Neoantigen Discovery for Cancer Immunotherapy — Hands-on

Understand how tumour mutations are translated into candidate neoantigens for vaccines and T cell therapies. This module focuses on conceptual pipelines from variants and expression through HLA binding ideas, clonality and safety considerations, ending in a prioritised neoantigen panel for translational oncology teams.

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Session Index

Session 1

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Tumour Antigens & Neoantigen Concepts

Classes of tumour antigens and where neoantigens fit in

- **tumour associated versus tumour specific antigens**
- **neoantigens from somatic mutations (conceptual)**
- **why neoantigens matter for personalised therapies**

Tumour mutation landscape in simple language

- **single nucleotide variants, indels and fusions**
- **frameshifts and splice changes as neoantigen**

sources **overview of clonal versus subclonal mutations**

Where neoantigen discovery sits in the immunotherapy workflow

NGS and expression data as inputs **candidate lists for vaccines and T cell therapies** **feedback from clinical and experimental readouts**

Session 2
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From Variants & Expression to Candidate Neoantigens

Conceptual variant and transcript inputs for neoantigen pipelines

tumour and normal sequencing overview **expressed mutations and fusion transcripts (orientation)** **copy number and allele fraction as context**

Deriving mutant peptide sequences in principle (no code required)

reference versus mutated protein segments **frameshift and splice driven new reading frames** **windowing ideas for potential epitope lengths**

HLA binding and presentation likelihood as guiding concepts

role of patient specific HLA types **binding affinity and motif alignment narratives** **processing and stability ideas in simple terms**

Session 3
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Shortlisting: Filters, Ranking & Risk

Evidence dimensions that influence neoantigen priority (conceptual)

binding strength and HLA coverage ideas **tumour**

expression and clonality orientation | support from immunopeptidomics where available

Negative filters and safety oriented thinking (conceptual only)

similarity to self and critical tissues | autoimmunity and cross reactivity risk ideas | simple flags for high caution candidates

Combining scores into pragmatic ranking schemes (no formulas)

tiering candidates as high, medium and exploratory | balancing potency, breadth and safety | link to onco immunology and biomarker thinking

Session 4

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Design Brief: Neoantigen Panel for Therapy

Structuring a neoantigen candidate table for project teams

peptide, mutation, gene and transcript annotation | HLA restriction, evidence tags and rank | notes on safety and experimental status

Building a panel for vaccine or T cell therapy concepts (conceptual)

choosing a balanced set of high value candidates | considering manufacturability and formulation ideas | aligning with clinical protocol plans at high level

Communicating assumptions, gaps and next steps clearly

slide ready figures and bullet narratives | explicit statements of data and model limits | handoff to wet lab, clinical and regulatory stakeholders