CHIBI Resources, Services, and Activities CONTINUED:

Integrative and Infrastructure Informatics

Integrative and Infrastructure Informatics projects at the NYU Center for Health Informatics and Bioinformatics include:

Deployment of a totally revamped High-Performance Computing Facility (HPCF) dedicated to the NYU Medical Center.

Supporting all informatics initiatives in the Biomedical Informatics Core of the Clinical and Translational Science Institute.

Development of novel methods through faculty initiated research, collaborative work and through dedicated methods informatics labs:

- **Kluger lab:** explores methods for studying mechanisms of disease and linking molecular information to phenotypes
- **Molecular Signatures Lab:** explores novel computational data analysis methods for development of molecular signatures, identifying biomarkers, and linking predictive with mechanistic knowledge about disease phenotypes from high throughput data
- **Computational Causal Discovery Lab:** develops cutting edge methods for discovering causal mechanisms from high dimensional data
- **Evidence Based Medicine Information Retrieval and Scientometrics Lab:** develops methods to support scanning the WWW and bibliographic databases for content and quality, as well as analysis of citation patterns, and quantitative modeling of research behavior.

Continuing education on informatics methods and development:

- Research colloquium series
- Invited speaker series
- Tutorial series
- Seminar series

Development of a MS/PhD graduate program in Biomedical Informatics

Finally, the Informatics Center is entrusted with the responsibility to coalesce and coordinate all professional informatics faculty, advise the institution about professional standards for informatics faculty and staff career development, and mentor informatics faculty.

Contact per area

- **Clinical and Research Data Management Unit**
  James Robinson
- **Educational Informatics**
  Marc Triola
- **Next-Generation Information Retrieval & Scientrometrics Lab/ Library Collaborative**
  Lawrence Fu
  Constantin Aliferis
- **Informatics for Data Mining**
  Alexander Statnikov
  Constantin Aliferis
- **Data Integration & Warehousing**
  John Chelico
  Ross Smith
  Constantin Aliferis
- **High Performance Computing**
  Constantin Aliferis
  Ross Smith
- **Best Practices in Bioinformatics**
  Constantin Aliferis
  Alexander Statnikov
- **Sequencing Informatics**
  Upstream:
  Stuart Brown
  Alexander Alekseyenko
  Yuval Kluger
  Jinhua Wang
  Downstream:
  Alexander Alekseyenko
  Yuval Kluger
  Jinhua Wang
  Alexander Statnikov
  Constantin Aliferis
- **Microarray Informatics**
  Jiri Zavadil
  Yuval Kluger
  Jinhua Wang,
  Constantin Aliferis
  Alexander Statnikov
- **Cancer Informatics**
  Yuval Kluger
  Jinhua Wang
  Stuart Brown
  Jiri Zavadil
  Constantin Aliferis
- **Proteomics Informatics**
  Stuart Brown
  Jinhua Wang
  Constantin Aliferis
  Alexander Statnikov
- **General Tools**
  Stuart Brown
- **Specialized Applications *(Genetics, Regulation, Pathways...)***
  Stuart Brown
  Yuval Kluger
  Alexander Statnikov
  Constantin Aliferis
  Jiri Zavadil
- **Molecular Signatures Development, Biomarker Discovery, Multi-Modal and Integrative Studies**
  Constantin Aliferis
  Alexander Statnikov
  Yuval Kluger

CHIBI website:
www.nyuinformatics.org

CHIBI Administrative contacts:
Heidi.Fitterling@nyumc.org
Jacquelyne.Price@nyumc.org

Center for Health Informatics and Bioinformatics

NYU Langone Medical Center

NYU CHIBI : A Brief History

The Center was launched in November 2008 with the recruitment of its Director Constantin F. Aliferis MD, PhD, Fellow of the American College of Medical Informatics. Dr. Aliferis developed the initial vision for the CHIBI working with the NYU senior scientific academic leadership. This "master plan" has been in constant evolution in consultation with the informatics faculty at NYU, the IT leadership, and the leaders of numerous institutes, departments, and laboratories, and cognizant of feedback from the broader scientific community throughout the NYUMC.

