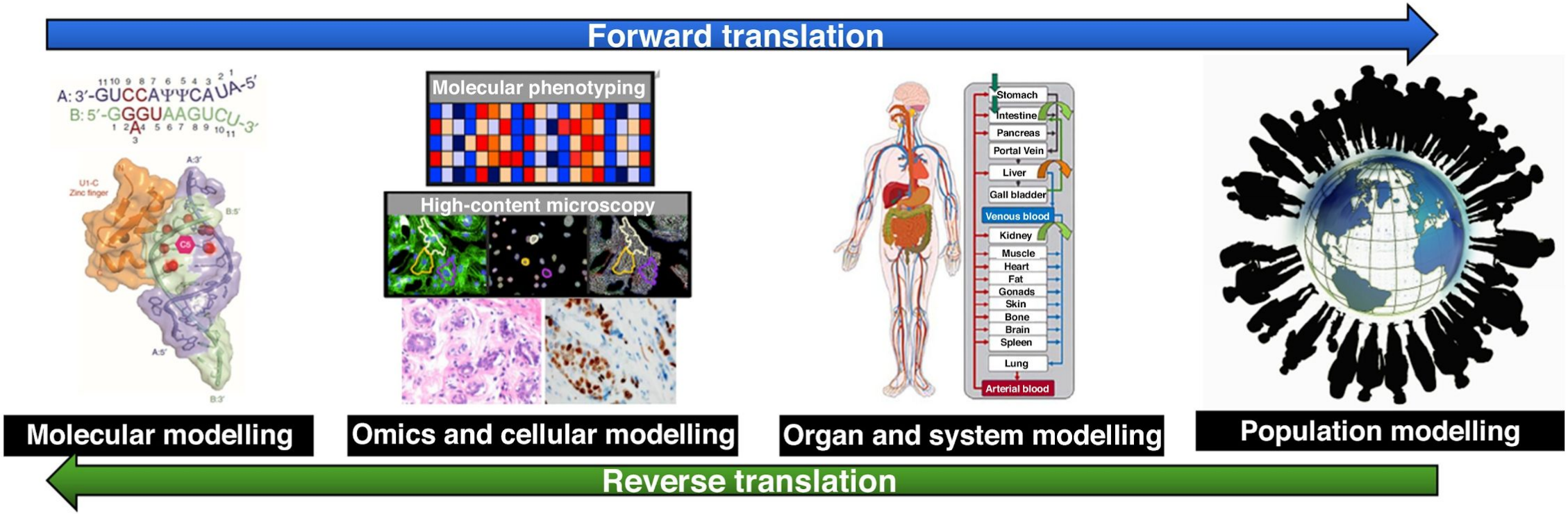
AMIDD 2023 Lecture 5: Key questions in drug discovery



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Today’s goals

- Drug discovery and development in social context
- Key questions in drug discovery
- Coronavirus vaccine as an example

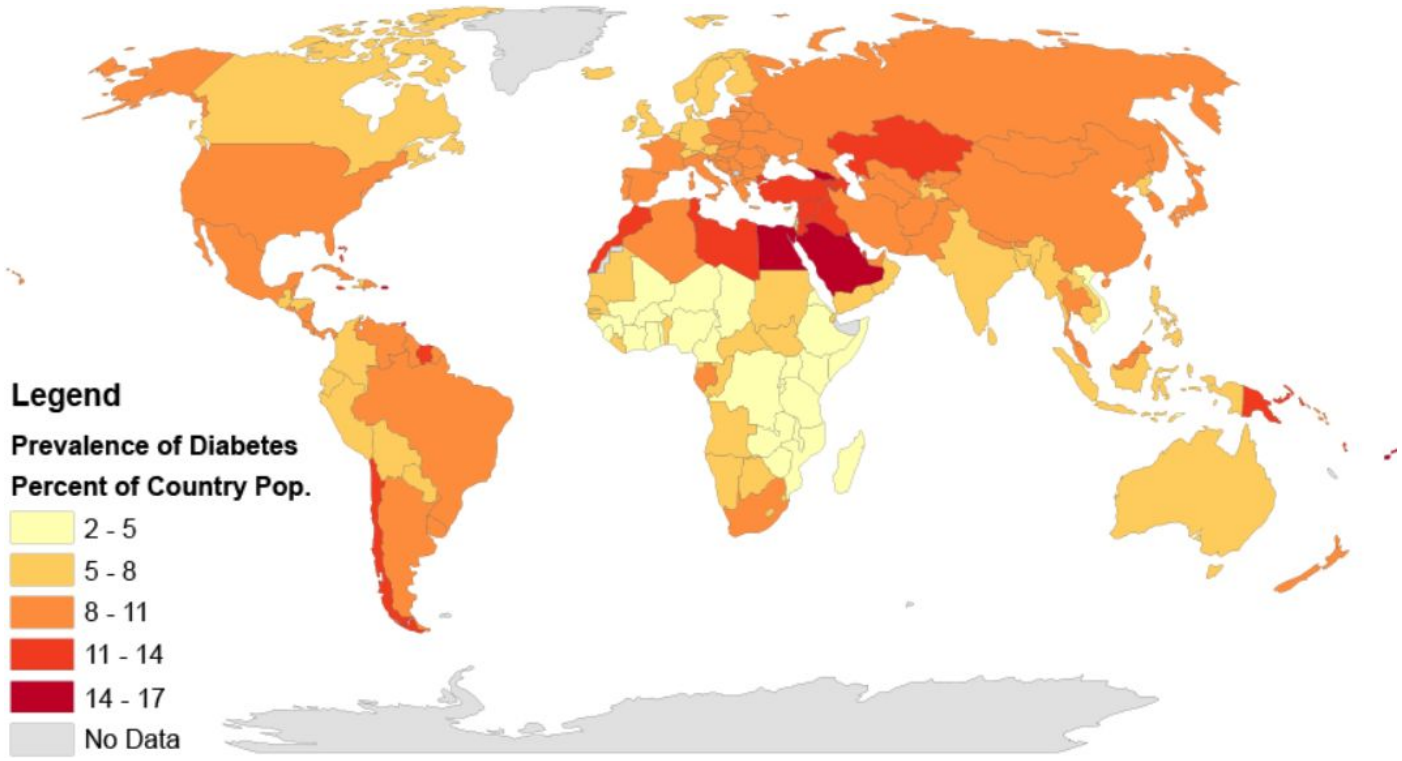
The social context of drug discovery: a role-playing game

