Overview of NIH grants in 2020

(Written on 10/09/2020 – updated on 02/11/2020)

Extramural NIH funding in 2020		
First author	Content	Funding ($)
Jason	Follow-up on adolescents after mononucleosis	613,912
Shungu	Study of N-acetylcysteine as treatment for ME/CFS	586,263
Friedberg	Organisation of the IACFS/ME conference	35,000
Williams	Study of EBV and HHV-6 dUTPases	529,624
Rayhan	fMRI before and after exercise testing	50,520
Nacul	Immunological profiling of 110 ME/CFS patients	539,448
Unutmaz	Transcriptomic profiling of immune cell subsets	653,059
Davis	Study of T cell activation, HLA sequencing, and DNA-sequencing to detect pathogens	750,389
Younger	Study of neurinflammatory markers in 90 ME/CFS patients	578,670
Li	Study of endogenous retrovirus variations associated with ME/CFS	78,000
Abdullah	Application of lipidomics in ME/CFS	197,454
	Sum researcher initiated research	4,612,339
Lipkin	Center for solutions for ME/CFS at Columbia University	1,900,660
Unutmaz	ME/CFS research center at Jackson laboratories	2,118,412
Hanson	Cornell ME/CFS collaborative research center	1,916,014
Brown	Data management and coordinating center at RTI	1,149,560
	Sum collaborative research centers	7,084,646
	Total	11,696,985

Reference number	Title	Project Leader	Project start-ending date	Funding for 2020	Content
1R01NS111105-01A1	Maintenance and incidence of ME/CFS following mono	Leonard Jason DePaul University, Chicago	1-JAN-2020 30-NOV-2024	$613,912	This study is a five-year follow-up of college students who developed infectious mononucleosis (approximately 10% meeting ME/CFS criteria after 6 months). Another cohort that didn't had mononucleosis will also be followed up to see how many will develop ME/CFS.
1R01NS116887-01	Mechanistic assessment of n-acetylcysteine as an antioxidant therapy for myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) through dose response and treatment target engagement	Dikoma Shungu Weill Cornell Medicine	15-JUL-2020 30-APR-2025	$586,263	This study focuses on exploring a naturally occurring and widely available dietary supplement, N-acetylcysteine (NAC) – a prodrug for in situ synthesis of the primary intracellular antioxidant, glutathione (GSH) – as a treatment for ME/CFS.
1R13NS115399-01	Research and clinical conference: international association for chronic fatigue syndrome/myalgic encephalomyelitis	Fred Friedberg	1-JUL-2020 30-JUN-2021	$35,000	The International Association for Chronic Fatigue Syndrome/Myalgic Encephalomyelitis (IACFS/ME) will hold its next scientific conference on April 2-5, 2020 in the New

					York City/New Jersey area. R13 funding would support attendance by early stage investigators (ESI) to increase the size and diversity of the field. To expand the conference the IACFS/ME invited researchers who study all aspects of fatigue, including illness fatigue (e.g., cancer, multiple sclerosis), as well as fatigue with respect to aging, sleep, exercise and occupational fatigue.
2R01AI084898-11	Stress effects on virus protein induced inflammation and sickness behavior	Marshall Vance Williams Ohio State University	15-APR-2010 30-JUN-2025	$529,624	In this renewal application, this authors will continue to study the role that EBV and HHV-6 dUTPases have in ME/CFS. Their overall hypothesis is that the increased abortive replication of EBV in plasmablasts/plasma cells in a subgroup of patients genetically susceptible to developing ME/CFS induces the increased synthesis and release of EBV dUTPase in exosomes. These trigger the production of pro-inflammatory TH1 cytokines as well as activin A, which the authors think may contribute to PEM.
5F30NS103563-04	Investigating the neural correlates of fatigue in myalgic encephalomyelitis / chronic fatigue syndrome(ME/CFS)	Rakib Rayhan (collaborator of Baraniuk) Howard University, Washington, D.C	31-JUL-2017 30-JUL-2021	$50,520	This proposal aims to harness the unique combination of fMRI and exercise to elucidate neural correlates of fatigue in ME/CFS. The main aim is to characterize exercise associated decrements in fatigue by modeling changes in functional connectivity within the Default Mode Network.
5R01AI103629-07	A longitudinal immunological and virological study for ME CFS biomarker discovery (renewal)	Louis Nacul London School of Hygiene & Tropical Medicine	15-JUN-2013 31-JUL-2021	$539,448	This is a follow-up of 110 ME/CFS cases (½ severe, ½ mild-moderate) with in-depth immunological profiling. The study uses ex vivo phenotyping of PBMC populations by flow cytometry, the functional response of NK and T cells after in vitro stimulation by flow cytometry, secreted cytokines in supernatants of stimulated PBMC cultures by multiplex bead array; and, genotype donors for MHC Class1 and KIR to inform analysis of flow cytometry data.

