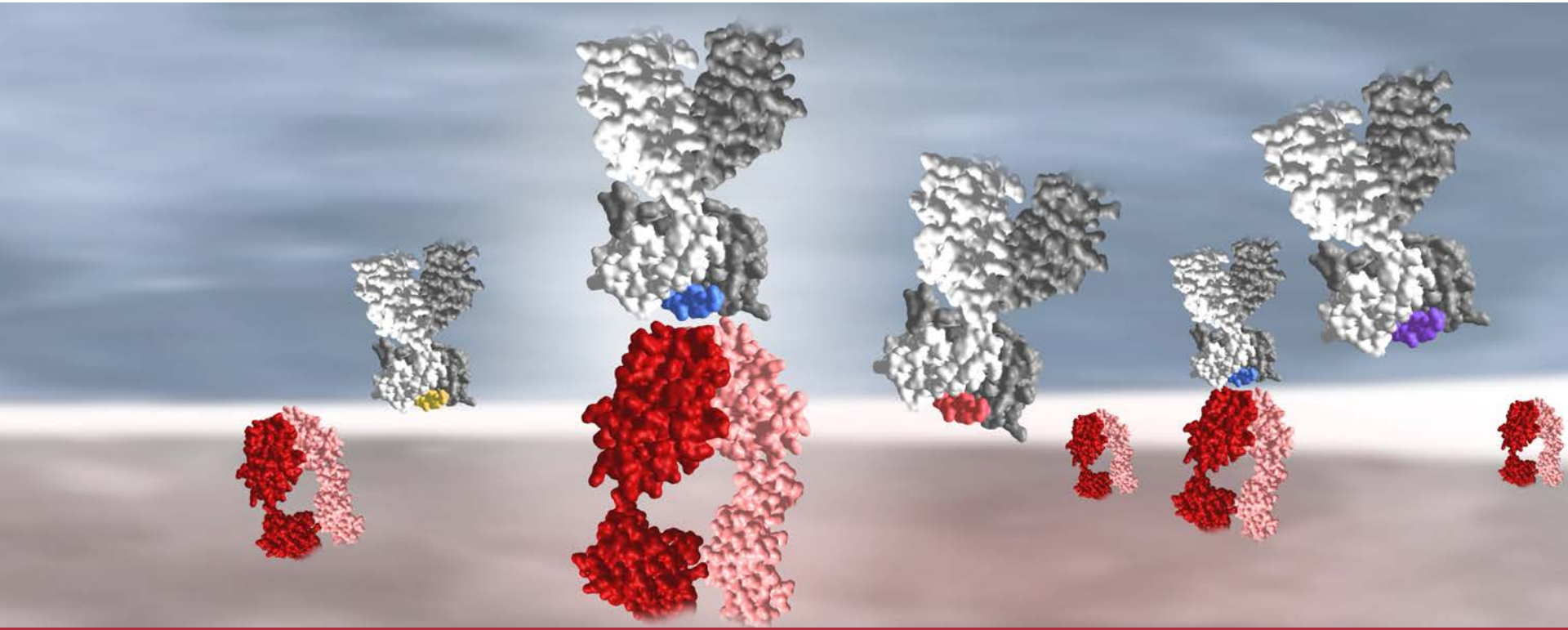
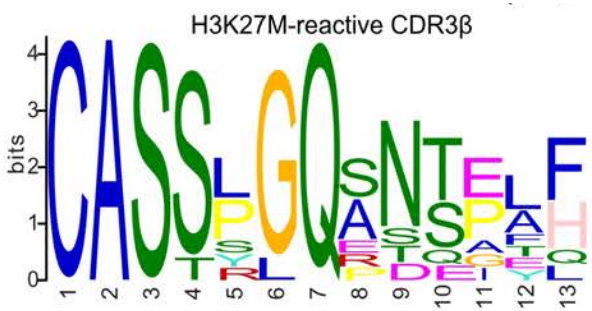
T-FINDER x Tumor Immunology
Rapid, functional cancer TCR and epitope discovery

