University Senate

Proposed: February 27, 2015
Adopted: February 27, 2015

# RESOLUTION TO APPROVE THE ESTABLISHMENT OF AN INSTITUTE FOR GENOMIC MEDICINE

WHEREAS, advances in genome sequencing are leading to new insights into biological processes and the development of a new category of medicines, and

WHEREAS, Columbia's intellectual capital includes expertise not only in genetics but in clinical practice, data analytics, bioethics and other fields, and

WHEREAS, the Institute will have a mandate to develop a robust program of basic and clinically applied research in human genetics and genomic medicine that will anchor emerging clinical programs in precision medicine, and

WHEREAS, CUMC has considerable strength in genetics and genomics in many departments, including Genetics and Development, Pediatrics, Systems Biology, Medicine and Psychiatry, as well as the Institute for Cancer Genetics and the Naomi Berrie Diabetes Center, and

WHEREAS, the Institute will bring together current faculty and researchers with expertise in all aspects of human genetics, and will develop collaborations with the Morningside departments of Biological Sciences and Bioengineering, and

WHEREAS, the Institute will create the structure for Columbia University to become a major force in the rapidly evolving field of human genomics discovery and application,

THEREFORE BE IT RESOLVED that an Institute for Genomic Medicine be established, approved by the Senate and authorized by the president, and that the Senate forward this resolution to the Trustees for appropriate action.

AND BE IT FURTHER RESOLVED that, in accordance with Section 351 of the University Statutes, the direction of the Institute shall be assigned to a committee consisting of a director and members nominated by the President and appointed by the Trustees to serve for a term of three years.

Proponent:

Committee on Education

# Proposal: Establishment of the Institute for Genomic Medicine

## Mission

The overarching goal is to create a Columbia University-wide coordinated and cohesive research, teaching and clinical institute focused on all aspects of human genetics and genomics. While based at P&S, the Institute for Genomic Medicine (IGM) will have faculty and researcher membership from both the CUMC and Morningside campuses. There is already considerable expertise in genetics on the CUMC campus, but the IGM through its structure, will have the capacity to facilitate the integration of genomic research, analysis and application to patient care across academic departments, disciplines and clinical programs. It will bring together experimental, analytic, clinical, bioethics and computational expertise centered on understanding and applying human genetic knowledge. In addition, educational programs in human genomics aimed at the undergraduate, graduate and community level will be created and coordinated by the institute.

## IGM Structure

The IGM will be based at the College of P&S, but strong links will be established with the Morningside and the Manhattanville campuses, both for research and for undergraduate and graduate education and training, and with the New York Presbyterian Hospital and the New York Genome Center for research, as well as with its translation into clinical care. As the development of the IGM evolves, it will welcome faculty from across Columbia University and will coordinate educational opportunities for undergraduates and graduates in relevant disciplines.

The IGM will have an explicit mandate to develop a robust program of basic and clinically applied research in human genetics and genomic medicine that will serve to anchor emerging clinical programs in Precision Medicine. The IGM will establish the necessary infrastructure to help provide genomic analyses across the New York Presbyterian system, including targeted bio banking (for human genetics studies related to precision medicine initiatives initiated by the IGM), clinical and genomic informatics, statistical genetics, and an oversight mechanism in partnership with the NYP to ensure that genetic diagnosis adheres to the highest scientific and ethical standards for the interpretation of personal genomes.

### *IGM Administration*

The director will report to the Dean of P&S on all administrative and financial issues, will report jointly to the Dean and the University-wide director of Precision Medicine on scientific issues, and will be advisory to both of them and the University President on strategic vision for the genomic portion of the Precision Medicine initiative. The director will also will oversee the IGM and will have a primary appointment in a P&S Basic Science Department. In order to create an effective partnership between clinical departments and the IGM, the director will also have secondary appointments in appropriate clinical departments where key signature programs will be based and in a department on the Morningside campus.

