**6. Supplementary Materials**

*S1. Comparative Analysis of Serum Antibody Titers between Wild-Type and Omicron XBB 1.5 across Booster and Infection Status Groups.*



**Supplementary Figure 1.** Significantly higher Omicron XBB 1.5 (orange rectangle) antibody titers compared to Wild-Type (WT) (blue dot) antibody titers **(A)**. Subgroup comparisons also show consistently higher Omicron XBB 1.5 versus WT antibody titers among people who have not received a booster (no booster), received a single booster (1x booster), and received two boosters (2x booster) for both WT and XBB 1.5, as shown in **(B)**. Individuals who tested positive after 2022 also exhibit significantly higher antibody titers compared to untested individuals **(C)**. Serum antibody titers were measured against anti-RBD IgG for their respective variants with optical density at 414 nm. Black lines depict the comparison between Omicron and XBB 1.5 titers, while blue and orange lines represent subgroup comparisons for each antibody titer group. Statistical analyses were conducted using the Mann-Whitney test for Omicron XBB 1.5 versus WT antibody titers. Subgroup comparisons based on the number of vaccines received and infection status were performed using the Kruskal-Wallis test. \*\*\*\* p<0.0001, \*\* p<0.01, \* p<0.05.

*S2. Comparative Serum Neutralization Capacity between Wild-Type and Omicron XBB 1.5 across Booster and Infection Status Groups.*



**Supplementary Figure 2.** A significantly higher serum neutralization capacity of Omicron XBB 1.5 (orange rectangle) compared to Wild-Type (WT) (blue dot) **(A)**. Similarly, consistent results are also shown in the booster analysis subgroup among people who have not received a booster (no booster), received a single booster (1x booster), and received two boosters (2x booster), as shown in for both WT and XBB 1.5 **(B)**. Individuals with BTI after 2022 exhibit the same neutralization capacity (NC) against WT and XBB 1.5. Untested individuals show significantly different neutralization against WT compared to XBB 1.5 **(C)**. Serum NC was measured by neutralizing VSV pseudovirus expressing SARS-CoV-2 spike protein with luciferase gene with human TMPRSS2-expressed ACE2 receptor. Black lines depict the comparison between Omicron and XBB 1.5 NC, while blue and orange lines represent subgroup comparisons for each NC group. Statistical analyses were conducted using the Mann-Whitney test for Omicron XBB 1.5 versus WT NC. Subgroup comparisons based on the number of vaccines received and infection status were performed using the Kruskal-Wallis test. \*\*\*\* p<0.0001, \*\* p<0.01.

*S3. Exploring Correlation Patterns: Serum Antibody Titers and Neutralization Capacity Across Wild-Type and Omicron XBB 1.5 Variants.*

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**Supplementary Figure 3.** Subgroup Analysis of Correlation Between Serum Antibody Titers and Neutralization Capacity for Respective Variants. Subgroup analysis by the number of booster doses received **(A-C)** demonstrates a consistent relationship among non-booster recipients **(A)**, single-booster recipients **(B)**, and two-times-booster recipients **(C)**. Similarly, subgroup analysis by infection status reveals comparable results for individuals who has BTI beyond 2021 (D) and those who were untested **(E)**. Serum antibody titers were measured against anti-RBD IgG for their respective variants with optical density at 414 nm, while serum neutralization capacity was measured by VSV pseudovirus luciferase assay system. Red lines depict the non-linear regression model between variables.