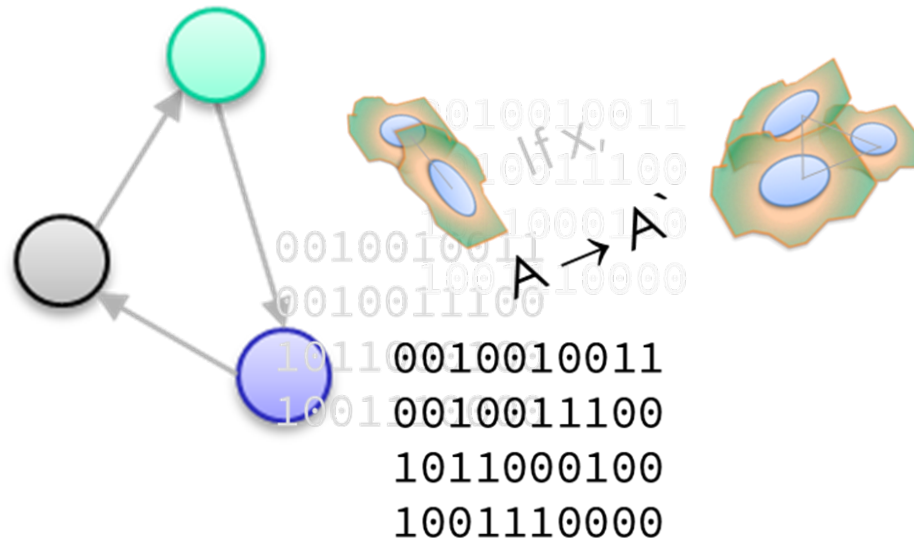


# Computational Bioengineering

## BME 4803 | BME 6313



## Project Introduction

**Slide Credits:**

Dr. David Noren

# Course Organization

- **Participation (20%)**
  - Modeling Challenges
- **Project (40%)**
  - Team Project: Predicting Cancer Outcomes
- **Final Exam (40%)**

# Team Projects

## Scoring Criteria

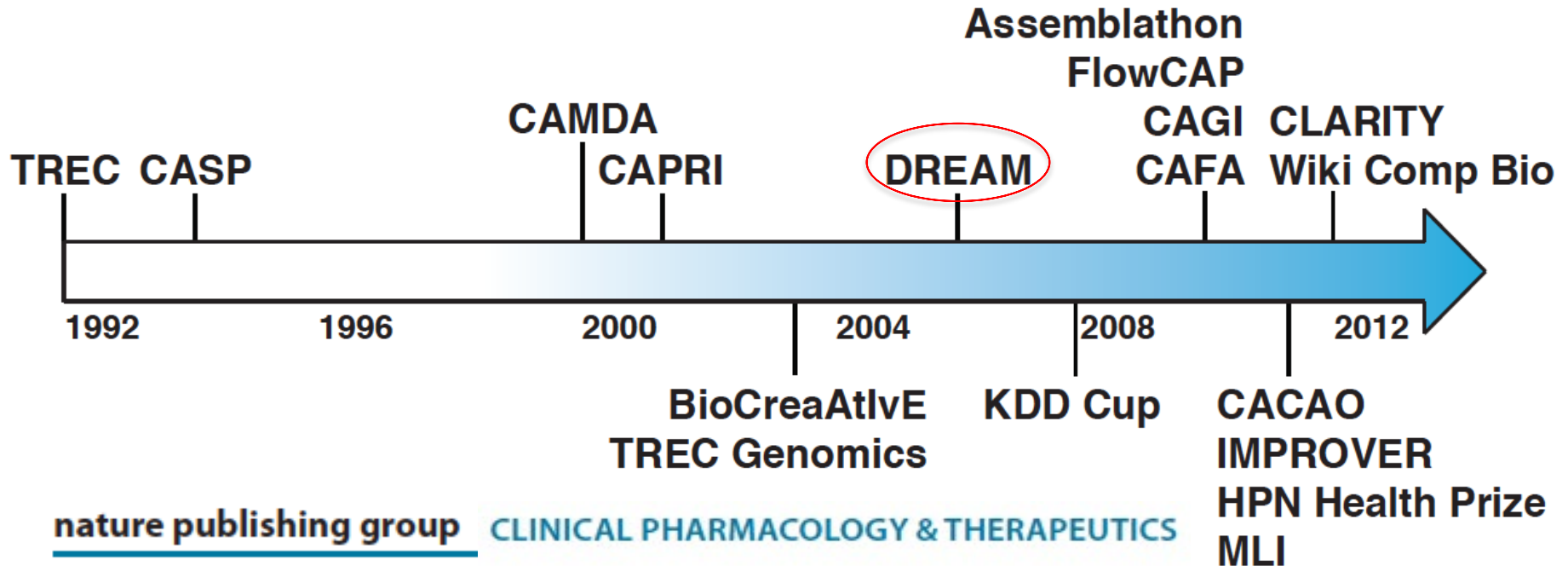
- 1. Organization**
- 2. Clarity**
- 3. Methodology & its Justification**
- 4. Conclusions**
- 5. Impact**
- 6. Creativity**

