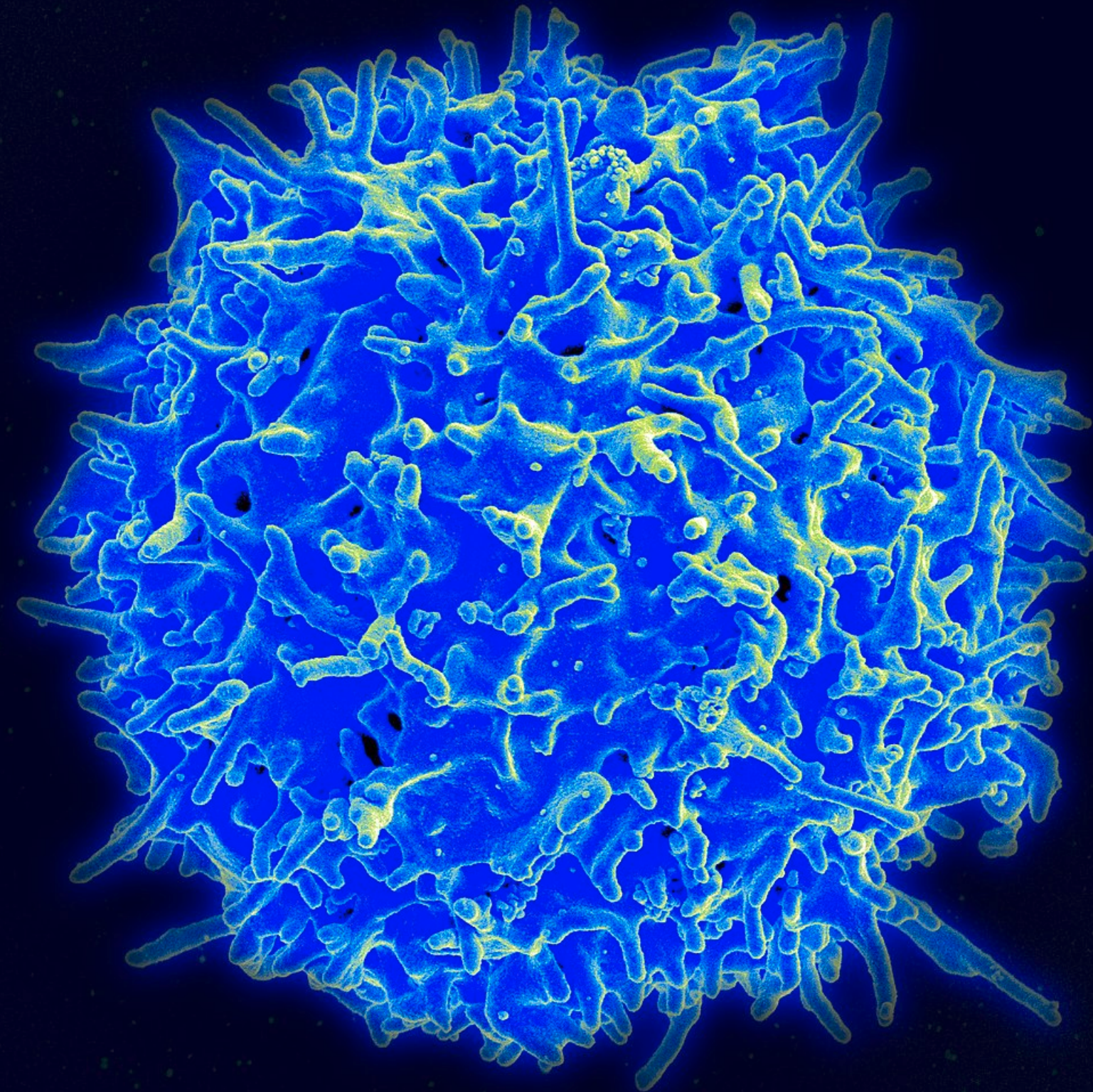
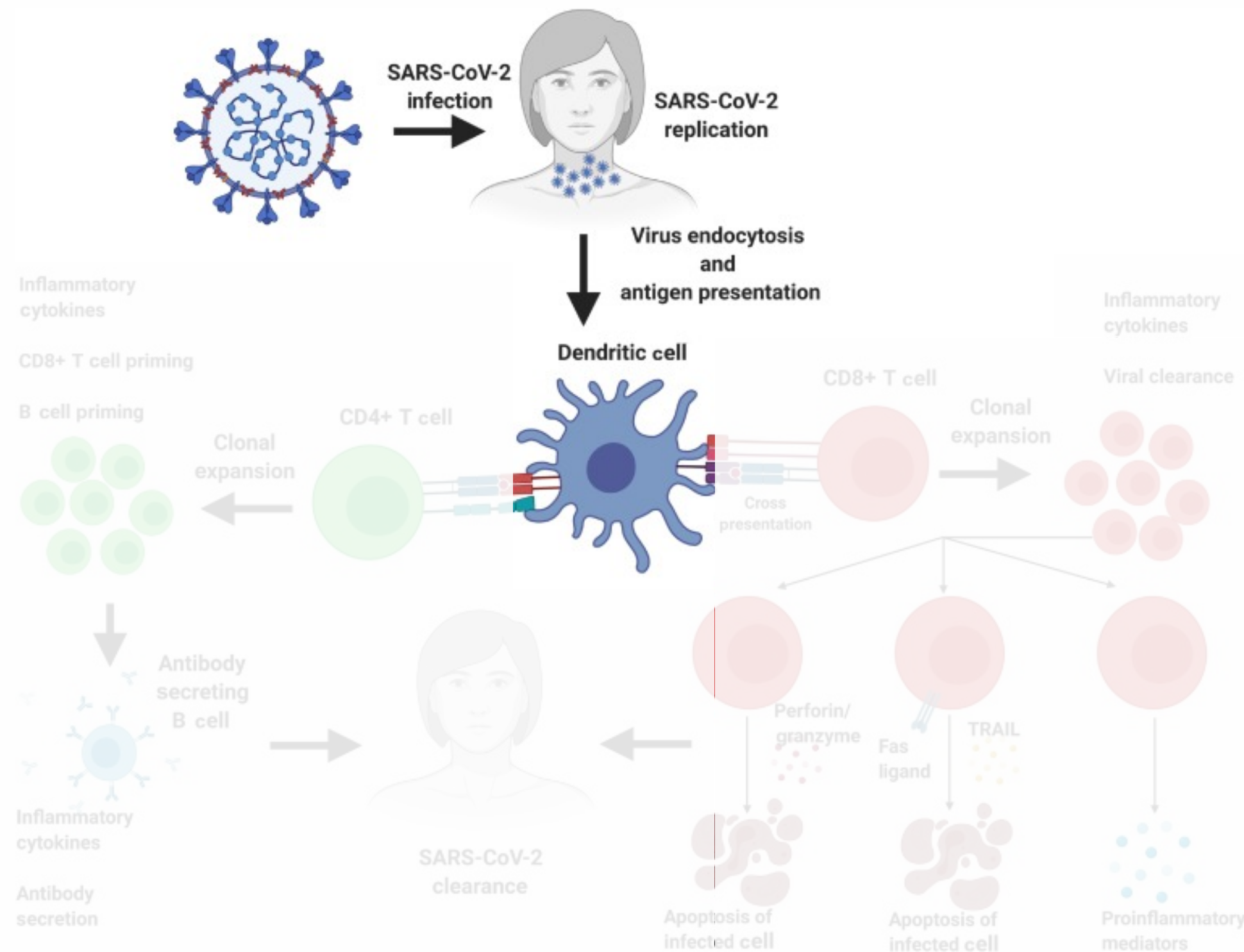


