BIOGRAPHICAL SKETCH

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NAME: **Mitchell S. V. Elkind**

eRA COMMONS USER NAME (credential, e.g., agency login): **ELKINDM**

POSITION TITLE: **Professor of Neurology and Epidemiology (with tenure)**

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Harvard College, Cambridge, MA	A.B.	1987	Philosophy
Cambridge University, Cambridge, England	M. Phil.	1988	Hist & Phil of Science
Harvard Medical School, Boston, MA	M.D.	1992	Medicine
Columbia University School of Public Health	M.S.	1998	Epidemiology

A. Personal Statement

I am a tenured Professor of Neurology and Epidemiology at Columbia University with extensive experience in stroke clinical practice, research, teaching, and mentoring. I also founded and lead our Neurology Department's recently formed Division of Neurology Clinical Outcomes Research and Population Sciences (NeuroCORPS), which is devoted to population studies of stroke and outcomes research. I have had continuous NIH funding since 2000, and I am currently a PI of the NINDS-funded Northern Manhattan Study (NOMAS), a prospective cohort study of stroke risk and cognitive decline, as well as a PI or Co-I of other independent clinical research projects and observational biomarker studies related to stroke pathogenesis. I am also currently PI of the NINDS-funded multicenter clinical trial of apixaban versus aspirin for stroke prevention among patients with unexplained strokes and atrial cardiopathy (ARCADIA, NINDS U01 NS095869). I serve as the Medical Director of Columbia's CTSA Trial Innovation Network hub. I also direct the Columbia Clinical Neuroscience Resident Research Education and Mentorship Program (R25 NS070697), an NINDS-funded post-doctoral training program for neurologists, neurosurgeons, and neuropathologists; and our NINDS-funded post-doctoral T32 program in Neuroepidemiology (T32 NS07153). I previously directed the Columbia Neurology Residency Training Program (2000-2004), and I served as the Fellowships Director of the Neurology Department. As Residency Director, I started a Resident Research Mentorship Program, and I directly mentor students, residents, fellows, and junior faculty in stroke clinical research, including 6 past or current K23 awardees. I have also mentored others internationally (e.g., M Katan, MD, MS) who were enrolled in similar post-doctoral training programs. I was Editor of the Resident and Fellow Section of the journal *Neurology* for 7 years, and currently serve as inaugural Editor of the International Stroke Early Career and Training Section (InterSECT) of the journal *Stroke*. I will serve as the President of the American Heart Association beginning in July 2020. The following manuscripts are representative of my expertise in this area (*indicates manuscripts for which Dr. Elkind was the senior author):

a. *Willey JZ, Rodriguez CJ, Moon YP, Paik MC, Di Tullio MR, Homma S, Sacco RL, **Elkind MSV**. Coronary heart death and myocardial infarction among Hispanics in the Northern Manhattan Study: Exploring the Hispanic paradox. **Ann Epidemiol** 2012;22:303-9. [PMCID:PMC3657757] (Second place for Annals of Epidemiology 2012 Best Paper award)
b. *Dhamoon MS, Moon YP, Paik MC, Sacco RL, **Elkind MSV**. Trajectory of functional decline before and after ischemic stroke: The Northern Manhattan Study. **Stroke** 2012;43:2180-2184. [PMCID:PMC3404224]
c. *Kamel H, Navi BB, Sriram N, Hovsepian DA, Devereux RB, **Elkind MSV**. The Risk of Thrombosis after the 6-Week Postpartum Period. **New Engl J Med** 2014;370:1307-15.

d. *Boehme AK, Luna J, Kulick ER, Kamel H, **Elkind MSV**. Influenza-like Illness as a Trigger for Ischemic Stroke. **Ann Clin Transl Neurol** 2018;5(4):456-463. [PMCID: PMC5899905]

B. Positions and Honors

Positions and Employment:

1992 - 1993 Intern, Internal Medicine, Brigham and Women's Hospital, Boston, MA (Chair: E Braunwald)
1993 - 1996 Neurology Resident, Massachusetts General Hospital, Boston, MA (Chair: AB Young)
1995 - 1996 Chief Resident, Neurology, Massachusetts General Hospital, Boston, MA
1996 - 1998 Post-Doctoral Clinical Fellow, Cerebrovascular Disease, Columbia University College of Physicians and Surgeons, New York, NY (Supervisor: RL Sacco)
1996 - 1998 Trainee, Neuroepidemiology Training Grant (T32 NINDS NS07153; PI: WA Hauser)
1998 - 2006 Assistant Professor of Neurology, Columbia University College of Physicians and Surgeons
2000 - 2004 Neurology Residency Program Director, Columbia University
2001 - 2006 Asst Prof of Neurology (in the Sergievsky Center), Columbia University, New York, NY
Jul 2006: Associate Professor of Neurology (with tenure), Columbia University, New York, NY
Jul 2008: Associate Chairman for Clinical Research and Training
Jan 2010: Assoc Prof of Neurology and Epidemiology (in Sergievsky Center), Columbia University, New York, NY (Department Chairs: T Pedley and S Galea)
Apr 2011: Fellowships Director, Neurology Department, Columbia University
Jan 2014: Professor of Neurology and Epidemiology (in Sergievsky Center), Columbia University, New York, NY (Department Chairs: R Mayeux and S Galea)
Oct 2014: Chief, Neurology Clinical Outcomes Research and Population Sciences (NeuroCORPS), Columbia University, New York, NY

Other Experience and Professional Memberships:

2008 - 2013 Member, NIH Clinical and Integrative Cardiovascular Science (CICS) study section
2008: AHA Expert Panel on Subclinical Atherosclerotic Disease and Emerging Risk Factors
2014-2020: National Board of Directors, American Heart Association/American Stroke Association

Honors:

2004 – 2006: Kathleen Scott Research Fellow of the American Heart Association
2006 – 2015: Associate Editor, Resident and Fellow Section, Neurology
2010: American Academy of Neurology Award for Creative Expression of Human Values
2012: Virginia Apgar Academy of Medical Educators
2014: C. Miller Fisher Neuroscience Visionary Award, Northeast Cerebrovascular Consortium
2016-2020: Chair, American Stroke Association Advisory Committee, 2016 – 2020
2017: Ellermann Lecture, Swiss Neurological Society, Interlaken, Switzerland
2018: American Heart Association Stroke Council Award
2019: President-Elect, American Heart Association

C. Contributions to Science *(*denotes papers for which Dr. Elkind served as senior author):*

1. ***Infection and stroke risk:*** My early contributions reflected an interest in the emerging evidence supporting the relationship between infections, particularly infection with obligate intracellular organisms such as Chlamydia pneumoniae, and cardiovascular disease. I was specifically interested in the relationship of these organisms to stroke risk. I conducted several case-control, and ultimately prospective cohort studies, to explore this hypothesis. My research, supported initially by CDC and K23 grants, and then my first R01, led to the recognition that serum antibody studies supported associations for C. pneumoniae with cardiovascular disease. My subsequent work on infectious disease and stroke risk has focused more on the concept of Infectious Burden. This concept reflects the notion that no single organism is likely to be discovered to be the single, or even major, explanatory cause of atherosclerotic disease or stroke. Instead, multiple pathogen exposures throughout life may cumulatively contribute to vascular injury and subsequent risk. In NOMAS, we found that a measure of cumulative exposure to five common pathogens based on serologies, was associated with risk of ischemic stroke, and also with carotid plaque thickness, cognition, and cognitive decline. I have further explored this hypothesis as Core Laboratory Director of the Vasculopathy and Infection in Pediatric Stroke (VIPS) study (Fullerton/DeVeber, PIs). In VIPS, we found that serologies against herpesviruses,

including but not limited to VZV, and parvovirus B19, were associated with risk of childhood stroke. I also showed in the Cardiovascular Health Study that recent infection, independent of a specific pathogen, was associated with short-term stroke risk.

