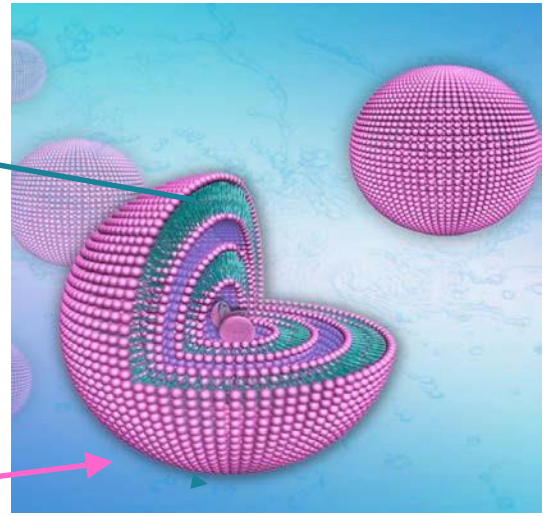
Presentation Overview

- Introduction to the Versamune® technology and how its peer-reviewed and published mechanism enables the Versamune®-based products to overcome key limitations of current immuno-oncology (*Journal of Immunology, June 2019*)
- Discussion of PDS0101 monotherapy clinical data and confirmation of first-in-class demonstration of high levels of *in-vivo* circulating tumor-specific killer T-cells
- Discussion of PDS0101 clinical data and how it informed the design of three (3) upcoming Phase 2 clinical trials partnered with the leaders in the field to enable rapid proof-of-concept with mitigated risk
- Review of robust and diverse Versamune®-based pipeline

Introduction to the Proprietary Versamune® Platform Technology

Water-insoluble
Fatty acids/hydrocarbon chains





Water-soluble &
positively charged head-group
coats the particle surface

Versamune® based on proprietary, positively charged and immune activating lipids - Form spherical nanoparticles in aqueous media
Sized to mimic viruses - Promotes excellent uptake by dendritic cells of immune system
Versamune® activates & matures dendritic cells* - Migrate to lymph nodes

Versamune® protected by multiple issued US & international patents valid 2031-2034

*Dendritic cells – cells of the immune system whose function is to take up foreign proteins, process & present them to T-cells in order to train the T-cells to recognize the infected cells

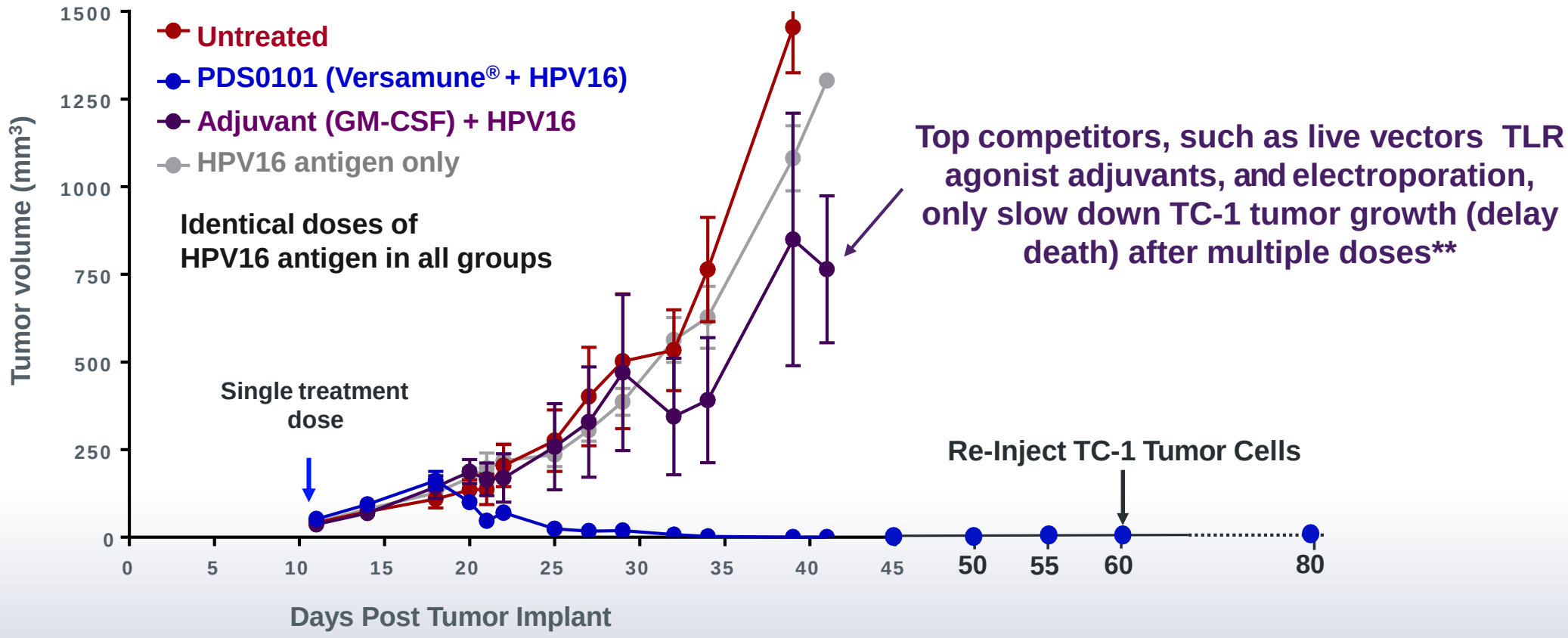
Versamune® Overcomes the Challenges of Immunotherapy

