

## Description of Additional Supplementary Files

**Supplementary Data 1.** Data of comorbidity for patients admitted to hospital in Qatar with Mild-Moderate vs Severe COVID-19 during the disease peak period (April 2020-May 2020).

**Supplementary Data 2.** Olink and clinical data for the cohort from Qatar.

**Supplementary Data 3.** Differentially Expressed Proteins (DEPs) between severe, mild and control cases in the cohort from Qatar.

**Supplementary Data 4.** (a) Drug-Protein Interactions (DPI) for proteins with > 1.5-fold upregulation in severe versus mild cases. Only FDA approved drugs included. (b) Multi-target Drug-Protein Interactions (DPI) for proteins with > 1.5-fold upregulation in severe versus mild cases. Summary of multi-target drugs.

**Supplementary Data 5.** Extracted data from the US MGH cohort for validation of the COVID-19 molecular severity score and the 4-marker clinical score.

**Supplementary Data 6.** (a) Statistical comparison for Figure 6a. (b) Statistical comparison for Figure 6b. Supplementary Data 6. (c) Statistical comparison for Figure 7a and Supplementary Figure 6a.