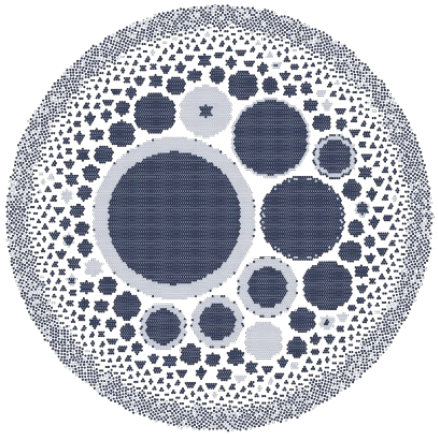


Tumor-specific TCR:epitope pairs can provide promising candidates for cancer vaccines and cell therapies

- Identification of > 50 epitope-reactive TCRs (per donor):
  - Turnaround time: 3 months, investment: 250k EUR
- Identification of unknown tumor epitopes:
  - Turnaround time: 6 months total, investment: 350k EUR/identified epitope
- Time and cost savings if patient material is already available



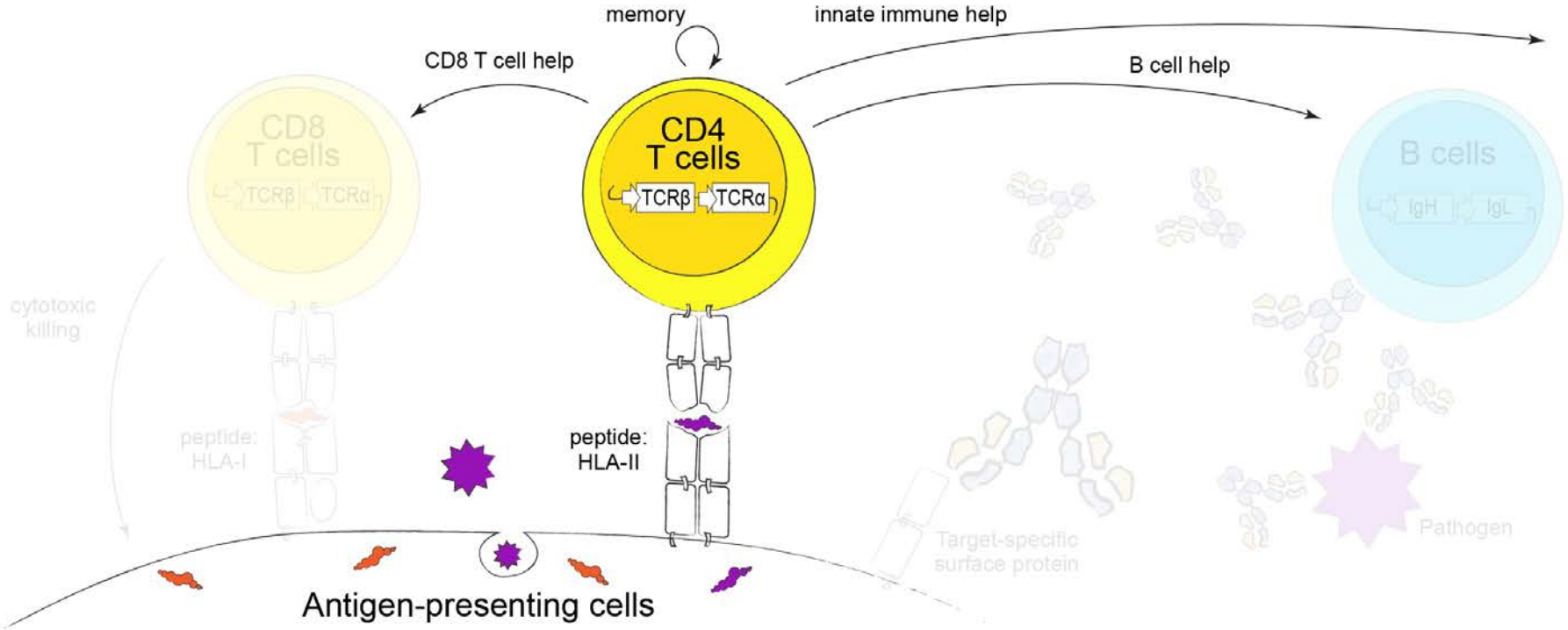
Neo-epitope specific TCRs motifs after patient T cell profiling



