

# Introduction Prof. Merten

**Module 1: Laboratory of Biomedical Microfluidics: Antibody Discovery**

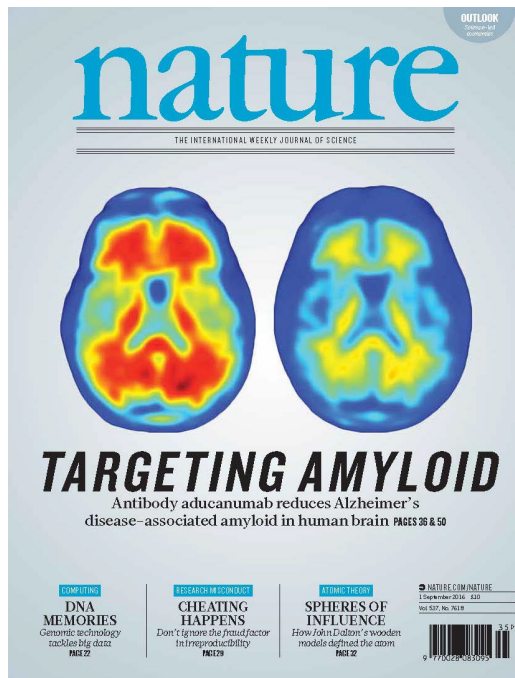
Module 2: Laboratory of Virology and Structural Immunology