5R01AI121920-05	Decoding immunological perturbations during chronic fatigue syndrome	Derya Unutmaz Jackson Laboratories	1-JUN-2016 31-MAY-2021	$653,059	This study uses high-resolution functional and transcriptomic profiling of immune cell subsets within the blood samples of a large, clinically characterized ME/CFS patient cohort and healthy controls. It will also examine the transcriptional alterations associated with ME/CFS within T and innate cell subsets, with a focus on long non–coding RNAs
5R01AI139550-03	Molecular and single-cell immunology of myalgic encephalomyelitis/ Chronic fatigue syndrome	Ronald Davis Stanford University	15-JUN-2018 31-MAY-2023	$750,389	This study consists of three parts. It will: 1) Study T cell activation 2) Perform HLA sequencing in a large cohort 3) Perform cell-free DNA sequencing to detect pathogens
5R01NS109529-02	Measuring neuroinflammation in chronic fatigue syndrome with whole-brain magnetic resonance spectroscopy	Yarred Younger University of Alabama at Birmingham	1-JUL-2019 31-MAR-2024	$578,670	In this study, neuroinflammatory markers will be assessed in gray matter, white matter, and cerebrospinal fluid in 90 ME/CFS patients and 30 controls. Additionally the study will use a “good-day, bad-day” longitudinal design to examine correlation between neuroinflammatory markers and symptom severity fluctuations in 20 ME/CFS patients.
5R03AI147084-02	Comprehensive analyses of endogenous retroviruses with severe chronic fatigue syndrome	Dawei Li University of Vermont	1-JUL-2019 30-JUN-2021	$78,000	This study will analyze existing CFS genome, methylome, transcriptome, and microbiome data to identify endogenous retrovirus variations associated with CFS
5R21AI142717-02	Application of lipidomics to identify biomarkers of immune and mitochondrial disturbances in chronic fatigue syndrome	Laila Abdullah (collaborator of Klimas) Roskamp Institute	21-DEC-2018 30-NOV-2020	$197,454	This study will apply a “highly versatile reverse phase capillary based liquid chromatography system coupled to a high resolution and high mass accuracy LTQ Orbitrap mass spectrometer to identify novel blood biomarkers of CFS.”
5U54AI138370-04	Center for solutions for ME/CFS	Ian Lipkin Columbia University	22-SEP-2017 31-AUG-2022	$1,900,660	This center will: 1) survey for the presence of molecular footprints of bacterial, fungal, and viral agents and corresponding immune responses in a 100

					case/100 control subset of repository samples 2) study plasma metabolome and PBMC transcriptome in the same cohort 1 using state-of-the-art mass spectrometric and RNA-seq methods, comprehensive mass spectral libraries, and tools for RNA profiling in bulk cell populations using cell sub-type specific markers 3) mine existing databases at Columbia for insights into clinical features, comorbidities, and sub-types. It will also investigate the utility of the Lean Test as a simple outpatient test for autonomic function.
Parent Project Number: 5U54AI138370-04 Sub-Project ID: 5845	Project 1: microbiology of me/cfs	Ian Lipkin Columbia University	22-SEP-2017 31-AUG-2022	$596,288	This study will "exploit sensitive sequence-based methods for detection and characterization of bacteria, viruses, and fungi, using blood, oral, and fecal samples from well characterized ME/CFS cases and controls."
Parent Project Number: 5U54AI138370-04 Sub-Project ID: 5846	Project 2: molecular signatures for ME/CFS sub-types	John Greally Columbia University	22-SEP-2017 31-AUG-2022	$245,838	Project Co-Lead Fiehn has generated preliminary data for 50 ME/CFS cases and 50 controls, showing results that support lipid and neurotransmitter metabolism abnormalities, in particular involving complex lipids and tryptophan metabolites. Co-Lead Greally's group will study the same patients as Fiehn in more depth. It has developed an approach that uses single cell transcriptomic reference data in combination with a published analytical algorithm to measure the proportions of cell subtypes in PBMCs from RNA-seq data.
Parent Project Number: 5U54AI138370-04 Sub-Project ID: 5847	Project 3 : clinical correlates and diagnostics in ME/CFS	Anthony Komaroff Columbia University	22-SEP-2017 31-AUG-2022	$411,256	Aim 1 of this study is to establish a ME/CFS clinical network, fully committed to the NINDS Common Data Elements project and to collection of survey data and biological samples needed for rigorous clinical research. The authors will also design a mobile app, myME/CFS, to help patients and physicians acquire