Ex vivo expansion of peripheral CD4 T cells on antigen libraries

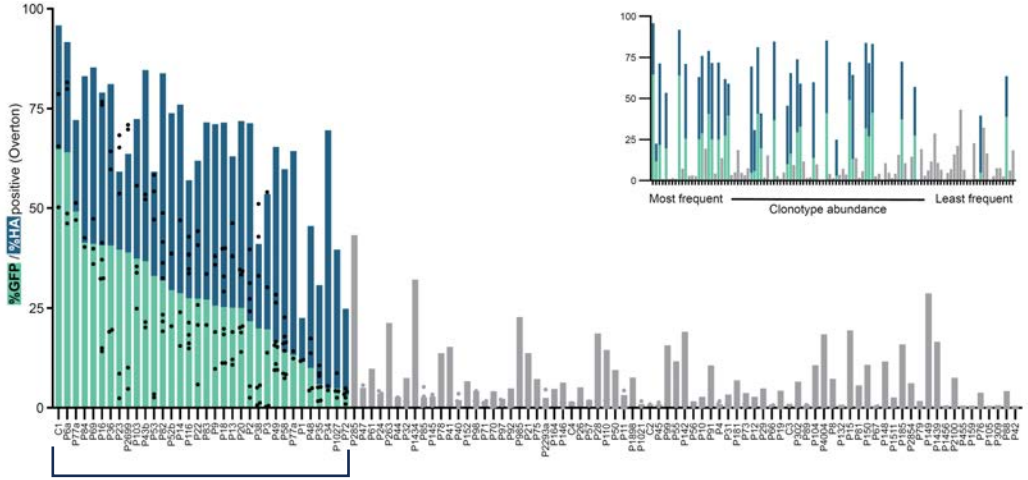
CAR, chimeric antigen receptor

CD4 T cells and their TCRs are particularly interesting due to their orchestration of comprehensive anti-tumor immune responses



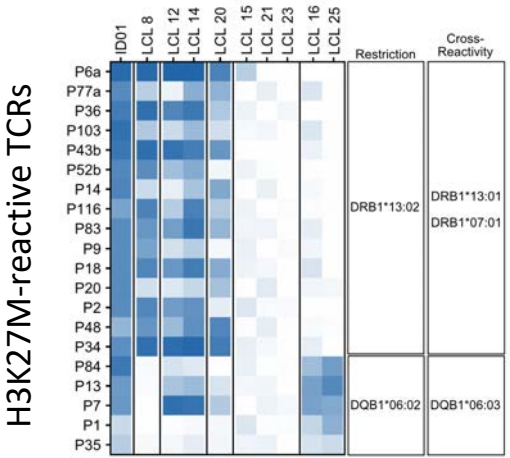
T-FINDER was used to fully characterize the tumor peptide-specific TCR repertoire from a neo-epitope vaccinated patient