Administratively, CHIBI is a freestanding entity reporting to the Vice Dean for Science Vivian Lee, M.D., Ph.D., MBA. CHIBI faculty members play various administrative roles in its diverse entities. We work closely with the IT Department, the Clinical and Translational Science Institute, the Cancer Center, several clinical and research departments divisions and units, several Research Institutes and Centers of Excellence, the Medical Library, and our colleagues at the central NYU campus. We also have several strong inter-university collaborations and work with donors and industrial partners to further our mission.

A welcome message from **Constantin Aliferis M.D., Ph.D.** *Director of CHIBI*

CHIBI represents the implementation of a bold and pioneering institutional vision under the leadership of Dean Robert I. Grossman and Vice Dean Vivian S. Lee to create a world class Academic Informatics Center in a major Clinical and Research setting (NYULMC) and to fully integrate the center activities with research, education and patient care, in an unprecedentedly short time frame.

Currently, biology and medicine are undergoing a complete transformation making this truly a magnificent moment in time to conduct basic, translational, and clinical research. Advanced computation is a critical and indispensable ingredient of this revolution. Consequently, our goals at CHIBI are both ambitious and far-reaching:

The mission of CHIBI is to catalyze transformative changes in biomedicine through breakthrough computational methodological research, best practices services, state of the art infrastructure, and cutting-edge education.

CHIBI faculty and staff are tirelessly working to transform medicine and advance science.

CHIBI faculty:

- Have invented best of class software, algorithms, theory and analysis protocols for diagnostic, predictive and prognostic analyses of high throughput data such as next generation diagnostics and personalized medicine.
- Have made major breakthroughs in the development of software, algorithms and theory in the interpretation of very high dimensional data thereby unraveling mechanisms of disease and modeling complex biological systems.
- Have pioneered innovative and uniquely powerful ways to search both the literature and the web for high quality medical information.
- Are pushing the envelope in innovative tools for medical education.
- Are working hand-in-hand with world-renowned scientists to support a multitude of projects that cover the spectrum from basic to translational to clinical research in practically every type of disease.
- Constitute a critical element of the infrastructure needed to operate exciting new technologies including high-throughput sequencing, as well as novel proteomic and genomic assay platforms.
- Are a critical component of supporting essential medical and clinical data management infrastructure including EMR, Warehouse, Biospecimen management and Clinical Trial databases.
- Provide support for hundreds of grants, grant proposals, and project live-cycles from research design and preliminary results through publication.
- Publish their findings in prominent journals and share their discoveries, methods and systems, with colleagues all over the world.

The CHIBI philosophy:

(a) Align CHIBI activities, infrastructure, and people with the needs and activities of basic science/ translational/ clinical research, education and patient care across the enterprise.
(b) Employ a strictly evidence-based approach to informatics services.
(c) Employ a theoretically and empirically rigorous approach to new methods development.
(d) Pursue excellence in new methods development and deployment in strategically chosen areas.

We strive to be a leader in a carefully considered set of areas that we feel can maximize the potential for novel discoveries and improved care for many years to come:

Area 1. Informatics and computational analytics for molecular signatures and personalized medicine.
Area 2. Computational causal discovery methods in biomedicine.
Area 3. Next generation sequencing informatics.
Area 4. Cutting-edge educational informatics methods and systems.
Area 5. Next generation biomedical information retrieval and scientometrics.
Area 6. Innovative research design and analysis services based on rigorous literature synthesis and empirical benchmarking.
Area 7. Assay-specific informatics for a variety of genomic and proteomic platforms.
Area 8. Advanced services and systems for multimodal data storage and management.
Area 9. Advanced enterprise-wide data mining methods, software and services.

CHIBI is a work in progress, thus we greatly value your feedback and advice on how to improve our center and on how to best accomplish our mission.

