ImmunoScape

Advancing the development
of therapeutics with the
Deep Immunomics platform
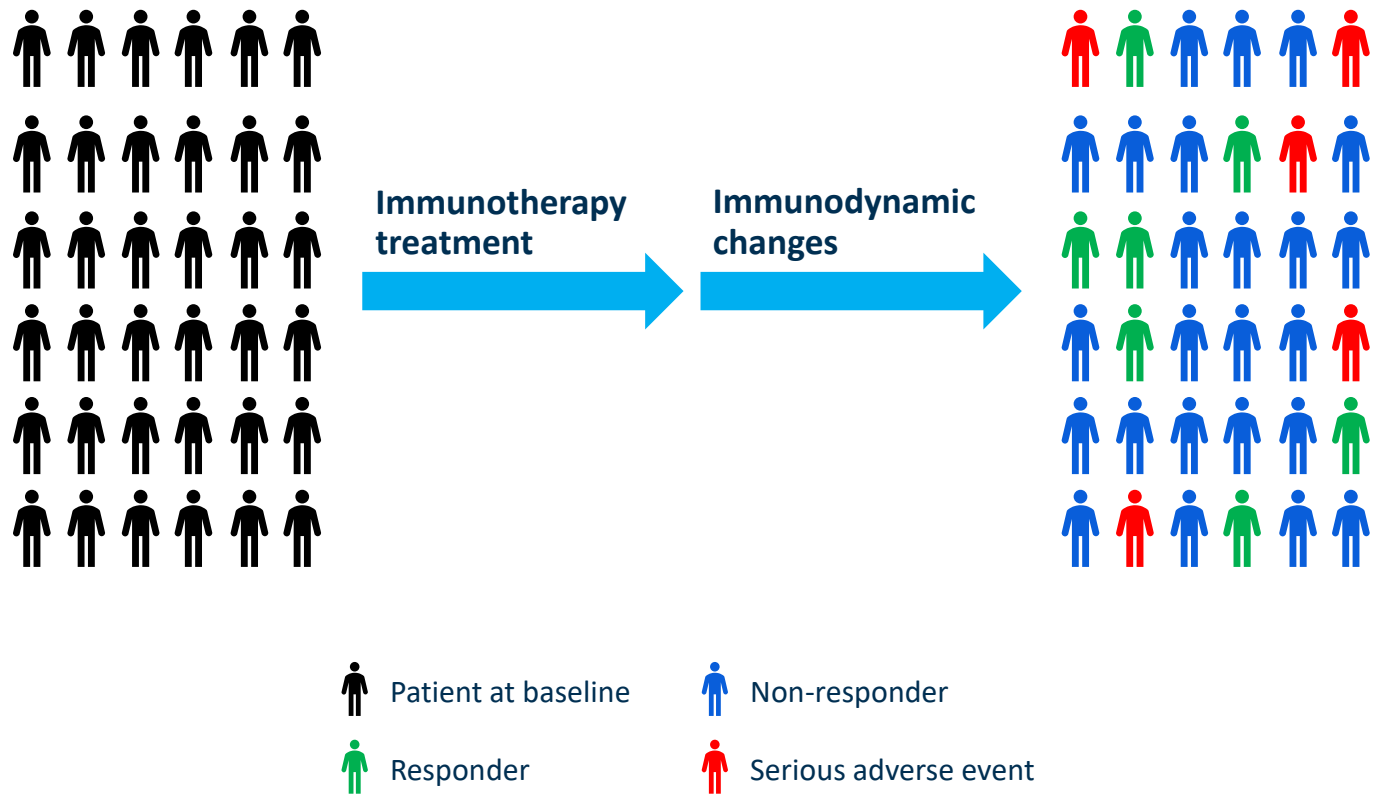
February 2021

ImmunoScape today

- Venture-backed company with 2 major investors: Anzu Partners and UTEC (University of Tokyo Edge Capital)

