Biostatistics & Statistical Genomics Shared Resource

ROSWELL PARK®
COMPREHENSIVE CANCER CENTER

Co-Director: Kristopher Attwood, PhD (Biostatistics)

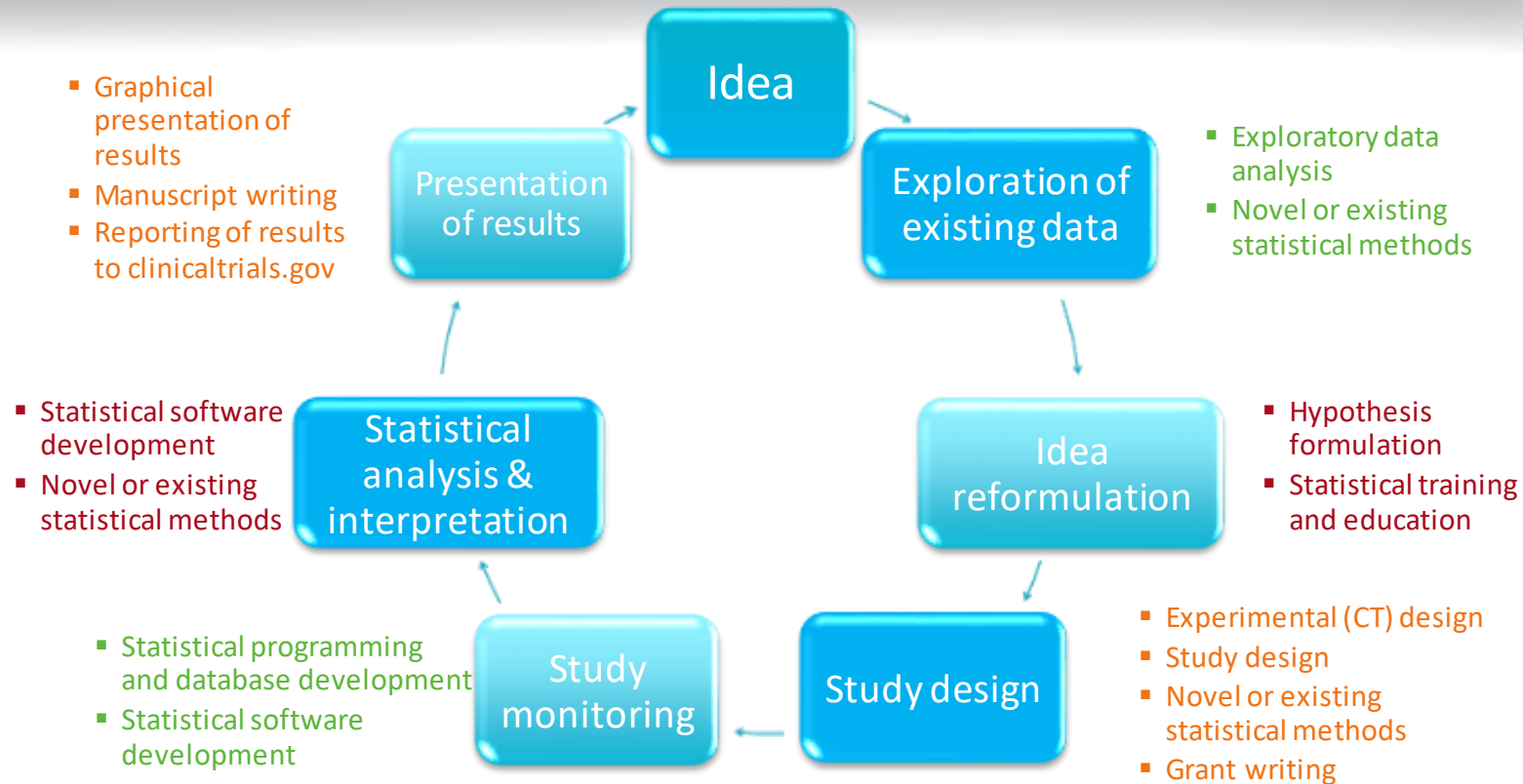**Co-Director: Qianqian Zhu, PhD (Statistical Genomics)**

The mission of our "core" is to

- Provide strategic service in the design, oversight, implementation, analysis, publication, and reporting of scientific studies by CCSG program members and other Roswell faculty and staff.