Limitations of Immunotherapy	How Versamune® Overcomes the Challenges
Inability to induce a robust killer T-cell response *in-vivo*	✓ **Promotes high number of clinically effective killer T-cells *in-vivo***
Poor antigen* uptake and processing by dendritic cells	• Efficient antigen uptake and endosomal processing
Poor ability to present antigens via the MHC Class I pathway	• Antigen presentation via MHC Class I and Class II pathways leads to killer (CD8+) and helper (CD4+) T-cell induction respectively
Non-specific immune activation resulting in weak T-cell responses and high blood presence of inflammatory cytokines	• Specifically triggers Type I IFNs and activation in local lymph nodes leading to high number of polyfunctional (most potent type) T-cells *in-vivo* & high safety
Mechanistic limitations result in lack of therapeutic benefit in human studies	• Immune responses associated with regression of disease in human study (PDS0101 monotherapy)

*Antigen – the unique or foreign protein associated with the cancer that can be recognized by our T-cells

PDS0101: Superior Preclinical Regression of HPV-Positive TC-1 Tumors & Memory Response vs. the Top Clinical Stage Products

In Vivo induction of superior quantity & quality of tumor-specific CD4+ and CD8+ T-cells results in complete regression and effective T-cell memory after a single dose*



*J. Immunology, 2019 (202), 1215
**Studies in TC-1 tumor model with other immunotherapies reported in: Vaccine 2009, January 14, 27 (3): 431; Science Translational Medicine 2016, 13 April, Vol 8 Issue 334; Vaccine 2009, August 3, 27 (33): 5706

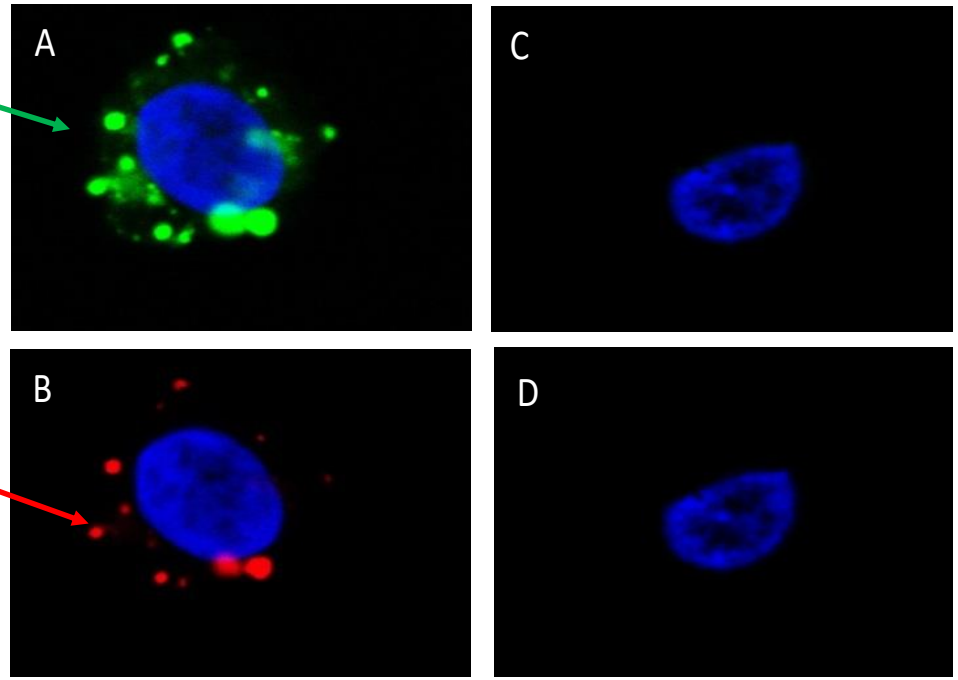
Versamune® Promotes Superior Antigen Processing and Presentation by Dendritic Cells to T-Cells

Incubation of fluorescent DQ-OVA* + Versamune® with human THP1 monocytes
Effective uptake, processing and endosomal accumulation in presence of Versamune®
Facilitates access to MHC Class-I Pathway and priming of killer T-cells

Versamune® + DQ-OVA | DQ-OVA

Versamune®-induced protein uptake and processing (green fluorescence)

Versamune®-induced accumulation of processed protein in the cell's endosome (red fluorescence)