Inferring responding immune clonotypes with **NoisET**

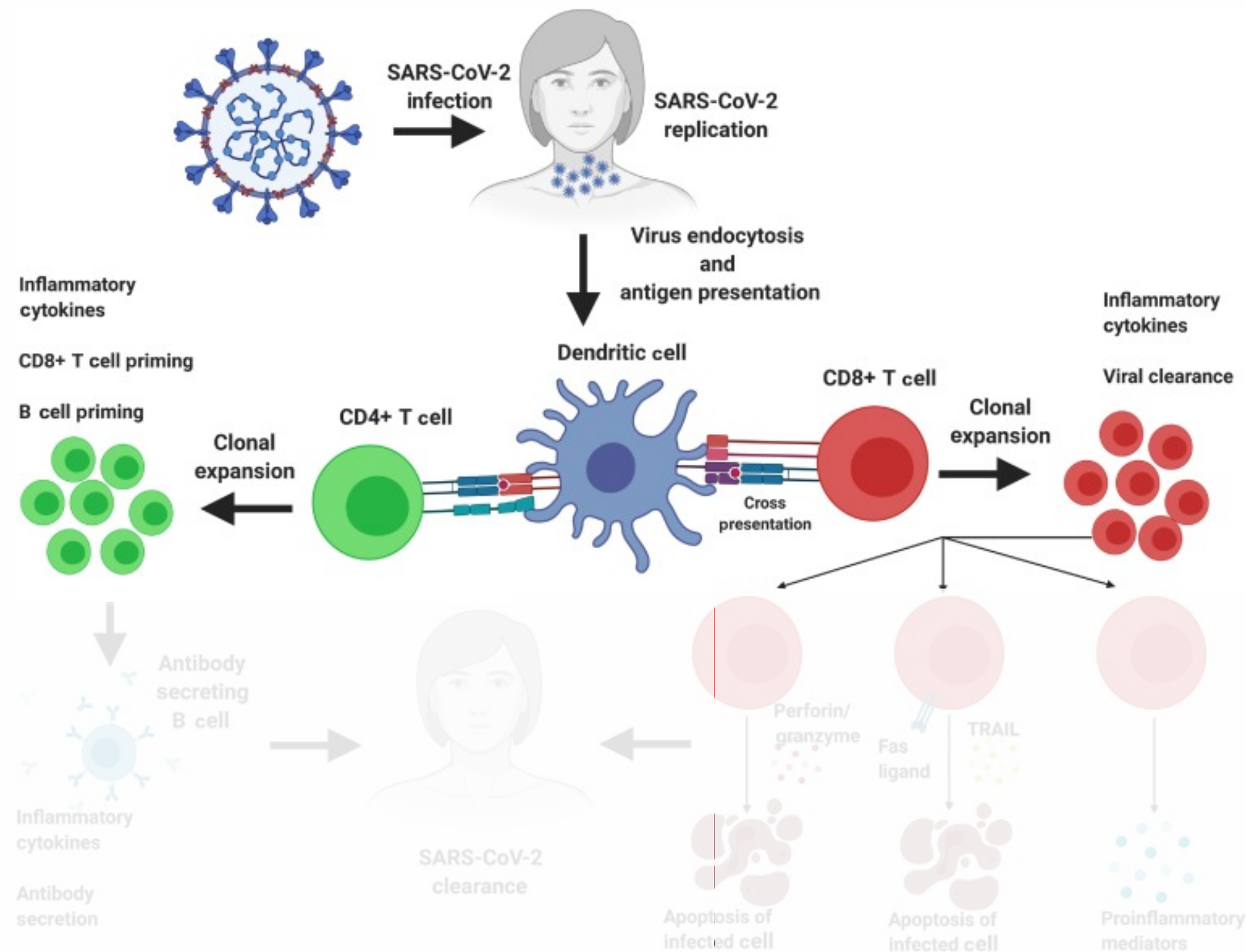


M. Bensouda Koraichi, A. Mazzolini
T. Mora, A. Walczak,
J.L. Weissman

