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 18.09.2024

Teaching Assistants

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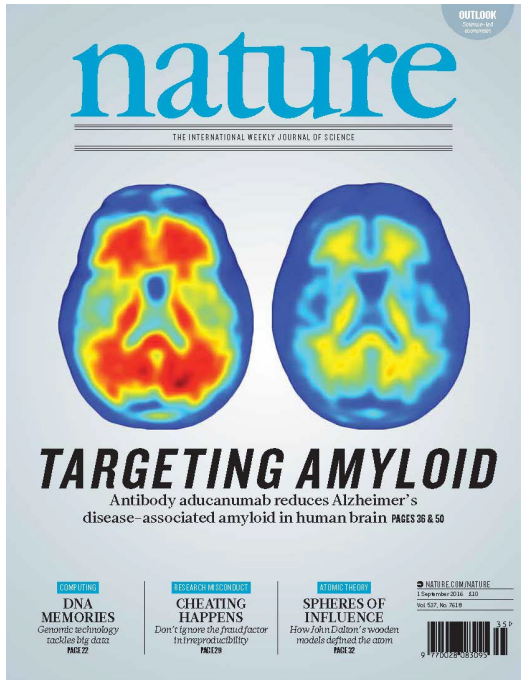
Contact person for: *Group A, C & D* *Group B, C & E*

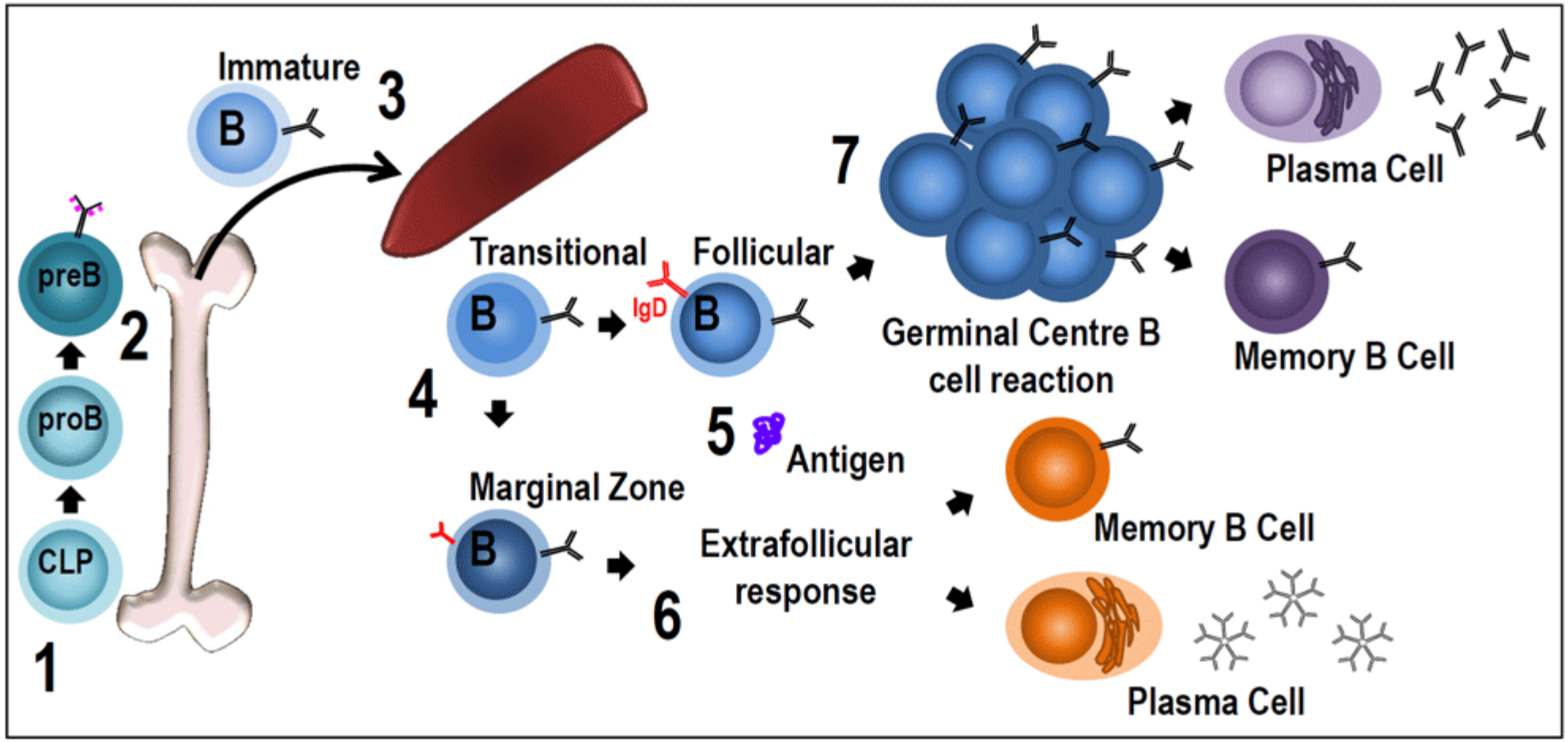
Remo and Roger will be able to provide **in-person support on September 25th in the classroom**. You can also **contact them by email to clarify things or for scheduling further meetings**. Please send them your questions ahead of any meeting, so that they can prepare for it.

