1. Robert K. Campbell, Ph.D.

Adjunct Associate Professor
Department of Molecular Pharmacology, Physiology & Biotechnology
Brown University
Box G-B
171 Meeting Street
Providence, RI 02912

Whitman Center Associate
Josephine Bay Paul Center in Comparative Molecular Biology and Evolution
Marine Biological Laboratory
7 MBL Street
Woods Hole, MA 02543

3. Education

1980	B.A.	History	Swarthmore College, Swarthmore, Pennsylvania. Thesis advisor: James A. Field, Jr., Ph.D. Thesis topic: The Battle of Manila and American naval history in the Far East in the second half of the nineteenth century.
1982	M.S.	Physiology	University of Wisconsin, Madison, Wisconsin.
1996	Ph.D.	Cell & Developmental Biology	University of Medicine and Dentistry of New Jersey and Rutgers, The State University of New Jersey, Piscataway, New Jersey. Advisor: William R. Moyle, Ph.D. Project: Structure-activity relationships and protein engineering of glycoprotein hormones.

4. Professional Appointments

a. Industry Positions

1983-1986 Squibb Corporation, Princeton, New Jersey.
Contributed to successful clinical development of five small molecules launched as medicines for cardiovascular, metabolic and infectious disease indications – captopril [Capoten®], zofenopril [Zofenil®, also Zopranol®, Bifril®], fosinopril [Monopril®], aztreonam [Azactam®], and pravastatin [Pravachol®].

Clinical Data Auditor
Co-established Squibb's first Clinical Quality Assurance program with the Head of Clinical QA. Conducted internal and field audits to support all clinical programs. Visited and assessed over 100 clinical study sites. Trained clinical research teams in Good Clinical Practices and Quality Assurance practices. Member of final review team for the clinical sections of two NDAs (aztreonam, and captopril for 1st line therapy).

1991-2014 EMD Serono Research Institute, Billerica, Massachusetts (unit of Merck KGaA, formerly Ares Advanced Technology and Serono)
Contributed to the successful development and worldwide launch of four recombinant protein medicines, including interferon beta for multiple sclerosis and follicle stimulating hormone for infertility. Facilitated teams and early stage project governance for two additional biotherapeutic candidates – one now on the market (anti-PD-L1 mAb Avelumab [MSB0010718C] co-developed with Pfizer) and one in development (anti-IL17 A/F bispecific nanobody M1095 [ALX-0761] with Ablynx)

Principal Investigator (1991-1992): Led research projects for protein engineering and assessment of peptide mimetics for glycoprotein hormones.

Executive Director (Head of Research US) (1992-1995) with responsibility for all US discovery research. Responsible for molecular biology, cell biology, protein chemistry and recombinant protein production departments (35 lab staff). These teams developed production clones for three products that reached the global market (Gonal-F®, Ovidrel®, Luveris®)

Executive Director – Research Quality Assurance (1995-1998) with global responsibility for collaborative research with academic groups in multiple myeloma and cytokine research. Member of regulatory registration team for interferon beta (Rebif®) and leader of molecular biology assessment and regulatory discussion with EMA rapporteur (Sweden) to reverse initial non-approval of Rebif®. Presenter at subsequent FDA and Australian Drug Evaluation Committee reviews to facilitate successful approvals.

US Head of Molecular Biology, Bioinformatics, and Systems Biology Departments (1998-2007) with responsibility for US research teams conducting protein engineering,

initial characterization of biotherapeutic drug candidates, and cancer target discovery and validation. Discovery Project Leader for two engineered proteins that progressed from discovery to preclinical development.

Global Head of Protein Engineering and Enabling Technologies (2007-2008) with responsibility for research department (10 Ph.D.-level staff, 20 total staff in U.S. and Germany) and global project teams (20+ additional staff) in protein engineering for discovery and development of biotherapeutic candidates for cancer, autoimmune diseases, neurodegenerative diseases, and infertility.

Global Executive Director for Strategic Implementation of Protein Therapeutics Pipeline (2008-2009) with responsibility for strategic alignment of projects directed at the invention and development of new protein therapeutics in oncology, reproductive health, autoimmune and inflammatory diseases, and neurodegenerative diseases. Member of leadership team for implementation of collaboration with Ablynx, leading to two clinical candidates. Responsible for facilitating collaboration between ImmunoOncology and Biotherapeutics teams on immunotherapy projects (including discovery and optimization of Avelumab [Bavencio®], which was granted accelerated approval in 2017 by FDA).

