Open Master's Thesis Position

Starting date: Spring/Summer 2027

Magnani Lab

https://www.magnanilab.com/

What are we interested in? CAR T cells are T cells engineered with an artificial receptor that recognizes tumor antigens, bypassing MHC presentation. In recent years, CAR T cells have shown remarkable clinical results, including expansion and multi-year persistence in patients with aggressive cancers. However, all approved CAR T-cell products rely on viral vectors for transgene delivery, which makes manufacturing complex and costly and limits patient access. Our lab addresses this by using the Sleeping Beauty (SB) transposon system (Figure 1), a non-viral "cut-and-paste" gene delivery tool that offers a simpler, more cost-effective route to CAR T cells.

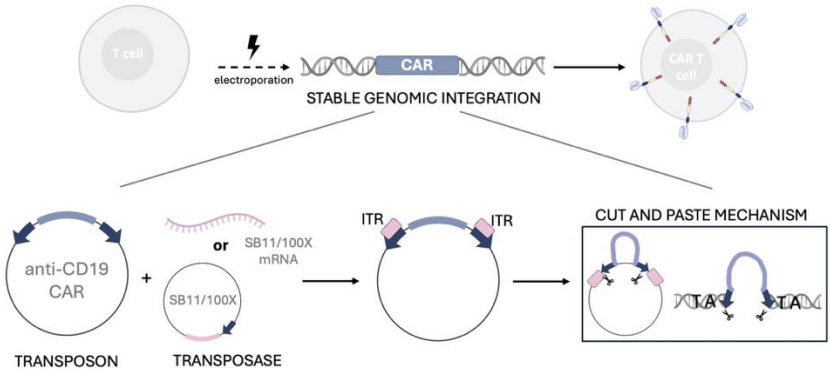

Figure 1 Schematic of the SB system. The transposase excises a CAR transgene from a transposon plasmid (both delivered by electroporation) and stably inserts it into the T-cell genome.

What will your project be about? Despite high response rates in hematological malignancies, relapse remains a major challenge. Chronic antigen exposure and an immunosuppressive tumor microenvironment can drive CAR T cells into exhaustion: they lose effector function and upregulate immune checkpoint receptors. In this project, you will investigate how checkpoint receptor signaling affects CAR T-cell function and explore different engineering strategies to counter it. By combining these approaches with SB CAR T-cell engineering, we aim to build more durable and potent CAR T cells.

What will you learn?

You will gain hands-on experience with key techniques in immuno-oncology and cell therapy:

- Molecular biology (DNA isolation, PCR, gel electrophoresis)
- T-cell and tumor cell line culture
- SB CAR T-cell production and CAR engineering
- Gene editing (CRISPR-Cas9, base editing)
- Flow cytometry
- In vitro functional assays (cytotoxicity assays, ELISAs)
- In vivo functional testing (immunodeficient and humanized mouse models)

Why us? By joining our Department of Medical Oncology and Hematology, you will have the opportunity to grow in a highly international environment shared by brilliant, dedicated scientists and physicians. For your master's thesis, you will be paired with a PhD student who will help and train you. Within the scope of the PhD student's project, you can also take on a small project of your own, which allows you to explore and develop independence early on.

What we are looking for?

- Strong interpersonal and communication skills
- Curiosity, critical thinking, and a precise, efficient working style
- Solid foundational knowledge of, and strong interest in, immunology and gene therapy
- Active participation in group and institutional meetings, including presenting your work
- Preferably available for one year

Interested? We are looking forward to your application. Please contact Prof. Chiara Magnani at chiara.magnani@usz.ch.