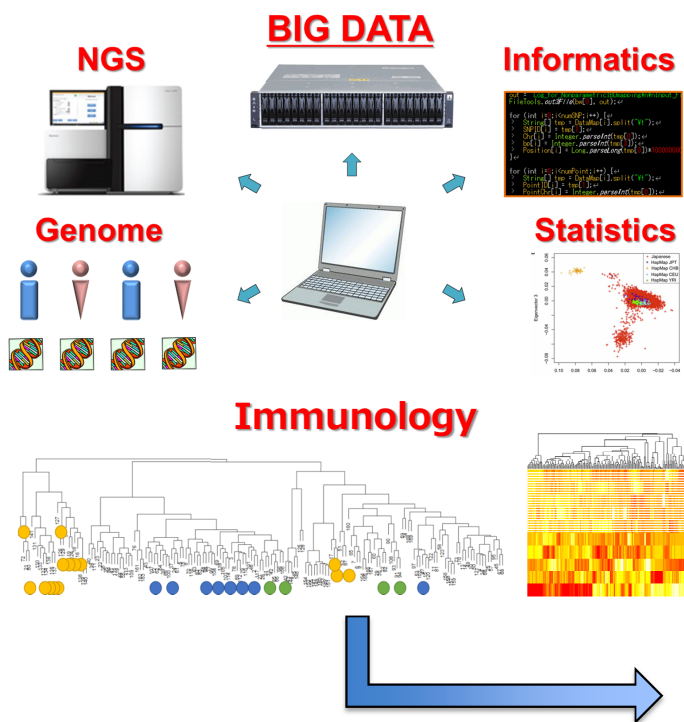


Laboratory of Statistical Immunology

Statistics + Genetics + Immunology



PI: Yukinori Okada

Personalized medicine using genome data

Class I HLA gene

HLA-A
HLA-B
HLA-C

Class II HLA gene

HLA-DRB1
HLA-DQA1
HLA-DQB1
HLA-DPA1
HLA-DPB1

Non-classical HLA

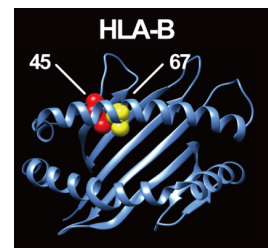
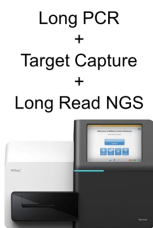
HLA-DOA
HLA-DOB
HLA-DM

HLA-like gene

MICA, MICB, TAP

Pseudo-HLA gene

HLA-F/G/H/K/Y
HLA-DRB2/3/5/8
HLA-DPA2

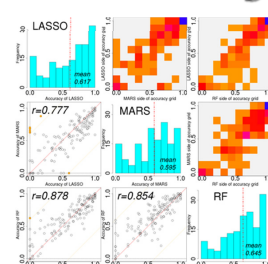
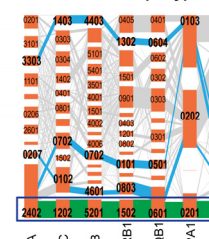


Biomarker screening by machine-learning

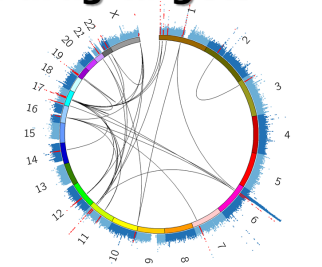
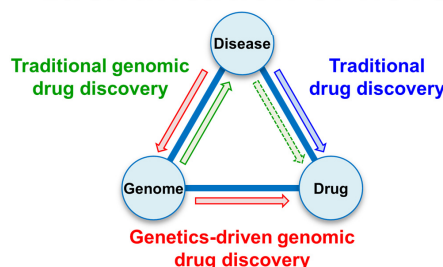
Linkage disequilibrium of HLA genes

| ϵ | A | C | B | DRB1 | DQB1 | DPA1 | DPB1 |
|------------|------|------|------|------|------|------|------|
| A | - | 0.07 | 0.08 | 0.05 | 0.03 | 0.02 | 0.02 |
| C | 0.07 | - | 0.30 | 0.15 | 0.10 | 0.05 | 0.06 |
| B | 0.08 | 0.30 | - | 0.16 | 0.12 | 0.05 | 0.07 |
| DRB1 | 0.05 | 0.15 | 0.16 | - | 0.39 | 0.07 | 0.10 |
| DQB1 | 0.03 | 0.10 | 0.12 | 0.39 | - | 0.04 | 0.07 |
| DPA1 | 0.02 | 0.05 | 0.05 | 0.07 | 0.04 | - | 0.26 |
| DPB1 | 0.02 | 0.06 | 0.07 | 0.10 | 0.07 | 0.26 | - |

HLA allele haplotypes



Identification of novel drug targets



Q: What is statistical genetics and statistical immunology?

A: Statistical genetics is a research field that evaluates causality of human genetic variations on diseases, using statistical and bioinformatics approaches. Statistical immunology especially focuses on genetic and epigenetic data obtained from immunology.

Q: What kind of data do you handle?

A: We handle genome and epigenome data mostly obtained from human populations (not from mice... sorry!!). We usually use the large-scale genome-wide association study (GWAS) data generated by SNP microarrays, and whole-genome sequence (WGS) data generated by NGS.

Q: What is the goal of research?

A: Our goal is elucidation of disease biology, disease epidemiology, and novel drug discovery. On this aim, we integrate large-scale human genome data with diverse biological and immunological resources.

Q: What kind of skill is necessary to join Lab. of statistical immunology?

A: Basic computational skills (e.g. Linux OS and programming) are required.