

Description of Additional Supplementary Files

File Name: Supplementary Data 1

Description: Patient characteristics.

File Name: Supplementary Data 2

Description: Amino acid sequences of predicted neoantigens.

File Name: Supplementary Data 3

Description: Predictive value of HAPS in enrolled patients.

File Name: Supplementary Data 4

Description: Gene list of the NGS-based 1,021 panel

File Name: Supplementary Data 5

Description: Association of HAPS with response to immunotherapy stratified by HLA-LOH

File Name: Supplementary Data 6

Description: TME signature and function.

File Name: Supplementary Data 7

Description: Distribution of immune cells analyzed via ssGSEA.

File Name: Supplementary Data 8

Description: TCR and panel-based HAPS analysis of Wang-panel-T/B cohort.

File Name: Supplementary Data 9

Description: Data used in the neural network model.

File Name: Supplementary Data 10

Description: List of primer sequences used for PCR