Patient ID01



H3K27M-reactive TCRs

HLA allele mapping

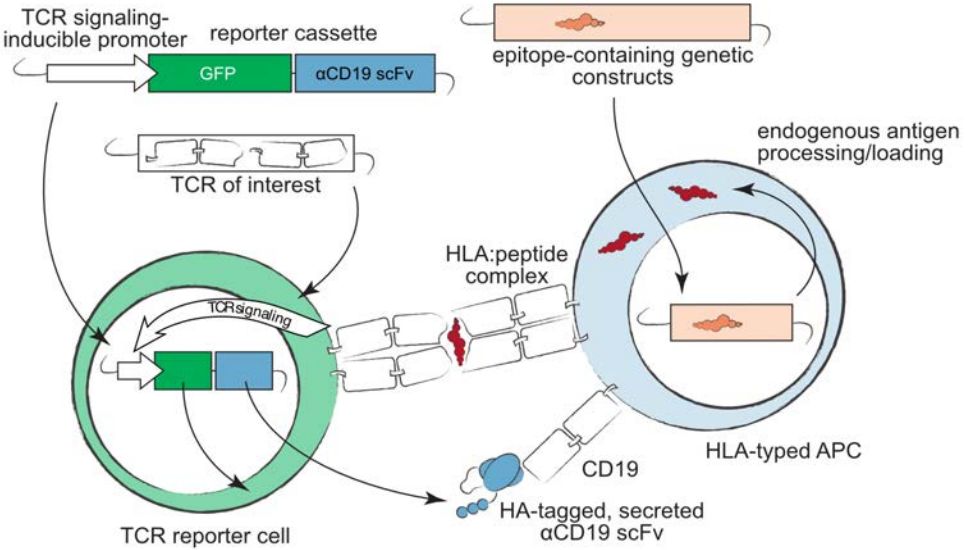


Boschert, Kromer, Lerner, et al (Sci Adv 2024)

- 34 reactive TCRs identified from a single patient, 14-day turnaround time
- All reactive TCRs were CD4 (T_{cm}) derived, and a neo-epitope specific BCR was identified in the CSF
- Class II HLA restriction analysis provides off-the-shelf, recipient-compatible TCRs for cell therapies

A novel reporter confers sensitivity and specificity and is compatible with all T cell-activating receptors

- Tight control of TCR signaling (minimal false positive rate)
- 100-fold signal-to-noise ratio
- 3-log linear range for relative activation strength

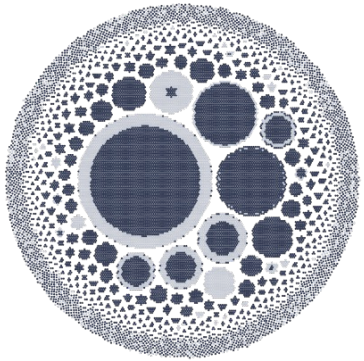


Project requirements:

- T-cell receptors of interest (can be identified by BioMed X using proprietary ESTEL protocol)
- Autologous PBMC sample (to generate APC line)
- Putative antigen list or patient material (e.g. tumor exome sequence, tumor cell line, immunoproteomic data)

APC, antigen-presenting cell; HLA, human leukocyte antigen; CAR, chimeric antigen receptor

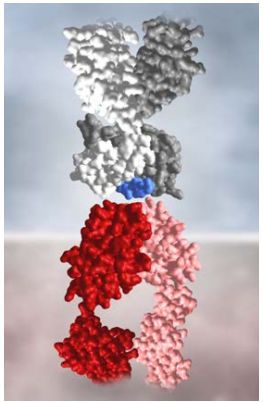
Our toolbox for TCR applications



ESTEL

Epitope-**S**pecific **T**-cell **E**xpansion on **L**ibraries quickly expands relevant TCRs from complex repertoires (e.g. PBMC)

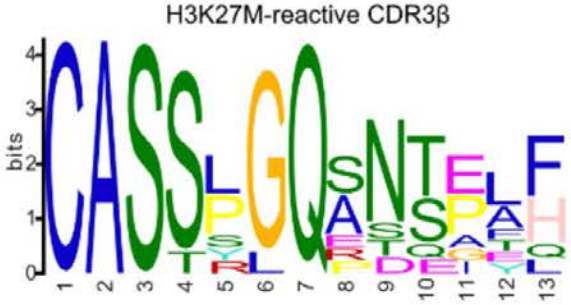
Unpublished



T-FINDER

T-cell **F**unctional **I**dentification and (**N**eo)-antigen **D**iscovery of **E**pitopes and **R**eceptors rapidly deconvolutes cognate TCR:epitope interactions

Cetin et al *Science Advances* 2024



Deep TCR/epitope Characterization

- Functional TCR repertoire analysis to identify binding motifs
- Autologous and population-level HLA mapping
- *De novo* minimal epitope discovery

Boschert et al *Science Advances* 2024

Tumor-reactive TCR prediction: Tan et al *Nature Biotechnology* (2024)

T-FINDER: T cell Functional Identification and (Neo)-antigen Discovery of Epitopes and Receptors