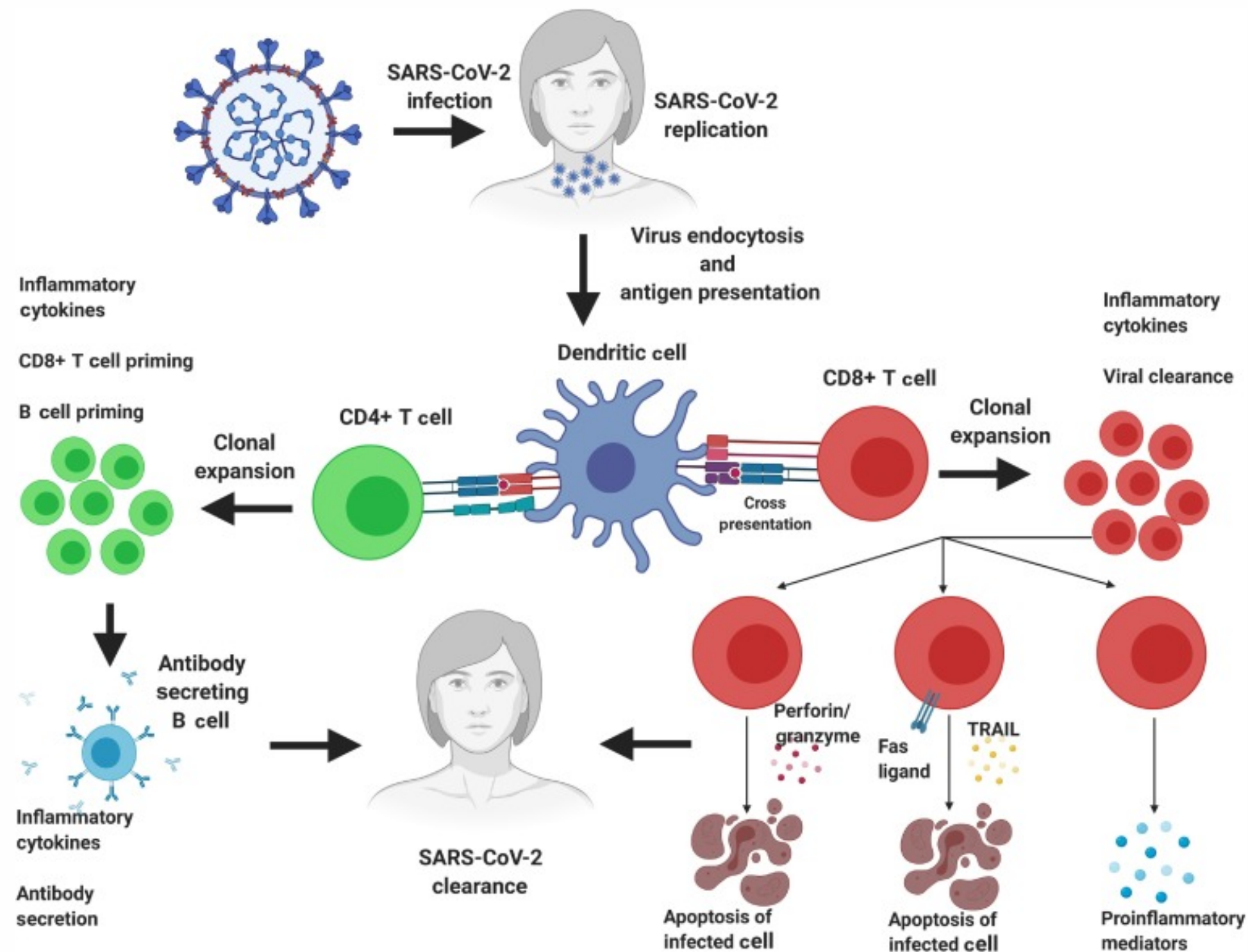
T-cell response to a disease



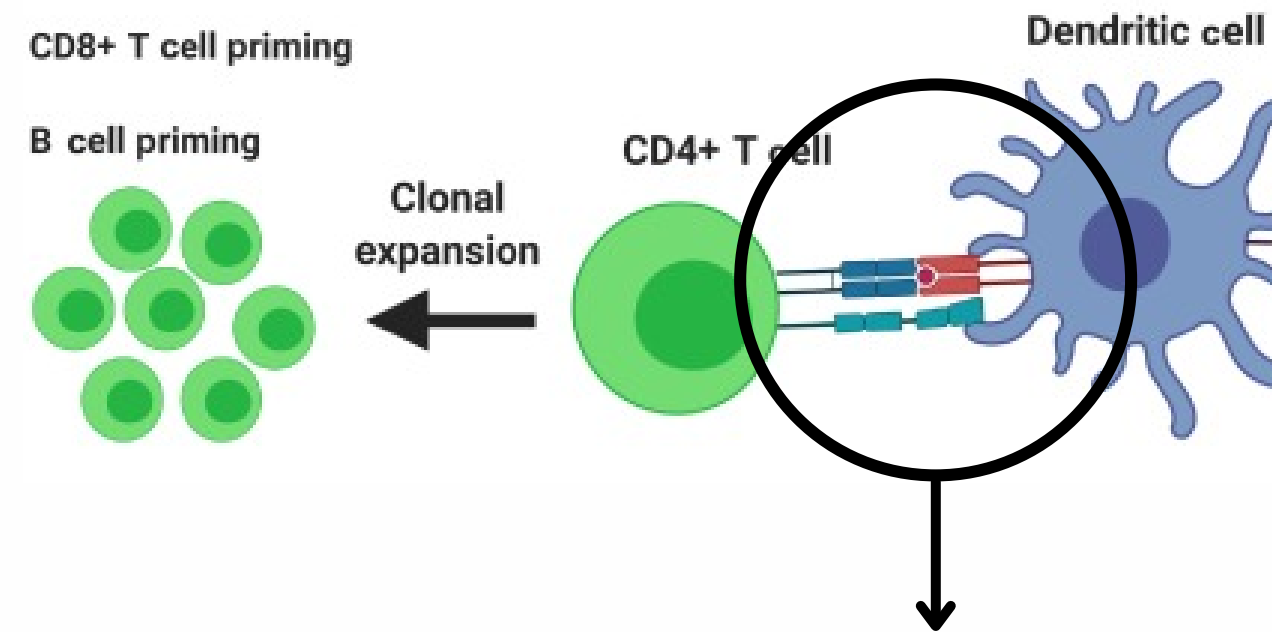
T-cell response to a disease



T-cell response to a disease

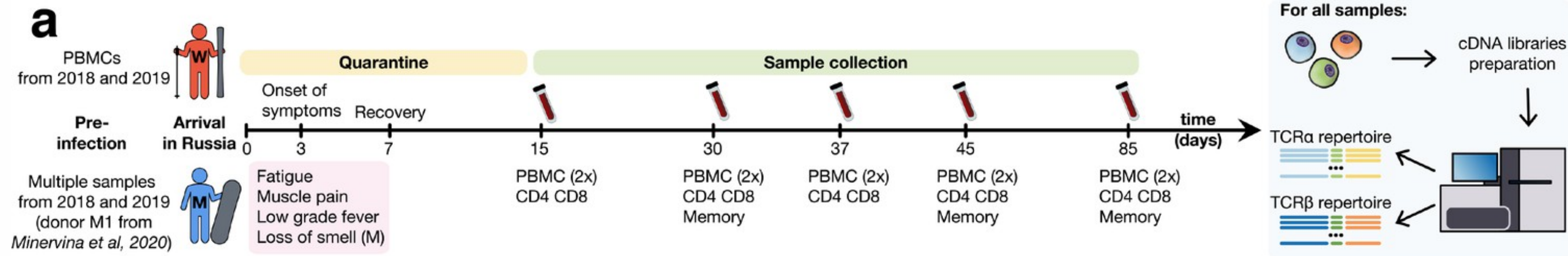