Global Head of Research, Endocrinology (2010-2012) – Member of Therapeutic Area Leadership Team with Heads of Clinical Research, Product Development, and the Global Business Unit. Responsible for overall global research strategy in Endocrinology therapeutic areas, alignment of strategy with future clinic and patient needs, and facilitating go/no go decision on the global Endocrinology product pipeline. This included executive sponsorship of seven Global Product Teams responsible for drugs in development for phenylketonuria, metabolic disorders, and growth hormone deficiencies. Partner with Global Business Development for setting search priorities and review of potential in-licensing and acquisitions for the Business Unit.

Director, External Innovation (2012-2014)
Responsible for identification, assessment, and alignment of potential technology collaborations with Company strategy and projects. Representative from EMD Serono to European Innovative Medicines Initiative, EFPIA Research Directors Group, and US PhARMA LD-KIT initiatives. Member of global evaluation team for Merck KGaA Innospire program to foster and review employee innovation proposals in pharmaceutical, consumer health, performance materials, and biosciences business areas. Organized and led symposia and workshops for revitalizing the Company's research collaborations with Weizmann Institute faculty.

Interim Director and Global Head of Knowledge Management (2012-2013; coincident with Director, External Innovation)
Co-led the realignment of global KM projects to Company needs, and subsequent reorganization/integration of KM resource into Research Informatics and Global Early

Development functions. Launched new collaborations to identify drug repositioning candidates and combinations in neurology and oncology business areas.

b. Academic Positions

1997-2009
Adjunct Assistant Professor
UMDNJ-Robert Wood Johnson Medical School, Piscataway, New Jersey.
Research Activities: Functional properties and evolution of glycoprotein hormones.

2003-2013
Instructor
Bioinformatics Program, Rabb School of Continuing Education, **Brandeis University**, Waltham, Massachusetts.

- Teaching Activities: Created graduate course *Drug Discovery and Development* and taught from 2003-2010 (focus of course alternated between malaria and human African trypanosomiasis). Class size from 4 to 12 students; 22 of 39 remain active in biotech/healthcare informatics and data analysis.

1998-present
Josephine Bay Paul Center in Comparative Molecular Biology and Evolution, **Marine Biological Laboratory**, Woods Hole, Massachusetts

Visiting Scientist (1998-2006)

- Research Activities: EMD Serono-funded start-up research on evolution of metazoan signaling systems using comparative genomics and model organisms.

Adjunct Associate Scientist (2006-2016)

- Research Activities: NIH-funded program to discover candidate treatments for Sleeping Sickness (RO1). Identification and functional characterization of druggable targets from human parasite genomes, repositioning of drug discovery programs to address neglected diseases, evolution of complex systems.

Whitman Center Associate (2016-present)

- Research Activities: NIH-funded program to discover candidate treatments for Sleeping Sickness (RO1). Identification and functional characterization of druggable targets from human parasite genomes, repositioning of drug discovery programs to address neglected diseases, evolution of complex systems.

2013-present
Department of Molecular Pharmacology, Physiology & Biotechnology, **Brown University**, Providence, RI 02912

Visiting Scientist (2013-2017)
Adjunct Associate Professor (2017-present)

- Teaching
    - BIOL-2125, *Bioinformatics in the Discovery, Development and Use of Medicines.* New course launched in January 2017. Taught Spring 2017, Fall 2017, Spring 2018
    - BIOL-0940E, *Precision Medicine or Privileged Medicine? Addressing disparities in the inclusiveness of biomedical research.* Created and taught this new sophomore Fall 2018, Spring 2019, Spring 2020. Course was awarded four Brown curriculum designations:
        - Community-Engaged Learning & Research – April 2018
        - DIAP Course: Race, Gender, and Inequality – April 2018
        - Sophomore Seminar – April 2018
        - Writing-designated course – January 2019
    - Recipient of 2018 Brown University Swearer Center Engaged Course Development Award to support development of engaged learning components of BIOL-0940E.
    - Recipient of 2018 Brown University Sheridan Center Writing Across the Curriculum Faculty Seminar Award to support student co-design of writing components and curriculum designation as a WRIT (writing) course.
- Research
    - Collaboration with Wolfgang Peti and Rebecca Page (now at University of Arizona) on structural studies of Trypanosome PDEB1 (funded in part by NIH grant through MBL 2013-2015).
    - Co-founder and current co-chair of Expedited Approvals team sponsored by Drug Information Association and American Statistical Association, comprised of members from industry, academia and FDA
- Engagement with University initiatives and community
    - Member, Science Friday Faculty Forum, March 2019-present
    - Member, Swearer Center K-12 Faculty Learning Community, September 2018-present.
    - Search Committee Member for Sheridan Center Associate Director position, December 2018-February 2019 (successful search, hiring offer accepted)
    - Participant (and first place winner) in Brown Ballroom Dance Team's "Dancing With the Professors" initiative, Sept 2018-Feb 1, 2019
    - Participant in 28-Oct-2016 workshop on Personal Narrative (led by Marshall Ganz [Harvard]) and engaged in follow-up from workshop related to Brown Initiative for Diversity and Inclusion.

