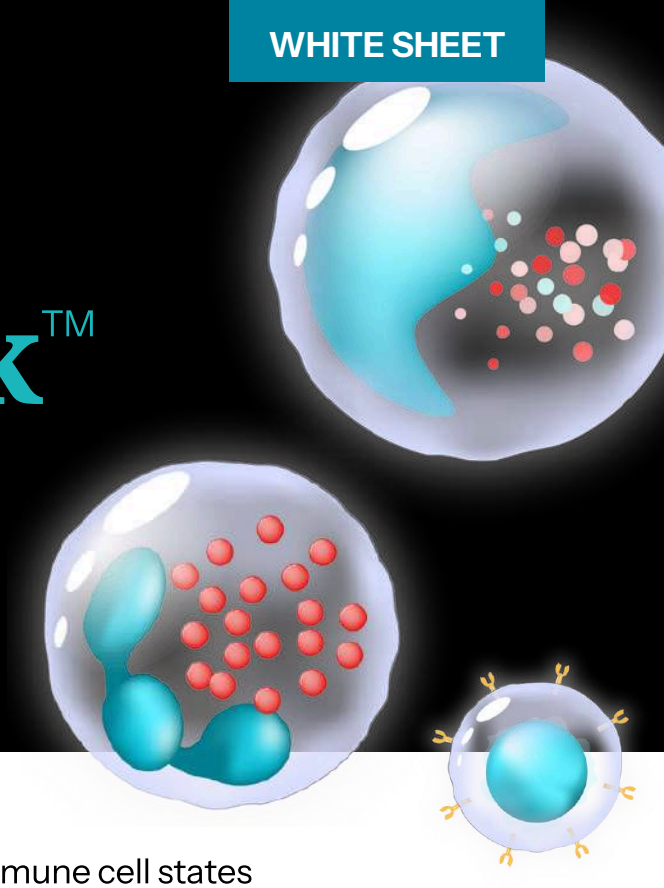
WHITE SHEET

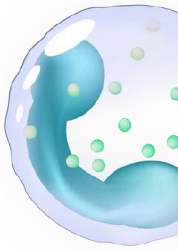
SAPIENT

ImmuneSeek™

Quantifying the **functional tumor immune proteome**



ImmuneSeek enables the direct measurement of immune cell states and signaling pathways in human tumors for precise characterization of immune activity and therapeutic response and resistance.



Mapping the Functional Tumor Immune Proteome

The success of modern oncology therapeutics increasingly depends on the functional state of the tumor immune microenvironment. Therapies such as immune checkpoint inhibitors, CAR-T, T-cell engagers, ADCs, and radioligand therapies **all rely on complex interactions between tumor cells and immune populations.**

However, clinical responses remain highly variable, driven by differences in:

- **Immune cell composition and infiltration**
- **Functional activation of immune pathways**
- **Antigen presentation capacity**
- **Immune suppression and checkpoint signaling**
- **Tumor–immune interaction dynamics**

These critcal properties are governed by the functional tumor immune proteome and therefore rarely captured by conventional genomic approaches.

ImmuneSeek addresses this challenge by directly quantifying and mapping immune biology in human tumors using a mass spectrometry-based discovery proteomics workflows.

Why Immune Biology Is Frequently Mischaracterized

A central challenge in immuno-oncology is that most analytical approaches rely on genomic or transcriptomic data, which **do not fully capture immune function.**

Common Approach	Key Limitation
RNA expression profiling	Does not reflect protein activity or pathway function.
Genomics	Cannot measure immune signaling or activation states.
Limited marker panels	Incomplete view of immune cell diversity.

As a result, drug developers often **lack the ability to determine whether immune cells are functionally active,** which pathways are driving response or suppression, or why patients succeed or fail on therapy.

The Power of the ImmuneSeek Approach

ImmuneSeek addresses this gap by **directly measuring the proteins that govern immune biology.** The workflow applies deep discovery proteomics to comprehensively profile and map immune biology across multiple dimensions.

Direct Measurement of Immune Cell States

ImmuneSeek quantifies proteins that define:

- **Immune cell populations** (e.g., T cells, NK cells, macrophages, dendritic cells)
- **Cytotoxic effector programs**
- **T-cell exhaustion and regulatory states**
- **Myeloid and macrophage polarization**

This provides a direct and quantitative view of **immune cell composition and state within tumors.**

ImmuneSeek is **optimized for both fresh-frozen and FFPE human tumor samples,** enabling:

- **Retrospective analysis** of clinical trial cohorts
- **Biomarker discovery** in archived samples
- **Translational insights** without requiring new biopsies

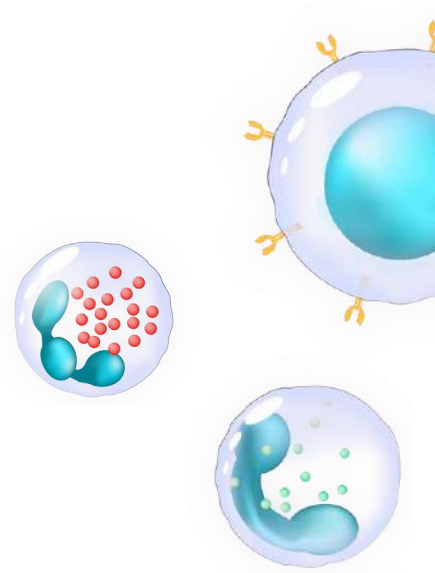
*This unlocks the large repository of FFPE clinical samples for **quantitative characterization of immune function.***