### *Administrative Leadership*

There are two committees that will be advisory to the Institute Director, the Executive Vice President for Health and Biomedical Sciences and Dean of the Faculties of Health Sciences and of Medicine, and the President at Columbia University with regard to the development and implementation of the programs:

1. University-wide Committee: See attached roster
2. CUMC Committee: See attached roster

***IGM Faculty***

Existing Faculty:

CUMC has considerable strength in genetics and genomics in many departments including Genetics and Development, Pediatrics, Systems Biology, Medicine and Psychiatry, as well as the Institute for Cancer Genetics, and the Naomi Berrie Diabetes Center. The IGM will provide the organizational structure to bring together current faculty and researchers with expertise in all aspects of human genetics. In addition, collaborations with Morningside departments of Biology and Bioengineering are in development and the IGM will expect to welcome additional faculty membership from the Morningside and Manhattanville Campuses.

New Faculty Recruitments:

The IGM will add four to five tenure-track or tenured faculty whose positions will be in any one of several departments, but whose work will be administratively 100% within the Institute, and eight or more that will be shared 50% by the Institute and 50 % by appropriate departments. Departmental affiliations will be decided as programmatically appropriate. Critically, all such faculty, in whatever departments they are housed, will be full members of the IGM, with full participation in its academic activities, and full access to all its core resources. The IGM faculty expertise will span a broad range of human genetics, including:

1) Animal and cellular models of human disease,
2) Statistical and population genetics,
3) Relevant basic human genetics,
4) Clinical genetics.

Early recruiting efforts will focus on a senior scientist expert in modeling neurological disease, and it is expected that this hire will be in partnership with the Zuckerman Mind Brain Behavior Institute. In addition, the IGM will jointly recruit, with the institute for Cancer Genetics, a clinician-scientist with a primary interest in cancer genomics who will help to coordinate cancer related studies involving the IGM, the Institute for Cancer Genetics and the Herbert Irving Cancer Center. Clinician-scientist faculty, together with clinical faculty at Columbia University College of Physicians and Surgeons, will help create and manage the IGM interface with the NYP health system.

## IGM Educational Activities

The IGM will play a central role in teaching, both at the College of Physician and Surgeons and on the Morningside campus. At P&S, the IGM will establish a module on human genomics that will include basic instruction in human genomics, training in clinical genetics and rotations both in genetics labs and genome sequencing clinics.

The IGM will also partner with Morningside faculty to establish new undergraduate courses on genomics, such as, a course focused explicitly on the "The Future of the Human Genome", to prepare students to understand the relevance of genetic/genomic data, and as preparation of students for a world in which genetic and genomic understanding will guide personal, policy and business decisions. In addition, IGM will also institute a summer undergraduate research program to

foster development of the next generation of scientists in genetics. As the IGM matures structurally, it expects to also be able to train graduate students from across Columbia University. Mechanisms will be established in order to determine how academic credit and salary contributions are shared between IGM faculty and the Morning side campus faculty.

As a part of an outreach element, the IGM will create a personal genomics portal to provide relevant information on the cutting edge science and technologies being employed by the IGM. The website will be curated by IGM members (faculty, staff and students) who will produce short articles on how they are using the IGM infrastructure to further their research. This will serve a two-fold purpose in encouraging interaction with the general public on genomic issues and will increase the global profile of the IGM beyond the immediate scientific community.

## IGM integration with NYP and Columbia Doctors Clinical Programs

The IGM will serve as a focal point not only for genomics research and education, but also for the clinical applications of genomics. As part of this effort, the IGM will establish careful and considered mechanisms so that patients seen at NYP Columbia affiliated hospitals that are exome or whole genome sequenced for clinical purposes may have their data stored and available for use by both research and clinical communities. Some early steps will include:

1) Building a sizeable database of sequenced genomes that can be used as controls for other genetic research studies,
2) Improving rates of genetic diagnosis by facilitating routine re-analysis of the data using cutting-edge approaches employed by the IGM to identify novel diseases or enhance the ability to detect disease-causing mutations in known genes.