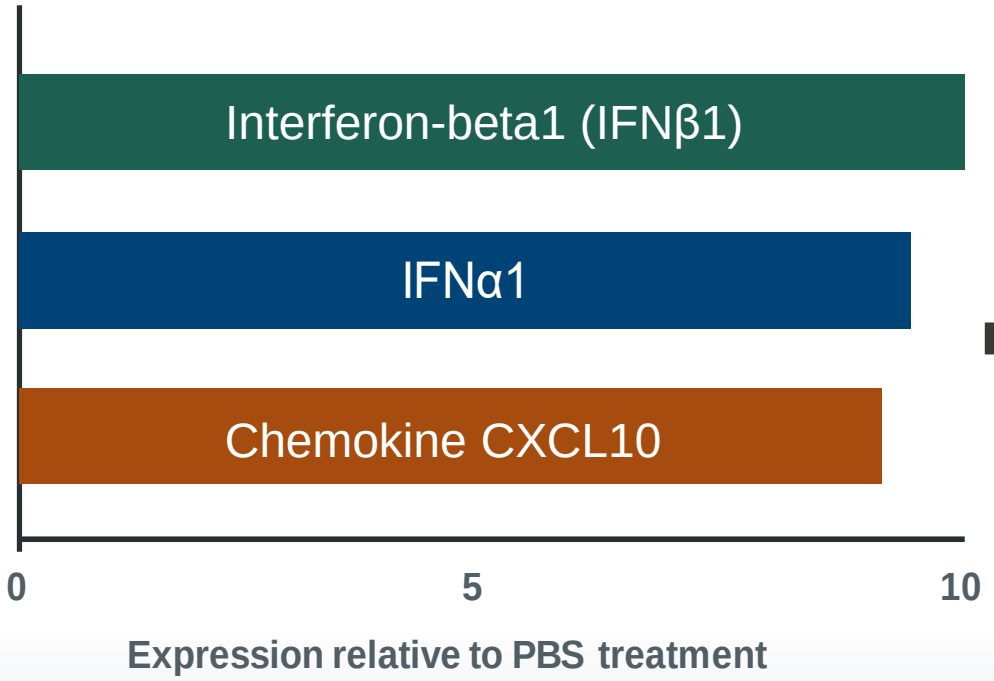


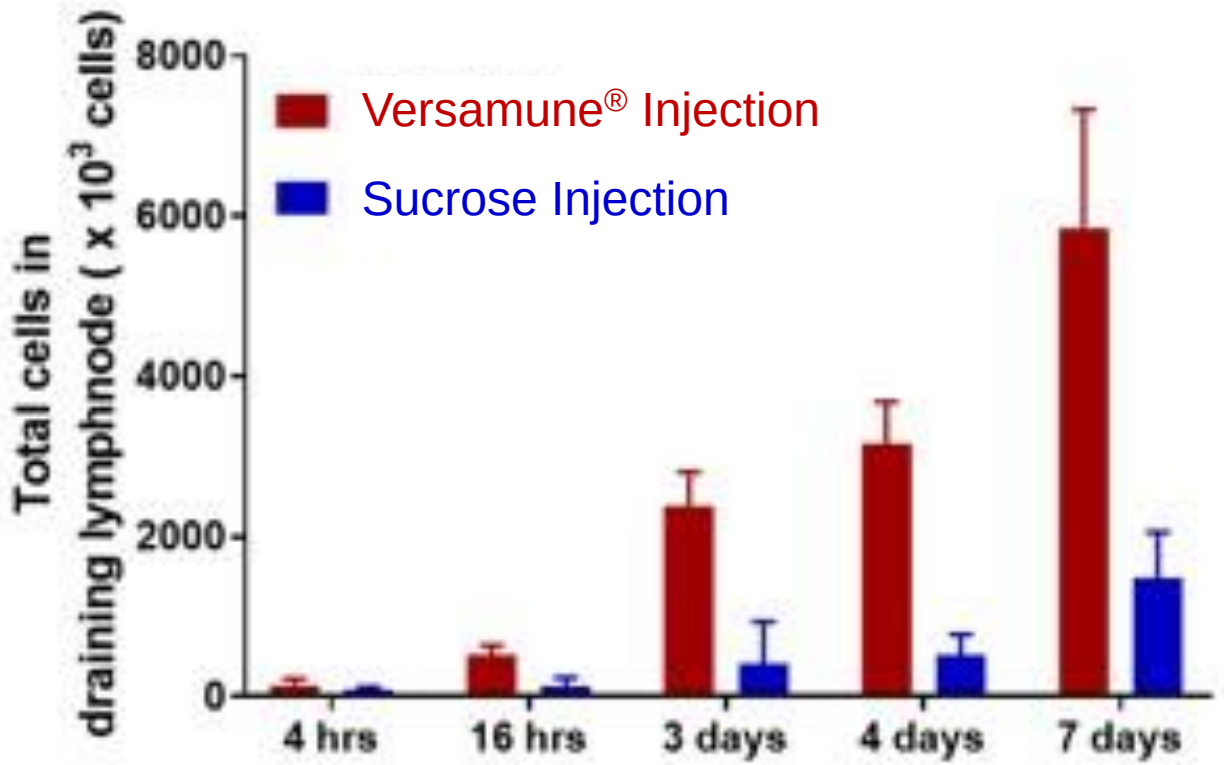
Confocal microscopy:

**DQ-OVA is the protein ovalbumin conjugated to a fluorescent molecule and used as a model antigen to facilitate the study of antigen uptake and antigen processing and trafficking within the dendritic cell

Induction of Type I Interferons & Associated Chemokines in the Lymph Nodes Leads to Powerful & Sustained Recruitment of T-Cells

Elevated T-cell levels persist in lymph nodes for over 7 days after 1 Versamune® dose
Localization of cytokines & chemokines promotes a strong safety profile