- Company offices and laboratories now established in both Singapore and San Diego, CA
  - 29 FTEs, including 13 PhD scientists
  - Deep in-house expertise in mass cytometry, high-dimensional flow cytometry, analysis of complex data sets, and bioinformatics

- Extensive history of collaborating with big pharma/biotech, small biotech companies, and top-tier academic medical centers
  - 35 total projects including ongoing efforts with 10+ pharma/biotech companies and 10+ academic centers
  - 1,400 antigens* screened across 6 HLA types using TargetScape

*Antigens include tumor neoantigens, tumor-associated antigens, viral antigens from influenza virus, SARS-CoV-2, CMV, EBV, HBV, HIV

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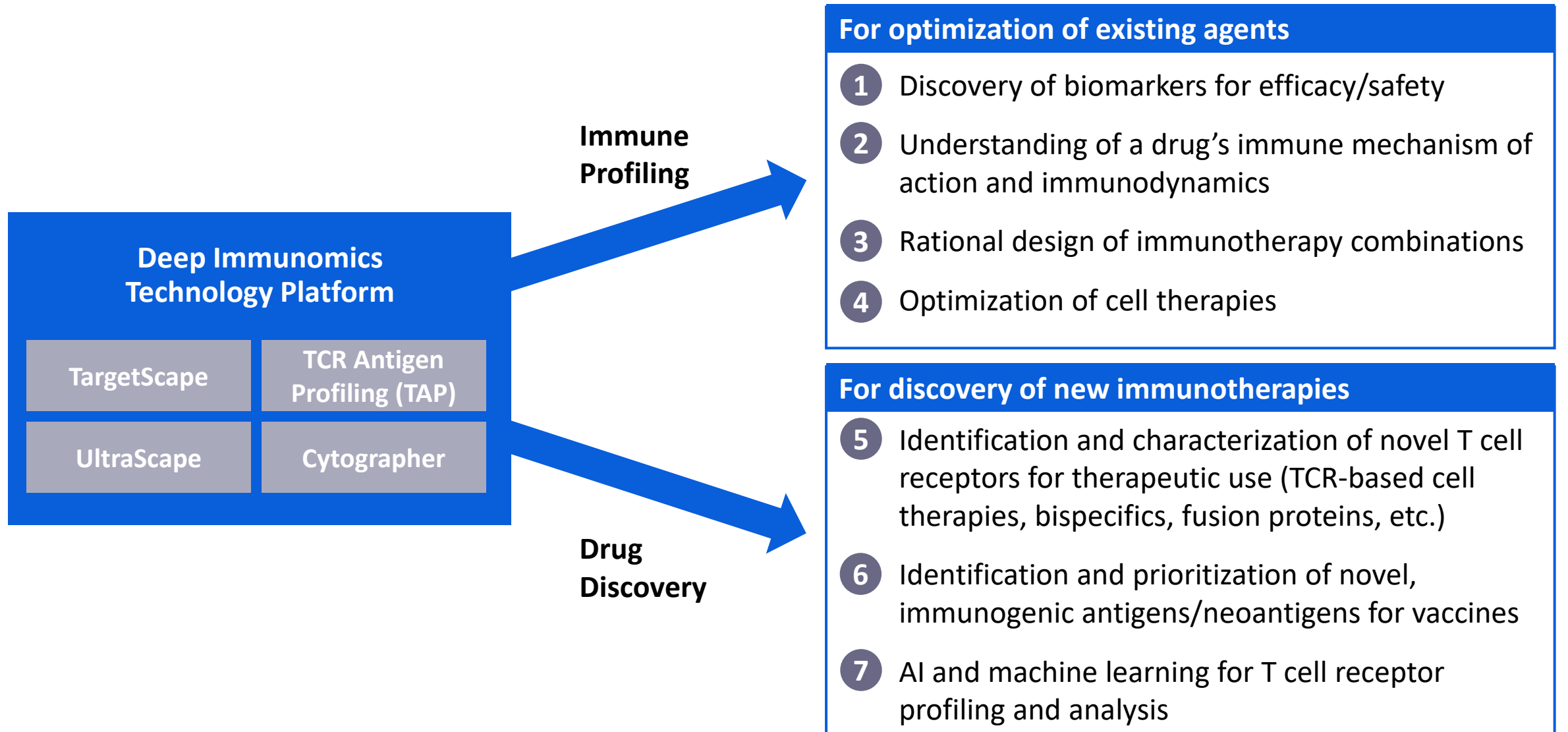# Introduction to the Deep Immunomics technology platform