- Participant in Forum for Entrepreneurship Analytics, Scholarship and Thought (FEAST)
- Mentor for students in Brown B-lab and Brown Venture Fund
- Mentor/manager for students engaged in new course creation and teaching.

5. Completed Publications

b. Chapters in books

Campbell, R.K., Matzuk, M.M., Canfield, R.C., Boime, I., and Moyle, W.R. Use of monoclonal antibodies and mutagenesis to study the structure of human chorionic gonadotropin. In Placental Protein Hormones, eds. M. Mochizuki and R. Hussa, Elsevier Science, New York pp123-132. (1988)

Campbell, R.K., Matzuk, M.M., Dean-Emig, D.M., Cogliani, E., Myers, R.V., Krichevsky, A., Boime, I., and Moyle, W.R. Use of β-subunit chimeras to study structures of glycoprotein hormones and to develop a model of the β-subunit. In Glycoprotein Hormones, eds. W.W. Chin and I. Boime, Serono Symposia, Norwell, Massachusetts pp37-43. (1990)

Campbell, R.K. Control of gonadotropin binding specificity, In Ovulation Induction, eds. M. Filicori and C. Flamigni, Excerpta Medica, Amsterdam pp185-190. (1994)

Moyle, W.R. and **Campbell, R.K**. Gonadotropins, In Endocrinology, ed. L.J. de Groot, W.B. Saunders Co., Philadelphia pp230-241. (1994)

Moyle, W.R. and **Campbell, R.K**. Gonadotropins. In Reproductive Endocrinology, Surgery and Technology, eds. E.Y. Adashi, J.A. Rock and Z. Rosenwaks. Lippincott-Raven Publishers, Philadelphia pp683-724. (1996)

Arkinstall, S., Wong, G., Hooft, R., Weiser, W., Evans, D., Jiang, X., Lai., J., El Tayar, N., **Campbell, R.K.**, and Fumero, S. Tomorrow's fertility treatment: the path to non-peptide FSH mimetics. In Proceedings, Ovulation Induction, Third World Congress. CIC Edizioni Internationali – Rome pp89-98. (2001)

c. Refereed Journal Articles

Moyle, W.R., Matzuk, M.M., **Campbell, R.K**., Cogliani, E., Dean-Emig, D.M., Krichevsky, A., Barnett, R.W., and Boime, I. Localization of residues that confer antibody specificity using human chorionic gonadotropin/luteinizing hormone β-subunit chimeras and mutants. *J. Biol. Chem*. 265:8511-8518. (1991) PMID: 1692832

Campbell, R.K., Dean-Emig, D.M., and Moyle, W.R. Conversion of human choriogonadotropin into a follitropin by protein engineering. *Proc. Natl. Acad. Sci. USA* 88:760-764. (1991) PMID: 1899483

Campbell, R.K., Erfle, H., Barnett, R.W., and Moyle, W.R. Assembly and expression of a synthetic gene encoding the bovine glycoprotein hormone α-subunit. *Mol. Cell. Endocrinol*. 83:195-200. (1992) PMID: 1372275[

Moyle, W.R., **Campbell, R.K**., Myers, R.V., Bernard, M.P., Han, Y., and Wang, X. Co-evolution of ligand-receptor pairs. *Nature* 368:251-255. (1994) PMID: 8145825

Cosowsky, L., Rao, S.N.V., Macdonald, G.J., Papkoff. H., **Campbell, R.K**., and Moyle, W. R. The groove between the α- and β-subunits of hormones with lutropin (LH) activity appears to contact the LH receptor, and its conformation is changed during hormone binding. *J. Biol. Chem*. 270:2001-20019. (1995) PMID: 7650019