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)

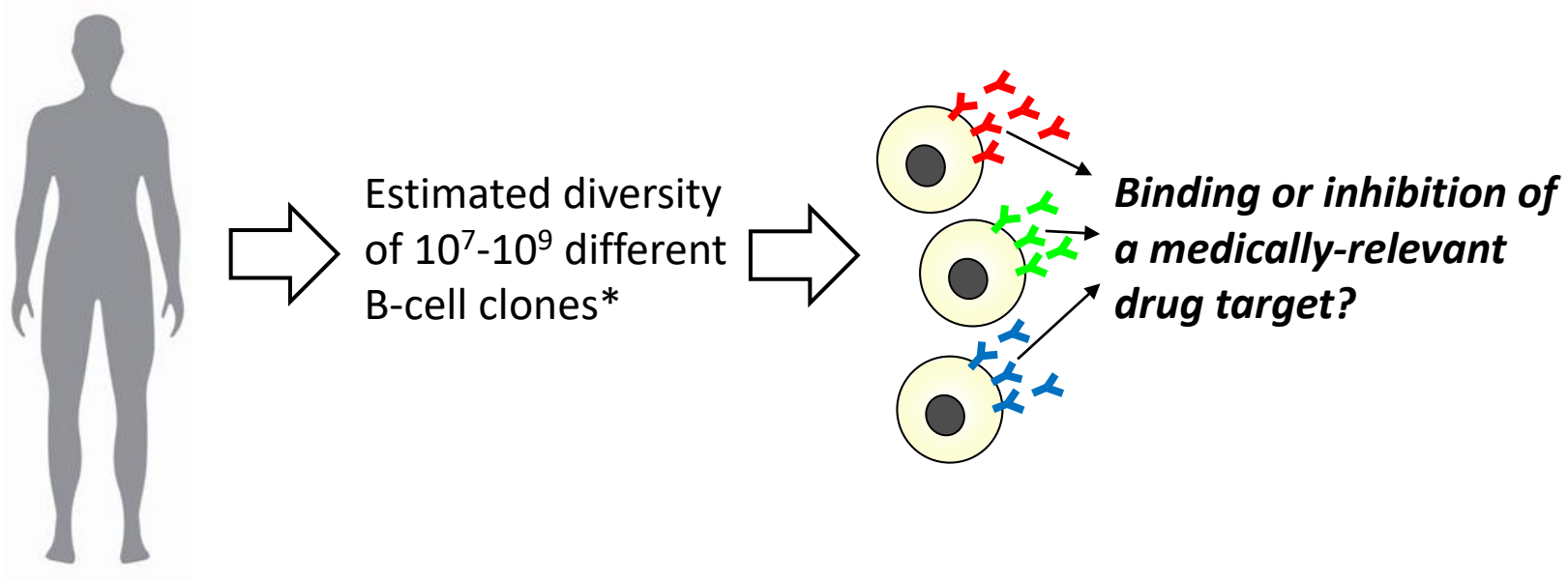


Which cells in your body produce antibodies?



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)

<u>Powerful methods in antibody discovery:</u>

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

BIO-467 groups 2024

Group A
Benjamin Charles Aouzir
Justine Bataillard
Aygul Bayramova
Camille Hilde Rosine Begon

Group B
Alice Canuti
Berta Céspedes Sarrias
Sarra Chaabane
Melissa Alexandra Dubugnon

Group C
Sandra Adel Aziz Gebraiel
Albane Irène Marie Madeleine Knoche
Lou-Anne Suzanne Lamouroux
Ghali Laraki

Group D
Tistou Émile Luisiere
Amélie Camilla Maloberti
Timothy Mann
Emi Myzeqari

Group E
Abderrahmane Ould Bay
Clarisse Jeanne Maylis Pierre
Niko Maximilien Pindao
Camille Anne-Marie Claudine Pittet

Group F
Maé Rollin
Valentino Antonio Vaccaro
Margot Yvette Nicole Vogelsperger
Ruike Yan

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 (Remo)

FACS-based and sequencing-based antibody screening

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

Group B & E (Roger)

Droplet microfluidics and Beacon™ microfluidics

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

Group C & F (Remo & Roger)

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: TAs will be present next week Wednesday (25th) in the classroom to answer questions and to assist, if necessary. You can also contact TA's for individual appointments, starting today

Presentation groups A, B & C: October 2nd, 8.15-10am

Presentations groups D, E & F: October 9th, 8.15-10am