- This includes
  - articulating study objectives and hypotheses
  - conceiving appropriate cost-effective designs and models for achievement of study objectives
  - assuring that modern and appropriate statistical methods are used
  - monitoring interim and final analyses
  - co-authoring abstracts, presentations, and manuscripts.

What types of studies do we work on?

- Clinical trials: phase I, II, III
- Basic science and translational research projects
- Epidemiological studies
- Surveys
- Retrospective review of existing data, e.g., tissue banking studies
- External data sources, e.g., SEER
- Quality of life studies
- gWAS
- Computational Biology
- Machine Learning studies

How/where Biostatistics fits in a scientific process

Idea

Exploration of existing data
- Exploratory data analysis
- Novel or existing statistical methods

Idea reformulation
- Hypothesis formulation
- Statistical training and education

Study design
- Experimental (CT) design
- Study design
- Novel or existing statistical methods
- Grant writing

Study monitoring
- Statistical programming and database development
- Statistical software development

Statistical analysis & interpretation
- Statistical software development
- Novel or existing statistical methods

Presentation of results
- Graphical presentation of results
- Manuscript writing
- Reporting of results to clinicaltrials.gov

At its heart, we are a _collaborative_ core

- We do provide services, e.g.,
    - Ad hoc power calculations
    - Assistance with specific analysis questions
    - etc.

- However, we are not truly a _fee-for-service_ core.

    We are a collaborative core and can be involved in the entire scientific process

Biostatistics Shared Resource Faculty and Staff

- Faculty
  - Kris Attwood, PhD (Co-Director)
  - Qianqian Zhu, PhD (Co-Director)
  - Alan Hutson, PhD (Chair)
  - Han Yu, PhD
  - Li Yan, PhD
  - Qian Liu, PhD
  - Sarah Mullin, PhD

- Staff
  - Adrienne Groman, MS
  - Katy Wang, MA
  - Kayla Catalfamo, MS
  - Anthony George, MS
  - Zhe Jing, MA (with Dr. Guru)
  - Ram Nambiar, MS

Close collaboration of Biostatistics, Statistical Genetics and Genomics, and Bioinformatics

Biostatistics Shared Resource ↔ Statistical Genetics and Genomics Resource ↔ **Bioinformatics Shared Resource**

All within Dept of Biostatistics and Bioinformatics
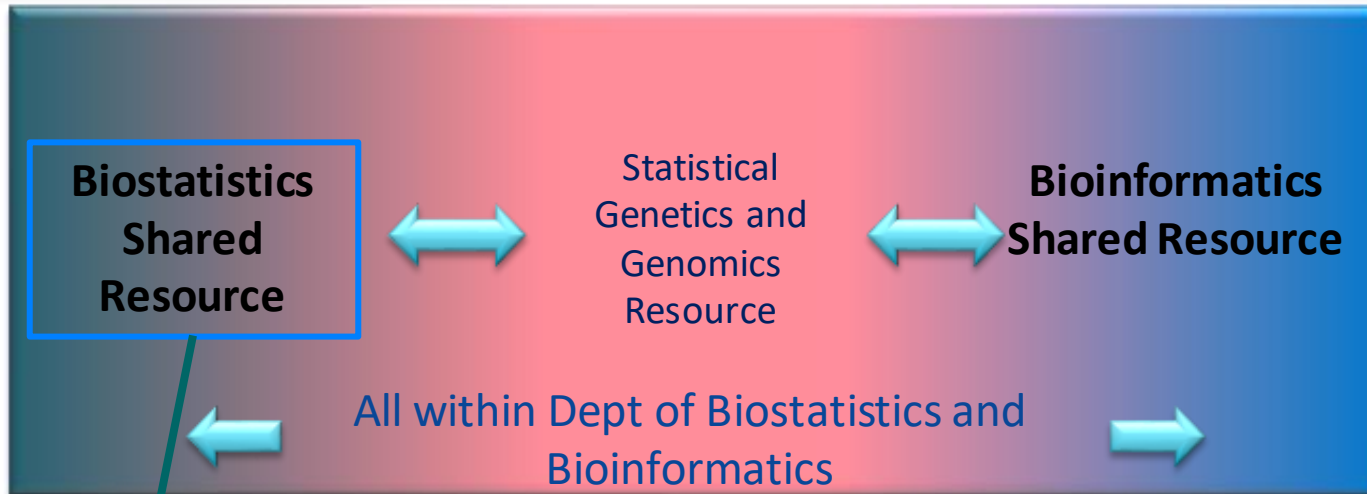
Also close collaboration with

