

Figure S1 Distribution of the high-resolution HLA genotyping results for *HLA-A*, *HLA-B*, and *HLA-C* alleles for plasma (A) and tissue (B) samples from 22 patients. Purple or Y (yes) denotes the concordance of the results with Sanger sequencing data. Orange or N (no) denotes discordance with the indicated alleles. HLA, human leukocyte antigen.

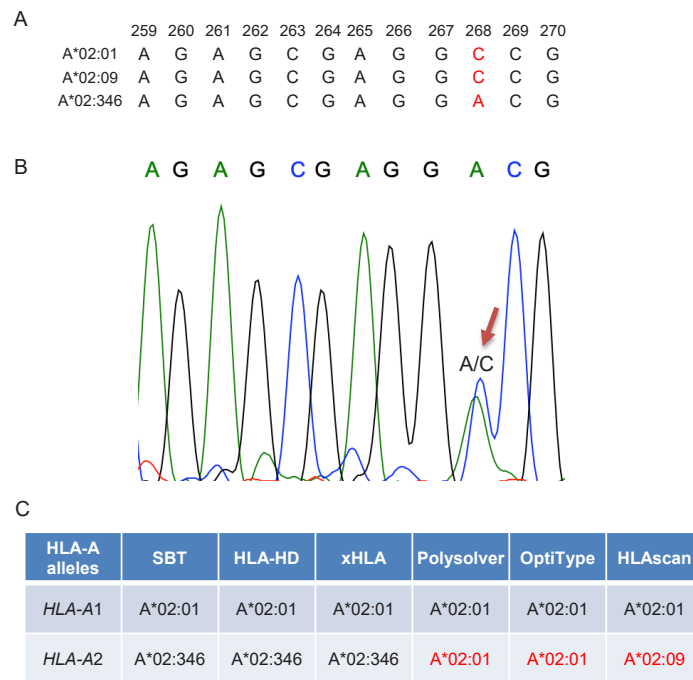


Figure S2 A case with heterozygous *HLA-A*02:01* and *HLA-A*02:346*. (A) DNA sequence alignment for *HLA-A*02:01*, *A*02:09*, and *A*02:346*. Red font indicates discordant nucleotides among the three alleles. (B) Screenshot of Sanger sequencing electropherogram for white blood cell sample of patient P09 indicating the heterozygous status of the patient with the presence of both A and C peaks at nucleotide 268. Red arrow denotes overlapping peaks for A and C, indicating heterozygosity. (C) Tabulated summary of the *HLA-A* allele pair of patient P09 from Sanger sequencing-based typing (SBT) and the 5 different NGS-based computational tools. Alleles in red font indicate discordant results with SBT. HLA, human leukocyte antigen; DNA, deoxyribonucleic acid.

Table S1 Analytical accuracy of the 5 HLA classification algorithms on next-generation sequencing data derived from paired 22 white blood cell (WBC), plasma, and tissue samples data for HLA class I genes at second field-level resolution

Algorithm	WBC	Plasma	Tissue
HLA-HD	99.2%	99.2%	96.2%
Polysolver	96.2%	96.2%	92.4%
OptiType	94.7%	93.2%	90.2%
HLAscan	93.2%	95.5%	87.9%
xHLA	91.7%	93.9%	90.2%

Red font indicates the highest accuracy in each sample type. HLA, human leukocyte antigen.

Table S2 Discordant calls by HLA-HD from tissue samples

Patient number	SBT-based HLA genotype (WBC sample, reference)		HLA-HD (tissue sample)	
	Allele 1	Allele 2	Allele 1	Allele 2
P14	C*08:01	C*04:82	C*08:01	C*04:01
P15	A*24:02	A*24:02	A*24:02	A*30:01
P15	B*40:06	B*15:01	B*40:06	B*15:515
P22	A*11:01	A*24:02	A*11:01	A*24:19
P22	C*14:02	C*07:02	C*14:02	C*07:51

Red font indicates discordant calls in allele 2 for tissue samples as compared to SBT-based reference HLA genotype. HLA, human leukocyte antigen; WBC, white blood cell; SBT, Sanger sequencing-based typing.