These activities will be coordinated through IGM's Genomic Analysis Facility; Sequencing Informatics and Clinical Informatics will collectively provide a mechanism for strong integration and analysis of sequencing data from internal and external sources.

It is expected that the director will rapidly establish a number of well-funded signature projects that bring together new and existing expertise at Columbia. IGM signature projects will be selected over time, but early examples include, but will not be limited to the following:

1) Exome and/or whole genome sequencing of all undiagnosed or unresolved presumed genetic diseases in children and newborns in the NYP Children's Hospital
2) Trio based sequencing of high risk pregnancies, and children in the NICU, including both new data collection and available retrospective data collection analysis
3) The development of a paradigm-defining translational epilepsy genetics program that will include patient sequencing, functional modeling of pathogenic mutations identified in individual patients, and the clinical trials of tailored therapies based on genomic studies.
4) A service to sequence and interpret the genomes of healthy adults to address the growing interest in personal genomics and to determine what can be usefully learned in studying the genomes of healthy people.
5) Collection of brain tissue from surgery for refractory epilepsy and other procedures for systematic investigation of the role of somatic mutations/epigenetics in human disease.

***Establishment of a NYP Sequencing Clinic***

The IGM will establish a centrally managed sequencing clinic at NYP to pave the way to more routine clinical use of genome sequencing in diagnostics. It is expected that over the first few years, through close collaboration with clinical geneticists at NYP and IGM, specific algorithms will be developed to determine when it is appropriate to refer a patient to the sequencing clinic. The IGM will establish and maintain an advisory board of human geneticists, ethicists, policy makers and clinicians in partnership with NYP that is charged with addressing challenges related to the clinical use of genomic information.

In summary, the IGM will create the structure for Columbia University to become a major force in the rapidly evolving field of human genomics discovery and application.

## CUMC Committee for Personalized Medicine

| Committee Members | | |
|---|---|---|
| **Last Name** | **First Name** | **Title** |
| Corwin, MD | Steve | Professor of Clinical Medicine; Chief Executive Officer, NewYork-Presbyterian Hospital |
| Appelbaum, MD | Paul | Elizabeth K. Dollard Professor of Psychiatry, Medicine and Law |
| Califano, PhD | Andrea | Clyde and Helen Wu Professor of Chemical Biology (in Biomedical Informatics) and Professor of Biochemistry and Molecular Biophysics (in the Institute for Cancer Genetics); Chair, Department of Systems Biology |
| Christiano, PhD | Angela | Richard and Mildred Rhodebeck Professor of Dermatology and Professor of Genetics and Development; Director, Basic Science Research Group of Dermatology |
| Chung, MD, PhD | Wendy | Associate Professor of Pediatrics (in Medicine) |
| Dalla-Favera, MD | Riccardo | Percy and Joanne Uris Professor of Clinical Medicine and Professor of Pathology and Cell Biology, Genetics and Development and Microbiology and Immunology (in the Institute for Cancer Genetics and the Herbert Irving Comprehensive Cancer Center) |
| D'Alton, MD | Mary | Willard C. Rappleye Professor of Obstetrics and Gynecology; Chair, Department of Obstetrics and Gynecology; Director of Services, Sloan Hospital for Women |
| Emerson, MD, PhD | Stephen | Clyde and Helen Wu Professor of Immunology (in Medicine) and Professor of Microbiology and Immunology (in the Herbert Irving Comprehensive Cancer Center); Director, Herbert Irving Comprehensive Cancer Center |
| Ghosh, PhD | Sankar | Silverstein and Hutt Family Professor of Microbiology; Chairman of the Department of Microbiology and Immunology |
| Ginsberg, MD | Henry | Herbert and Florence Irving Professor of Medicine; Director, Irving Institute for Clinical and Translational Research |
| Goldstein, PhD | David | Profesor of Genetics & Development |
| Hripcsak, MD | George | Vivian Beaumont Allen Professor of Biomedical Informatics; Chairman of the Department of Biomedical Informatics |
| Karsenty, MD | Gerard | Paul A. Marks Professor of Genetics and Development and Professor of Medicine; Chair, Department of Genetics and Development |
| Landry, MD | Don | Samuel Bard Professor of Medicine; Chairman of the Department of Medicine |
| Maniatis, PhD | Tom | Isidore S. Edelman Professor of Biochemistry, Chairman of the Department of Biochemistry and Molecular Biophysics, cofounder of the New York Genome Center and Lasker Foundation's Koshland Special Achievement Awardee in Medical Science |
| Mason, PhD | Carol Ann | Professor of Pathology and Cell Biology, Neuroscience and Ophthalmic Science (in Ophthalmology) |
| Mayeux, MD | Richard | Gertrude H. Sergievsky Professor of Neurology, Psychiatry and Epidemiology (in the Gertrude H. Sergievsky Center and Taub Institute for Research of Alzheimer's Disease and the Aging Brain); Chair, Department of Neurology; Director, Gertrude H. Sergievsky Center; Co-Director, Taub Institute for Research of Alzheimer's Disease and the Aging Brain |
| Taylor, MD | Anne L. | John Lindenbaum Professor of Medicine at CUMC;SVP of Faculty Affairs and Career Development at CUMC; Vice Dean of Academic Affairs, College of Physicians and Surgeons |
| Wood, MD | Margaret | E.M. Papper Professor of Anesthesiology; Chairman of the Department of Anesthesiology |
| * Zuker, PhD | Charles | Professor of Biochemistry and Molecular Biophysics and of Neuroscience and Howard Hughes Medical Institute Investigator |