					valuable longitudinal data. In Aim 2, they will mine existing databases to identify clinical sub-types that differ in presentation, course, comorbidities, family medical history, or other features. In Aim 3, the clinical utility of a simple office-based test for autonomic dysfunction, the Lean Test will be assessed.
Parent Project Number:5U54 AI138370-04 Sub-Project ID: 5844	Administrative core	Ian Lipkin Columbia University	22-SEP-2017 31-AUG-2022	$647,278	The Administrative Core will provide an organizational foundation for all activities of the Center for Solutions for ME/CFS (CfS for ME/CFS) by providing scientific oversight, infrastructure for regulatory and fiscal compliance, programs for career development, and lines for communication among investigators, community partners, other CRCs, the DMCC, and the NIH.
5U54NS105539-04	Topological mapping of immune, microbiota, metabolomic and clinical phenotypes to reveal me/cfs disease mechanisms	Derya Unutmaz Jackson Laboratory	30-SEP-2017 31-AUG-2022	$2,118,412	The aims of this center are: 1) Develop a comprehensive and prospective database of immune, metabolomics and microbiome profiles of ME/CFS patients (Clinical Research Project); 2) Establish a platform for mechanistic discoveries on role of ME/CFS microbiota and immune response (Basic Research Project); 3) Rapidly implement recruitment of the ME/CFS prospective clinical cohort (Clinical Core); and 4) Coordinate an integrative, multidisciplinary group in ME/CFS research (Admin Core). In addition, the center will capitalize on both on scientific expertise and vast mouse genetic resource of the Jackson Laboratory to develop highly collaborative inter-CRC projects to understand role of epigenetics, developing mouse models for microbiome-immune interactions and neurological symptoms.
Parent Project Number: 5U54NS105539-04	Clinical core	Suzanne Vernon Jackson Laboratory	30-SEP-2017 31-AUG-2022	$188,388	The goals of the Clinical Core are 1) to accrue the necessary samples and associated clinical data from ME/CFS patients and healthy subject cohorts to

Sub-Project ID: 5815					support the research projects of the proposed ME/CFS Collaborative Research, and 2) to engage the ME/CFS patient and advocate community through online platforms and outreach. The Clinical Core will be based at the Bateman Horne Center of Excellence.
Parent Project Number: 5U54NS105539-04 Sub-Project ID: 5816	Topological mapping of immune, microbiota, metabolomic and clinical phenotypes to reveal ME/CFS disease mechanisms - clinical research project	Peter Robinson Jackson Laboratory	30-SEP-2017 31-AUG-2022	$723,072	The aims of this study are: 1) to assess immunological abnormalities and blood metabolomic changes prospectively in a large ME/CFS patient cohort; 2) to define correlations between microbiome ecological distribution and clinical state of ME/CFS; 3) to establish ME/CFS clinical ontology with computational and biostatistical analysis of the immune, metabolic and microbiome interactome in ME/CFS patients.
Parent Project Number: 5U54NS105539-04 Sub-Project ID: 5817	Topological mapping of immune, microbiota, metabolomic and clinical phenotypes to reveal ME/CFS disease mechanisms - basic research project	Julia Oh Jackson Laboratory	30-SEP-2017 31-AUG-2022	$682,428	By probing the immune responses of ME/CFS patients to microbial stimuli, this study hopes to define the molecular mechanisms by which ME/CFS-related gut microbes mediate immune activation. It will interrogate microbes and immune cells harvested from ME/CFS patients through complementary pipelines, each designed to isolate one side of the microbe-immune axis. The microbial pipeline will compare ME/CFS- related bacteria collected from patients to bacteria from healthy controls using a set of relevant immune assays. The immune pipeline will compare immune cells collected from ME/CFS patients to healthy immune cells, exposing both to a battery of microbial triggers and immune cell activators.
Parent Project Number: 5U54NS105539-04	Topological mapping of immune, microbiota, metabolomic and clinical phenotypes to reveal ME/CFS disease mechanisms - admin core	Derya Unutmaz Jackson Laboratory	30-SEP-2017 31-AUG-2022	$524,524	The goal of the Administrative (Admin) Core is to provide management, oversight and logistical support for the proposed JAX Myalgic