T-cell response to a disease

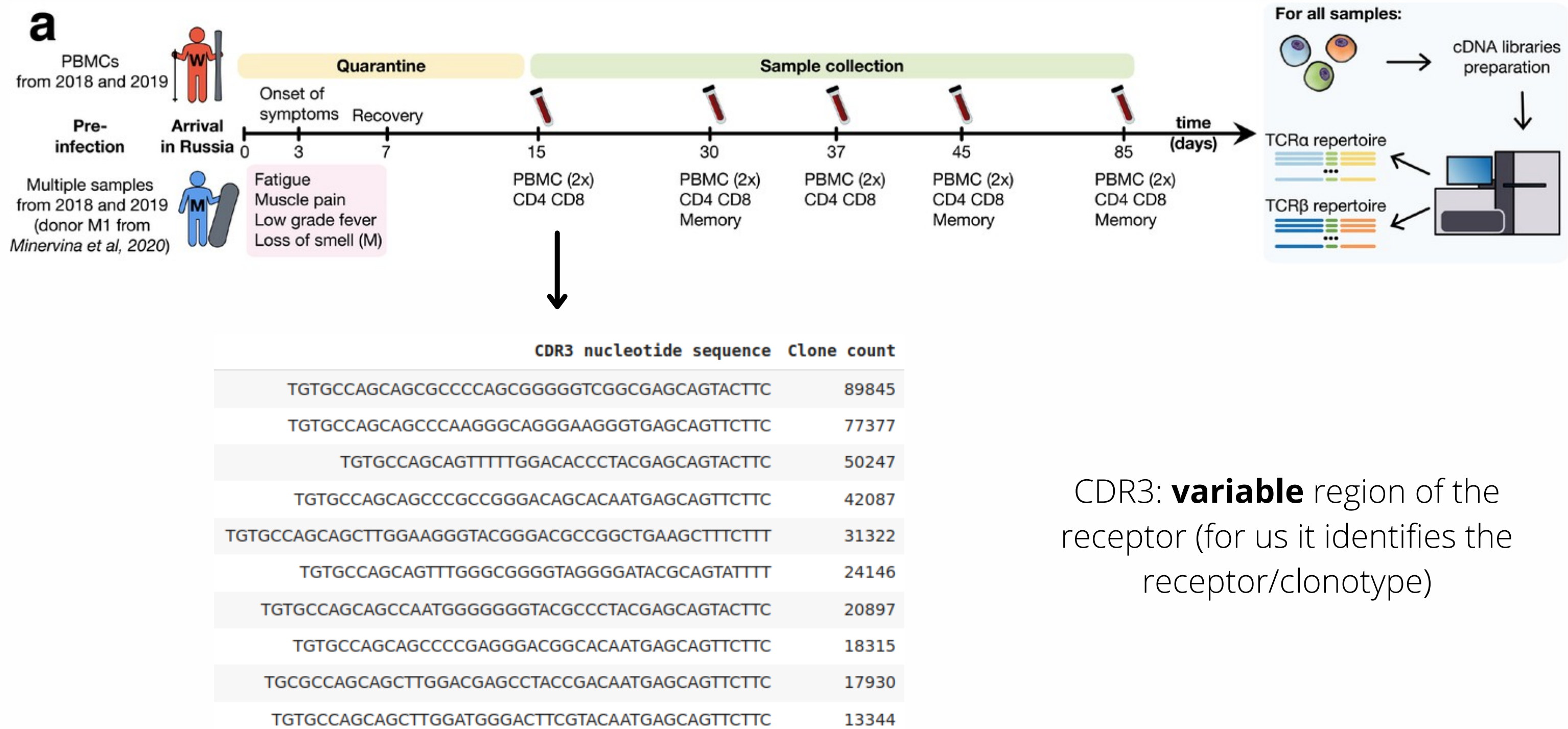


T-cell receptor has to bind to the specific antigen
(10^9 - 10^{10} unique receptors in our body)