We consider a case study of developing new drugs to treat complications caused by type II diabetes, which affects on average 9.2% of the world population.

We divide the classroom into four personas.

1. Patients
2. Medical doctors
3. Drug discovery company
4. The regulatory agency

Questions for each group: (1) What are your main interests and concerns? (2) With which other group do you have to work together and why? And what are your priorities? Rank the partners. (4) What are the ideal and worse scenarios for you?



Global prevalence of diabetes from 2014, using data from 195 countries. Source: Wikimedia. Author: Walter Scott Wilkens. Reused with CC-AS 4.0 license.

Q1: What are the interests and concerns?

Patients: Interests: Time, Cost, Safety. Concerns: safety, convenience, cost. Addition: benefit/risk analysis; Trust. Efficacy compared to current standard of care.

Medical doctors: career, benefits of patients; concerns: does not work, responsibile for it; conflict of interest (conferences, compenstations), work with all other groups. Addition: overhead associated with the money, benefits (legal and illegal), who takes responsibility?

Pharma: money, good reputation (fast, working, low cost, low prize); concerns: failure, not approved by the agency, do harm (reputation). Intellectual Property. Cost effectiveness. Competitor. Research & Development staff/ideas. Patients/Doctors. Legal. Lack of reproducibility. How to diagnose? Technology debts. Length of life cycle. Agencies.

Regulatory agency: approving drugs that are safe and efficacious; concern: research integrity, fairness and evidence, cannot oversee everything, mistakes can do big harm. Understaffed. Legal. Patients pressure.Insider information. Corruption.

Q2:

Regulatory agencies

1. Patients
2. Company
3. Medical researcher (safety): integrity, security, transparency
4. Medical experts (efficacy, choice of prescribers)

Comments: company & medical experts, patient plays an ever more important role.

Company

1. Patients
2. Agency
3. Medical doctors

Comments: agency, regulated interactions with medical experts, patient plays an ever more important role

Medical doctors

1. Patients
2. Company
3. Agency (?) advice

Comments: patients, agency to give advice, regulated interactions with companies

Patients

1. Medical doctors
2. Company
3. Agencies

Comments: patients communicate a lot with other patients

Q3

Patients

- Best outcome: it works, cured forever
- Worst scenario: worse or death, works for you but not approved, ignored diseases

Medical doctors

- Patients are cured, positive results, impressive career
- Worsened condition, mistakes and liability

Drug discovery company

- Fast development, little safety issue, high efficacy; Intellectual property; High sales
- Failure to find drugs; not approved; undetected harms/side effects; competitors; unengaged patients. Losing money

The regulatory agency

- Best: perfect working, company fully reliable and trusted
- Worse: large harm, held liability due to mistake and/or corruption, lost of trust

Offline activities

Read Bollag, G. et al. Clinical efficacy of a RAF inhibitor needs broad target blockade in BRAF -mutant melanoma. Nature 467, 596–599 (2010), and answer questions. **The reading is required for the lecture #7.**