DIABLA

Accelerating drug discovery

SIU CARBONDALE Southern Illinois University

DNA – Stores information

RNA – Moves information

Proteins – Do the work

Protein targets

- >200,000 proteins
- Some have useful effects
- Hard to find the ones you want
- Identified targets
  - Speed drug development
  - Indicate side effects

Discovering Target Proteins

Protein Target

Drug

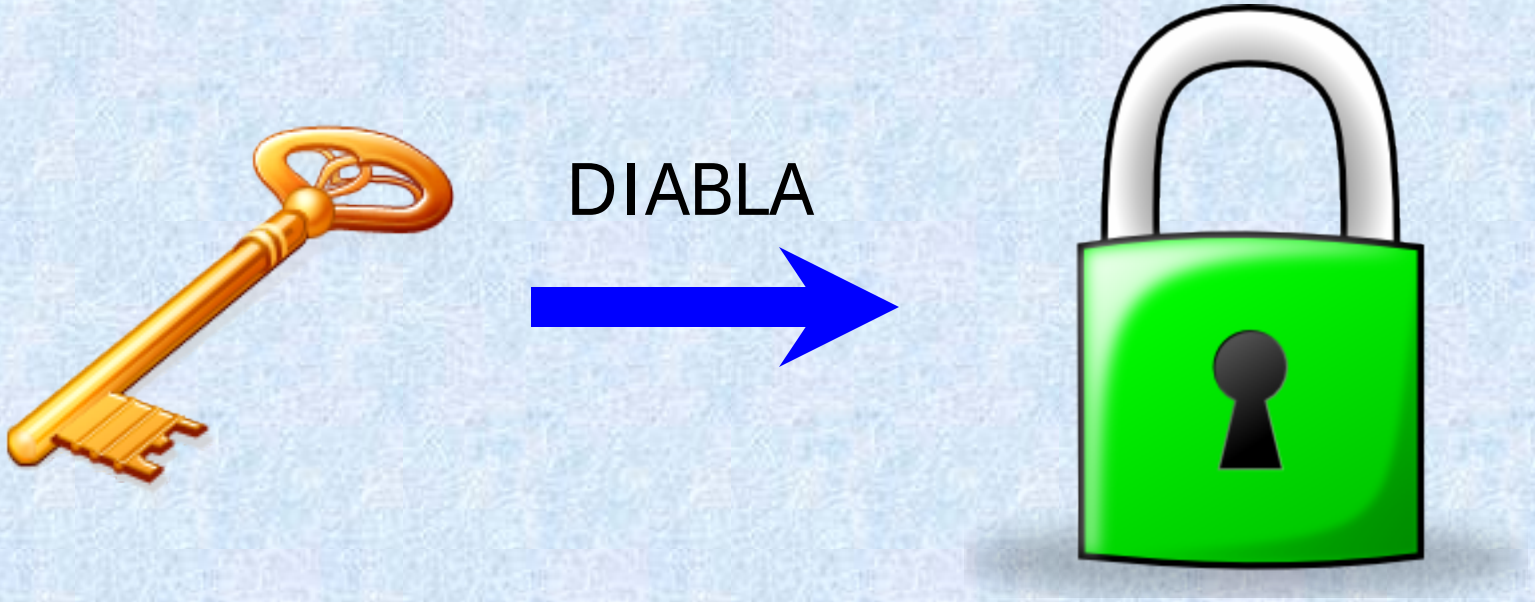
Discovering Target Proteins

Drug → ?

→

DIABLA

- DIABLA allows us to find the protein targets
- It was invented by Drs. Tolley and McCarroll at SIUC