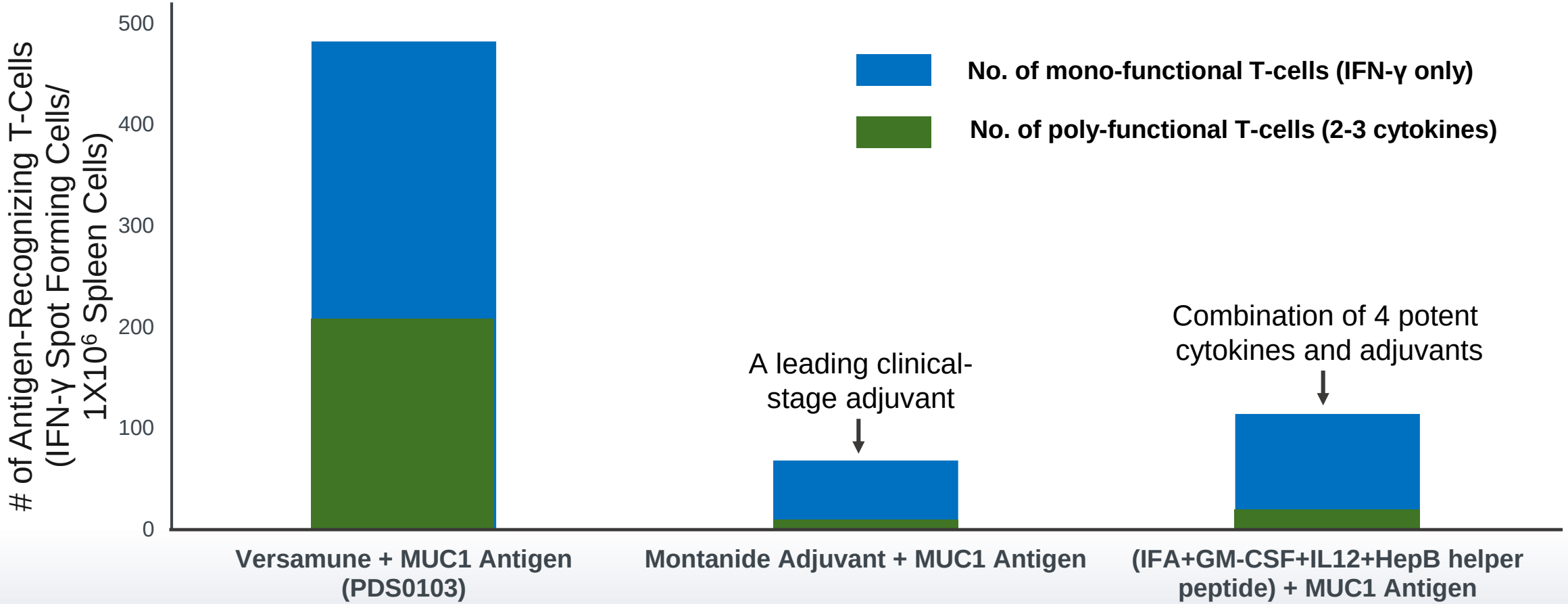




Abbreviated from S. Gandhapudi et al, Journal of Immunology, 2019 (202), 1215

Subcutaneous Injection of Versamune® Products Leads to Superior Quantity & Quality of Tumor-Attacking Killer T-Cells *In-Vivo*

Versamune® induces > 10-Fold Higher Poly-functional (Most Potent) T-Cells



Adapted from S. Gandhapudi et al, Journal of Immunology, 2019 (202), 1215

Versamune® Immuno-Oncology Products: Clinical Development Strategy in Advanced Cancer

Versamune®-based immunotherapies being developed as combination therapies to exploit demonstrated synergies between Versamune® and other anti-cancer agents

- Checkpoint inhibitors have shown confirmed clinical efficacy and have demonstrated clinical benefit in late stage cancer
  - Checkpoint inhibitors block a key immunological defense mechanism for cancer tumors, and are reported to **work primarily in patients whose immune systems are already generating tumor-attacking CD8+ killer T-cells pre-treatment**
- Using various tumor-specific proteins (antigens), Versamune® has demonstrated the **unique ability to generate large and superior numbers of CD8+ killer T-cells** that effectively recognize and kill antigen-expressing cancer cells in preclinical and **human clinical studies**

- ***PDS is developing a new generation of advanced cancer treatments combining Versamune®-based immunotherapies with checkpoint inhibitors and other standard-of-care therapies***

Overview of Lead Clinical Product (PDS0101)

HPV-Associated Cancers and Pre-Cancers

PDS0101
Immunotherapy for Advanced HPV-Associated Cancers

- PDS0101 is based on two components:

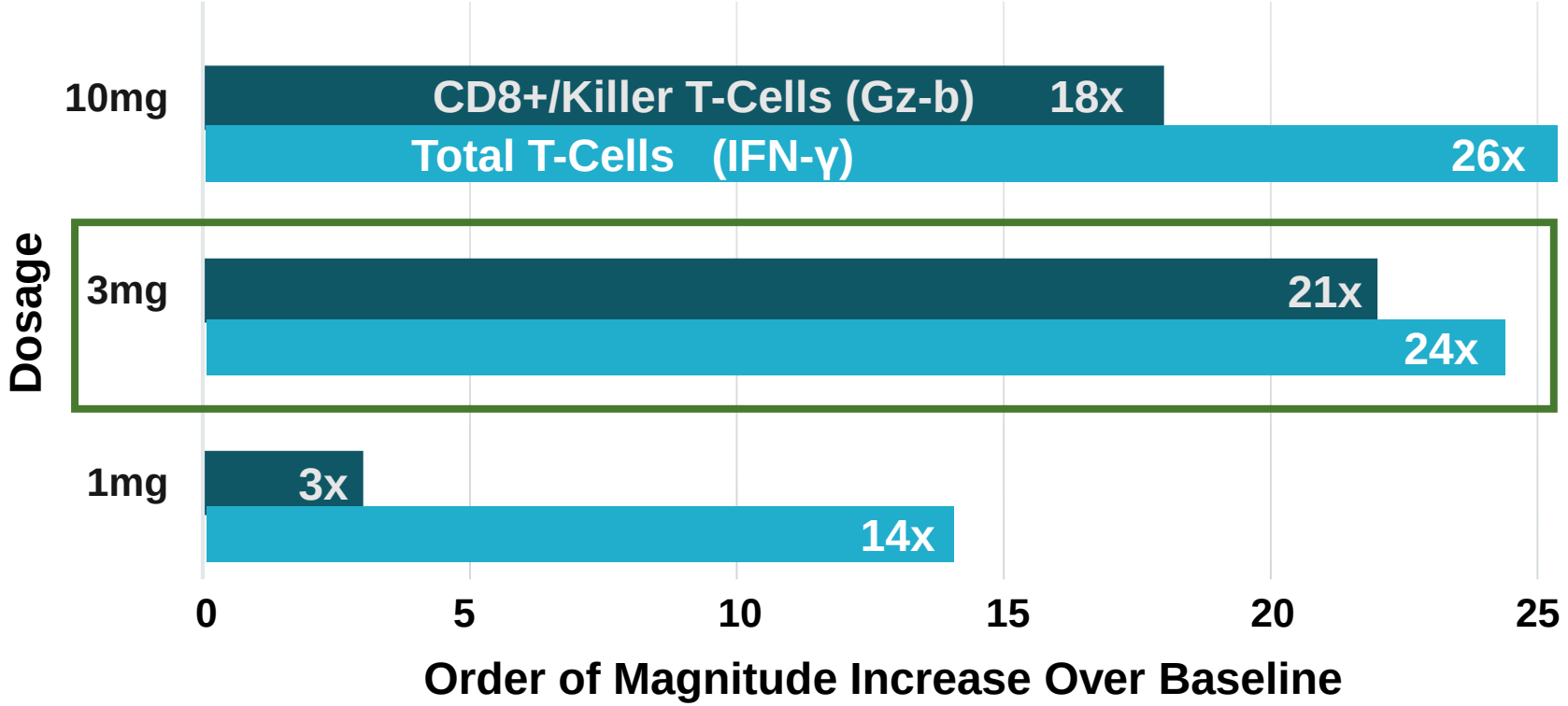
  1. Proprietary mixture of six HPV16 E6 and E7 long viral peptides designed to address over 90% of the population
     - HPV16 causes the vast majority of advanced HPV associated cancers
     - In a human clinical trial, PDS demonstrated that its proprietary antigens are effectively recognized by the immune systems of HPV-infected patients
     - Treatment led to strong HPV-specific killer T-cell responses and clinical benefit

  2. Versamune® platform technology has demonstrated an exceptional ability to prime killer (CD8+) T-cells of the immune system to recognize specific tumor antigens included in each formulation, and to arm T-cells with a potent ability to specifically attack and kill the cancer cells expressing that tumor antigen*

*S. Gandhapudi et al, Journal of Immunology, 2019 (202), 1215

Human Clinical Results: Phase 1 Clinical Study Showed Unique & Potent HPV16 CD8+ T-Cell Induction by Granzyme-b ELISPOT

Over 20-Fold Increase in HPV-Specific CD8+ T-Cell Responses on Day- 14 Versus Pre-Treatment Levels T-Cell Responses were Confirmed to be Independent of Patient Genetic Sub-Type (HLA)



- Open label study
- High-risk HPV & CIN
- 3-6 subjects/cohort

Unlike PDS0101, no T-cell activating technology or immunotherapy has demonstrated the ability to induce *in-vivo* in humans, quantifiable amounts of granzyme-b inducing antigen-specific CD8+ T-cells in circulating blood

PDS0101 Phase 1 Follow-up Data Supports Observed Strong Killer T-Cells: Regression of CIN Lesions in at Least 60% of Evaluable Patients

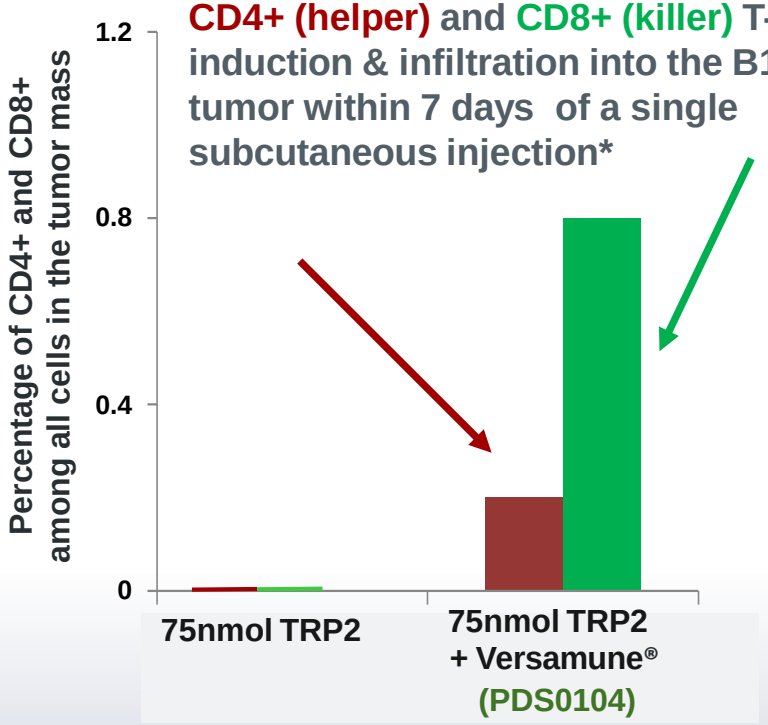
- All patients had high-risk HPV infection and CIN, but not all had HPV16 infection
- Clearance of the CIN (lesion regression) was observed in at least 6 of 10 evaluable patients across the three tested doses, as early as 1-3 months after treatment in several patients
- Spontaneous regression of CIN1 occurs in about 44% of patients over a 2 year duration*
- Two of twelve patients were not evaluable
  - One patient, who demonstrated a strong HPV16 T-cell response was lost to follow up
  - Another patient received LEEP excision therapy (standard of care)
- Two patients who had regression by cytology were not considered clinical responders:
  - 1st regressed to atypical cells of undetermined significance at 1st test (3 mths) but HPV detected
  - 2nd had complete regression by cytology at 1st test (3 mths) but had residual CIN by colposcopy