a. **Elkind MSV**, Ramakrishnan P, Moon YP, Boden-Albala B, Liu KM, Spitalnik SL, Rundek T, Sacco RL, Paik MC. Infectious burden and risk of stroke: The Northern Manhattan Study. **Arch Neurol** 2010;67:33-38. [PMCID: PMC2830860]
b. **Elkind MSV**, Luna JM, Moon YP, Boden-Albala B, Liu KM, Spitalnik S, Rundek T, Sacco RL, Paik MC. Infectious Burden and Carotid Plaque Thickness: The Northern Manhattan Study. **Stroke** 2010;41: e117-e122. [PMCID: PMC2830875]
c. **Elkind MSV**, Carty CL, O'Meara ES, Lumley T, Lefkowitz D, Kronmal RA, Longstreth WT. Hospitalization for infection and risk of acute ischemic stroke: The Cardiovascular Health Study. **Stroke** 2011;42:1851-1856. [PMCID: PMC3125478]
d. *Fullerton HJ, Luna JM, Wintermark M, Hills NK, Tokarz R, Li Y, Glaser C, DeVeber GA, Lipkin WI, **Elkind MSV**. Parvovirus B19 Infection in Children with Arterial Ischemic Stroke. **Stroke** 2017;48(10):2875-2877. [PMCID: PMC5614850].

2. **Inflammatory biomarkers and stroke risk**: Distinct from infection is the more general question of whether inflammation, and biomarkers indicative of vascular inflammation, contribute to our ability to predict stroke. I have performed a number of studies of serum biomarkers in relation to risk of incident stroke and risk of recurrent outcomes after stroke. As a group these studies have demonstrated that the commonly used inflammation-reflective biomarker, high-sensitivity C-reactive protein (hsCRP), predicts stroke risk modestly in groups already at high risk of vascular disease due to their risk factor burden; that hsCRP predicts recurrent stroke and other outcomes after lacunar stroke; that hsCRP predicts mortality better than recurrent stroke in patients with unspecified stroke subtypes; and that lipoprotein-phospholipase A2 (Lp-PLA2) predicts recurrent vascular events better than mortality in patients with unspecified stroke subtypes, suggesting that Lp-PLA2 may be a more specific marker of vascular inflammation.

a. **Elkind MSV**, Tai W, Coates K, Paik MC, Sacco RL. Lipoprotein-associated phospholipase A2, C-reactive protein, and outcome after ischemic stroke. **Arch Int Med** 2006;166:2073-2080.
b. **Elkind MSV**, Luna JM, Moon YP, Liu KM, Spitalnik S, Paik MC, Sacco RL. High-sensitivity C-reactive protein predicts mortality but not stroke: The Northern Manhattan Study. **Neurology** 2009;73:1300-1307. [PMCID: PMC2764412]
c. **Elkind MSV**, Luna JM, McClure LA, Zhang Y, Coffey CS, Roldan A, Del Brutto O, Pretell EJ, Pettigrew LC, Meyer B, Tapia J, White C, Oscar Benavente. C-reactive Protein as a Prognostic Marker after Lacunar Stroke: Levels of Inflammatory Markers in Treatment of Stroke. **Stroke** 2014;45:707-716. [PMCID: PMC4114338]
d. *Boehme AK, McClure LA, Zhang Y, Luna JM, Del Brutto OH, Benavente OR, **Elkind MSV**. Inflammatory markers and outcomes after lacunar stroke: the Levels of Inflammatory Markers in Treatment of Stroke Study. **Stroke** 2016;47(3):659-67. [PMCID:PMC4766076]

3. **Cardiac biomarkers of stroke risk:** I extended my research beyond inflammatory biomarkers to explore how biomarkers of cardiac risk can detect different aspects of pathophysiology and thereby permit more specific treatment of patients. I have focused on both blood measures related to cardiac dysfunction, including serum NT-proBNP, but also echo- and electrocardiographic measures, including PFO, PSVT and P wave dispersion. These observations have led me, together with my mentee and colleague Hooman Kamel, MD, who has a K23 award on this topic, to hypothesize that markers of left atrial dysfunction may be a more sensitive predictor of stroke risk, particularly in cryptogenic stroke, than atrial fibrillation. The present randomized trial of anticoagulants for stroke prevention among patients with biomarker evidence of abnormalities of left atrial function represents a natural next step in the evolution of these ideas, and could have major clinical implications if our hypothesis is confirmed, as patients with stroke could be selected for anticoagulant therapy immediately, without waiting months for atrial fibrillation to be diagnosed.