Competing Technologies

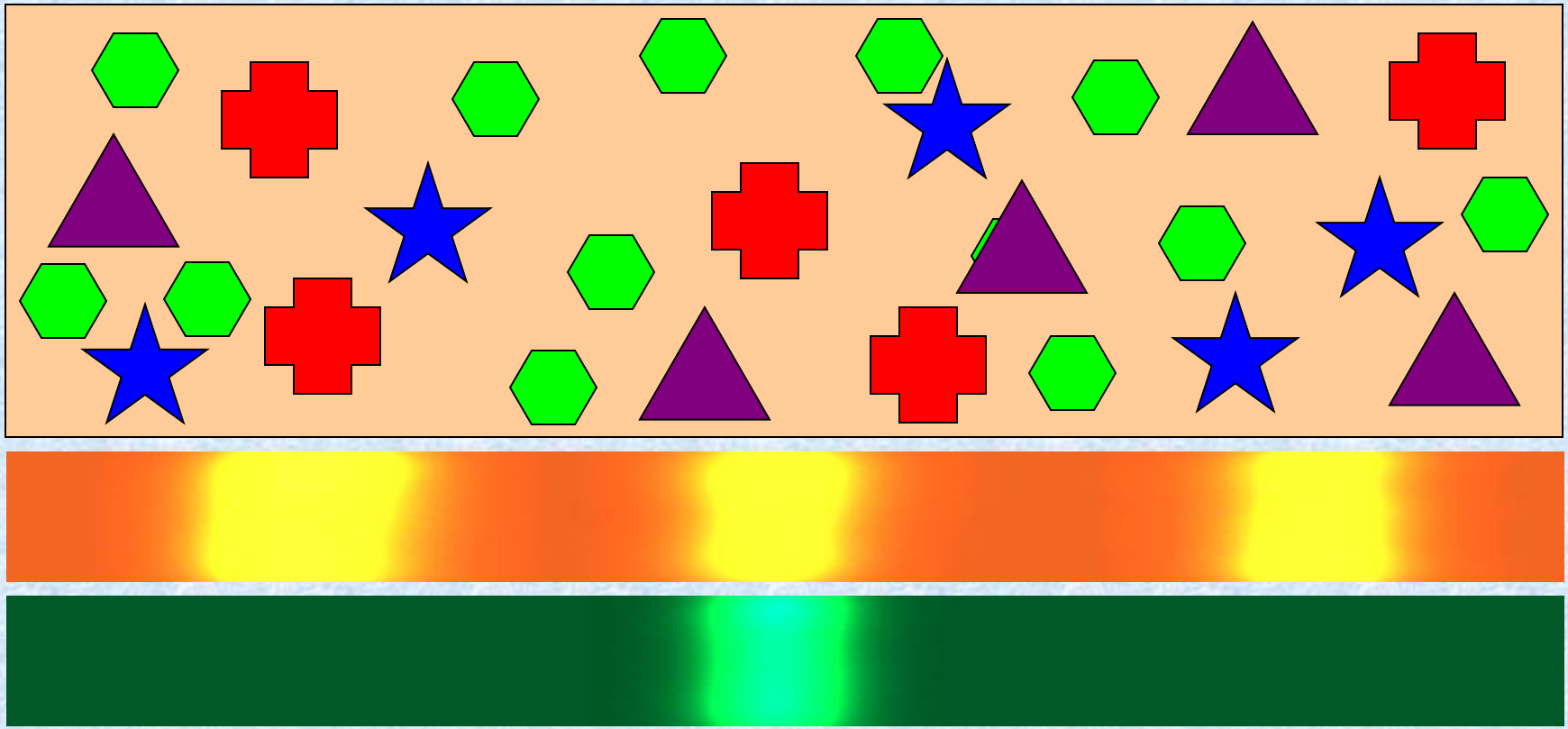
Method	Multiple targets	Unknown targets	Complex samples
Fluorescence polarization	–	?	–
Haploinsufficiency	–	x	x
Affinity chromatography	?	x	–
DIABLA	X	X	X