Module 3: Bionanophotonics Systems Laboratory

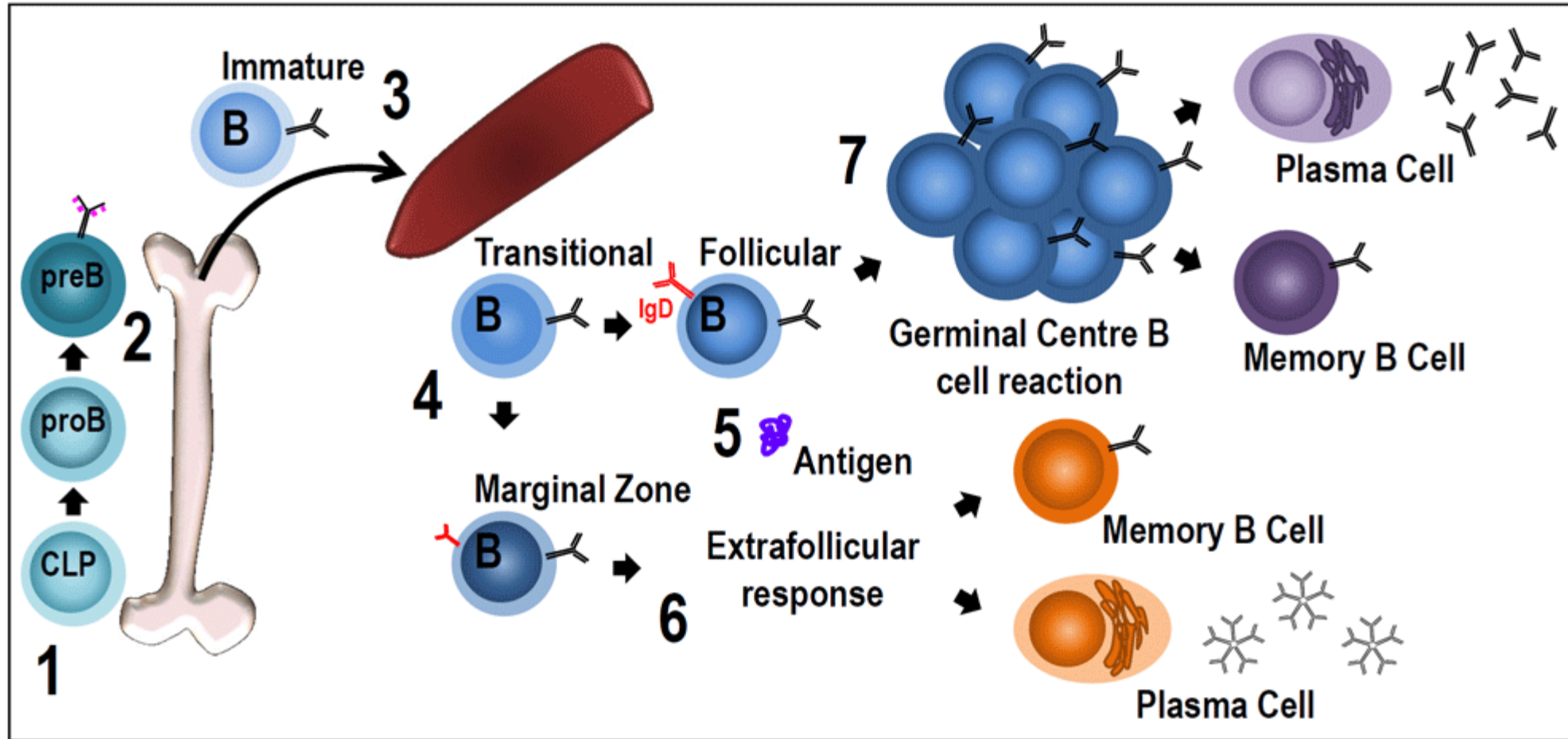
Christoph Merten 17.09.2025

# Why are monoclonal antibodies important?

- Fastest growing class of all prescription drugs, >150 mAbs in clinical use (as of 2023)
- Annual sales of approximately 200 billion US\$ per year, 11.9% CAGR (2022)
- Effective against a broad disease spectrum (e.g. oncology, infections, inflammation, neurodegenerative diseases)

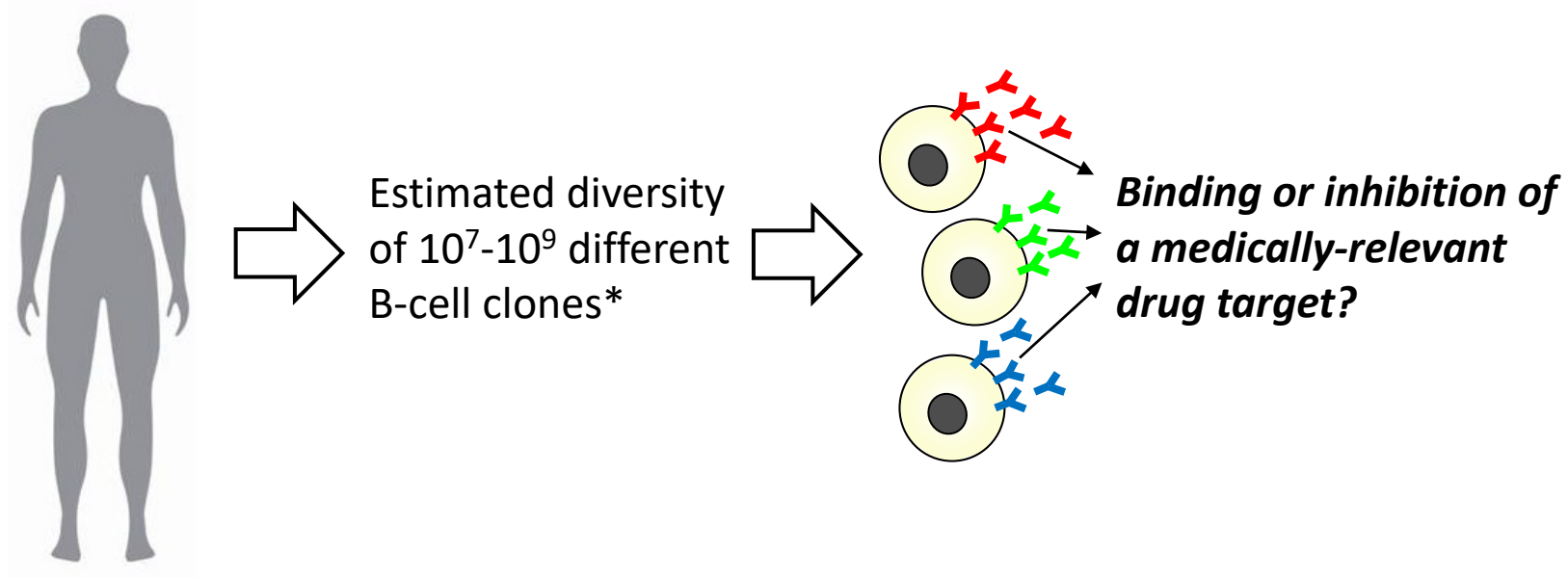


# Which cells in your body produce antibodies?



Yam-Puc JC, Zhang L, Zhang Y and Toellner KM. Role of B-cell receptors for B-cell development and antigen-induced differentiation [version 1; peer review: 2 approved]. *F1000Research* 2018, **7**(F1000 Faculty Rev):429 (<https://doi.org/10.12688/f1000research.13567.1>)