Moyle, W.R., **Campbell, R.K**., Rao, S.N.V., Ayad, N.G., Bernard, M.P., Han, Y., and Wang, Y. Model of human chorionic gonadotropin and lutropin receptor interaction that explains signal transduction of the glycoprotein hormones. *J. Biol. Chem*. 270:20020-20031. (1995) PMID: 7650020

Loumaye, E., **Campbell, R.K**., and Salat-Baroux, J. Human follicle stimulating hormone produced by recombinant DNA technology: a review for clinicians. *Human Reprod. Update* 1:188-199. (1995) PMID: 15726772

Cosowsky, L., Lin, W., Han, Y., Bernard, M.P., **Campbell, R.K**., and Moyle, W.R. Influence of subunit interactions on lutropin specificity. *J. Biol. Chem*. 272:3309-3314. (1997) PMID: 9013570

Campbell, R.K., Bergert, E.R., Wang, Y., Morris, J.C., and Moyle, W.R. Chimeric proteins can be more than the sum of their parts: implications for evolution and protein design. *Nature Biotechnology* 15:439-443. (1997) PMID: 9131622

Recombinant Human FSH Product Development Group (E. Loumaye, M. Dreano, A. Galazka, C. Howles L. Ham, A. Munafo, E. Eshkol, E. Giudice, E. De Luca, A. Sirna, F. Antonetti, C-E. Giartosio, L. Scaglia, C. Kelton, **R. Campbell**, S. Chappel, B. Duthu, S. Cymbalista, P. Lepage). Recombinant follicle stimulating hormone: development of the first biotechnology product for the treatment of infertility. *Human Reprod. Update* 4:862-881. (1998) PMID: 10098477

Xing, Y., Williams, C., **Campbell, R.K**., Cook, S., Knoppers, M., Addona, T., Altarocca, V., and Moyle, W.R. Threading of a glycosylated protein loop through a protein hole: implications for combination of human chorionic gonadotropin subunits. *Protein Science* 10:226-235. (2001). PMID: 11266609

Laan, M., Richmond, H., He, C., and **Campbell, R.K**. Zebrafish as a model for vertebrate reproduction: characterization of the first functional zebrafish (*Danio rerio*) gonadotropin receptor. *Gen. Comp. Endocrinol*. 125:349-364. (2002) PMID: 11884080

Morrison, H.G., Zamora, G., **Campbell, R.K**., and Sogin, M.L. Inferring protein function from genomic sequence: *Giardia lamblia* expresses a phosphatidylinositol kinase-related kinase similar to yeast and mammalian TOR. *Comp. Biochem. Physiol. B Biochem. Mol. Biol*. 133:477-491. (2002) PMID: 12470813

Dehal, P., Satou, Y., **Campbell, R.K**., Chapman, J., Degnan, B., De Tomaso, A., Davidson, B., Di Gregorio, A., Gelpke, M., Goodstein, D.M., Harafuji, N., Hastings, K.E., Ho, I., Hotta, K., Huang, W., Kawashima T, Lemaire P, Martinez D, Meinertzhagen IA, Necula S, Nonaka M, Putnam N, Rash S, Saiga, H., Satake, M., Terry, A., Yamada, L., Wang, H.G., Awazu, S., Azumi, K., Boore, J., Branno, M., Chin-Bow, S., DeSantis, R., Doyle, S., Francino, P., Keys, D.N., Haga, S., Hayashi, H., Hino, K., Imai, K.S., Inaba, K., Kano, S., Kobayashi, K., Kobayashi, M., Lee, B.I., Makabe, K.W., Manohar, C., Matassi, G., Medina, M., Mochizuki, Y., Mount, S., Morishita, T., Miura, S., Nakayama, A., Nishizaka, S., Nomoto, H., Ohta, F., Oishi, K., Rigoutsos, I., Sano, M., Sasaki, A., Sasakura, Y., Shoguchi, E., Shin-i, T., Spagnuolo, A., Stainier, D., Suzuki, M.M., Tassy, O., Takatori, N., Tokuoka, M., Yagi, K., Yoshizaki, F., Wada, S., Zhang, C., Hyatt, P.D., Larimer, F., Detter, C., Doggett, N., Glavina, T., Hawkins, T., Richardson, P., Lucas, S., Kohara, Y., Levine, M., Satoh, N., and Rokhsar, D.S. The draft genome of *Ciona intestinalis*: insights into chordate and vertebrate origins. *Science* 298:2157-2167 (2002) PMID: 12481130