CRS

This ensures the Institute has statistical coverage
from *preclinical and clinical biostatistics*
to *epidemiology*
to *genetics and genomics*
to *bioinformatics*.

Select areas of expertise in biostatistics

- Clinical trials design and analysis
- Epidemiologic statistical methods
- Diagnostic testing
- Computationally intensive statistical methods & Exact testing
- Bootstrap and resampling methods
- Longitudinal data methods
- Survival and censored data methods

- Linear modeling
- Nonlinear modeling
- Monte Carlo simulation
- Mathematical statistics
- Computational & Systems Biology
- gWAS studies
- Machine Learning

Select areas of expertise in genetics & genomics

- Pharmacogenomics, genetic testing, and personalized medicine
- Statistical and bioinformatics analysis of genome, epigenome, and transcriptome data
- Developing power estimates for biomarker discovery
- Developing statistically sound and computationally efficient methods to pinpoint the causal genetic variants of human diseases utilizing high-throughput genetics and genomics data
- Collaboration with biologists and clinicians in genetic epidemiology studies utilizing approaches of Genome-Wide Association Studies (GWAS) and Next-generation Sequencing (NGS)

Software/Hardware

Software

- SAS® Software
- R
- Mathematica®
- PASS Power Analysis and Sample Size Software

Hardware

- Microcomputer workstations
- Linux high-performance computing cluster (1,600 processors, 200 TB storage)
- Access to UB's Center for Computational Research's (CCR) Linux cluster with >8,000 processor cores and 600 TB of high-performance storage

Some other things we do

- Biostatistics Core members are on the following committees at Roswell Park

  - SRC
  - SRC Executive
  - IRB (3)
  - Phase I
  - DSMB

  - Clinical Research IT Governance Committee
  - Research & Education IT Governance Committee
  - SRSR Advisory Committee
  - CCSG Steering Committee
  - Investigational New Drug SAE Trending Committee

- Serve on external DSMBs, DMCs, NIH study sections

- Our own methodological research

Why work with our Core?

- Biostatistics is a vital part of the entire scientific process

- Grants typically do not get funded without good statistical input via collaboration
  - Most (all?) grants will be reviewed by statistician

- Studies do not get approved without good statistical input via collaboration

- All investigator-initiated studies need to have a statistician assigned to them

Cost?

- For internal (Roswell Park) users, there is **<u>no fee</u>** or chargeback for using the Biostatistics Shared Resource

- On grants, there should be an appropriate percent effort for the biostatistician
  - On grants, unfunded participants are viewed dubiously during review

How does one get begin collaborating?

- Requests for collaboration/service should be made with **<u>LIMS</u>** at: **https://rpcilims.roswellpark.org/**
(which can also be found under our directory listing on *i2)*

- Some notes on using LIMS
    - Must be on campus (or access via Citrix)

    - There are occasional problems with logging in.
    If so, email me…

    - Specify:
        - meaningful *Request Description*
        - realistic *Due Date*