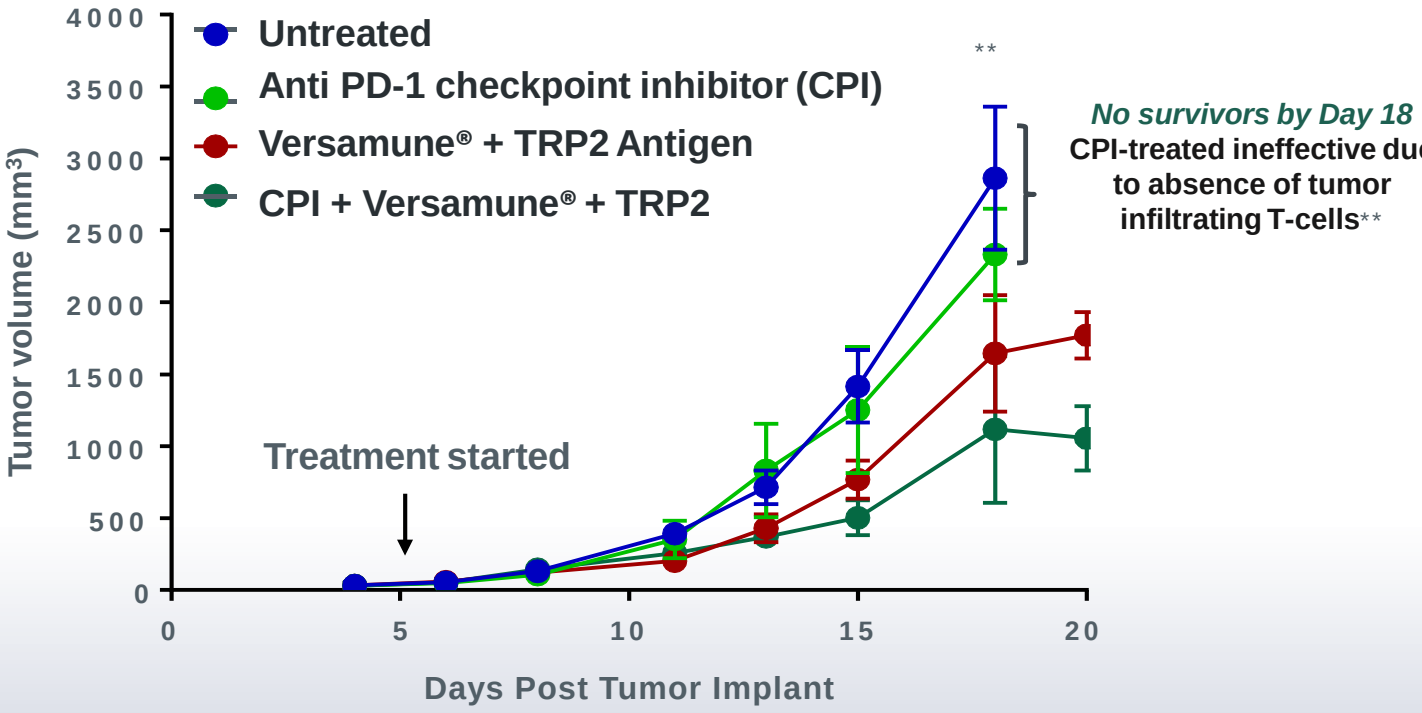
*Stefani C. et al, 2014, European Review for Medical and Pharmacological Sciences, 18: 728-733.

Synergy of Versamune® + Tumor Antigen and Checkpoint Inhibitor Demonstrated in Aggressive B16 Melanoma Model

Versamune® + TRP2 antigen (sub-optimal levels) demonstrates strong synergy with checkpoint inhibitor in B16 melanoma: Provides significantly prolonged survival over checkpoint inhibitor therapy**

Versamune® promotes TRP2-specific **CD4+ (helper)** and **CD8+ (killer)** T-cell induction & infiltration into the B16 tumor within 7 days of a single subcutaneous injection*





*Vasievich et al, Molecular Pharmaceutics 2012, 6, 9(2) 261-8
**S. Gandhapudi et al, Journal of Immunology, 2019 (202), 1215

PDS0101 Phase 2 Combination Trials with Leaders in Immuno-Oncology

Technology & Product-Validating Partnerships

Clinical trials to be initiated in late Q1/early Q2 2020
Interim data expected within 12-18 months of start

PDS Product	Indication	Partner	Added Combination Product	Study Size
PDS0101 (HPV-Cancer)	Head & neck cancer First line treatment Recurrent/metastatic	MERCK	KEYTRUDA® (Standard of care)	96 subjects 20 US sites
	Advanced HPV cancers	NIH NATIONAL CANCER INSTITUTE Confidential Large Pharma	Two Novel Immunotherapies (Promising results in phase 1 studies)	30 subjects 1 US site (NCI)
	Cervical cancer Stage IIb-IVa	Partner yet to be announced	Chemo-radiotherapy (Standard of care)	33 subjects 1 US site

Overview of Pipeline

Developing Broad Product Pipeline with Leaders in I-O

Product	Indication	Partner	Combination	Status
PDS0102 (TARP)	Prostate and breast cancers	NIH NATIONAL CANCER INSTITUTE No industry partner selected	Checkpoint Inhibitor	Preclinical studies ongoing
PDS0103 (MUC-1)	Ovarian, colorectal, lung, breast cancers	No industry partner selected	Checkpoint Inhibitor	Preclinical studies ongoing
PDS0104 (Melanoma)	Melanoma	No industry partner selected	Checkpoint Inhibitor	Preclinical studies ongoing

Clinical Development of PDS0102

- The National Cancer Institute (NCI) demonstrated that its proprietary TARP antigen is immunogenic in prostate cancer patients, with injection/vaccination resulting in a significant lowering of tumor growth rate
  - PDS is combining TARP with Versamune® to promote more effective induction of prostate-specific CD4/CD8 T-cells and altering of the tumor microenvironment*.

