Understanding the Secrets of Cancer Hidden in Protein Sequences

March 18, 2024

UNDERSTANDING THE SEQUENCE OF IMMUNO-ONCOLOGY PROTEINS WITH SINGLE-MOLECULE RESOLUTION

Alterations in protein sequences play a crucial role in the formation of neoantigens, aiding cancer cells in evading immune recognition in the field of immuno-oncology. Additionally, these alterations give rise to onco-proteins, key drivers of cancer cell growth, survival, and metastasis. Understanding these molecular changes is paramount, as they contribute to therapeutic resistance, significantly impacting the effectiveness of cancer treatments and ultimately influencing patient outcomes.

Quantum-Si's Next-Generation Protein Sequencing™ Platinum® instrument offers an affordable and powerful solution to interrogate these protein alterations with single-molecule resolution. Briefly, proteins are digested into peptides, and then functionalized, conjugated, and immobilized on a semiconductor chip with dye-labeled N-terminal amino acid recognizers and aminopeptidases for sequencing. Kinetic signatures of the binding events are translated into meaningful amino acid, peptide, and protein data.

Immuno-oncology proteins sequenced on Platinum demonstrate how researchers can investigate mutations and protein alterations of potential immuno-oncology therapeutic relevance.

MMP12 | MATRIX METALLOPROTEINASE-12

Breaking down extracellular matrix components, MMP12 presents a dual role in cancer–it can promote tumor growth and invasion by facilitating the remodeling of the tumor microenvironment, while modulating the immune response against cancer cells.

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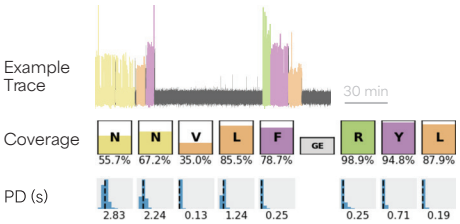

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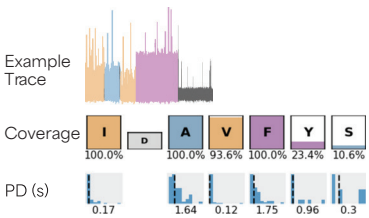

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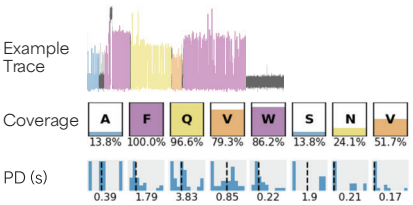

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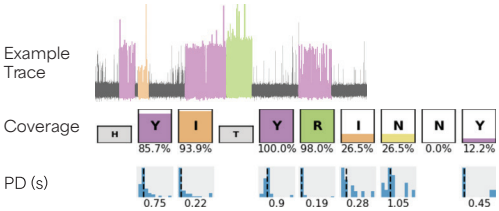

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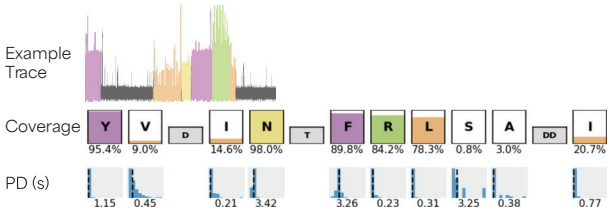

IL4 | INTERLEUKIN-4

While fostering an immunosuppressive tumor microenvironment, IL4 can also aid in anti-tumor immunity by stimulating immune cells to attack cancer cells and promoting a Th2 immune response.

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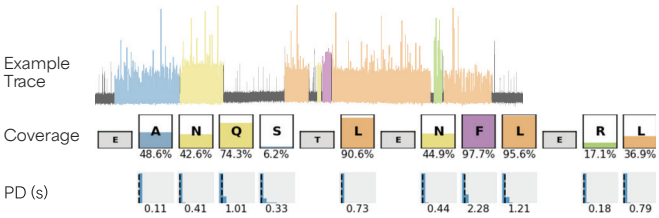

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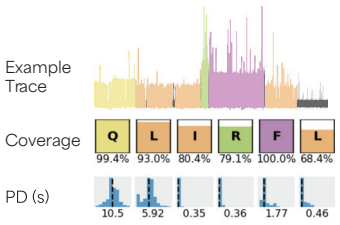

ANGP1 | ANGIOPOIETIN-1

Promoting blood vessel stability and maturation, ANGP1 holds potential to enhance vascularization within the tumor microenvironment and consequently influence cancer therapy efficacy.

