Sponsor/Co-Sponsor Statements

Research Support Available

Current Support for Dr. Nicholas Anderson

Funding Source	Identifying number	Title	PI name	Dates	Award Amount
NIH/ NCATS	UL1 RR024146	Clinical Translational Science Center	Berglund	06/01/2016-05/31/2021	$5,400,000/Annual

Pending Support for Dr. Jason Adams

Funding Source	Identifying number	Title	PI name	Dates	Award Amount
Department of Defense	W81XWH-18-DMRDP-PTCRA	Endovascular Perfusion Augmentation for Critical Care (EPACC): Personalized and Adaptive Therapy for Resuscitation After Trauma	Adams (Co-I)	TBD, 3 year funding period from date of award	$4,483,153
Department of Defense, Special Operations Command	W81XWH-17-R-SOC1	VentRight: Optimizing Ventilation Across the Care Continuum	Adams (Co-PI)	TBD, 2 year funding period from date of award	$547,189
UC Davis Department of Pathology and Laboratory Medicine	N/A	Validation of a machine learning-based automated ARDS diagnostic test	Adams	2/1/2018-1/31/2019	$28,715.52

Previous Fellows/Trainees

Select Previous Trainees of Dr. Nicholas Anderson

Trainee	Year of Entry	Prior Degree	Research Topic	Current Position
Parmit Chilana, PhD	2008	BS	Supporting Users After Software Deployment through Selection-Based Crowdsourced Contextual Help	Assistant Professor at Simon Fraser University, Vancouver, Canada
Paul Fearn, PhD	2010	MS	Approaches and Strategy for Cancer Research and Surveillance Data: Integration, Information Pipeline, Data Models, and Informatics Opportunities	Chief of Surveillance Research Program, National Cancer Institute, Washington D.C.
Cyan James, PhD	2012	MS	Trust and consequences, Biorepositories and the health learning system	AAAS Science and Technology Fellow, Washington DC
Javier Lopez, MD	2014	MD	Troponin sensitivity in high risk cardiovascular patients	Assistant Professor, Department of Cardiology, UC Davis, Sacramento, CA
Sakib Jalil, PhD	2016	PhD	Clinical User-experience evaluation of type 2 diabetes patients using an in-home monitoring device: Complementing a telemedicine clinical trial with HCI evaluation	Post-doctoral fellow, UC Davis School of Nursing, Sacramento, CA

Previous Trainees for Dr. Jason Adams

Trainee	Year of Entry	Prior Degree	Research Topic	Current Position
Brooks Kuhn, MD MAS	2014	MD	Patient-Ventilator Asynchrony in Patients with COPD and Asthma	Assistant Professor, UC Davis
Jason Lee, MD	2016	MD	Sepsis Mortality in Patients with End-Stage Renal Disease	Attending Physician, Scripps Clinic

Total Previous Trainees

	Pre-doctoral	Postdoctoral
Nicholas Anderson	6	2
Jason Adams	0	2

Training Plan, Environment, Research Facilities

Lab Meetings: Lab meetings with Dr. Adams's research group occur once per week on Thursday afternoon, for 2 hours. At lab meetings students are regularly expected to present their research to the other members of the laboratory for critique and experimental refinement. These meetings include involvement of the following members besides the PI:

Faculty	PhD Students	Master's Students	Medical Students	Respiratory Therapists
Nicholas Anderson, PhD	Sarina Fazio, RN	Yue Xia, Computer Science	Brian McGary	Jimmy Nguyen
Jean-Pierre Delplanque, PhD		James McCay, Mechanical Engineering		
Chen-Nee Chuah,PhD				
Michael A. Johnson, MD, PhD				
Brooks Kuhn,MD				

One-on-one meetings with Sponsor Co/sponsor: *One on one meetings with Dr. Adams occur weekly for one hour*. During this meeting research progress is discussed and research training is provided around study design, data analysis and presentation, manuscript and grant writing, and strategies for effective multidisciplinary collaboration. An additional two hours of instruction occur on a biweekly basis during joint meetings with Dr. Adams and Dr. Chen-Nee Chuah that alternate physically between the labs of Drs. Adams and Chuah. The PI also meets jointly with Dr. Adams and Dr. Johnson for 1-2 hours on a monthly basis. *One-on-one meetings will be scheduled with Dr. Anderson on a monthly basis* to provide training in concepts and performance of informatics research, and to discuss the PI's progress in goals of becoming a better leader and expert informatics researcher.

Scientific Leadership Training: We would like to refine the PI's skills in this area through a combination of professional development and research leadership training. 1) UC Davis offers a series of workshops titled "Leaders for the Future," which offer training in leadership skills, communication, and project management. We will require that he attend these workshops in either 2018 or 2019. 2) We will recommend that the PI complete an Individual Development Plan (IDP) after completing qualifying exams in 2018 and continuing each year until termination of his PhD. The IDP will be reviewed with the PI quarterly by both mentors and refined as needed. This will help guide his goals while he continues his PhD research, and will help him transition to and independent research career. 3) The PI has already begun to lead a research effort related to his PhD work that includes mentoring of a respiratory therapist interested in research, and has taken on increasing role providing mentorship for Computer Science Master's students working in the laboratory. We will provide the PI with longitudinal guidance on developing strong mentoring skills as part of his PhD training, which will help him further prepare for academic independence and leadership as a scientist.