Our longitudinal data

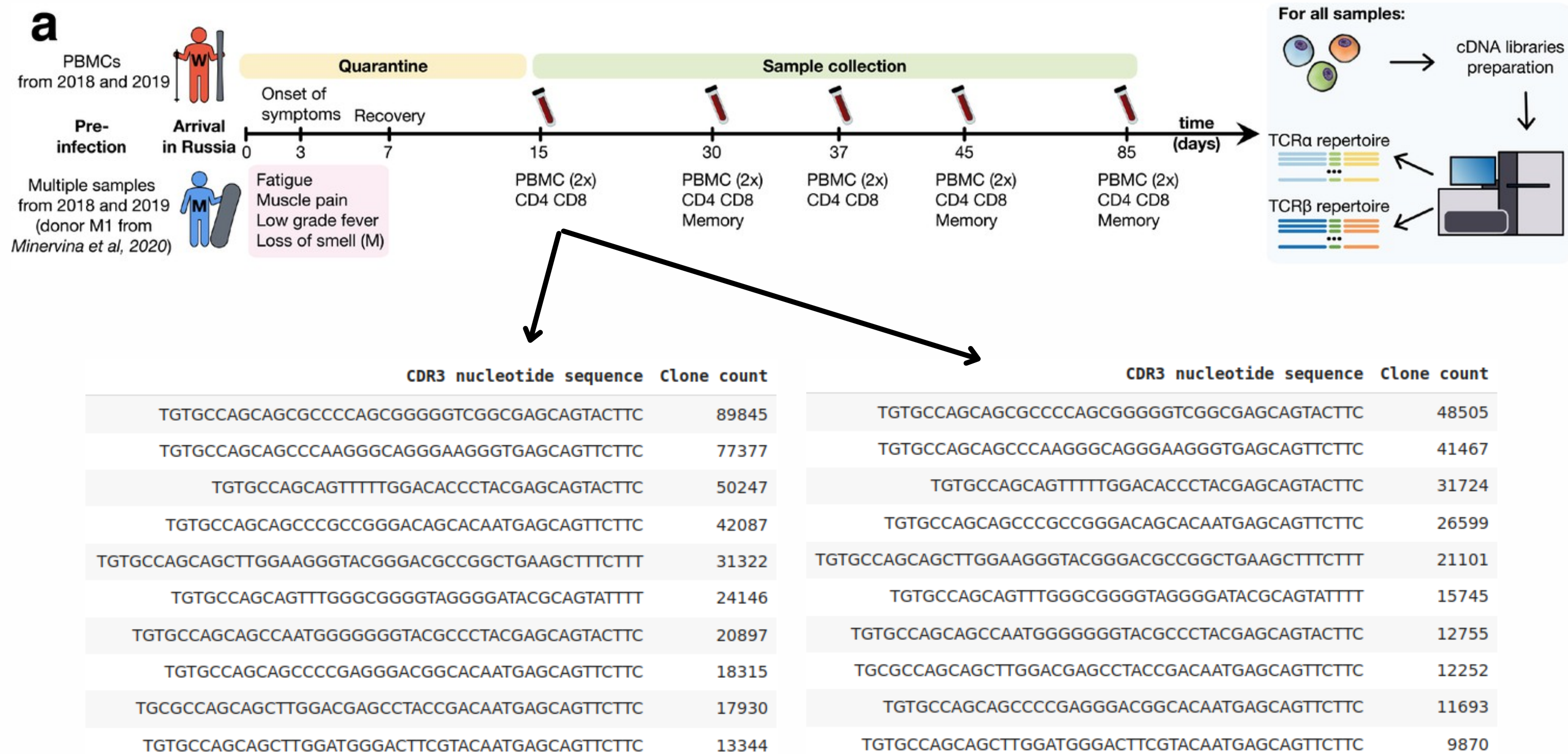


Our longitudinal data



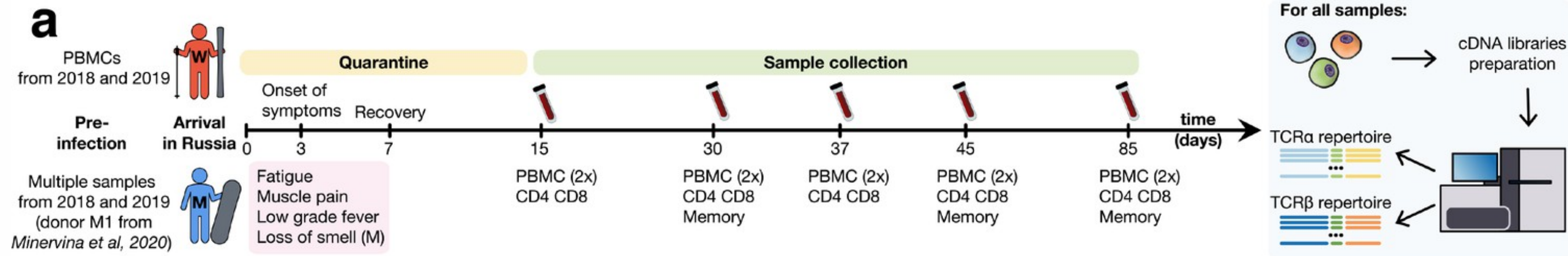
CDR3: **variable** region of the receptor (for us it identifies the receptor/clonotype)