Campbell, R.K., Satoh, N., and Degnan, B.M. Piecing together evolution of the vertebrate endocrine system. *Trends Genet*. 20:359-366. (2004) PMID: 15262408

Anderson, R.J., Weng, Z., **Campbell, R.K**., and Jiang, X. Main-chain conformational tendencies of amino acids. *Proteins* 60:679-689. (2005) PMID: 16021632

Gould, R.M., Morrison, H.G., Gilland, E., and **Campbell, R.K**. Evolution of myelin proteins: homologs of DM20 and PMP22 identified in the ascidian (*Ciona intestinalis*) genome. *Biological Bulletin* 209:49-66. (2005) PMID: 16110093

Clelland, E., Kohli, G., **Campbell, R.K**., Sharma, S., Shimasaki, S., and Peng, C. Bone morphogenetic protein 15 in the zebrafish ovary: cDNA cloning, genomic organization, tissue distribution and role in oocyte maturation. *Endocrinology* 147:201-209. (2006) PMID: 16210364

McKenna, S.D., Feger, G., Kelton, C., Yang, M., Ardissone, V., Cirillo, R., Vitte, P.A., Jiang, X., and **Campbell, R.K**. Tumor necrosis factor (TNF)-soluble high-affinity receptor complex as a TNF antagonist. *J. Pharmacol Exp. Ther*. 322:822-828. (2007) PMID: 17495128

Rull, K., Hallast, P., Uuskula, L., Jackson, J., Punab, M., Salumets, A., **Campbell, R.K**., and Laan, M. Fine scale quantification of hCG beta gene transcription in human trophoblastic and non-malignant non-trophoblastic tissues. *Mol. Human Reprod*. 14:23-31. (2008) PMID: 18048458

Martini, P.G., Taylor, D.M., Bienkowska, J., Jackson, J., McAllister, G., Keilhack, H. and **Campbell, R.K**. Comparative expression analysis of four breast cancer subtypes versus matched normal tissue from the same patients. *J. Steroid Biochem. Mol.* Biol. 109:207-211. (2008) PMID: 18424034

Agüero, F., Al-Lazikani, B., Berriman, M., Buckner, F.S., **Campbell, R.K**., Carmona, S., Chen, F., Crowther, G.J., Hertz-Fowler, C., Hopkins, A.L., McAllister, G., Nwaka, S., Overington, J., Pain, A., Paolini, G.V., Pieper, U., Ralph, S.A., Riechers, A., Roos, D.S., Sali, A., Shanmugam, D., Suzuki, T., van Voorhis, W.C., and Verlinde, C. Genome-scale prioritization of drug targets: TDRtargets.org. *Nature Rev. Drug Discovery*. 7:900-907. (2008) PMID: 18927591

Bland, N.D., Cuihua Wang, C., Tallman, C., Gustafson, A.E., Wang, Z., Ashton, T.D., Ochiana, S.O., McAllister, G., Cotter, K., Fang, A.P., Gechijian, L., Garceau, N., Gangurde, R., Ortenberg, R., Ondrechen, M.J., **Campbell, R.K.** and Pollastri, M.P. Pharmacological Validation of *Trypanosoma brucei* Phosphodiesterases B1 and B2 as Druggable Targets for African Sleeping Sickness. *J Med Chem*. 54(23):8188-94 (2011) PMID: 22023548

Ochiana, S.O., Bland, N.D., Cuihua Wang, C., Russo, M., Gustafson, A.E., **Campbell, R.K.**, and Pollastri, M.P. Synthesis and evaluation of human phosphodiesterases (PDE) 5 inhibitor analogs as trypanosomal PDE inhibitors. Part 2. Tadalafil analogs. *Bioorg. Med. Chem. Lett.* 22(7):2579-2581. (2012) PMID: 22377518

Cuihua Wang, C., Ashton, T.D., Bland, N.D., Gustafson, A.E., Ochiana, S.O., **Campbell, R.K.**, and Pollastri, M.P. Synthesis and evaluation of human phosphodiesterases (PDE) 5 inhibitor analogs as trypanosomal PDE inhibitors. Part 1. Sildenafil analogs. *Bioorg. Med. Chem. Lett.* 22(7):2582-2584. (2012) PMID: 22370268