ImmunoScape

Understanding each patient's immunome, and how it evolves in response to treatment, is the key to developing next-generation immunotherapies

Immunotherapy treatment

Immunodynamic changes

At ImmunoScape, we believe that these outcomes can be understood by deep characterization of the immunome **at scale**.

Legend:
- Patient at baseline
- Responder
- Non-responder
- Serious adverse event

- Immunomic data generated across many patients at multiple timepoints, pre- and post-treatment
- Multiple immune cell compartments studied
- Hundreds of T cell specificities and dozens of markers analyzed per sample

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ImmunoScape's Deep Immunomics technology platform is designed to address the critical needs in immunotherapy development

Deep Immunomics Technology Platform

- TargetScape
- TCR Antigen Profiling (TAP)
- UltraScape
- Cytographer

Immune Profiling

Drug Discovery

For optimization of existing agents

1. Discovery of biomarkers for efficacy/safety
2. Understanding of a drug's immune mechanism of action and immunodynamics
3. Rational design of immunotherapy combinations
4. Optimization of cell therapies

For discovery of new immunotherapies

5. Identification and characterization of novel T cell receptors for therapeutic use (TCR-based cell therapies, bispecifics, fusion proteins, etc.)
6. Identification and prioritization of novel, immunogenic antigens/neoantigens for vaccines
7. AI and machine learning for T cell receptor profiling and analysis

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The Deep Immunomics platform is composed of 4 key technologies that allow for high-resolution characterization of a patient's immunome

Overview of the Deep Immunomics technology platform				
Technology	**Analytical method**	**Cells studied**	**Cells analyzed per sample**	**Example application**
TargetScape	Mass cytometry Flow cytometry	T cells	Millions	Simultaneous analysis of T cell specificity (100+) and phenotype (~40 markers)
TCR Antigen Profiling (TAP)	Mass cytometry Single cell sequencing	T cells	Up to 10,000	Analysis of T cell transcriptome, clonality, phenotype, and TCR sequence
UltraScape	Mass cytometry	Multiple immune compartments (T cells, B cells, NK cells, monocytes, dendritic cells, etc.)	Millions	Simultaneous, high resolution characterization of multiple immune cell populations (up to 120 channels)
Cytographer	Proprietary suite of bioinformatics and data analysis tools	n/a	n/a	High-dimensional data analysis, statistical analysis, data visualization

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Recent pharma and biotech collaborations (public)

Not exhaustive – much of ImmunoScape's work is confidential

Genentech - Oncology

Therapeutic area: Oncology

Indication: Non-small cell lung cancer

Publication of results:

Late-differentiated effector neoantigen-specific CD8+ T cells are enriched in peripheral blood of non-small cell lung carcinoma patients responding to atezolizumab treatment
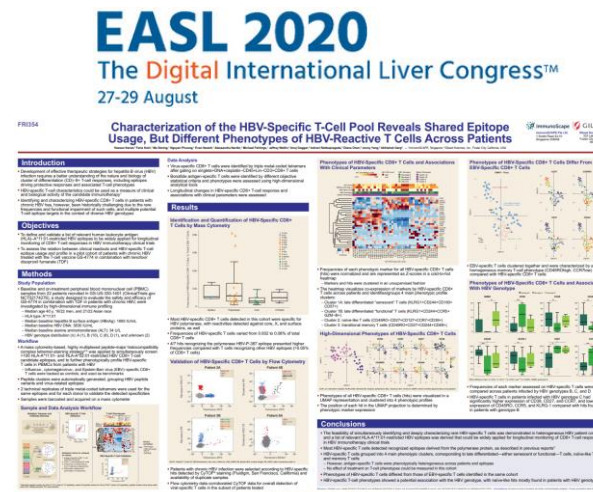
Fehlings M, Jhunjhunwala S, Kowanetz M, et al. *Journal for ImmunoTherapy of Cancer* 2019;7:249. doi: 10.1186/s40425-019-0695-9

