

Johns Hopkins Engineering

Immunoengineering

Module 1/Lecture 1A

Immunoengineering: A New Frontier

A Historical Perspective



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Immunology History: Cells and Antibodies Example



1880



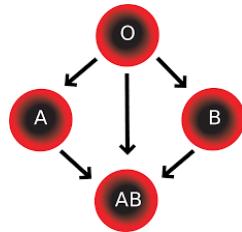
1500



Immunology History: Cells and Antibodies Example



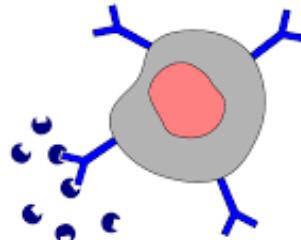
1880



1900



1500



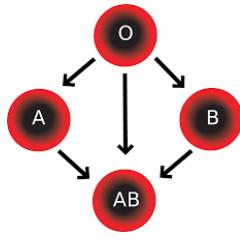
1948

Different-b-cells-with-antigen-receptors-and-antigen-molecules.svg
https://commons.wikimedia.org/wiki/File:Blood_Compatibility.svg

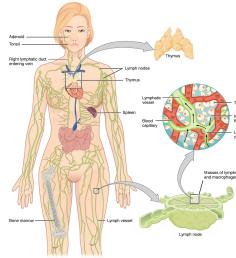
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1880



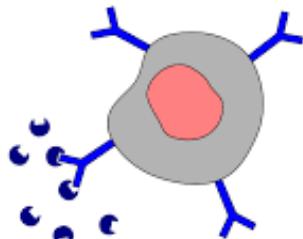
1900



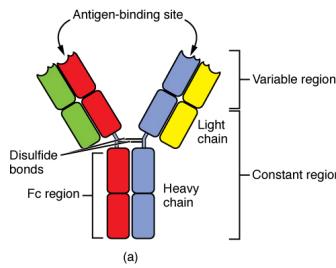
1959



1500



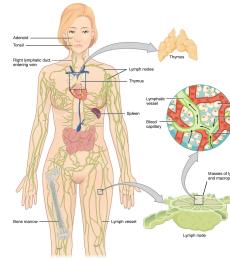
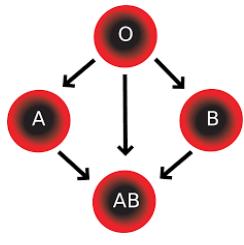
1972



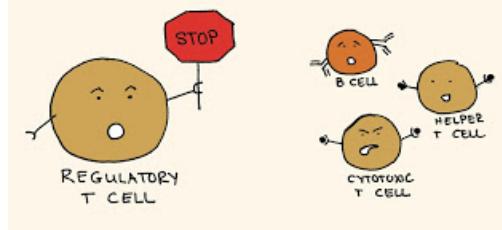
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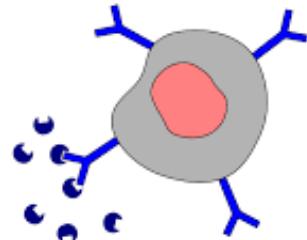
1880



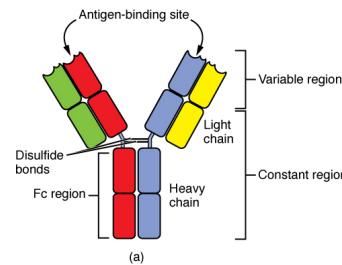
1959



1995



1948



2014



Bioengineering History – Teeth Example



600 AD

1500 BC



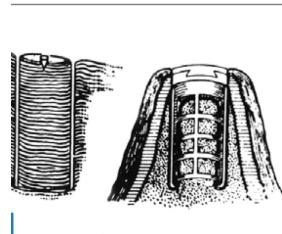
<http://www.ancient-origins.net/human-origins-science/jewel-capped-teeth-golden-bridges-9000-years-dentistry-001427>,

Pasqualini, U., & Pasqualini, M. E. (2009). *Treatise of implant dentistry: The Italian tribute to modern implantology*. Ariesdue.