DIABLA

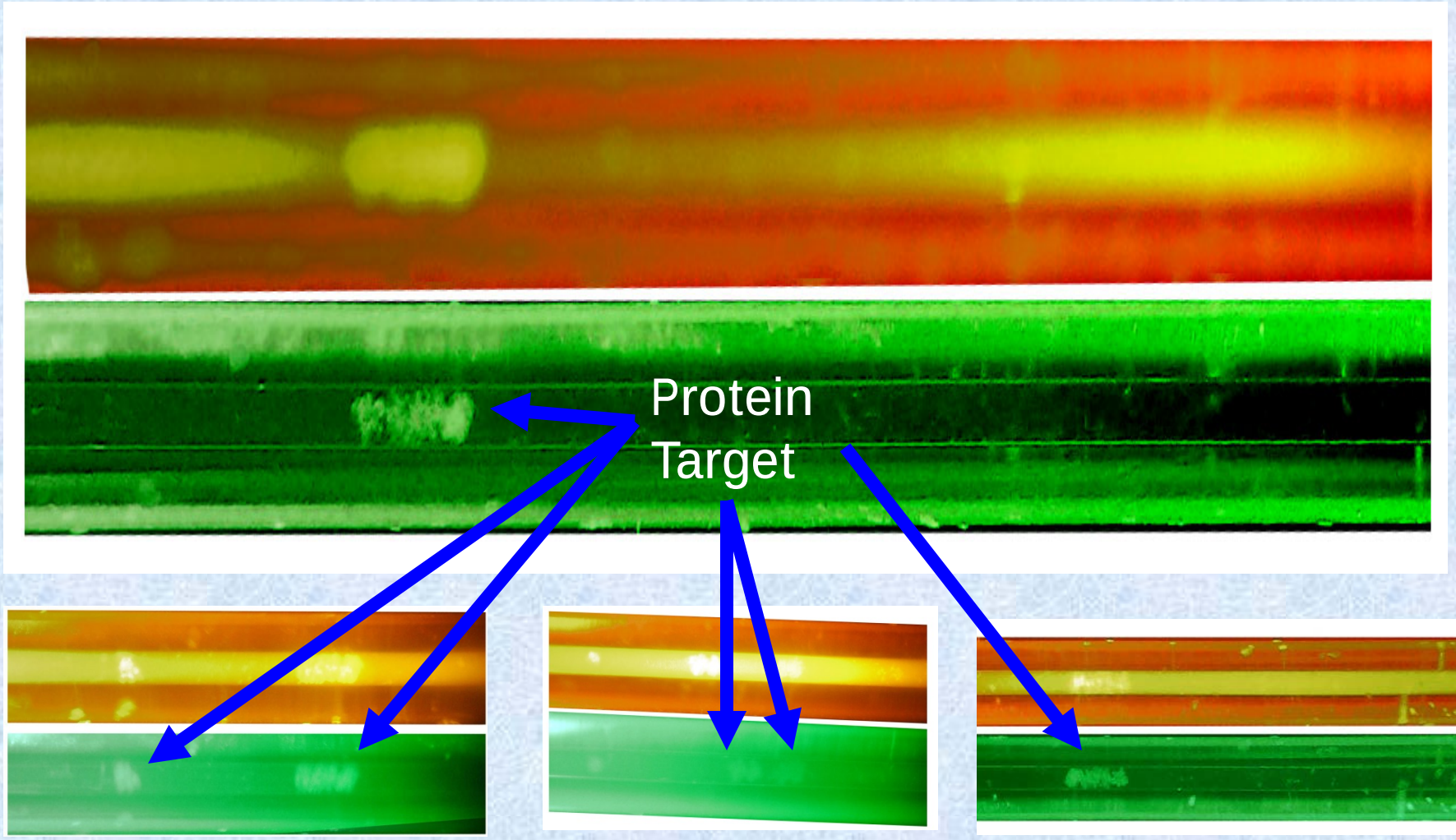
Drug

Protein Target

Non-target Proteins

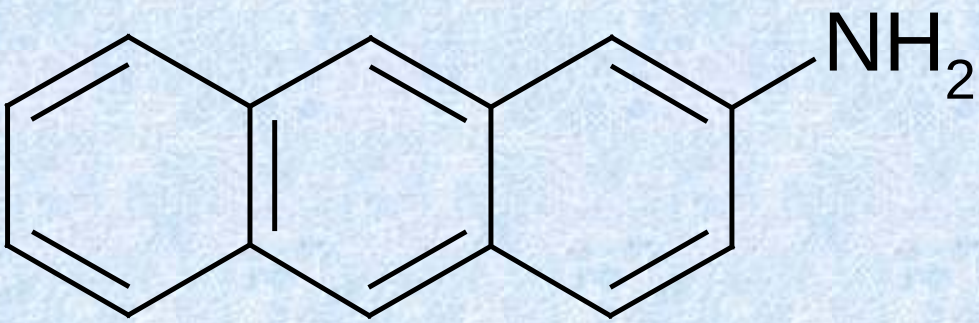


Progesterone targets in cancer cells



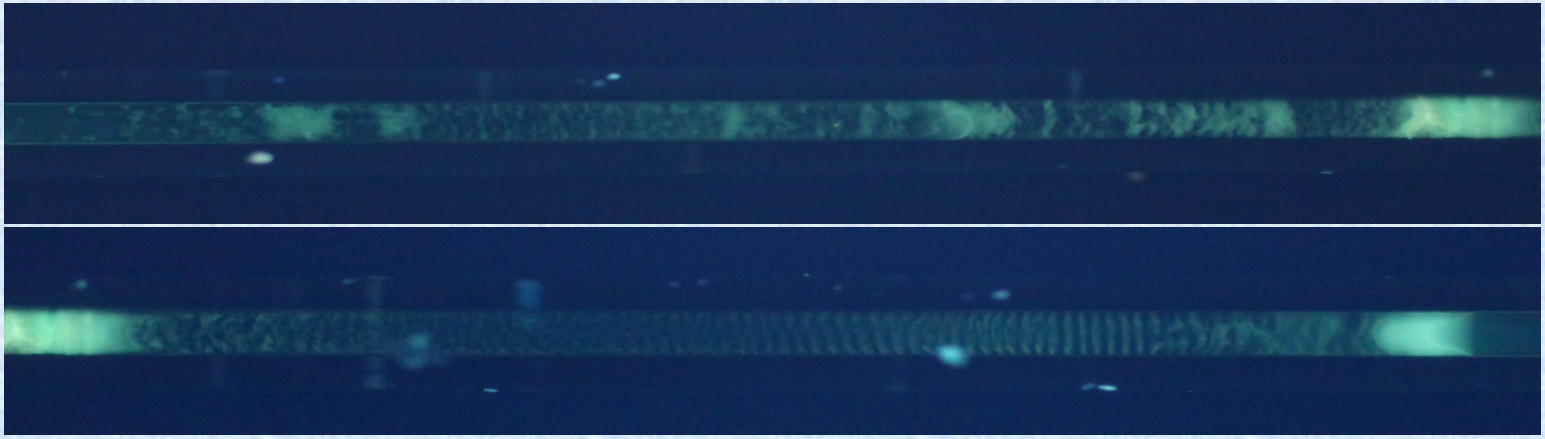
2-aminoanthracene

- Present in cigarette smoke
- Potent carcinogen
- Shown to destroy pancreatic islet cells in rats
- Exact mechanism is not known

