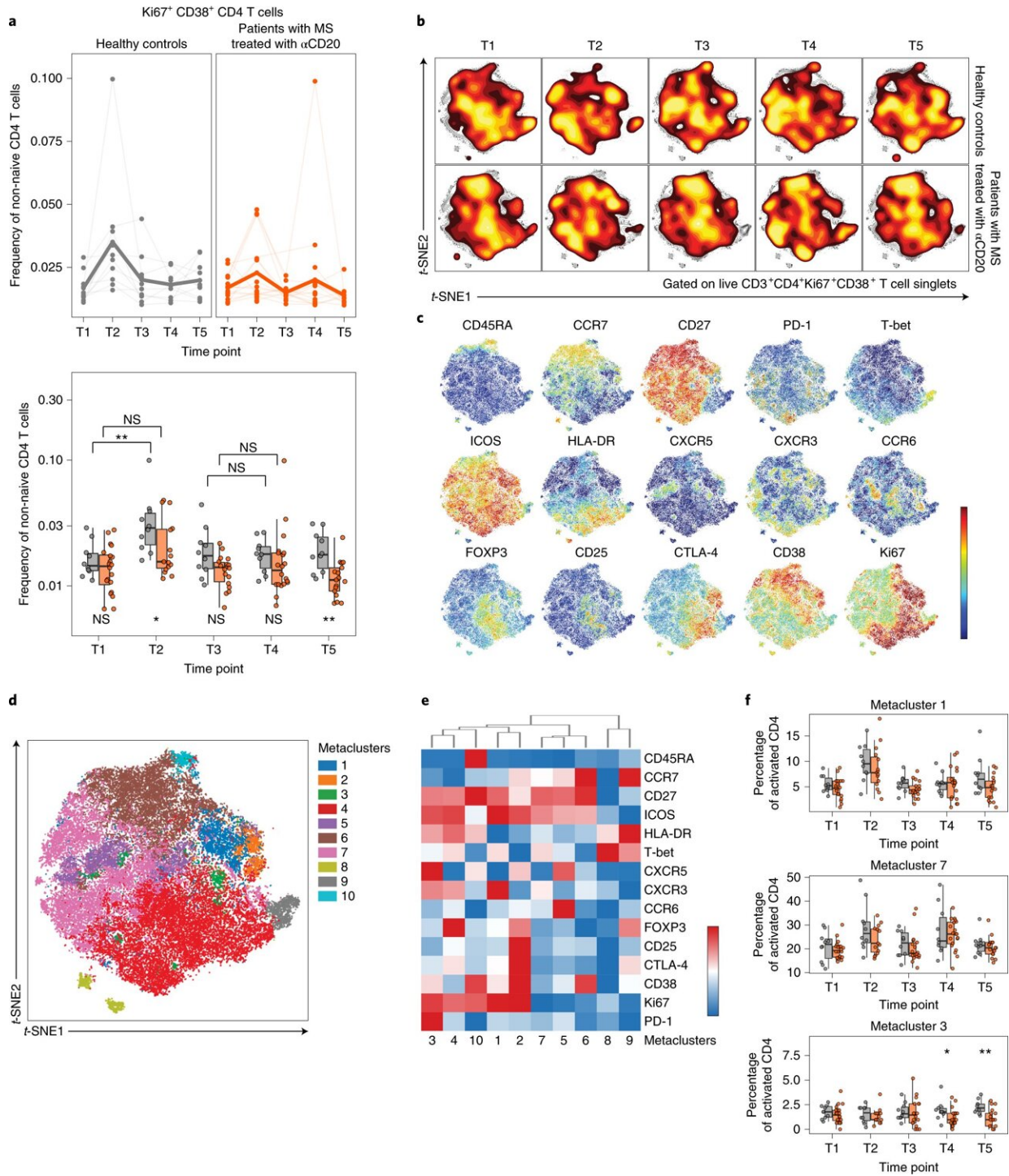


Patients with multiple sclerosis show robust T-cell responses to mRNA COVID-19 vaccines

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SARS-CoV-2 mRNA vaccination results in altered CD4 T cell activation in patients with MS treated with aCD20. a, The frequency of activated Ki67+CD38+ CD4 T cells of total non-naive CD4 T cells. Top: Individuals (points) and the mean (thicker line) are shown for each group. Bottom: Tukey

box plots (median, Q1 and Q3 quartiles) for each time point and group are depicted. An unpaired, two-tailed Wilcoxon test was used to compare the two groups at each time point (shown under the box plots) or the groups between the time points indicated (shown above the box plots). NS, not significant. b, Opt-SNE projections of concatenated cytometry data for activated Ki67+CD38+ CD4 T cells for each time point and group combination are shown. c, Surface expression intensity of the indicated markers projected on the opt-SNE two-dimensional (2D) map generated with all samples in b (color scale: mean fluorescence intensity (MFI) expression of each individual marker in a log scale). d, FlowSOM metaclusters were created using activated Ki67+CD38+ CD4 T cells concatenated from all samples and projected to the opt-SNE map. e, Surface expression intensity heatmap of the markers indicated for each of the ten FlowSOM metaclusters in d (color scale: row-adjusted z-score expression for each individual marker). f, Abundance of metaclusters 1, 7 and 3 as the percentage of activated Ki67+CD38+ CD4 T cells. Unpaired, two-tailed Wilcoxon test P values are shown when P

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