Universität Basel

Engineered anti-CD20-scFv expressing cellular membrane derived nanovesicles

In recent years, extracellular vesicles have attracted considerable interest as drug delivery systems due to their high biocompatibility, low immunogenicity, and natural ability to transport bioactive molecules between cells.

However, the therapeutic application of natural extracellular vesicles is hindered by their low secretion rates, heterogeneity, and limited targeting capabilities. To overcome these challenges, this project focuses on the development and comparative evaluation of three types of vesicles: engineered nano plasma membrane vesicles (nPMVs), natural extracellular vesicles (EVs), and extracellular vesicles derived from apoptotic cells (ApoEVs). Each vesicle type will be functionalized to display an anti-CD20 single chain variable fragment (scFv) on their surface, facilitating targeted delivery to CD20-overexpressing cells.

Through this comparative approach, we aim to identify the vesicle type best suited for targeted therapy and to demonstrate that cell membrane engineering is a versatile and effective strategy for incorporating targeting moieties into membrane-derived nanovesicles, thereby enhancing their potential as precision drug delivery platforms.

During this project, the MSc student learn the following methods:

- nPMV production
- EV production
- ApoEV production
- Cell culture
- Dynamic Light Scattering (DLS)
- Flow cytometry
- Confocal microscopy
- Zebrafish Larvae handling and injections
- Scientific writing

This project is suitable for internal MSc students (Drug sciences or Pharmacy) as well as for external master students with interest in nanoscience and drug delivery.

Applications can be sent to David Wang (david.wang@unibas.ch) or Megan Stierli (megan.stierli@unibas.ch).

Start date: Flexible/beginning 2026