Our longitudinal data with replicates



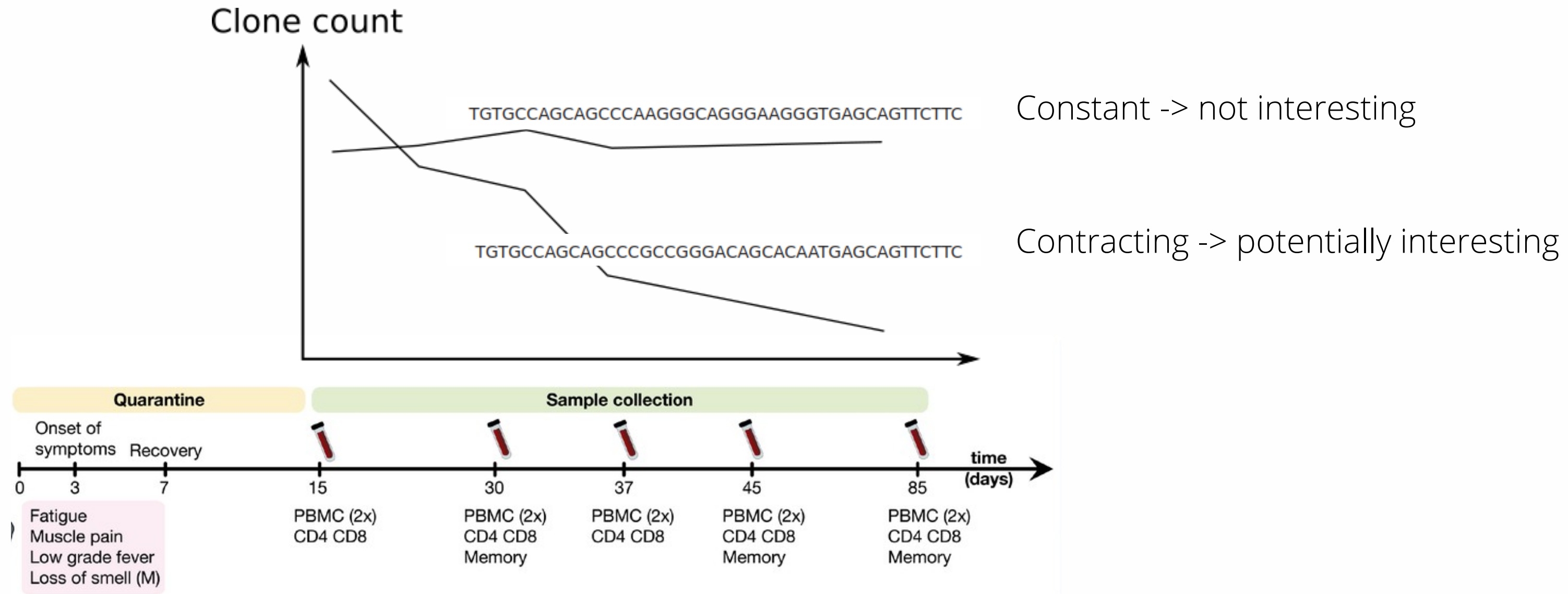
from Minervina A et al. "Longitudinal high-throughput TCR repertoire profiling reveals ...". *eLife*, 2021