a. Kent DM, Ruthazer R, Weimar C, Mas JL, Serena J, Homma S, Di Angelantonio E, Di Tullio MR, Lutz JS, **Elkind MSV**, Griffith J, Jaigobin C, Mattle HP, Michel P, Mono ML, Nedeltchev K, Papetti F, Thaler DE. An index to identify stroke-related vs incidental patent foramen ovale in cryptogenic stroke. **Neurology** 2013;81:619-625. [PMCID:PMC3775694]

b. Kamel H, **Elkind MSV**, Bhave PD, Navi BB, Iadecola C, Devereux RB, Fink ME. Paroxysmal Supraventricular Tachycardia and the Risk of Ischemic Stroke. **Stroke** 2013;44:1550-4. [PMCID: PMC3950597]
c. Kamel H, Bartz TM, Longstreth WT, Okin PM, Thacker EL, Patton KK, Stein PK, Gottesman RF, Heckbert SR, Kronmal RA, **Elkind MSV**, Soliman EZ. Association between left atrial abnormality on ECG and Vascular Brain Injury on MRI in the Cardiovascular Health Study. **Stroke** 2015;46(3):711-6. [PMCID:PMC4342300]
d. *Yaghi S, Moon YP, Mora-McLaughlin C, Willey JZ, Di Tullio M, Kamel H, Sacco RL, **Elkind MSV**. Left Atrial Enlargement and Stroke Recurrence: The Northern Manhattan Stroke Study. **Stroke** 2015; 46:1488-93. [PMCID: PMC4442058].

4. **Anti-inflammatory therapy for acute stroke:** As part of efforts to better understand the role of inflammation in stroke pathophysiology, I developed an interest in testing the hypothesis that HMG-CoA reductase inhibitors, or statins, would be neuroprotective through their effects in reducing inflammation and other effects on downstream products of the mevalonate pathway. As part of the NINDS Specialized Program of Treatment in Acute Ischemic Stroke (SPOTRIAS) at Columbia, I developed a drug development program, the Neuroprotection Neuroprotection with Statin Therapy for Acute Recovery Trial (NeuSTART), including serving as sponsor of the IND. This consisted of an initial Phase I dose-escalation study using the then novel adaptive design Time to Treatment Continuous Reassessment Method, in which we demonstrated that we could safely use doses of lovastatin approximately 8 times as high as the currently approved doses. This led to our currently ongoing Phase 2 randomized safety study of high dose lovastatin for acute ischemic stroke.

a. **Elkind MSV**, Flint AC, Sciacca RR, Sacco RL. Use of lipid lowering agents prior to onset of ischemic stroke is associated with decreased mortality: The Northern Manhattan Stroke Study. **Neurology** 2005;65:253-258.
b. **Elkind MSV**, Sacco RL, MacArthur RB, Fink DJ, Peerschke E, Andrews H, Neils G, Stillman J, Corporan T, Leifer D, Cheung K. The Neuroprotection with Statin Therapy for Acute Recovery Trial (NeuSTART): An Adaptive Design Phase I Dose-Escalation Study of High-Dose Lovastatin in Acute Ischemic Stroke. **Int J Stroke** 2008;3:210-218. [PMCID:PMC4130457]
c. **Elkind MSV**, Sacco RL, MacArthur RB, Peerschke E, Neils G, Andrews H, Stillman J, Corporan T, Leifer D, Liu R, Cheung K. High-Dose Lovastatin for Acute Ischemic Stroke: Results of the Phase I Dose-Escalation Neuroprotection with Statin Therapy for Acute Recovery Trial (NeuSTART). **Cerebrovasc Dis** 2009;28:266-275. [PMCID: PMC2814015]
d. *Kandadai MA, Meunier J, Lindsell CJ, Shaw GJ, **Elkind MSV**. Short-term high-dose effect of lovastatin on thrombolysis by rt-PA in a human whole-blood in vitro clot model. **Curr Neurovasc Res** 2012;9:207-13. [PMCID:PMC3664397]