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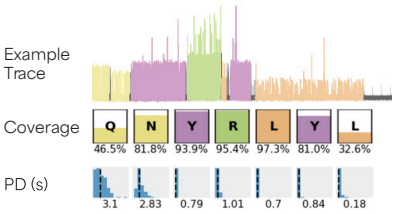

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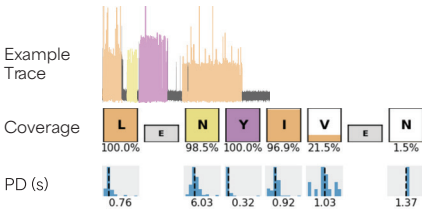
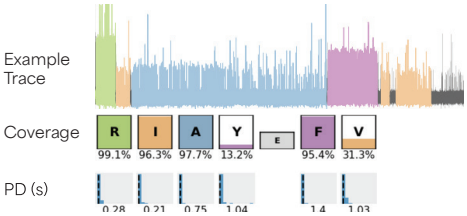


ADA | ADENOSINE DEAMINASE

By converting adenosine to inosine, ADA can counter immunosuppression and tumor immune evasion.

RIAYEFVEMK



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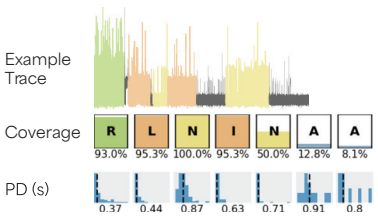

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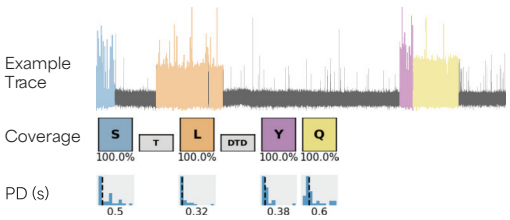

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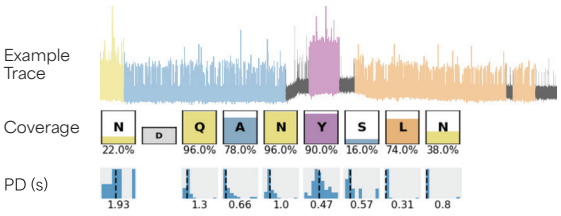

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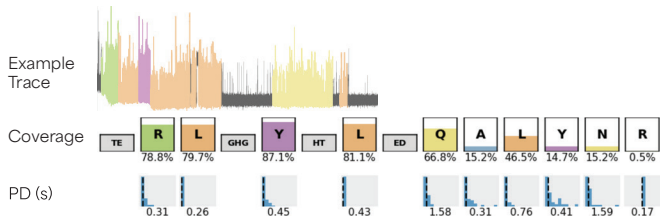

PDIA1 | PROTEIN DISULFIDE ISOMERASE A1

PDIA1 plays a critical role in modulating protein folding and immune responses, showcasing its potential as a target for cancer treatment.