# Acute Myeloid Leukemia Outcome Prediction Challenge



# Challenges in Computational Bio

## History of DREAM

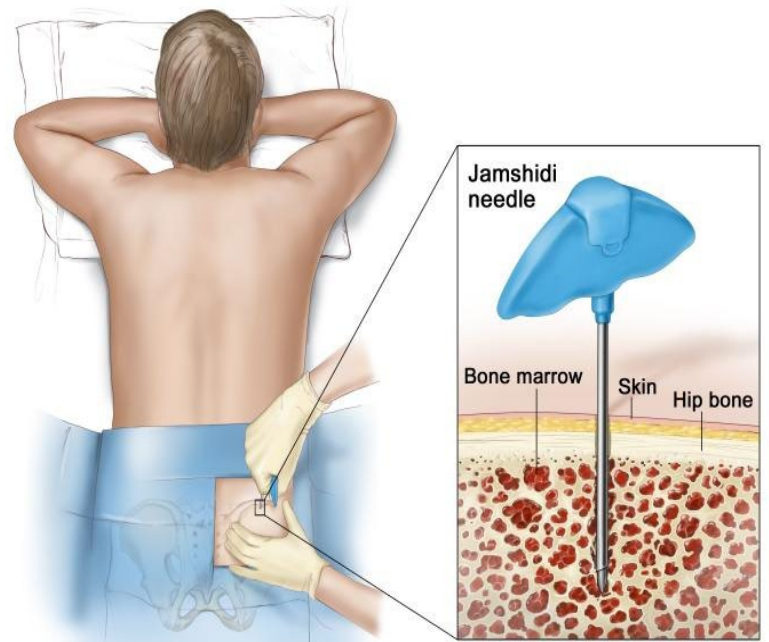


Seeking the Wisdom of Crowds Through  
Challenge-Based Competitions in  
Biomedical Research

# Acute Myeloid Leukemia

## A Heterogeneous Disease

AML = “A myeloid leukemia that is characterized by the rapid growth of abnormal white blood cells that accumulate in the bone marrow and interfere with the production of normal blood cells”



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# Acute Myeloid Leukemia

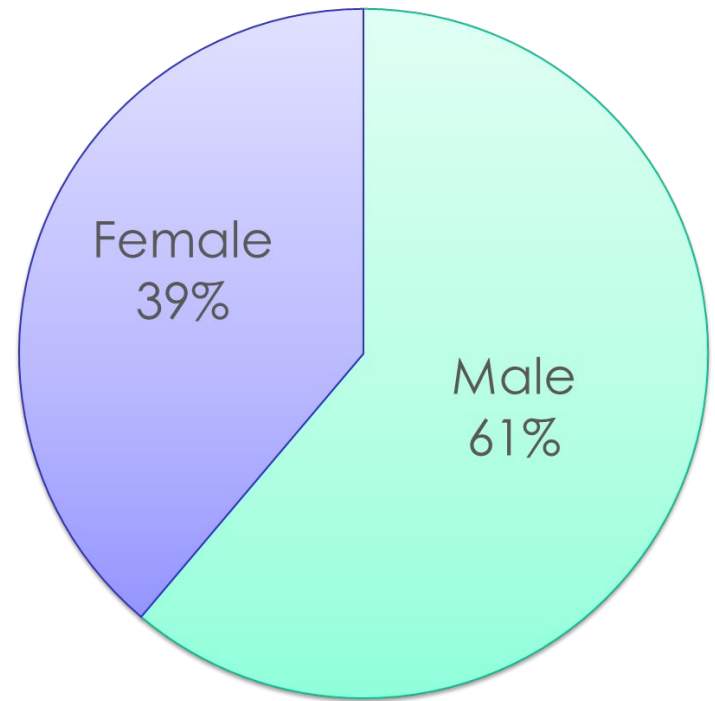
## A Heterogeneous Disease

~ 18,600 new cases /year

~ 10,500 deaths (2013)