Sub-Project ID: 5814					Encephalomyelitis/Chronic Fatigue Syndrome Collaborative Research Center (ME/CFS CRC). The Admin Core's role will be to: foster productive scientific interactions within the JAX ME/CFS CRC, which involves 12 investigators at four different locations (JAX, University of Connecticut, North Carolina State University, Bateman Horne Center)
5U54NS105541-04	Cornell ME/CFS collaborative research center	Maureen Hanson Cornell University	30-SEP-2017 31-AUG-2022	$1,916,014	This center will apply neuroimaging, proteomics, metabolomics, and single cell RNA and microRNA sequencing approaches to interrogate the underlying biomedical mechanisms that contribute ME/CFS, by thorough examination of biomarkers from patients and controls both before and after symptom provocation through exercise Three research projects will seek to (1) examine oxidative stress in the brain and neuroinflammation (Project 1), (2) examine inflammatory molecules, metabolism, and cargo of extracellular vesicle (Project 2) and (3) determine levels of gene dysregulation across the immune system (Project 3).
Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5837	Cornell ME/CFS collaborative research center	Maureen Hanson Cornell University	30-SEP-2017 31-AUG-2022	$523,257	Administrative core: Cornell University will be the lead institution on the Cornell ME/CFS Collaborative Research Center (CCCRC), which constitutes a multi-institutional effort involving over 20 key personnel from Cornell University in Ithaca, Weill Cornell Medicine (WCM) in New York City, Ithaca College (IC), Boyce Thompson Institute (BTI), and The Workwell Foundation (Ripon CA).
Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5838	Cornell ME/CFS CRC clinical core	Betsy Keller Cornell University	30-SEP-2017 31-AUG-2022	$27,626	The Clinical Core will obtain physiological data to establish the functional status of both patients and controls using the two-CPET protocol to assess the effects of PEM on functional capacity.

Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5839	Integrative data analysis core	Fabien Campagne Cornell University	30-SEP-2017 31-AUG-2022	$337,420	The Integrative Data Analysis Core (IDAC) of this ME/CFS Center will support Projects of the Center for bioinformatics, data management and data integration. IDAC will work closely with the Clinical Core to organize de-identified subject data to facilitate data analyses in each of the Center's Project.
Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5840	Oxidative stress and neuroinflammation: co-conspirators in ME/CFS pathophysiology	Dikoma Shungu Cornell University	30-SEP-2017 31-AUG-2022	$178,291	This study aims to: (a) use proton magnetic resonance spectroscopy (1H MRS) to measure in vivo brain levels of glutathione (GSH) -- the most abundant antioxidant in the central nervous system – as a marker of oxidative stress; (b) use 1H MRS to measure in vivo brain levels of lactate and N-acetylaspartate (NAA) as markers of mitochondrial dysfunction; (c) use 31P MRS to measure in vivo brain levels of ATP, creatine phosphate (PCr) and inorganic phosphate (Pi) as complementary indices of mitochondrial dysfunction; (d) use in vivo brain 11C-(R)-PK11195 positron emission tomography (PET) to measure the binding potential of the ligand as a marker of neuroinflammation; and (f) measure circulating markers of neuroinflammation and oxidative stress for corroborating the proposed neuroimaging biomarkers.
Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5841	Probing the pathophysiology of ME/CFS through proteomics and metabolomics	Maureen Hanson Cornell University	30-SEP-2017 31-AUG-2022	$387,435	By analyzing, in conjunction with physiological data, metabolites, circulating inflammatory molecules, and extracellular vesicle (EV) cargo in blood samples from before and after exercise sessions, the authors aim to uncover markers and mechanisms of post-exertional malaise in ME/CFS.
Parent Project Number: 5U54NS105541-04 Sub-Project ID: 5842	Deciphering gene dysregulation across the immune system in ME/CFS with single-cell transcriptomics	Andrew Grimson Cornell University	30-SEP-2017 31-AUG-2022	$461,985	In project 3 of this research center, the authors plan to use single-cell RNA sequencing (scRNAseq) to interrogate the transcriptomes of leukocytes from peripheral blood collected from a cohort of ME/CFS patients and controls post-exercise.

					The authors also plan to examine possible roles for microRNAs found in extracellular vesicles (ECV-miRNAs) in ME/CFS
5U24NS105535-04	Data management and coordinating center (DMCC) for the myalgic encephalomyelitis/ chronic fatigue syndrome (ME/CFS) collaborative research centers (CRC)	Linda Brown RTI International (formerly Research Triangle Institute)	25-SEP-2017 30-JUN-2022	$1,149,560	Data Management and Coordinating Center (DMCC) providing operational, communications, and logistical support to the ME/CFS CRCs Network. The DMCC will be led by Drs. Rick Williams and Peter Rowe and collaborate with Solve ME/CFS Initiative to support patient recruitment.