With Best Wishes,

Constantin Aliferis M.D., Ph.D.
Director of CHIBI

CHIBI Faculty

Constantin Aliferis, M.D., Ph.D., FACMI

Director, NYU Center for Health Informatics and Bioinformatics. Informatics Director, NYU Clinical and Translational Science Institute. Associate Professor, Department of Pathology, NYU School of Medicine. Director, Molecular Signatures Laboratory, Center for Health Informatics and Bioinformatics

Specialty areas:
Computational data analytics for molecular profiles and biomarkers, personalized medicine, Markov Blanket and causal graph induction, best practices for bioinformatics, downstream analysis of next-generation sequencing data, information retrieval with machine learning, high performance computing, informatics education.

Alexander Alekseyenko, Ph.D.

Research Assistant Professor, Department of Medicine, Division of Clinical Pharmacology, NYU School of Medicine

Specialty areas:
Development of Statistical and Generation DNA Sequencing, Applications to Studies of Human Microbiomic Diversity and Human Genetics.

Stuart Brown, Ph.D.

Research Associate Professor, Department of Cell Biology, NYU School of Medicine

Specialty areas:
Applications of Next Generation DNA Sequencing to Studies of Gene Expression and Genetic Diversity, Bioinformatics Data Management.

Michael Cantor, M.D.

Clinical Assistant Professor, Department of Medicine, Division of General Internal Medicine, NYU School of Medicine. Director, Healthcare Informatics, Pfizer, Inc.

Specialty areas:
Secondary Use of Clinical Data, Personalized Medicine, Automated Methods for Pharmacovigilance.

John D. Chelico, M.D., M.A.

Assistant Chief Medical Information Officer (CMIO), New York City Health and Hospitals Corporation, South Manhattan Healthcare Network. Instructor of Clinical Medicine, Department of Medicine, Division of General Internal Medicine, NYU School of Medicine.

Specialty Areas:
Clinical Data Warehousing, Use of Electronic Health Records Information for Clinical Research and Quality Improvement in Healthcare.

Lawrence Fu, Ph.D.

Research Assistant Professor, Department of Medicine, Division of Clinical Pharmacology, NYU School of Medicine

Specialty areas:
Machine Learning Methods for Next-Generation Information Retrieval and Scientometric Analysis.

Yuval Kluger, Ph.D.

Assistant Professor, Department of Cell Biology, NYU School of Medicine Affiliate faculty, Courant Institute of Mathematical Sciences Affiliate faculty, Department of Dermatology at Yale University

Specialty areas:
Integrative Bioinformatics, Biomarker Identification, Signal Processing of New High-Throughput Data, Discovering Complex Genomics Patterns in GWAS Studies and Cancer Evolution.

James Robinson, M.Ed.

Director Clinical Research Informatics and Data Management Unit, Center for Health Informatics and Bioinformatics. Research Assistant Professor, Department of Child and Adolescent Psychiatry, NYU School of Medicine. Research Assistant Professor, Department of Psychiatry, NYU School of Medicine. Director Innovative Clinical Research Solutions, Nathan S. Kline Institute for Psychiatric Research Director Information Sciences Division, Nathan S. Kline Institute for Psychiatric Research

Specialty areas:
Managing Large Scale Research Computing Infrastructures, Database Management of Clinical Trials and Other Research Protocol Based Data.

Phillip Ross Smith, Ph.D., M.D.

Associate Professor, Department of Cell Biology, NYU School of Medicine

Specialty areas:
Informatics Education, Development of Computational Methods for Analysis of ChIP-Seq Data, High Performance Computing.

Alexander Statnikov, Ph.D.

Assistant Professor, Department of Medicine, Division of Clinical Pharmacology, NYU School of Medicine. Director, Computational Causal Discovery Laboratory, Center for Health Informatics and Bioinformatics

Specialty areas:
Large Scale Causal Discovery and Reverse Engineering of Biological Networks, Molecular Profiling, Analysis of Biomarker Multiplicity, Biomarker Discovery, Automated Software for Bioinformatics and Medical Data Analysis.

Marc Triola, M.D.

Assistant Professor, Department of Medicine, Division of General Internal Medicine, NYU School of Medicine. Chief, Section of Medical Informatics, Department of Medicine, Division of General Internal Medicine, NYU School of Medicine. Director, Division of Educational Informatics, NYU School of Medicine

Specialty areas:
Informatics Systems and Methods to Support Medical Education.