Professional meetings/conferences: We will require that the PI plan to contribute to and attend professional conferences at the intersection of his research areas annually. He will attend the annual American Medical Informatics Association (AMIA) symposium that occurs each November, which is the largest conference in the informatics community, and includes significant applied clinical, computer science and critical care audiences. To complement these data science focused goals, he will also seek to contribute to and attend the annual meeting of the American Thoracic Society (ATS) to gain exposure to research and fellow scientists in the domain of respiratory disease research. UC Davis also hosts an annual symposium focused on Pulmonary and Critical Care research, titled "Lung Research Day", that the PI will attend. At a minimum, the PI expects to submit a publication-ready manuscript abstract to these national meetings, as well as to local UC Davis symposium and other venues, and either present his work if selected.

Coursework: We require the PI to develop skills in deep learning, which is a relatively new method in machine learning (ML). For this he has already incorporated Dr. Yong-Jae Lee, an expert on deep learning at UC Davis, into his PhD committee. He will also attend an in-depth course where he will gain greater understanding in the fundamentals of deep learning. In addition to improving his ML skills, the PI will also be required to improve his skills in informatics systems, study design, and responsible conduct of research. While not a formal course, the PI will continue to join Dr. Adams on

clinical rounds in the ICU to learn principles of respiratory failure including ARDS, mechanical ventilation, and clinical workflows including clinician interactions with technology.

Course	Year
ECS 289M Special Topics in Deep learning	2018
ECS 220 Theory of Computation (pre-requisite to degree completion)	2018
CLH 204 Responsible Conduct in Research	2018-2019
MHI 207 Medical Decision Support	2019
EPI 205 Clinical Epidemiology and Study Design	2019

Seminars and Journal Clubs: The PI will attend seminars across the domains of focus at UC Davis. He will attend the monthly applied seminars in the Department of Computer Science, and seek to lead and present in sessions associated with ML and data analytics topics. He will also attend the UC Davis Health Informatics weekly graduate seminar series which has interdisciplinary and health oriented focus. In addition, the PI will attend selected clinical conferences and journal clubs at UC Davis (at the discretion of Dr. Adams) sponsored by the Division of Pulmonary, Critical Care, and Sleep medicine germane to his understanding of respiratory disease including ARDS, and respiratory research.

Writing: The PI will take on an increasing responsibility for writing both manuscripts and grant proposals over the course of his PhD. He will continue to attend a scientific writing group led by Dr. Brooks Kuhn in Dr. Adams's lab. He will maintain a portfolio of his academic work that includes publications, design planning and software contributions to advance his skills in development and communication. He will also seek and attend UC Davis writer's retreats for peer support when writing journal manuscripts.

Networking opportunities for interaction with other groups and scientists: In addition to participation in the academic courses, seminars and colloquiums, the PI will explore opportunities to engage in both academic and industry networks. Within the UC system, he will seek opportunities to collaborate with the technical incubators at UC Berkeley CITRIS (Center for Information Technology Resources in the Interests of Society), and the Sacramento Hackerlab. Within UC Davis, he will compete in "Grad Slam," an event held at UC Davis to practice and refine research communication. This opportunity will give him the ability to network with the wider UC Davis community and also improve his communication skills for effectively conveying his research. As mentioned above, he will be expected to attend 2 national meetings (AMIA and ATS) where he will network with researchers in biomedical informatics/computer science and Pulmonary and Critical Care. Nationally he will join the student academic networks of AMIA, specifically the Clinical Decision Support and Implementation Science interest groups associated with ML and data analytics, as well as ATS subcommittees related to applications of ML and data science in healthcare/Pulmonary and Critical Care research. He will maintain an online portfolio of the progress of the development of his work and chosen domain.

Environment: The PI is currently a PhD student in the Graduate Group in Computer Science (GGCS) at UC Davis and a member of the UC Davis Critical Care Informatics Lab (CCIL). The CCIL is jointly led by Dr. Adams and Dr. Anderson and is a multidisciplinary research environment including both pre- and post-doctoral trainees from Pulmonary and Critical Care Medicine, Computer Science, Mechanical Engineering, Critical Care Nursing, and Respiratory Therapy. The laboratory is located in the UC Davis Center for Health and Technology in a space complete with multiple computer workstations, white boards, conference tables, and flat panel TV ideally suited for presentations. The lab has access to UC Davis-hosted secure databases and computational resources as well as a powerful lab server. Dr. Adams and Dr. Anderson have have fostered ongoing collaborative relationships with Dr. Chen-Nee Chuah of GGCS, Dr. M. Austin Johnson of Emergency Medicine, and Dr. Jean-Pierre Delplanque of Mechanical and Aerospace Engineering. Dr. Delplanque attends weekly CCIL lab meetings. Dr. Chuah attends a 2 hour long pre-lab meeting with Dr. Adams and the PI every other week. Dr. Johnson attends CCIL lab meeting approximately once per month. These relationships have afforded the PI the ability to learn scientific knowledge and skills from a variety of researchers, and to develop skills in inter-professional scientific collaboration and communication. The lab environment has also enabled the PI to develop a close mentor-mentee relationship with Dr. Chuah, an expert signal analyst and ML practitioner, that has resulted in successful completion of a Master's degree in Computer Science with a focus on ML. The collaboration with Dr. Chuah has also enabled him to write 1 first author paper, while an additional 2 papers are expected to be published once their analyses are complete. The GGCS also has multiple ML experts on staff, including Dr. Yong Jae Lee who will also assist the PI in the fundamentals of deep learning as part of his role on the PI's PhD committee. *The resources of the mentor's lab and collaborative relationships offered by the GGCS will ensure that the PI lacks for nothing in terms of training and resources to complete the proposal.*