## University-wide Task Force for Personalized Medicine

| Committee Members | | |
|---|---|---|
| **Last Name** | **First Name** | **Title** |
| Bollinger | Lee C. | Chair, University Task Force; President; Seth Low Professor of the University |
| Goldman, MD | Lee | Co-chair, University Task Force; Executive Vice President for Health and Biomedical Sciences and Dean of the Faculties of Health Sciences and Medicine; Harold and Margaret Hatch Professor of the University and Professor of Medicine and of Epidemiology |
| Coatsworth, MD | John | Co-chair, University Task Force; Provost; Professor of International and Public Affairs and of History |
| Corwin, | Steve | Professor of Clinical Medicine; Chief Executive Officer, NewYork-Presbyterian Hospital |
| Alverson, | Amelia | Senior Vice President, Columbia University Medical Center Development |
| Appelbaum, MD | Paul | Elizabeth K. Dollard Professor of Psychiatry, Medicine and Law |
| Axel, MD | Richard | University Professor of Biochemistry, Molecular Biophysics and Pathology |
| Bakken, PhD, RN | Suzanne | Alumni Professor of the School of Nursing and Professor of Biomedical Informatics; Director, Center for Evidence-based Practice in the Underserved |
| Bearman, PhD | Peter | Jonathan R. Cole Professor of Sociology; Director, Interdisciplinary Center for Innovative Theories and Empirics |
| Bowman, PhD | DuBois | Professor of Biostatistics; Chair, Department of Biostatistics |
| Boyce | Mary | Dean of The Fu Foundation School of Engineering and Applied Science and Morris A. and Alma Schapiro Professor; Professor of Mechanical Engineering |
| Califano, PhD | Andrea | Clyde and Helen Wu Professor of Chemical Biology (in Biomedical Informatics) and Professor of Biochemistry and Molecular Biophysics (in the Institute for Cancer Genetics); Chair, Department of Systems Biology |
| Christiano, PhD | Angela | Richard and Mildred Rhodebeck Professor of Dermatology and Professor of Genetics and Development; Director, Basic Science Research Group of Dermatology |
| Chung, MD, PhD | Wendy | Associate Professor of Pediatrics (in Medicine) |
| Coll | Steve | Dean of the Graduate School of Journalism and Henry R. Luce Professor of Journalism |
| D'Alton, MD | Mary | Willard C. Rappleye Professor of Obstetrics and Gynecology; Chair, Department of Obstetrics and Gynecology; Director of Services, Sloan Hospital for Women |
| Darnell, MD, PhD | Robert | Robert and Harriet Heilbrunn Professor of Cancer Biology, The Rockefeller University in the City of New York; Director for Science Programs, Center for Clinical and Translational Research, The Rockefeller University in New York City; Investigator, Howard Hughes Medical Institute; Senior Physician, The Rockefeller University Hospital; Adjunct Attending Neuro-Oncologist, Memorial Sloan-Kettering Cancer Center |
| Edgar | Harold | Julius Silver Professor of Law, Science and Technology |