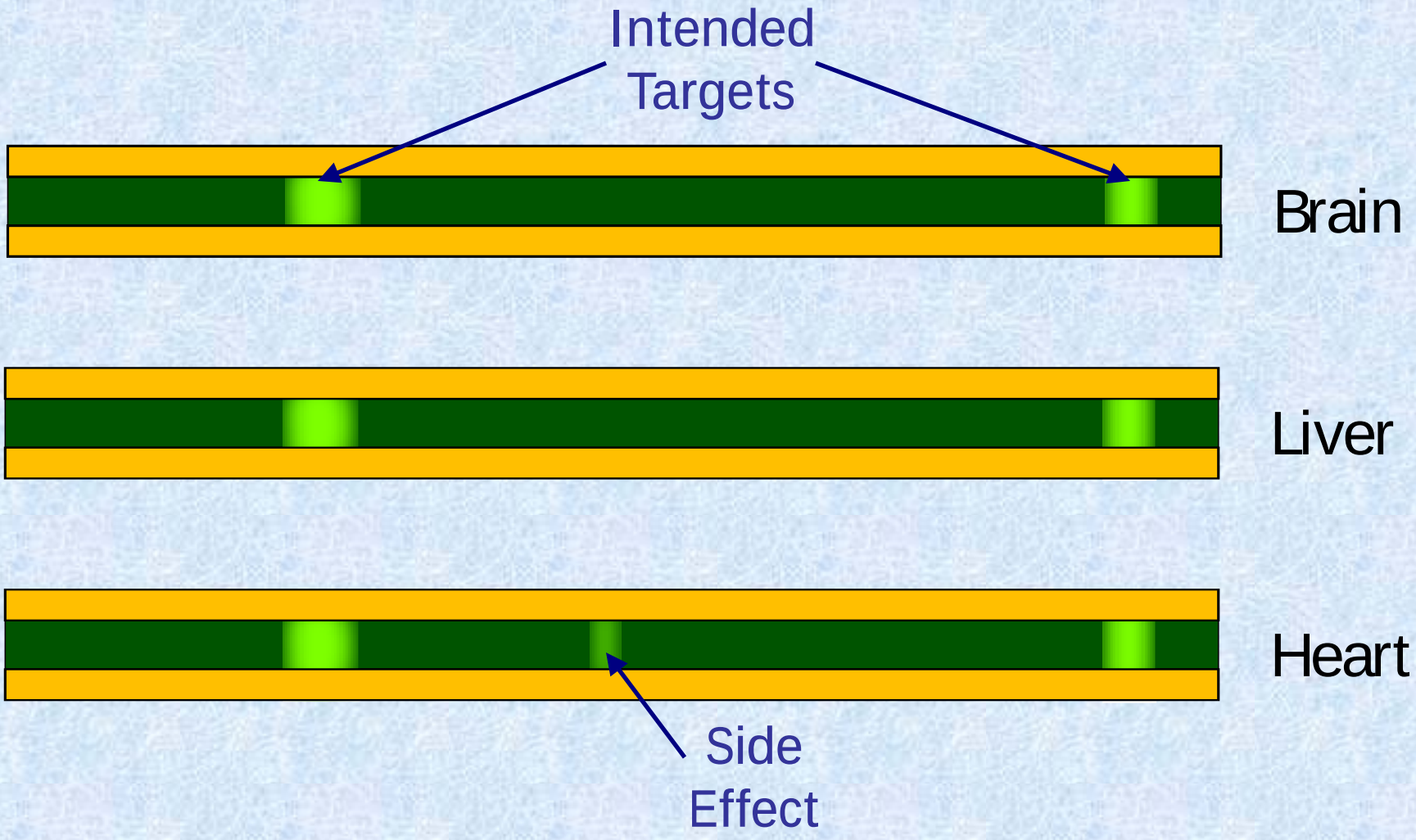


2-aminoanthracene

- 2-aminoanthracene was excited at 392 nm with an emission at 419 nm
- Binding proteins from rat pancreatic cells were identified using DIABLA
- DIABLA was useful in identifying the targets

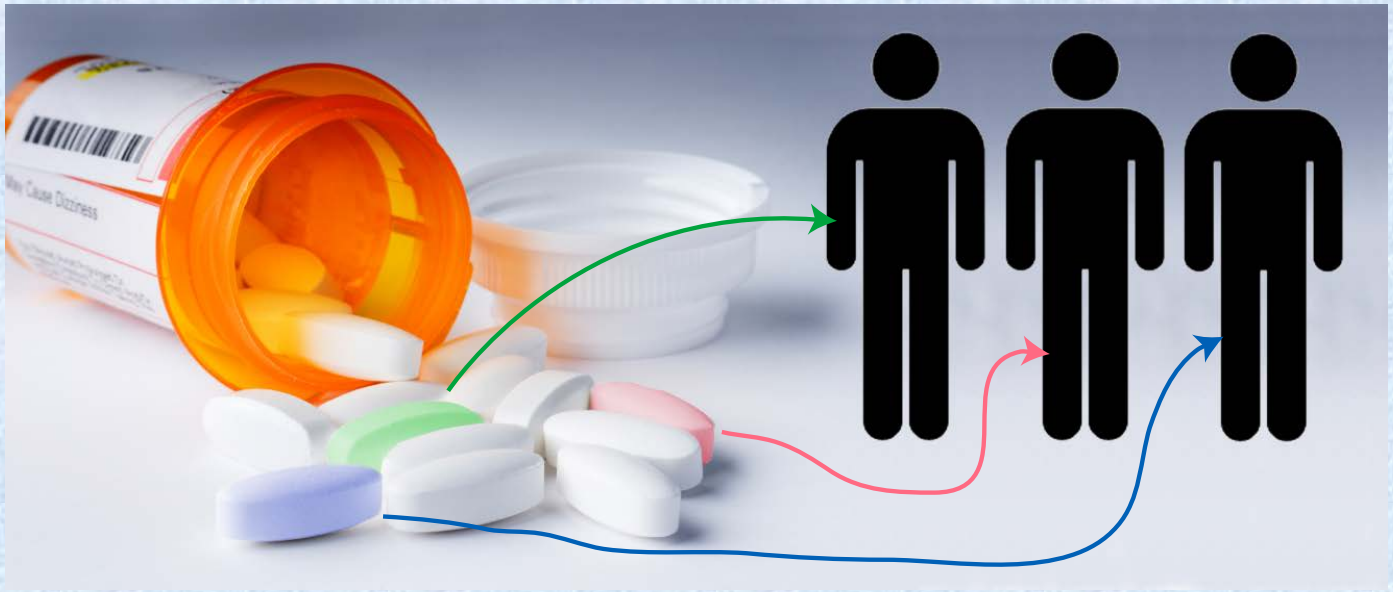


Screening for side effects



Personalized Medicine

- People react differently to the same medicine
- DIABLA could determine how a drug will affect individuals
- Personalized treatment is called the “holy grail” of medicine



Advantages

- Fast

  ~20 minutes
- High resolution

  > 1100 unique fractions
- Parallel analyses

  Simultaneous separation
- Low sample volume

  ~10 µL

The Market

- Pharmaceutical companies
  - Invest ~15% of revenue in R&D
    - More than $65 billion
  - New drugs
    - Cost > $1 billion
    - Take ~12 years
  - DIABLA will reduce both the cost and time to bring a drug to market

Next steps

- Demonstrate capability
  - Find the unknown targets of drugs, pollutants and other molecules
  - Work with pharmaceutical companies on drugs in development
- Develop the DIABLA device
  - Work with an instrumentation manufacturer to develop commercial hardware
  - Partner with an existing analytical device company to jointly pursue commercialization