Gilead – Infectious Disease

Therapeutic area: Infectious disease

Indication: HBV

Publication of results:

FRI354 Characterization of the HBV-specific T cell pool reveals shared epitope usage but different phenotypes of HBV-reactive T cells across patients

Arcturus – Infectious Disease

Therapeutic area: Infectious disease

Indication: SARS-CoV-2

Publication of results:

Collaboration announced August 2020, no data has been publicly disclosed.

A full list of 25+ ImmunoScape publications can be found on our website (www.immunoscape.com)
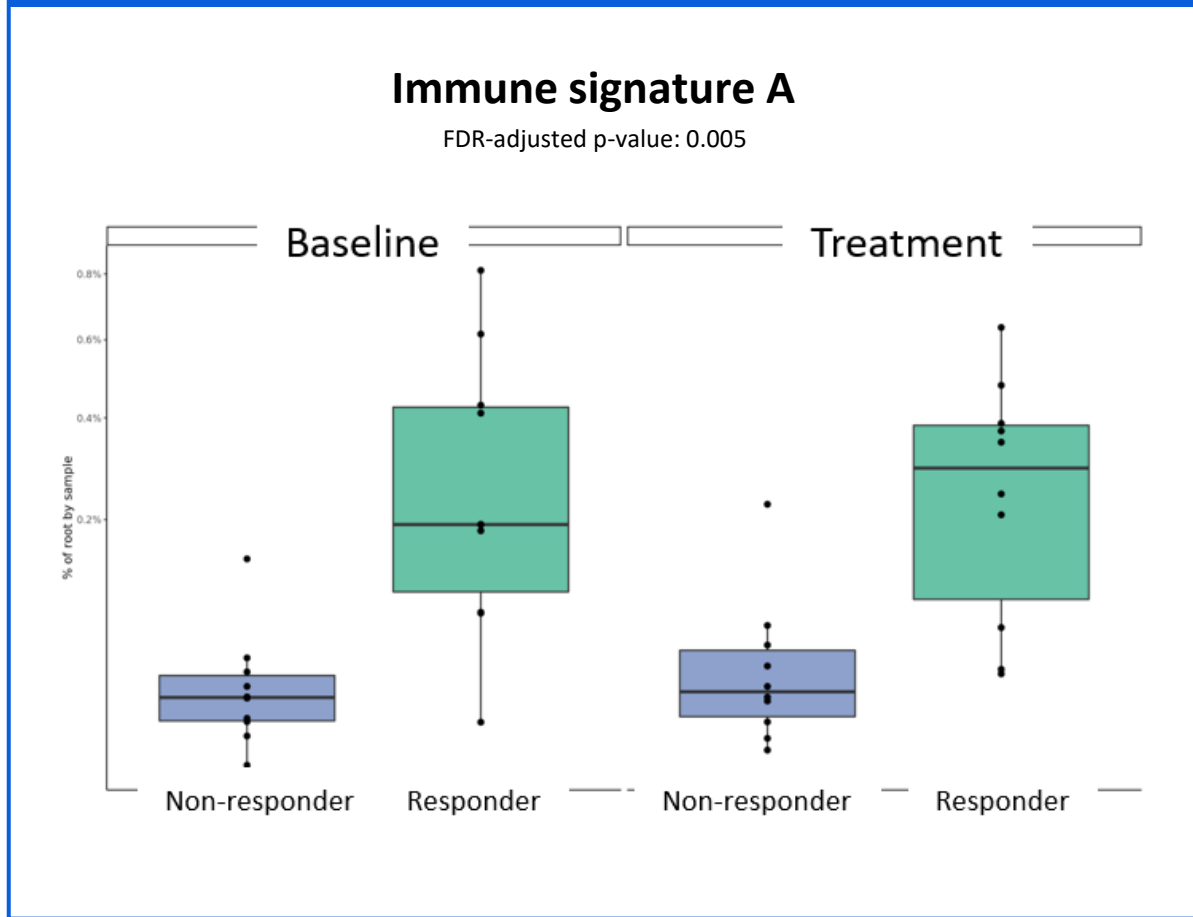
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2020 ImmunoScape research highlights