Jinhua Wang, Ph.D.

Assistant Professor, Department of Pediatrics, NYU School of Medicine. Affiliate faculty, NYU Cancer Institute.

Specialty areas:
Analysis of RNA-Seq and Chip-on-chip Data, De-novo and Re-Sequencing Algorithms, Linking Disparate Knowledge Bases, Regulatory and Protein Interaction Networks, CNV/SNV and Splice Variation Analyses.

Jiri Zavadil, Ph.D.

Assistant Professor, Department of Pathology, NYU School of Medicine. Assistant Director, NYU Genome Technology Center, NYU Langone Medical Center

Specialty areas:
Molecular Profiling Focused on Human Disease Pathogenesis and Developmental Biology, Analysis of Microarray and Next Generation DNA Sequencing Data.

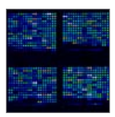
CHIBI Staff & Trainees

1. Heidi Fitterling, M.P.H., *Head Administrator and Grants Manager*
2. Jacquelyne Price *Administrative Assistant*
3. Nikita Lytkin, Ph.D. *Senior Scientific Programmer*
4. Steven Sotero, M.A. *Informatics Core Manager*
5. Zuojian Tang, M.S. *Associate Research Scientist*
6. Jizhou Ai, M.S. *Scientific Programmer*
7. Mariann Micsinai, M.A. *Informatics Fellow*
8. Varun Narendra, M.S. *MD/PhD student*
9. Fabio Parisi, Ph.D. *Post-doctoral Fellow*

CHIBI Resources, Services, and Activities:

Bioinformatics

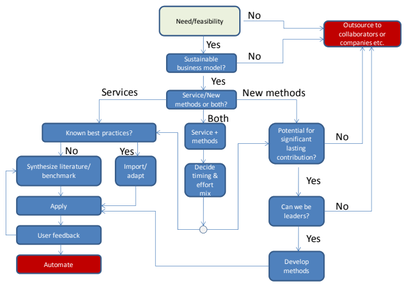
Bioinformatics entities/activities at the NYU Center for Health Informatics and Bioinformatics include:



Assay, disease, and center-specific bioinformatics such as:

- Next-generation Sequencing Informatics
  - *Chi-Seq*
  - *RNA-Seq*
  - *Epigenetics*
  - *Microbiomics*
  - *Micro RNA studies*
  - *CNV & splice variation studies*
  - *Digital RNA*
  - *Denovo sequencing assembly and re-sequencing*
- Microarray Informatics
- Proteomics Informatics
- Genetics-genomics Informatics
- Cancer Informatics
- Centers of Excellence
- Multi-nodal & Integrative Studies

The Best Practices Integrative Informatics Consultation service (BPIC).
The mission of BPIC is to advise researchers about and to undertake all aspects of informatics research design and study execution. BPIC's mission also includes reviews and synthesis of the literature and conducting large-scale benchmarking of a wide array of methods in order to base advice to researchers on solid evidence. BPIC also aims to efficiently connect methods developers with methods consumers.



BPIC Workflow

Health Informatics

Health informatics entities/activities at the NYU Center for Health Informatics and Bioinformatics include:

The Division of Educational Informatics
Develops and deploys informatics technology in support of medical education.

Development and deployment of information retrieval models through the Evidence Based Medicine Information Retrieval and Scientometrics Lab and the Library-Informatics Collaborative in support of scanning the WWW and bibliographic databases for content and quality, as well as analysis of citation patterns, and quantitative modeling of research behavior. Also design and deployment of novel ways to find researchers for a variety of purposes (research, education, health care).

Data storage, management, integration and mining including:

- Use of the new Electronic Medical Record for research purposes
- Design, acquisition and deployment of a Federated Data Warehouse
- Clinical trial and other clinical research protocol-supporting data management systems
- Database management services
- Biorepository specimen and data management and integration
- Enterprise-wide data mining software and services
- Laboratory Information Management Systems for high-throughput assay core project management and integration with the EMR

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