

HLA Typing & Population Coverage Analysis — Hands-on

Build a practical bridge between HLA biology, typing outputs and population level analytics. This module orients you to HLA nomenclature and allele frequency resources, then walks through how coverage calculations guide vaccine design, neoantigen selection and multi epitope construct planning.

HLA Typing & Population Coverage Analysis

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Session 1

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HLA System & Nomenclature Foundations

HLA loci, classes and functional groupings

[class I vs class II overview](#) [HLA A, B, C](#) [HLA DR, DQ, DP](#)

HLA nomenclature and allele naming conventions

[two, four and six digit resolution](#) [G and P groups](#)
[null and low expression alleles](#)

Alleles, supertypes and peptide binding preferences

[supertype concepts](#) [anchor positions and motifs](#) [link](#)

to epitope prediction tasks

Session 2

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HLA Typing Technologies & Data Outputs

Overview of serological and molecular typing methods

SSP, SSO, SBT (conceptual) **NGS based typing overview** **resolution and ambiguity**

Typical HLA typing reports and file formats

per sample genotype tables **multi allele codes and ambiguities** **export for downstream pipelines**

Quality, concordance and basic checks for analytics use

missing loci and partial calls **alleles not in prediction tools** **harmonising resolution across samples**

Session 3

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Allele Frequencies, Haplotypes & Coverage

Allele frequency databases and reference panels (orientation)

AFND and related resources **ethnic and regional stratification** **limitations and sampling bias**

Genotype, phenotype, allele and haplotype frequencies (concepts)

Hardy Weinberg assumptions **linkage disequilibrium** **co occurrence of alleles across loci**

Defining coverage for individual epitopes and epitope sets

per allele vs per individual coverage **number of restricting alleles per epitope** **interpreting coverage**

metrics

Session 4

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Population Coverage Workflow & Case Study

End to end population coverage calculation for an epitope panel

input epitopes and restricting alleles **selecting target populations** **interpreting per region outputs**

Design choices for multi epitope constructs and vaccines

balancing coverage and construct size **class I and class II balance** **prioritising core vs optional epitopes**

Mini case study: cohort definition and reporting of coverage metrics

defining target cohorts and geographies **summary tables and figures** **handoff to multi epitope design and simulation modules**