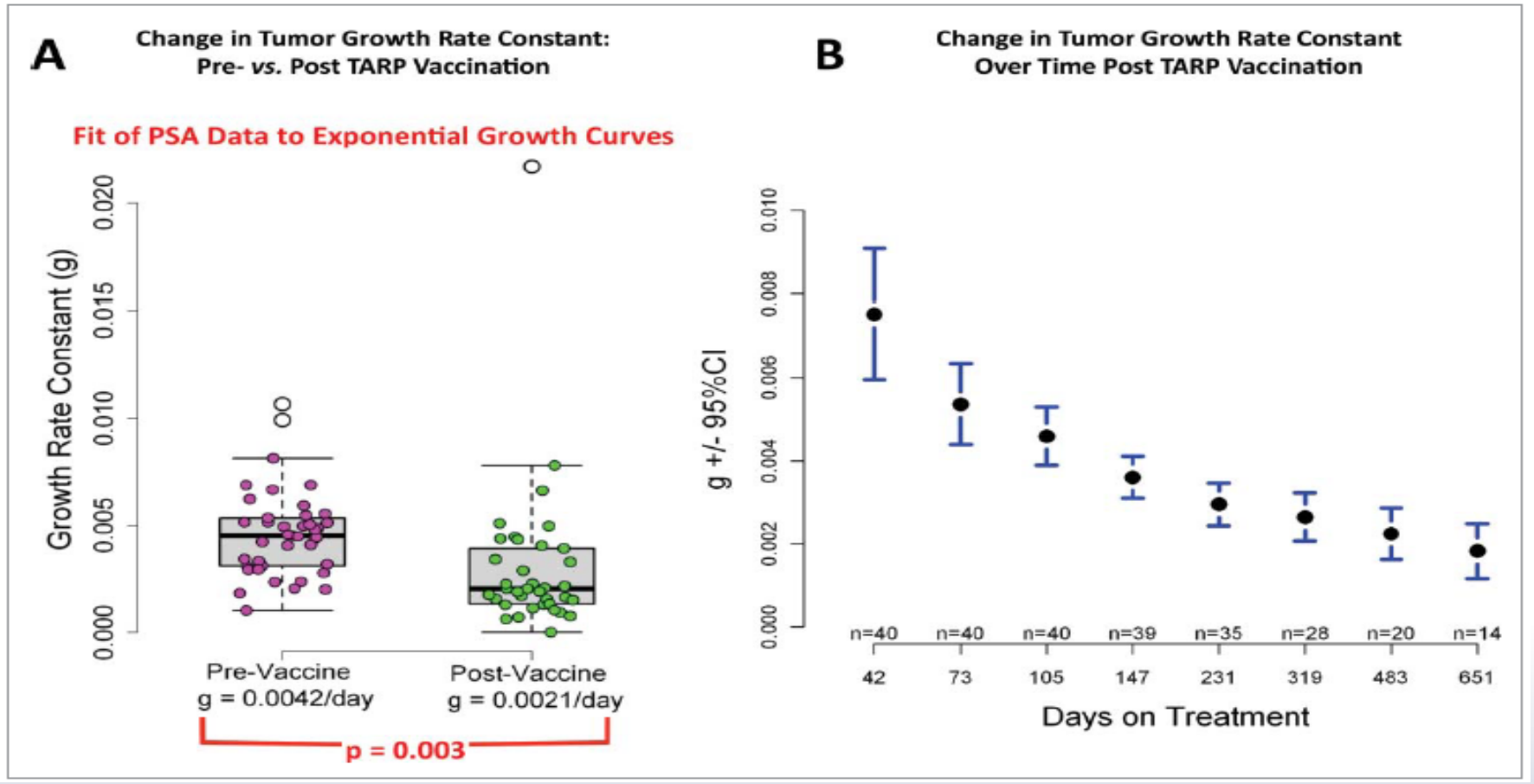
- PDS has a collaborative research and development agreement (CRADA 03039) with the NCI to co-develop PDS0102 (NCI-patented TARP cancer antigen with Versamune®) in combination with a synergistic immunotherapeutic product:
  - Checkpoint inhibitors have shown confirmed clinical activity and have demonstrated strong potential in on-going prostate cancer trials
  - In on-going preclinical studies Versamune®, has demonstrated the ability to significantly enhance the immune system's ability to generate TARP-specific killer T-cells
  - Prostate cancer patients treated with a TARP-based immunotherapy (no Versamune®) showed generation of TARP recognizing T-cells and reduction in tumor growth rate*

*L. V. Wood et al et al, Oncoimmunology, 2016, Vol. 5 (8)