5. Vascular correlates of functional decline before and after stroke: Working with another K23 mentee, Mandip Dhamoon, MD, DrPH, we have developed the concept that stroke serves not only as an acute event leading to neurological deficits, but that it may contribute to an ongoing further functional decline, even after an interval of several years. We have found in NOMAS, CHS, and other cohorts, that the slope of decline in function and quality of life accelerates after acute stroke. The mechanisms for this remain uncertain, and may include recurrent subclinical infarcts, inflammation, and neurodegeneration, and current studies are seeking to address these possibilities. The implications are that therapies directed at inflammation could reduce post-stroke functional decline.

a. *Dhamoon MS, Moon YP, Paik MC, Boden-Albala B, Rundek T, Sacco RL, **Elkind MSV**. Long-term functional recovery after first ischemic stroke: The Northern Manhattan Study. **Stroke** 2009; 40(8):2805-11. [PMCID: PMC2830874]
b. *Dhamoon MS, Moon YP, Paik MC, Boden-Albala B, Rundek T, Sacco RL, **Elkind MSV**. Quality of life declines after first ischemic stroke: The Northern Manhattan Study. **Neurology** 2010;75:328-334. [PMCID: PMC2918891]
c. *Dhamoon MS, Moon YP, Paik MC, Sacco RL, **Elkind MSV**. Diabetes predicts long-term disability in an elderly urban cohort: The Northern Manhattan Study. **Ann Epidemiol** 2014; 24:362-368. [PMCID:PMC4011963.]
d. *Dhamoon MS, Cheung K, Moon YP, Wright CB, Willey JZ, Sacco RL, **Elkind MSV**. Tumor necrosis factor receptor-1 is associated with trajectories of functional status: the Northern Manhattan Study. **Am J Epidemiol** 2017;186(1):11-20.

Complete List of Published Works in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/mitchell.elkind.1/bibliography/47466154/public/?sort=date&direction=ascending

D. Research Support

Active

U01 NS095869 Elkind/Kamel/Longstreth/Tirschwell (MPI) 05/01/2017-04/30/2022
NIH/NINDS
AtRial Cardiopathy and Antithrombotic Drugs In prevention After cryptogenic stroke (ARCADIA)
The goal of this Phase 3 multicenter, randomized trial to be run through the StrokeNet mechanism is to test the hypothesis that apixaban will be superior to aspirin for secondary stroke prevention among patients with unexplained stroke and biomarkers indicative of atrial cardiopathy.
Role: Contact PI

6R0137 NS029993 Elkind/Sacco (MPI) 01/07/1993 - 03/31/2020
NIH/NINDS
Stroke Incidence and Risk Factors in a Tri-Ethnic Region
This prospective cohort study (Northern Manhattan Study, NOMAS) investigates risk factors for stroke and other vascular outcomes in a multi-ethnic, urban population. In addition, the study seeks to understand the relationships between these risk factors and cognition and MRI-defined cerebrovascular disease.

1UL1 TR001873 Reilly (PI) 07/01/2016 – 05/31/2021
NCATS/NIH
Clinical and Translational Science Award
The goal of the Irving Institute CTSA is to transform the culture of biomedical research enabling CUMC investigators to develop new treatments faster and deliver those treatments to patients more efficiently, effectively, and safely than before.
Role: Project Lead, and Medical Director, Trial Innovation Network Hub Liaison Team

R01 HL141811 Chang (PI) 07/01/2018 — 06/30/2023
NIH/NHLBI
The impact of an alternative emergency department management strategy on PTSD and cardiovascular risk in survivors of TIA and minor stroke
The aim of this study is to study the impact of emergency department discharge to rapid outpatient neurology clinic on TIA/stroke-induced PTSD, cardiovascular disease outcomes and 30-day rehospitalization in a sample of TIA and minor stroke patients seen in the emergency department.

2T32-NS07153-36 Elkind (PI) 04/01/2019 – 06/30/2024
NIH/NINDS
Neuroepidemiology Training Grant
The main goal of this grant is to train post-doctoral trainees in the methods of neuroepidemiology and mentor future researchers in the field.
Role: Director and Mentor

2R25 NS070697 Elkind (PI) 03/15/15 - 03/30/2020
NIH/NINDS
Neurology Research Education and Mentorship Program
The purpose of this award is to provide a mentored research training experience for neurology residents with the explicit goal of fostering their ability to successfully compete for more advanced mentored career development (K) awards.
Role: Director and Mentor