~ 25% cured

~ 65 median age



# Definitions

## Patient Disease Outcomes

**Primary Resistant:** Primary resistant to the given therapy. The patient fails to respond after one or two cycles of induction.

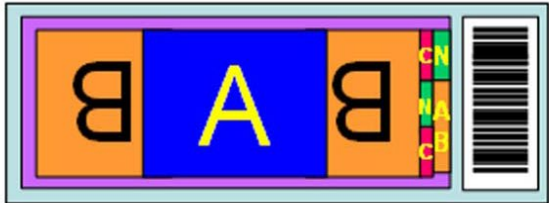
**Complete Remission:** No signs or symptoms of the disease. This includes normal peripheral blood cell count (absolute neutrophil count  $>1,000/\text{mm}^3$  and platelet count  $>100,000/\text{mm}^3$ ) and normocellular marrow with less than 5% blasts in the marrow.

**Remission Duration:** Length of remission (in weeks) for those patients who achieve Complete Remission. Remission ends if the patient relapses or dies.

**Overall Survival:** Length of life (in weeks) for each patient following initial diagnosis.

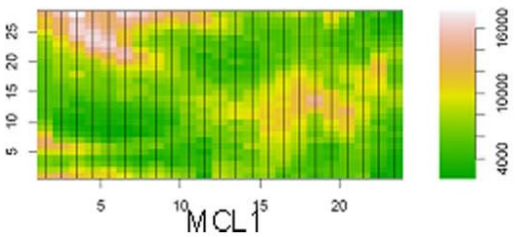
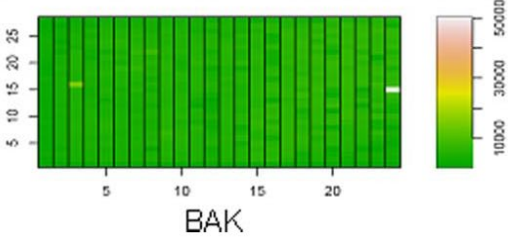
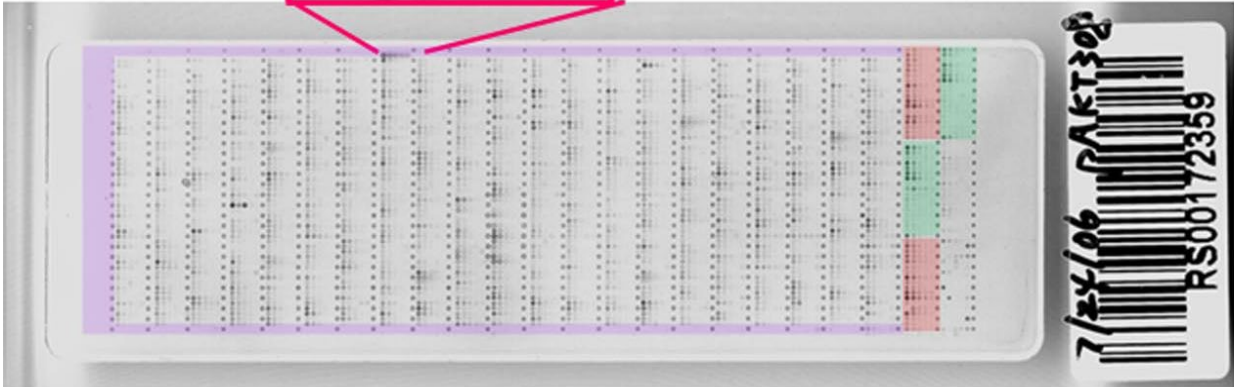
# Definitions