The UC Davis Medical Center (UCDMC) is a large, tertiary care, academic medical center serving one of the most ethnically diverse regions in the country. UCDMC is a level 1 trauma center with over 33,000 admissions to 627 licensed beds including 87 adult ICU beds spread across 7 ICUs. UCDMC has been named one of "Healthcare's Most Wired" hospitals by Hospitals & Health Networks magazine, and one the "Most Connected Hospitals" by US News and World Report. UCDMC's research IT division has been a major partner in supporting the CCIL's ventilator waveform data acquisition efforts using the health system's wireless network to support VWD data acquisition from patients in the ED and ICUs. Dr. Adams attends regularly on the Medical ICU and Cardiothoracic ICU services at UCMDC and the PI joins clinical rounds regularly for educational purposes. The PI is also actively engaged in a collaboration between Dr. Adams and Dr. Michael Johnson in Emergency Medicine, developing automated methods for the monitoring and management of patients requiring mechanical ventilation, using large animal models of ARDS. This opportunity enabled the PI to be co-listed as an inventor on a patent that was recently filed by the UC Regents. *We believe that these collaborative relationships with other UC Davis Medical Center and Main Campus faculty members and clinicians will ensure that PI receives excellent resources and medical education to complete his goals.*

Research Facilities: The PI will have access to all research facilities that are available to us at the University of California Davis (UCD). The PI has a cubicle at UCD Medical Center (UCDMC) and has the computational resources necessary to complete his necessary data analytics tasks including: 60 Raspberry Pi microcomputers, an Apple iMac desktop computer, and a lab server with dual 2.4 GHz quad core CPUs, 192 GB of high speed RAM, and 16 TB of hard drive storage for research and development work. Also of note are the Center for Virtual Care (CVC) and the Pulmonary Clinical Trials Research Unit. The CVC will be an excellent resource for the PI, and will allow use of equipment to simulate patient lung mechanics using mechanical lungs and life-like mannequins where both airway resistance and respiratory system compliance can be experimentally manipulated. The Pulmonary Clinical Trials Research Unit will assist with ongoing enrollment of mechanically ventilated patients in Dr. Adams's longitudinal research developing ventilator waveform analysis tools to study patient-ventilator interactions and disease states.

Number of Fellows/Trainees to be Supervised During Fellowship

Dr. Nicholas Anderson
Including Mr. Rehm, Dr. Anderson will supervise 6 graduate students (2PhD and 4 MS), 1 postdoctoral fellow and 2 visiting faculty (1 quarter per year**).**

Dr. Jason Adams
Including Mr. Rehm, Dr. Adams will supervise 3 graduate students (2 PhD and 1 MS), and 1 postdoctoral fellow**.**

Applicant's Qualifications and Potential for a Research Career

To F31 review committee,

I am pleased and honored to provide my strong support of Gregory Rehm for this fellowship proposal. [redacted]

[redacted]

Based on this very strong work to date, the degree in which he studies and develops his interests, and the committed faculty and mentorship he has accumulated is based on these qualities, I believe that Gregory will be very well prepared to establish new and novel research in biomedical informatics. Developing successively more responsibility in teaching, peer mentoring and research development will position him for the new requirements for multidisciplinary funded research of the future.

Nicholas Anderson PhD, MS
Associate Professor, Biomedical Informatics
Division Chief, Health Informatics, Department of Public Health Sciences, School of Medicine
Director of Informatics Research, UC Davis Health
Chair of Graduate Group in Health Informatics
University of California, Davis

To F31 review committee,

It is with the utmost enthusiasm that I express my support for Greg Rehm, and my unconditional dedication to his training and mentorship for his proposed research. [redacted]

[redacted] His cohesive mentoring team, research environment, and training plan will ensure that he can complete the proposed research and that he acquires the education, skills, and connections in the scientific community needed to complete his PhD, and continue on to a productive and independently funded academic career.

Jason Y. Adams, MD, MS
Assistant Professor
Division of Pulmonary, Critical Care, and Sleep Medicine
UC Davis School of Medicine
Medical Director, IT Division of Health Informatics,
UC Davis Health