

Description of Additional Supplementary Files

Supplementary Data 1. Patient characteristics

Supplementary Data 2. CD4⁺ T cell type composition in PBMC and SFMC in RA patients (n=4 ACPA-, n=4 ACPA+) (Frequencies)

Supplementary Data 3. Differentially expressed genes in the 12 CD4⁺ T cell clusters in combined peripheral blood and synovial fluid (n=15 RA patients, 11 ACPA+, 4 ACPA-)

Supplementary Data 4. CDR3 alpha/beta amino-acid sequences in annotated CD4⁺ T cell clusters in peripheral blood in n=8 RA patients (4 ACPA- and 4 ACPA+)

Supplementary Data 5. CDR3 alpha/beta amino-acid sequences in annotated CD4⁺ T cell clusters in synovial fluid in n=8 RA patients (4 ACPA- and 4 ACPA+)

Supplementary Data 6. Phenotype (CD4⁺ T cell clusters) and TCR clonality sharing of expanded CD4⁺ T cell clones

- a. TCR a/b recovery in CD4⁺ T cells in SF and PB (n=4 ACPA+; n=4 ACPA-)
- b. Phenotype of expanded CD4⁺ T cell clones in ACPA+ SF (n=4) and ACPA- (n=3)
- c. Phenotype of expanded CD4⁺ T cell clones in ACPA+ PB (n=4) and ACPA- (n=3)
- d. Phenotype of expanded CD4⁺ T cell clones which are shared between CD4⁺ T cell clusters (n=4 ACPA+ SF and n=3 ACPA- SF)
- e. Sharing of CDR3s with CXCL13high T_{PH} (first table), Tregs (second table), effector CD4⁺ T cells (third table) and cytotoxic CD4⁺ T cells (fourth table) clones in ACPA+ SF (n=4) and ACPA- (n=3)

Supplementary Data 7. CDR3 alpha/beta amino acid sequences shared in annotated CD4⁺ T cell clusters in synovial fluid in ACPA+ SF (n=4) and ACPA- (n=3)

Supplementary Data 8. Flow cytometry antibodies

Supplementary Data 9. Flow cytometry panels