## Reverse Phase Protein Array



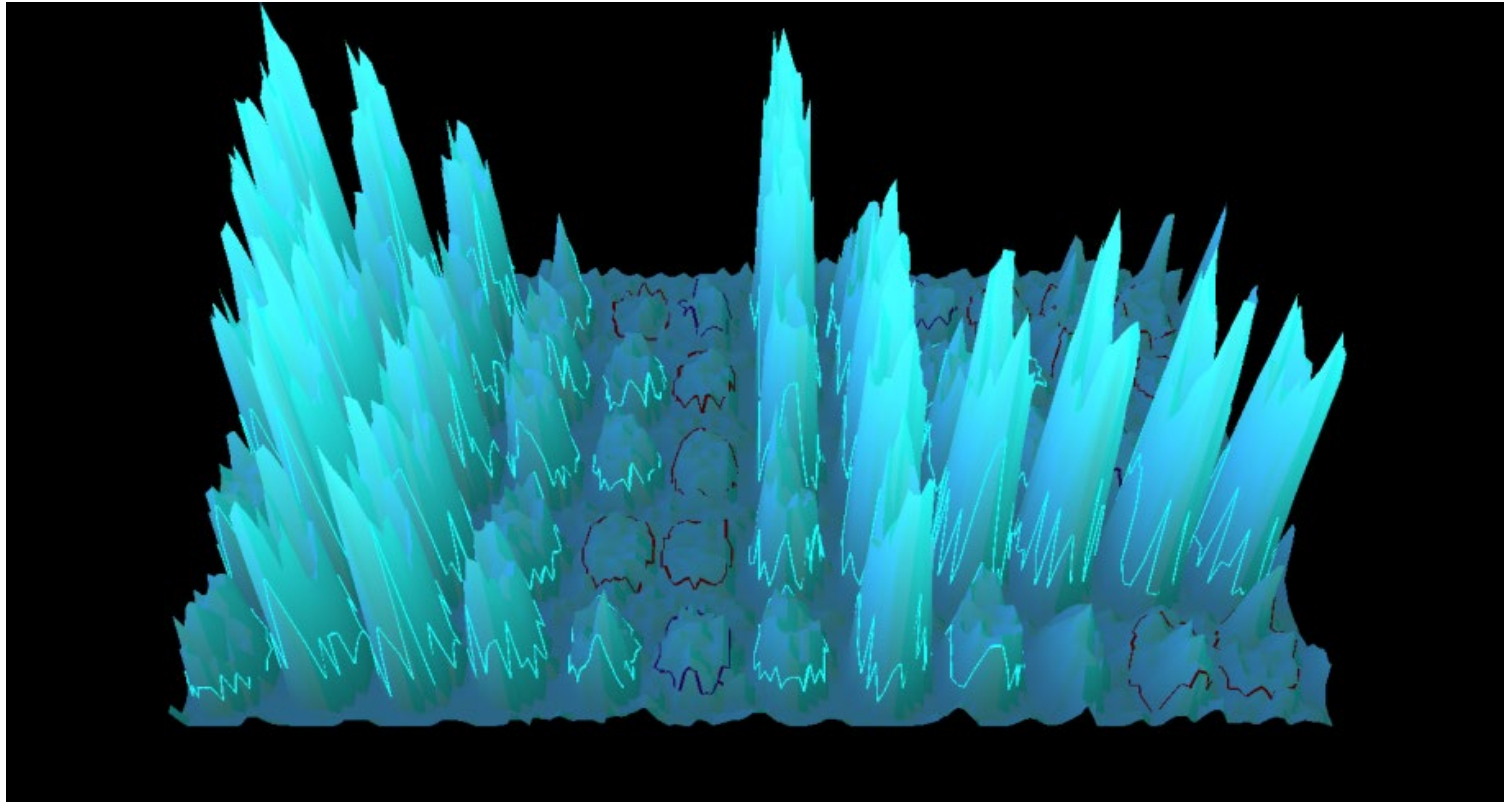
Patient # 1	F	1/3	1/9	1/27	1/81	+
Patient # 2	F	1/3	1/9	1/27	1/81	-
Cell Equivalents	85	28	9	3	1	

AKT peptide  
pAKT T308 peptide



# Definitions

## Reverse Phase Protein Array



# Reverse Phase Protein Array (RPPA) Methodology

- Protein samples printed onto slide in 5 serial 1:2 dilutions (1152/slide)
- Slide probed with a validated antibody (Y)
- Slide probed with a secondary antibody with a detection signal (Y)
- DAB substrate give brown precipitate
- Slide scanned on desktop scanner