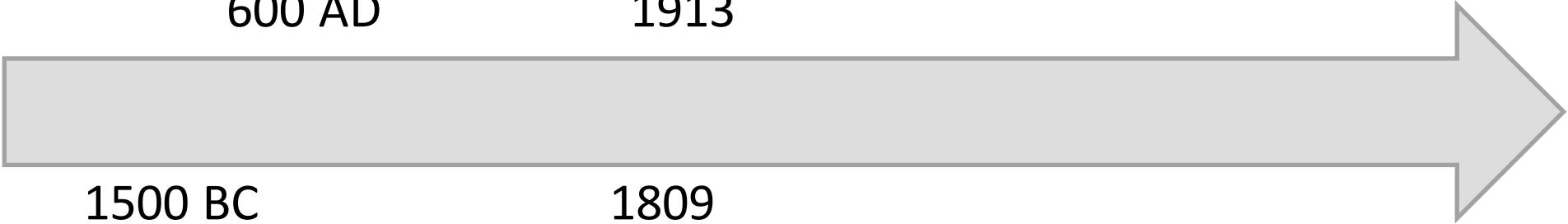
Bioengineering History – Teeth Example



600 AD



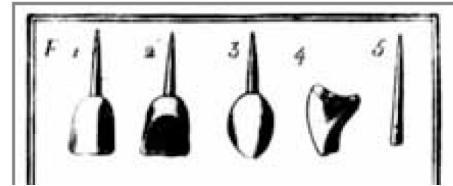
1913



1500 BC



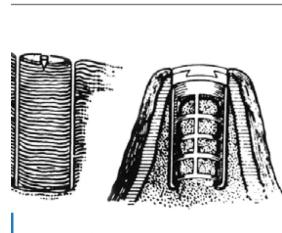
1809



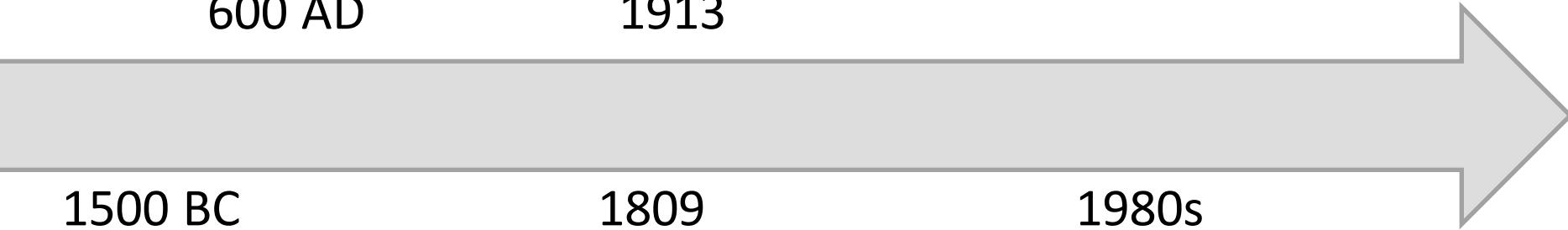
Bioengineering History – Teeth Example



600 AD



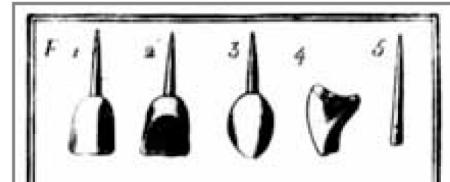
1913



1500 BC



1809



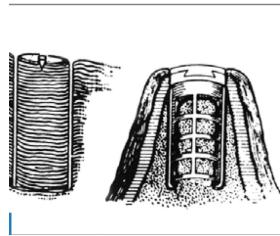
1980s



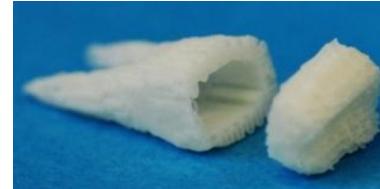
Bioengineering History – Teeth Example



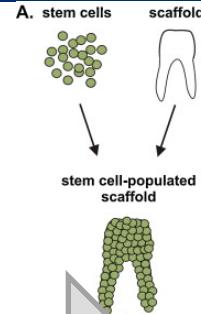
600 AD



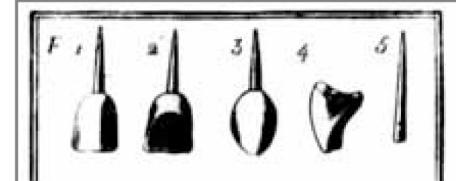
1913



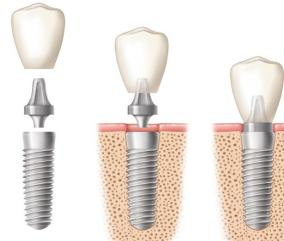
2000s



1500 BC



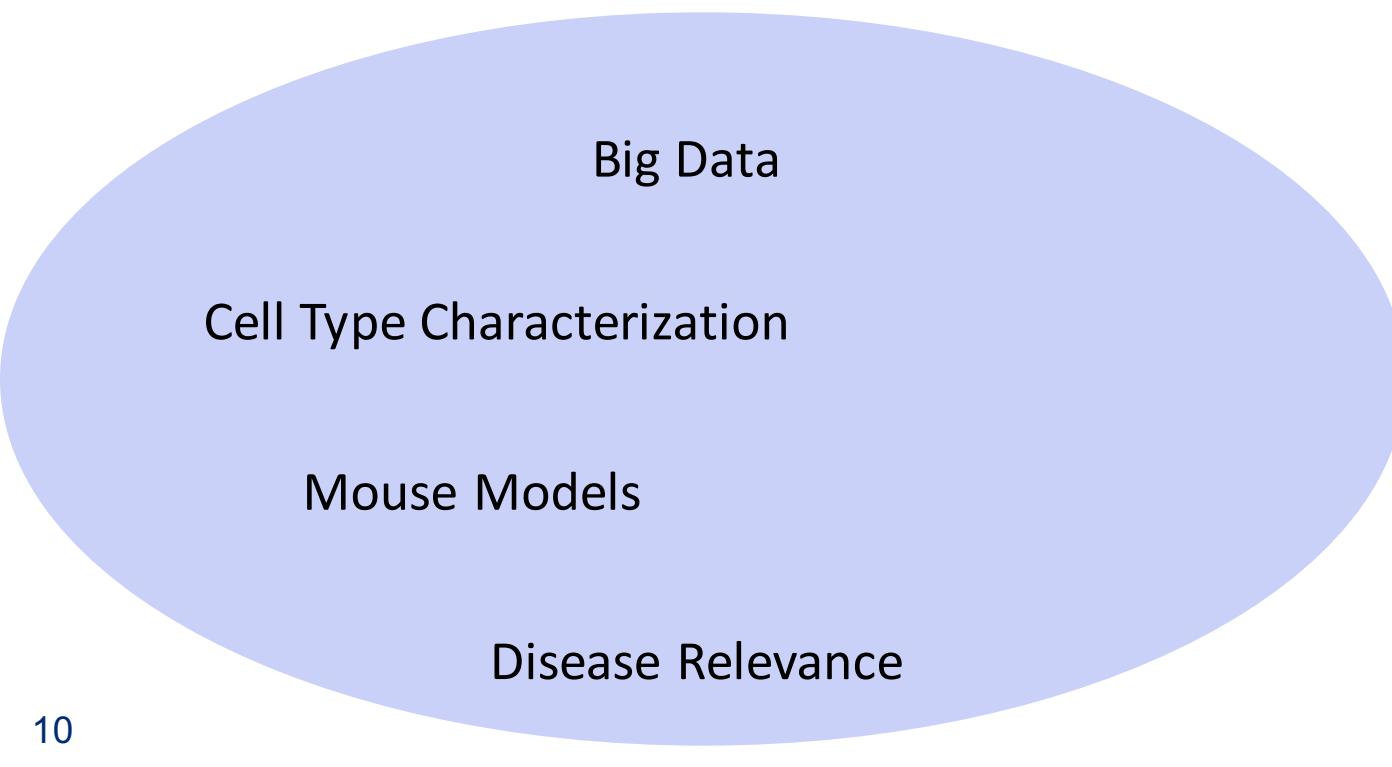
1809



1980s