| Emerson, MD, PhD | Stephen | Clyde and Helen Wu Professor of Immunology (in Medicine) and Professor of Microbiology and Immunology (in the Herbert Irving Comprehensive Cancer Center); Director, Herbert Irving Comprehensive Cancer Center |
| Forde, MD | Ken | University Trustee; Jose M. Ferrer Professor Emeritus of Surgery |
| Fried, MD, MPH | Linda | Dean of the Mailman School of Public Health and DeLamar Professor of Public Health Practice; Senior Vice President, Columbia University Medical Center; Professor of Epidemiology and of Medicine |
| Green | Linda | Armand G. Erpf Professor of Business |
| Hripcsak, MD | George | Vivian Beaumont Allen Professor of Biomedical Informatics; Chair, Department of Biomedical Informatics |
| Jebara | Tony | Associate Professor of Computer Science |
| Karsenty, MD | Gerard | Paul A. Marks Professor of Genetics and Development and Professor of Medicine; Chair, Department of Genetics and Development |
| Kasdin | Robert | Senior Executive Vice President |
| Landry, MD | Don | Samuel Bard Professor of Medicine; Chair, Department of Medicine |
| Madigan | David | Executive Vice President for Arts and Sciences and Dean of the Faculty of Arts and Sciences; Professor of Statistics |
| Maniatis, PhD | Tom | Isidore S. Edelman Professor of Biochemistry; Chair, Department of Biochemistry and Molecular Biophysics |
| Mayeux, MD | Richard | Gertrude H. Sergievsky Professor of Neurology, Psychiatry and Epidemiology (in the Gertrude H. Sergievsky Center and Taub Institute for Research of Alzheimer's Disease and the Aging Brain); Chair, Department of Neurology; Director, Gertrude H. Sergievsky Center; Co-Director, Taub Institute for Research of Alzheimer's Disease and the Aging Brain |
| McKeown | Kathleen | Henry and Gertrude Rothschild Professor of Computer Science; Director, Institute for Data Science and Engineering |
| Miller | Amber | Professor of Physics; Dean of Science, Faculty of Arts and Sciences |
| Mukherjee, MD, PhD | Siddharta | Assistant Professor of Medicine |
| Purdy | G. Michael | Executive Vice President for Research; Professor of Earth and Environmental Sciences |
| Rowe | Jack | Professor of Health Policy and Management |
| Staudinger, PhD | Ursula | Robert N. Butler Professor; Director, Robert N. Butler Columbia Aging Center |
| Stohler, DMD, DrMedDent | Christian | Dean of the College of Dental Medicine; Senior Vice President for Dental Medicine, Columbia University Medical Center; Professor of Dental Medicine |
| Van Sickle | Fred | Executive Vice President for University Development and Alumni Relations |
| Vagelos, MD | P. Roy | Chair, Board of Advisors, Columbia University Medical Center; Chairman of the Board, Regeneron Pharmaceuticals; Retired Chairman of the Board and Chief Executive Officer, Merck & Co. Inc. |
| Vunjak-Novakovic, PhD | Gordana | Mikati Foundation Professor of Biomedical Engineering and Professor of Medical Sciences (in Medicine) |
| Zuker, PhD | Charles | Professor of Biochemistry and Molecular Biophysics and Neuroscience |