Functional Immune Pathway Activity

ImmuneSeek captures activation of key immune pathways, including:

- **Antigen presentation machinery**
- **Interferon and cytokine signaling**
- **Immune checkpoint pathways**
- **Innate immune activation**

Because these pathways are measured at the protein level, ImmuneSeek reveals **functional immune activity rather than inferred potential.**

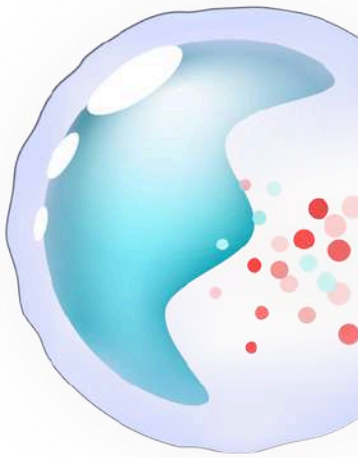


Mechanisms of Immune Resistance

Tumors evade immune response through protein-level adaptations such as:

- **Loss of antigen presentation**
- **Interferon signaling defects**
- **Expansion of immunosuppressive programs**
- **Checkpoint pathway compensation**

ImmuneSeek directly quantifies these mechanisms, enabling deeper understanding of **primary and acquired resistance to immunotherapy.**



How ImmuneSeek Guides Development Decisions

ImmuneSeek provides data that **directly informs immuno-oncology strategy.**

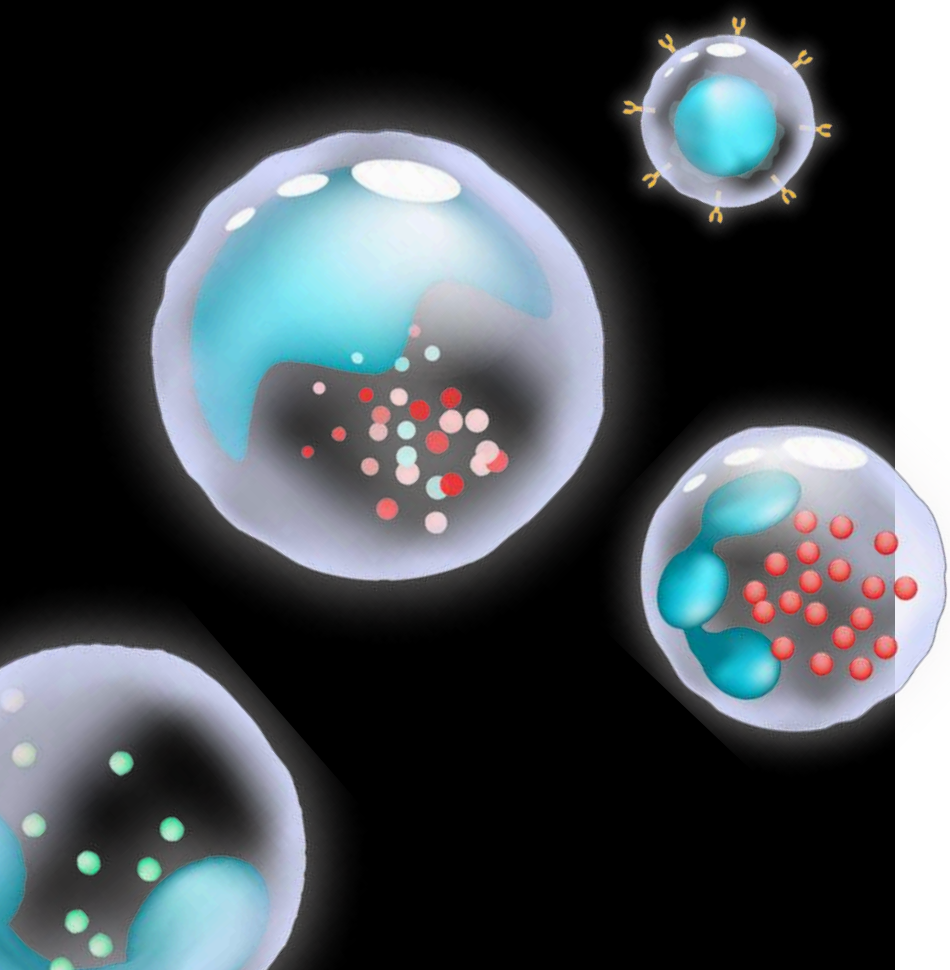
Development Question	ImmuneSeek Insight
Are immune pathways functionally active?	Direct measurement of pathway activation
Why are patients not responding to immunotherapy?	Identification of immune resistance mechanisms
How can patients be stratified?	Functional immune state classification
Which combinations should be pursued?	Identification of suppressive or compensatory pathways

ImmuneSeek:

From descriptive immune biology to **actionable insight**

Immuno-oncology development is often **limited by incomplete understanding** of immune function.

ImmuneSeek **shifts analysis from inference to direct measurement of functional pathway activity,** delivering quantitative insight into immune biology that determines therapeutic response.



De-Risking Oncology Drug Development

Precise characterization of immune activity, response, and resistance is essential to the development of modern oncology therapeutics. ImmuneSeek delivers this depth of insight to **optimize patient selection, biomarker development, and therapeutic strategy,** allowing teams to answer:

- Which immune cell populations are functionally active within tumors?
- Why are patients not responding to checkpoint inhibitors or cell therapies?
- What mechanisms are driving immune resistance?
- How can patients be stratified based on immune state?

To request a ImmuneSeek study, contact discover@sapient.bio.

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Discover more today.

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