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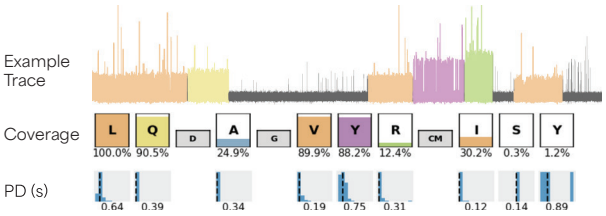

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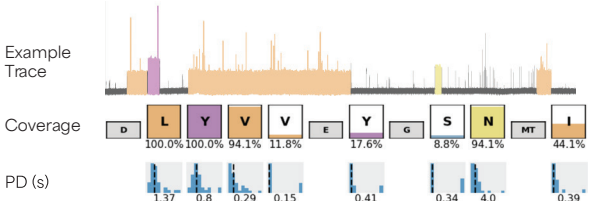

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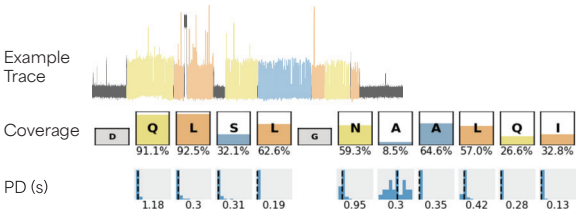

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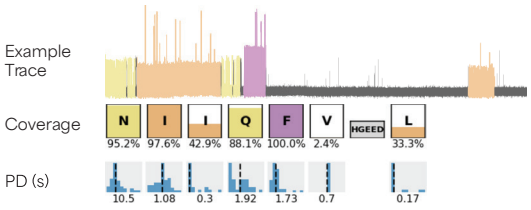

HMOX1 | HEME OXYGENASE-1

An enzyme involved in heme degradation, HMOX1 plays a protective role in hindering tumor growth via anti-proliferative effects.

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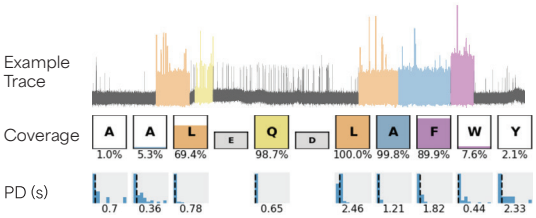

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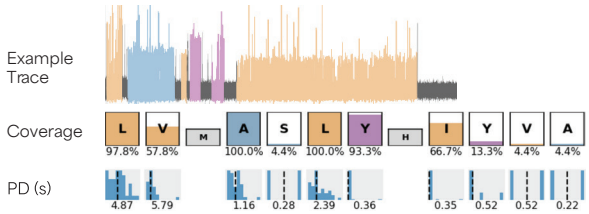

IL6 | INTERLEUKIN-6

A versatile cytokine that promotes tumor growth and immunosuppresion, IL6 is a compelling target for anti-cancer therapies.

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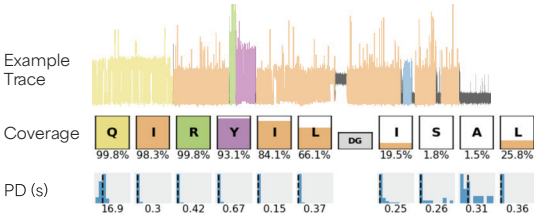

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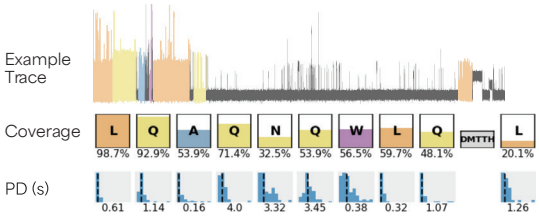
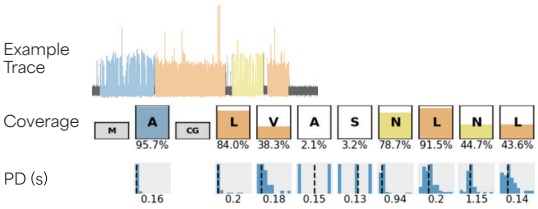


LEG1 | GALECTIN-1

A versatile cytokine that promotes tumor growth and immunosuppresion, IL6 is a compelling target for anti-cancer therapies.

MACGLVASNLNLK



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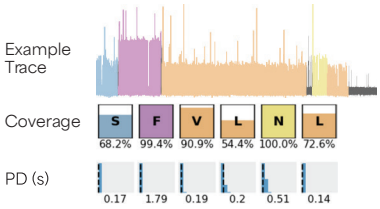

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