Woodring, J.L., Bland, N.D., Ochiana, S.O., Campbell, R.K., and Pollastri, M.P. Synthesis and assessment of catechol diether compounds as inhibitors of trypanosomal phosphodiesterase B1 (TbrPDEB1). *Bioorg. Med. Chem. Lett.* 23(21):5971-5974. (2013) PMID: 24042005

Amata, E., Bland, N.D., Hoyt, C.T., Settimo, L., **Campbell, R.K.**, Pollastri, M.P. Repurposing human PDE4 inhibitors for neglected tropical diseases: design, synthesis and evaluation of cilomilast analogues as *Trypanosoma brucei* PDEB1 inhibitors. *Bioorg Med Chem Lett.* 24(17):4084-9. (2014) PMID: 25127163

Ochiana, S.O., Bland, N.D., Settimo, L., **Campbell, R.K**., Pollastri, M.P. Repurposing Human PDE4 Inhibitors for Neglected Tropical Diseases. Evaluation of Analogs of the Human PDE4 Inhibitor GSK-256066 as Inhibitors of PDEB1 of *Trypanosoma brucei*. *Chem Biol Drug Des*. 85(5), 549-564. (2015) PMID: 25283372

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Trusheim, M.R., Shrier, A.A., Antonijevic, Z., Beckman, R.A., **Campbell, R.K.**, Chen, C., Flaherty, K.T., Loewy, J., Lacombe, D., Madhavan, S., Selker, H.P., Esserman, L.J. PIPELINEs: Creating Comparable Clinical Knowledge Efficiently by Linking Trial Platforms. *Clin Pharmacol Ther.* 100(6), 713-729. (2016) PMID: 27643536

d. Non-refereed journal articles

Ott, T.J., Herczeg, S.A., and **Campbell, R.K**. Clinical quality assurance. *Drug Info J*. 20:195-198. (1986) http://dij.sagepub.com/content/20/2/195

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Campbell, R.K. Molecular pharmacology of gonadotropins. *Endocrine*. 26:291-296. (2005) PMID: 16034184

e. Review articles

Pollastri, M.P. and **Campbell, R.K**. Target repurposing for neglected diseases. *Future Med Chem*. 3(10):1307-15. (2011) PMID: 21859304

k. Patents awarded

U.S. 5,508,261 Analogs of glycoprotein hormones having altered receptor binding specificity and activity and methods for preparing and using same. Issued April 16, 1996.

U.S. 6,193,972 Hybrid heterodimeric protein hormone. Issued February 27, 2001

U.S. 6,194,177 DNA encoding a hybrid heterodimeric protein. Issued February 27, 2001.

WO0185783 Nucleic acids encoding polypeptides related to the alpha subunit of the glycoprotein hormone family and methods of use thereof. Published November 20, 2001.

U.S. 6,663,867 Hybrid heterodimeric protein hormone containing a TNF binding protein and a glycoprotein hormone subunit. Issued December 16, 2003.

U.S. 7,291,339 Homogeneity and secretion of a recombinant follicle stimulating hormone (FSH) in mammalian systems. Issued November 6, 2007.

U.S. 7.317,095 Mutant glycoproteins. Issued January 8, 2008

U.S. 7,820,165 Compositions and methods of producing hybrid antigen binding molecules and uses thereof. Issued October 26, 2010

6. Research Grants

b. Completed grants as PI

National Institutes of Health, NIAID (US)
Validation and development of trypanosomal phosphodiesterase inhibitors for treatment of sleeping sickness (5R01AI082577 and 3R01AI082577 [ARRA supplement for students]) - April 1, 2009 to March 31, 2015
Principal Investigator (multi-PI award with Michael Pollastri [Northeastern U])
Total Direct Costs: $2,031,670

Tres Cantos Open Lab Foundation (UK)
Modulation of trypanosomal cAMP signaling for sleeping sickness therapeutic discovery (TC050) - February 1, 2014 to April 30, 2016
Principal Investigator (multi-PI award with Harry de Koning [University of Glasgow] and Michael Pollastri [Northeastern University])
Total Direct Costs: £159,602

7. Trainees and Mentees

Post-doctoral Fellows	Year	Current Position
Maris Laan, Ph.D.	1999-2000	Professor, University of Tartu, Tartu, Estonia