The Emergence of Immunoengineering

Understanding of Immunology



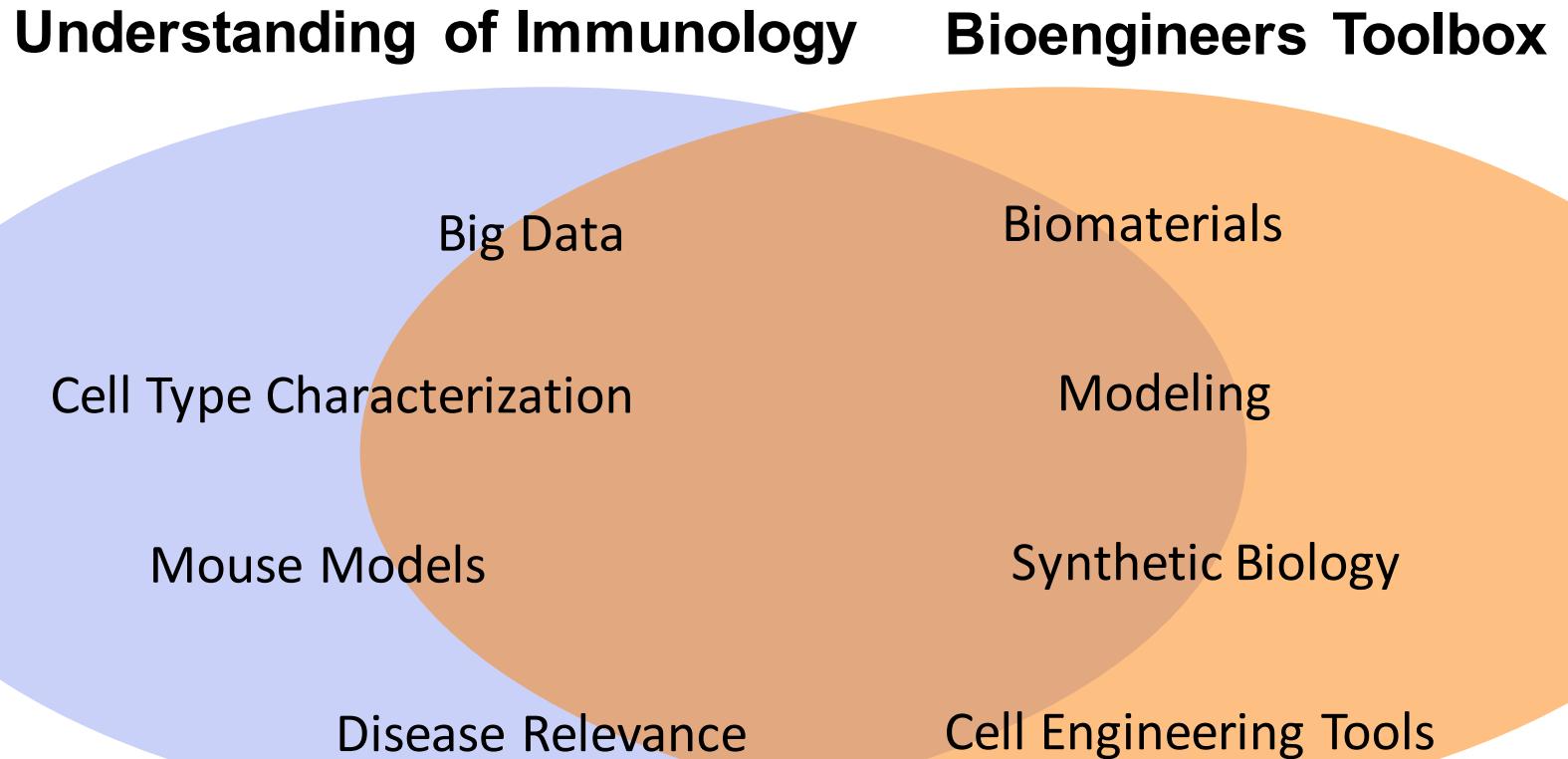
Big Data

Cell Type Characterization

Mouse Models

Disease Relevance

The Emergence of Immunoengineering





RESEARCH FUNDING

Immunoengineering

The NIBIB Immunoengineering Program supports the development and/or application of engineering principles, tools, methods, and technologies to manipulate and control the immune system to prevent, diagnose, and/or treat diseases to improve human health. Appropriate tools may include biomaterials, engineered tissues, synthetic biology approaches, therapeutic delivery systems, probes and devices for monitoring immune cell trafficking, mathematical models, and other methods. Technology development and application within the program must focus on engineering design-based approaches, and may include, but is not limited to, novel vaccines, cancer therapies, control of the immunological environment for regenerative medicine and drug delivery applications, control of the inflammatory response, and methods to ameliorate autoimmune disorders.

Subspecialties

- Tissue Engineering
- Synthetic Biology
- Drug Delivery
- Imaging & Detection
- Cell Engineering
- Molecular Engineering
- Mathematical Modeling
- Material Science

Applications

- Biomaterial Implants
- Tissue Transplantation
- Allergy
- Pathogens
- Autoimmunity
- Cancer



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