Clinical Development of PDS0102

Validation of the TARP antigen for use in a prostate cancer immunotherapy

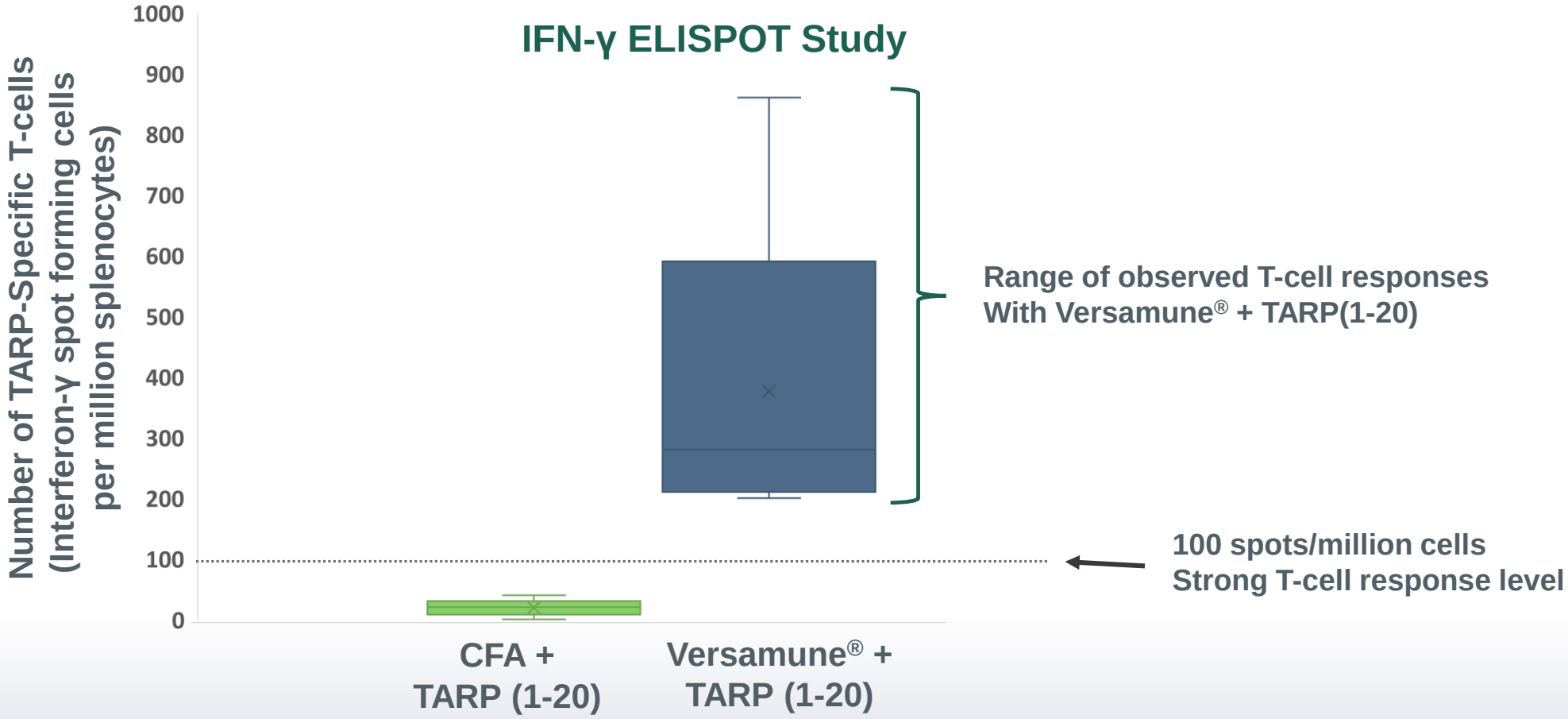
TARP antigen was seen to be immunogenic in Stage D0 prostate cancer patients – Patients vaccinated with TARP showed a significant decrease in tumor growth rate based on PSA levels*



*L. V. Wood et al et al, Oncoimmunology, 2016, Vol. 5 (8)

PDS0102: Versamune® May Provide Superior *In-Vivo* Ability to Generate Significantly Enhanced Anti-TARP Killer T-Cell Response*

PRE-CLINICAL OPTIMIZATION STUDIES:
TARP-Specific T-cell Induction after 2 injections of R-DOTAP + TARP (1-20)



CFA – Complete Freund's Adjuvant a highly potent immune activator not used in humans due to potentially lethal toxicity

Summary

- PDS0101 provides first demonstration of *in-vivo* induction of high levels of circulating potent tumor-specific CD8+ (killer) T-cells in human clinical study ✓
- Clinical efficacy of PDS0101 monotherapy demonstrated ✓
- Dramatically superior tumor regression efficacy (TC-1) vs. the top clinical competitors ✓
- Strong pre-clinical synergy with checkpoint inhibitors demonstrated ✓
- Excellent safety profile allows for unique evaluation in first-line treatment of cancer in combination with KEYTRUDA® ✓

Three PDS0101 Phase 2 trials in combination with standard of care checkpoint inhibitor, chemoradiotherapy as well as leading clinical stage immunotherapy provides risk mitigated path to rapid proof of concept with multiple shots on goal

*L. V. Wood et al et al, Oncoimmunology, 2016, Vol. 5 (8)

Financial Information

• Number of shares outstanding[1]	5.8M
• Cash on hand[2]	$17.4M
• Recent share price [3]	$2.82
• Market Cap[2]	$16.3M
• Debt [1]	None

[1] October 31, 2019
[2] September 30, 2019
[3] December 6, 2019

PDS Biotechnology

Targeting killer T-cells against cancer

Biologics that Recruit and Activate T-cells in-vivo to Target and Kill Specific Cancers

LD Micro Conference, Los Angeles, CA
Wednesday, December 11th, 2019

Frank K. Bedu-Addo, Ph.D.
CEO, PDS Biotechnology