M. Afaq Shakir, Ph.D.	1999-2001	Instructor, Houston Community College, Houston, TX
Nicholas Bland, Ph.D.	2010-2014	Senior Scientist, Excellerate Bioscience, LTD, Nottingham, UK
Maomao Zhang, Ph.D. (New York Academy of Science mentorship program)	2016-2019	Scientist, Calico Life Sciences, South San Francisco

High School & Undergraduate Students (NIH-funded)	Year	Current Position
Kristina Cotter (Undergraduate)	2009	PhD graduate (Tufts) Current - Alliance Manager, RD-MD, San Francisco (startup biotech) Current - M.Sc. student in Genetic Counseling, Stanford University
Anna Fang (High School)	2009	MD student, Harvard Medical School
Lara Gechijian (High School)	2009	PhD graduate (Harvard Medical School) Current - Scientist, Jnana Therapeutics, Boston (startup biotech)

a. Service to the Profession

2013-2014: Deputy delegate to the European Federation of Pharmaceutical and Industry Associations (EFPIA) Research Directors Group for finalization and launch of 3.5 Billion Euro Innovative Medicines Initiative 2 and Strategic Research Agenda

2014-present: Bayesian Scientific Working Group (BSWG) of the Drug Information Association and American Statistical Society

2014-present: Adaptive Design Scientific Working Group (ASWG) of the Drug Information Association and American Statistical Society

2016-present: Co-chair DIA-ASA ADSWG-BSWG joint subteam on Expedited Approvals and Adaptive Pathways (DIA: Drug Information Association, ASA: American Statistical Association, ADSWG: Adaptive Design Scientific Working Group, BSWG: Bayesian Scientific Working Group).

8. Academic honors

1987 Center for Advanced Biotechnology and Medicine Predoctoral Fellowship, UMDNJ

9. Teaching

a. Regular courses

Brandeis University Rabb School, 2003-2010:

- Graduate course *Drug Discovery and Development*, RBIF-106.
    - Enrollment: Ranged from 4-12 students from Bioinformatics and Project Management MS programs, and Bioinformatics Certificate Program
    - 30 hours direct contact time, 30 hours preparation and evaluation/grading.
    - Responsible for all aspects of course creation, implementation, and student assessment
    - Approach was to engage students in real-world bioinformatics research and preparation of an industry-style drug discovery project proposal.
    - 22 of 39 students still active in biotech/healthcare informatics and data analysis (on LinkedIn)

Brown University, 2017-present:

- Graduate course *Bioinformatics in the Discovery, Development and Use of Medicines*, BIOL-2125. Created 2016, Launched January 2017. Taught Spring 2017, Fall 2017, Spring 2018, Fall 2019 (tentative).
    - Enrollment to date: 17 (5 PhD students, 10 MS students and 2 undergraduates)
    - 180 hours: 30 hours in-class plus projected 48 hours for readings, 18 hours for bioinformatics assignments, and 84 hours for research to complete final project (Innovative Medicines Initiative-scale call for proposals).
    - Responsible for all aspects of course creation, implementation, and student assessment
    - Approach engages students in real-world approaches for development of actionable evidence to support stakeholder actions in discovery, development and use of medicines in Parkinson disease and pancreatic cancer.
- Sophomore seminar *Precision Medicine or Privileged Medicine: Addressing disparities in biomedical research*, BIOL-0940E. Created 2018, Launched for registration April 2018. Taught Fall 2018, Spring 2019, Spring 2020.
    - Co-created in collaboration with two Brown undergraduates – Brooke Spencer ’19 (2017-present) and Katerina Tori ’18 (2018-present)
    - Enrollment for Fall 2018: 18 sophomores (from 40 applicants). Enrollment for Spring 2019: 13 sophomores

- 180 hours: 32 hours in-class plus projected 60 hours for readings, 28 hours for weekly assignments, 5 hours preparing to facilitate one class discussion, 15 hours researching and preparing the group disease analysis, 10 hours researching and preparing the group ethics analysis, 25 hours preparing the Individual Project assignment and 5 hours for site visits and external talks.
- Course engages students in an examination of the biomedical research behind precision medicine, disparities in the inclusiveness of this research, and the potential implications of these disparities on benefits and harms of new medicines for people across Rhode Island. All students participate in co-facilitating a class session and co-design of rubric for final project.