# The human antibody repertoire is highly diverse – how to find the needle in the haystack?



\*References:

DeWitt WS, et al. A Public Database of Memory and Naive B-Cell Receptor Sequences. *PLoS One* 11:e0160853. (2016)  
Briney B, Inderbitzin A, Joyce C, Burton DR Commonality despite exceptional diversity in the baseline human antibody repertoire. *Nature* 566:393-397. (2019)

## Powerful methods in antibody discovery:

- hybridoma technology (Nobel Prize 1984) and B-cell immortalization
- phage display (Nobel Prize 2018)
- microfluidics
- immune repertoire sequencing

# BIO-467 groups 2025 (preliminary)

Group A	
Sophie Thu Thuy	Holtz
Dünya Sibel	Zoghlami
Zoé	Vogler
Achille Paul	Pirotais

Group B	
Elsa	Guisolan
Daniel	Alves Lopes
Yuno	Reigner
Anastasia	Zeller

Group C	
Jeanne Noëline Anémone	Oouvray
Tania	Pesic
Simone	Vicentini
Inès Clara Marie	Montero

Group D	
Virginia	d'Adamo
Léa Claire	Rochat
Grégoire Oskar Albert	Pachebat
Lucas	Firouzi

Group E	
Samuel	Waridel
Nehal	Sharma
Pietro	Boiardi
Federico	Rossi

Group F	
Pauline Marine Yvette	Charpentier
Cris	Darbelay
Sandra	Tanackovic
Julie	Terreaux

# Module 1 papers

## Reviews for general intro and background info:

- *Pedrioli A & Oxenius A., Single B cell technologies for monoclonal antibody discovery. Trends in Immunology 2021*
- *Wilson PC & Andrews SF., Tools to therapeutically harness the human antibody response. Nature Reviews. Immunology 2012*
- *Kato M & Hanyu, Y., Screening technologies for recombinant antibody libraries. Medical Research Archives 2015*  
(Book: ISSN 2375-1924)
- *Bradbury AR et al., Beyond natural antibodies: the power of in vitro display technologies. Nature Biotechnology 2011*
- *Georgiou et al., The promise and challenge of high-throughput sequencing of the antibody repertoire. Nature Biotechnology 2014*

## Group A & D

### ***FACS-based and sequencing-based antibody screening***

- *Schardt 2021 (Scientific Reports), Goldstein 2019 (Communications Biology)*

## Group B & E

### ***Droplet microfluidics and Beacon™ microfluidics***

- *Wang 2018 (Nature Biotechnology), Winters 2019 (mAbs)*

## Group C & F

### ***Discovery of monoclonal and polyclonal anti-SARS antibodies***

- *Fenwick 2022 (Nature Microbiology), Keating 2021 (Nature Biotechnology)*

In your presentation **compare the different technologies** described in the papers assigned to you and **point out the strength** (normally oversold) **and weaknesses** (much less apparent) of the different approaches.

# Presentation schedule

**Preparation day:** Roger will be present next week Wednesday (24<sup>th</sup>) to answer questions and to assist, if necessary. You can also contact him for individual appointments, starting today

**Presentation groups A, B & C:** October 1<sup>st</sup>, 8.15-10am

**Presentations groups D, E & F:** October 8<sup>th</sup>, 8.15-10am

# Teaching Assistant



roger.diaz@epfl.ch

<https://epfl.zoom.us/j/65955986467?pwd=S01Ha9pG9G6jpFMN2t7zxvpIY9qasl.1>

Meeting ID: 659 5598 6467

Passcode: 657785

**on ZOOM**

Roger will be able to provide ~~in-person support on September 24<sup>th</sup> in the classroom~~. You can also contact him by email to clarify things or for scheduling further meetings. Please send him your questions ahead of any meeting, so that he can prepare for it.

# Questions?