	Therapeutic area	Aim of collaboration	Key findings	Partner
Immune profiling	**Oncology** *Clinical (Phase II)*	Response prediction for a checkpoint inhibitor	Discovery of a **baseline immune signature associated with clinical response** to this checkpoint inhibitor (p-value < 0.05 for responders vs. non-responders)	Major biotech/pharma company
	Oncology *Clinical (Phase I)*	CRS prediction for an autologous cell therapy	Identification of an **immune signature in the manufactured cell therapy product** associated with cytokine release syndrome (p-value < 0.05)	Mie University
	Oncology *Preclinical - Translational*	Selection of optimal checkpoint combinations	In a mouse model of HCC resistant to anti-PD-1 mAbs, treatment with the **combination of anti-PD-1 and anti-TIGIT was found to restore activity**, prolong survival, and increase the $CD8/T_{reg}$ ratio in the tumor	Univ. of Hong Kong
Drug discovery	**Oncology** *Preclinical – Discovery*	TCR epitope validation	Validation of multiple **novel shared neoantigens** based on a new computational prediction method through **detection of ultra-rare T cells** (typical detection threshold ~0.006%)	Academic medical center
	Infectious disease *Clinical*	Antigen discovery	Identification of **18 novel SARS-CoV-2 epitopes** in COVID-19 recovered patients, spanning both structural and non-structural viral proteins	Johns Hopkins Univ., NIAID

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The Deep Immunomics platform was used identify baseline immune cell populations that correlate with response to checkpoint inhibitor therapy

Selected bulk T cell data from immune profiling analysis

Immune signature A

FDR-adjusted p-value: 0.005

- ImmunoScape collaborated with a big pharma partner to identify potential biomarkers to predict response to a checkpoint inhibitor therapy

- All subjects in this single indication study had pre- and post-treatment samples available for analysis (N = 10s of patients, equal mix of responders and non-responders)

- Using the Deep Immunomics platform, unbiased analysis of 30+ immune markers was used to develop a baseline signature with significant correlation to clinical response

- Studies are ongoing to further explore this finding

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Potential Collaborations

Key takeaways

- The Deep Immunomics technology platform can be used across multiple immune cell compartments to understand patient response to therapy, minimize risk of adverse events, and many other important questions in drug development

- This technology has been validated extensively both in preclinical models and in clinical trials

- Scale is critically important to this type of immune profiling; the complexity of the immune response makes it necessary to investigate many parameters to create a robust set of data for analysis
  - Number of subjects and timepoints
  - Number of immune cell markers
  - Number of immune cell specificities

Potential models for collaboration

Depth and scale of data

Low → High

Type of collaboration	Pilot study	Multi-year R&D collaboration	Exclusive R&D collaboration
No. of drugs/ mechanisms studied	1	10+	50+
No. of unique subjects	10 – 40	300 – 1000+	5000+
Duration	3 – 6 months	2+ years	3+ years

- **Please note that these are examples, and the ranges are very wide**

- **We are flexible and work with our partners to determine the optimum model for collaboration**

- **ImmunoScape is happy to conduct a pilot study to allow partners to evaluate our technology**

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Contact information

- If you have any questions about ImmunoScape's technology platform or would like to discuss potential partnerships, please contact a member of the BD team

- We look forward to collaborating with your team

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