Question

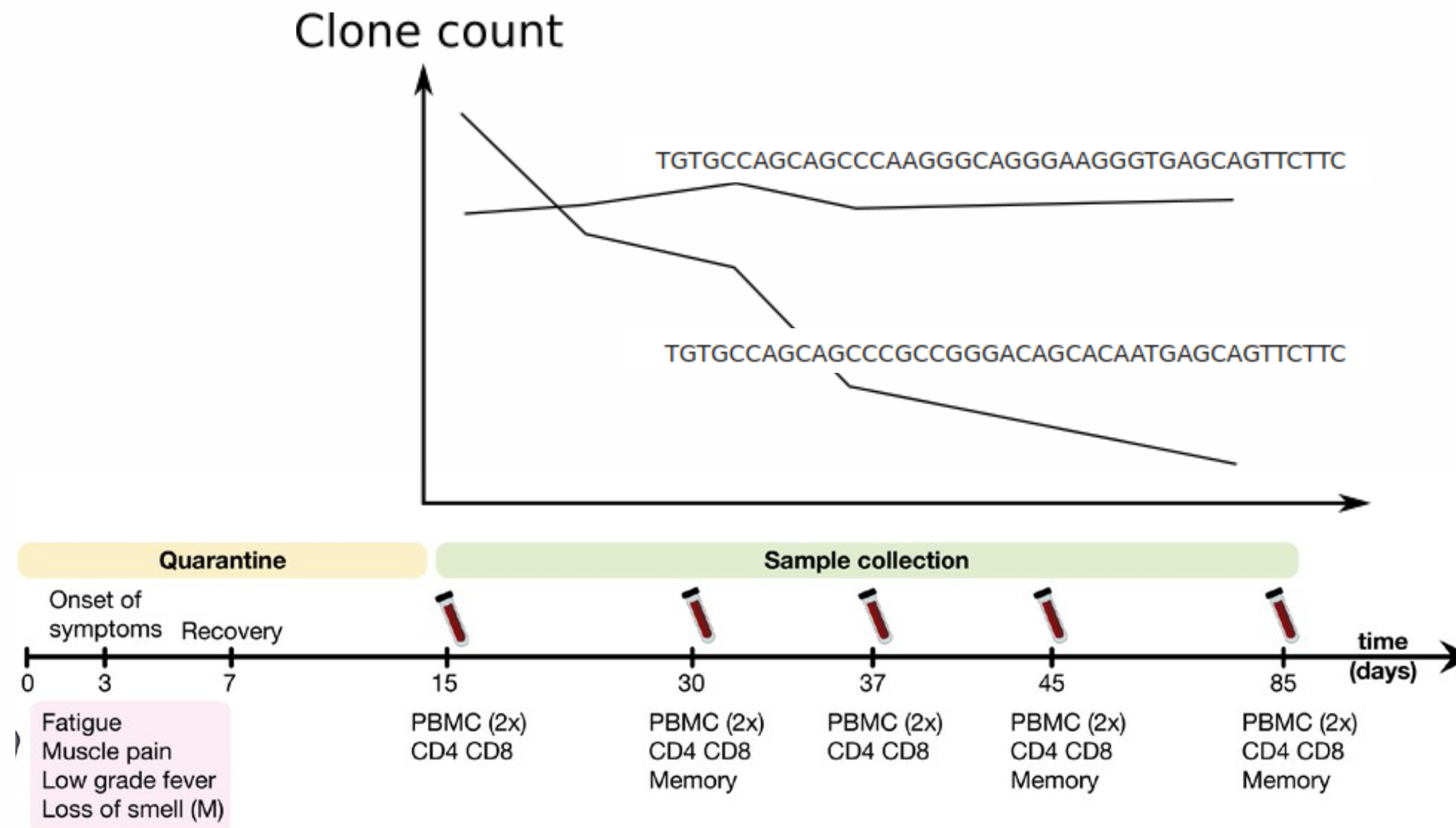


How can we identify the Tcells receptors of the immune system that **significantly** respond to COVID?

Naive approach



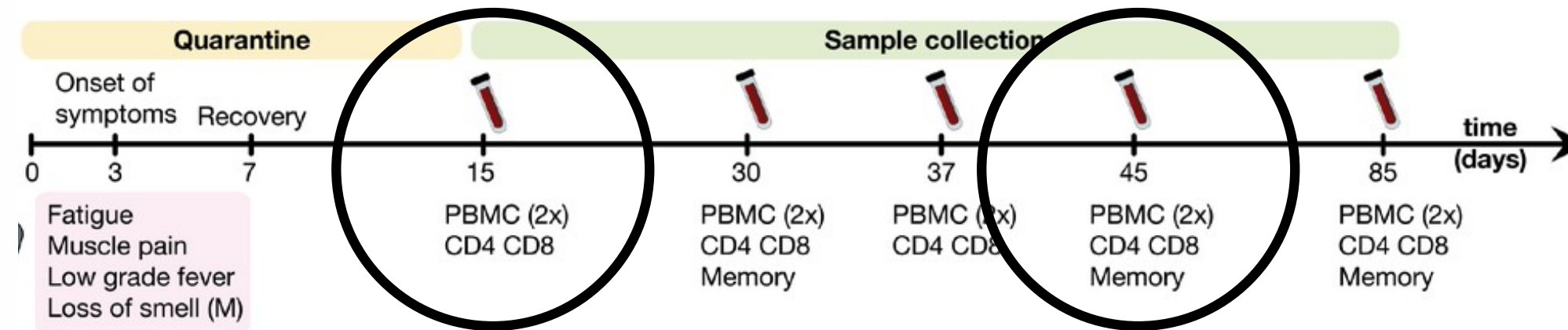
Naive approach



Problems:

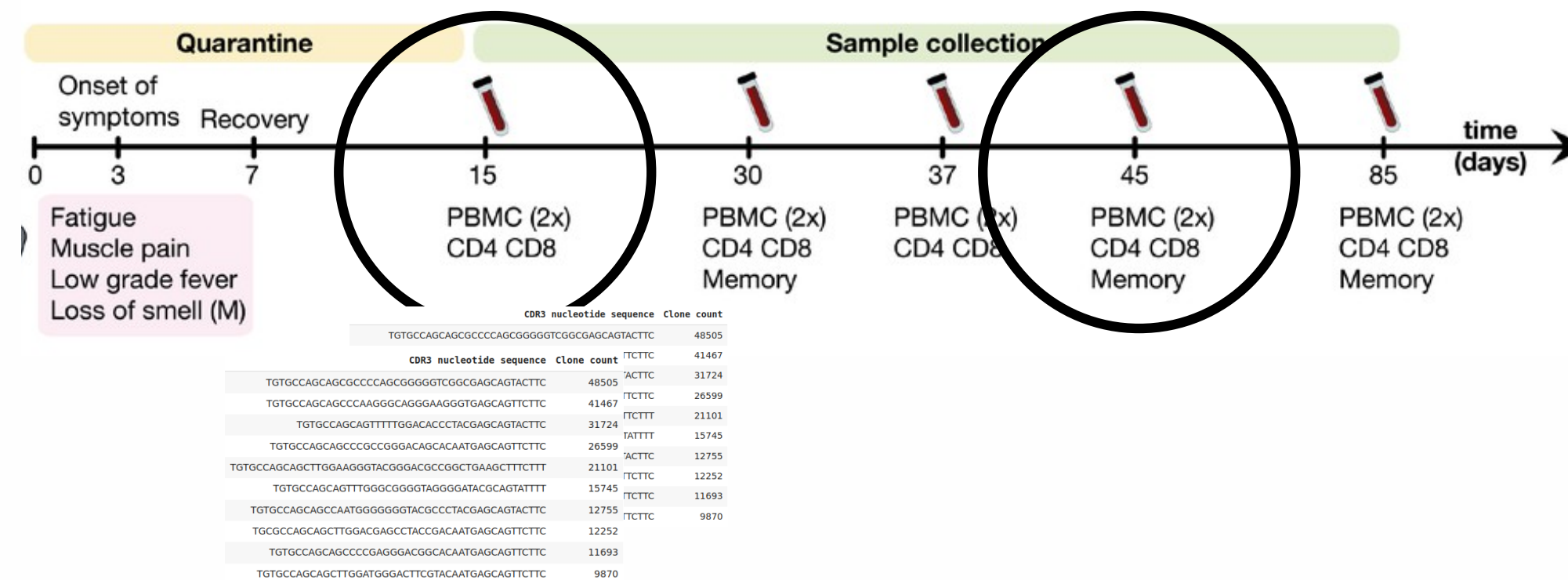
- How do I define precisely a contracting clone and separate it from a constant one?
- There is sampling **noise**! Counts can change because of that and not because of a real contraction.

Noiset in short



Noiset implements a Bayesian method for identifying the contracting clonotypes between two time points

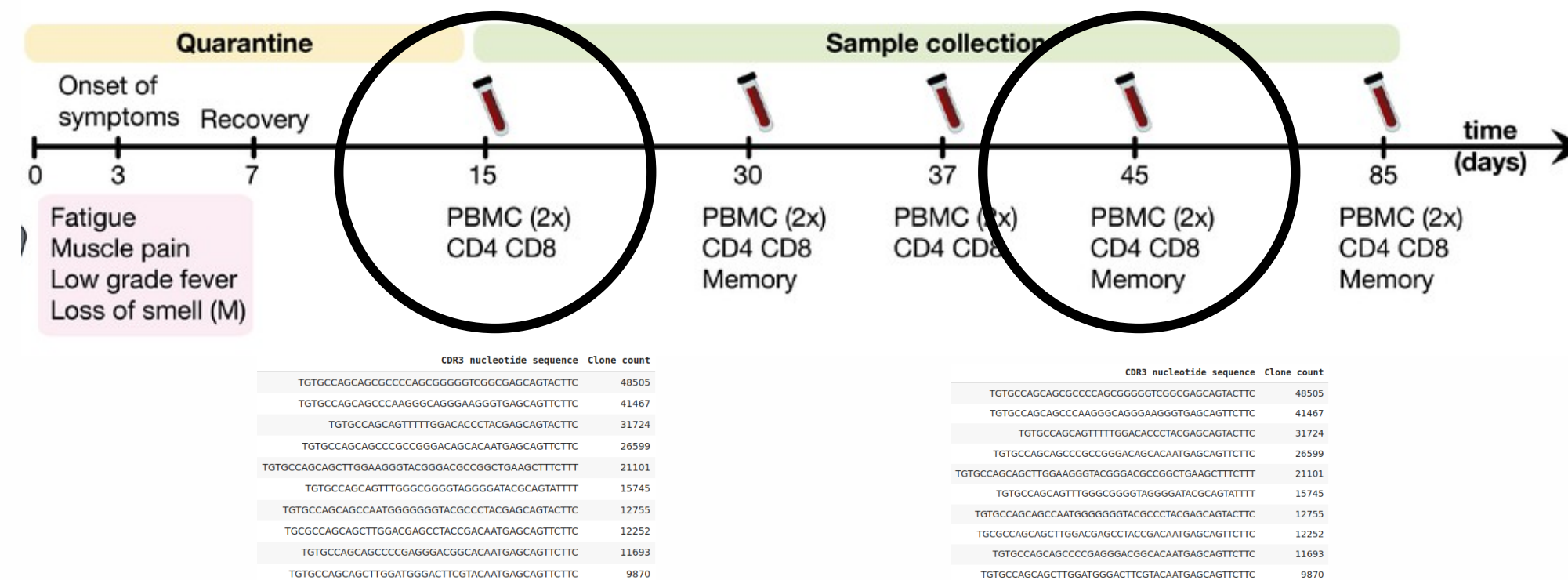
Noiset in short



Noiset implements a Bayesian method for identifying the contracting clonotypes between two time points

It quantifies the sampling noise given the two replicates

Noiset in short



Noiset implements a Bayesian method for identifying the contracting clonotypes between two time points

It quantifies the sampling noise given the two replicates

It identifies which clonotypes significantly contract given the sampling noise

Plan of the tutorial

Go to the repository: **https://github.com/mbensouda/NoisET_tutorial**

There are three notebooks that can be opened in google colab (Python):

- Part 1: Familiarize with longitudinal data of T Cell Receptors
- Part 2: Learning the noise between replicates (with NoisET)
- Part 3: Inferring the contracted clonotypes (with NoisET) and validating the method

For R people: the notebooks have been translated in the Noiset_R folder