

Nina Starr Braunwald's Career, Legacy, and Awards: Results of a Survey of The Thoracic Surgery Foundation Award Recipients



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The legacy of Nina Starr Braunwald lives on in her innovations, clearing a path for women in cardiothoracic surgery, and in the lives of those she has trained or supported. As one of the early pioneers in cardiac surgery, she represents what is excellent in our profession. The Braunwald family has donated to The Thoracic

Surgery Foundation in the form of Research Awards, and a survey was conducted to determine the career paths of recipients since the first award in 1993.

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Nina Starr Braunwald (Fig 1) was the first woman to be certified by the American Board of Thoracic Surgery (ABTS), the first woman to be elected to membership in the Association of Women Surgeons, and the first surgeon of either sex to implant a prosthetic mitral valve into a human patient [1, 2]. This remarkable surgeon was also the beloved wife of a highly accomplished cardiologist, Dr Eugene Braunwald, and mother of three children. Her accomplishments were remarkable for a surgeon of any era, but especially so for a woman entering practice in the mid-20th century.

After her death in 1992, Dr Braunwald approached Dr John Kirklin to establish a fellowship to honor her life and career. He wrote to Dr Kirklin: "We would like the endowment to be used to establish a fellowship which would bear Nina's name. Its purpose would be to support women dedicated to the development of a career in academic cardiac surgery."

Dr Kirklin oversaw the establishment of the Nina Starr Braunwald Research Awards to be administered through The Thoracic Surgery Foundation for Research and Education (TSFRE, now TSF) [3]. Over time, the award has served residents working on cardiac surgery research projects and has provided early support to women faculty members. From the time Dr Nina Starr Braunwald became the first female diplomate of the ABTS in 1961 until 1980, only 10 other women had achieved this status. By 2000, the number of female ABTS diplomates was 96, and by 2017, this number had increased to a total of 309 of 8,617 total ABTS awardees. The Nina Starr Braunwald Research Awards boast support for many of the successful women who practice cardiac surgery today.



Fig 1. Nina Starr Braunwald. (Photograph courtesy of the Braunwald family.)

In response to Dr Eugene Braunwald's request for follow-up on the impact of this financial corpus on the original intended goal, the recipients were surveyed, with permission from the TSF, regarding their career

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Table 1. Recipients of the Nina Starr Braunwald Awards Through The Thoracic Surgery Foundation Since the First in 1993

Awardee No., First Initial, and Last Name ^a	Award Type	Amount (\$)	Year Awarded ^b	Project Title
1. J. Walker	RF	37,500	1993	The Direct Effects of Acute Administration of 3,5,3-Triiodo-L-Thyronine on Isolated Myocyte Function
2. E. Tseng	RF	70,000	1995	The Role of Nitric Oxide in Mediating Neurologic Injury in a Canine Model of Hypothermic Circulatory Arrest
3. M. Allen	RA	100,000	1995	To Expand the Scope of Research on Adhesion Molecules
4. M. Mancini	RA	100,000	1996	The Role of Platelet Derived Growth Factor in Allograft Vascular Disease
5. P. Thistlewaite	RA	100,000	1997	Expression of Angiogenesis Factors in the Heart by Adenovirus Mediated Gene Therapy
6. M. Kibbe	RF	35,000	1998	Prevention of Intimal Hyperplasia With iNOS Gene Therapy
7. E. Morgan	RF	52,500	1998	The Role of NF-κB in Myocardial Ischemia-Reperfusion Injury
8. K.Q. Flores	RF	35,000	1999	Upregulation of Angiogenic Growth Factors and Their Receptors as a Mechanism of TMR
9a. M. Nathan	RF	70,000	2001	The Stunned Heart in Cardiac Surgery; Apoptosis/Necrosis
9b. M. Nathan	RF	80,000	2013	Technical Performance Score; A Quality Assessment Tool For Congenital Cardiac Surgery; A Multi-Institutional Study
10. L. Balsam	RF	35,000	2002	From Marrow To Heart: Myocardial Regeneration With Bone Marrow Cells
11. T. Karamlou	RF	70,000	2002	Volume Overload in the Ovine Fetus Alters Cardiomyocyte and Coronary Growth
12. D. Pham Ceppa	RF	70,000	2003	Functional Characterization of SCRO in Lung Cancer
13. B-N. Nguyen	RF	70,000	2004	CCRS in Cardiac Allograft Vasculopathy
14. B. Robinson	RF	70,000	2005	The Stunned Heart in Cardiac Surgery; Apoptosis/Necrosis and the Role of Heat Shock Proteins
15. J. Lawton	RA	200,000	2007	The Role of Mitochondrial KATP Channel in Myocyte Volume Response to Stress
16. R. Kelly	RA	200,000	2007	Revascularization of Chronic Hibernating Myocardium Reverses Reduction in Regional Function and Normalized Bioenergetic Adaptations of the Mitochondria
17. K. Gandy	RA	220,000	2008	The Use of Autologous Hematopoietic Stem Cells in Tolerance Induction for Organ Transplantation
18. J. Hirsch-Romano	RA	130,000	2010	Development of a Congenital Heart Assessment of Sensory and Motor Status
19. A. Fielder	RF	30,000	2013	Chronic Ventricular Restraint in Right Heart Failure
20. E. Downs	RF	60,000	2014	Anisotropic Reinforcement of Acute Right Ventricular Dysfunction
21. A. Gaffey	RF	60,000	2014	A Novel, Vascularized Clinically Translatable Tissue Engineered Construct to Provide Angiogenic Endothelial Progenitor Cell Therapy to Treat Ischemic Cardiomyopathy
22. H. Wang	RF	60,000	2015	Metabolomic and MicroRNA Signatures in Peripheral Blood of Patients With Thoracic Aortic Aneurysm
23. H. Reich	RF	30,000	2015	Repeat Dosing of Allogeneic Cardiosphere-Derived Cells After Myocardial Infarction in Immunocompetent Rats
24. J. Philip	RF	60,000	2016	Regulation of Cardiac Fibroblast-Mediated Ventricular Remodeling by Beta-Arrestin1
25. K. Holst	RF	30,000	2016	Optimal Cell Therapy Delivery for Pediatric Right Ventricular Failure: Umbilical Cord Blood-Derived Mononuclear Cells in Pigs

(Continued)

Table 1. Continued

Awardee No., First Initial, and Last Name ^a	Award Type	Amount (\$)	Year Awarded ^b	Project Title
26. M. Ouzounian	RA	80,000	2017	Biomechanical and Metabolic Properties of Proximal Aortic Aneurysms in Patients With Bicuspid Aortic Valves
27 L. Huckaby	RF	60,000	2017	Estrogen and Sex Differences in Bicuspid and Tricuspid Aortic Valve Thoracic Aortic Aneurysm
Total: 27 recipients and 28 awards	8 RA 20 RF	2,215,000	1993-2017	

^a Patpilai Kasimpila, MD, is the new resident awardee and was not included in the summary or analysis. Danielle Gottlieb Sen, MD, is the new faculty awardee and also was not included in the summary or analysis. ^b Awards were delivered over 2 years, except for two candidates (K.H. and H.R.).

RA = Research Award or Faculty Career Development Award; RF = Resident Fellowship Research Award.

progression and their views on the value of this award, and they gave permission to have the report published. The objective of this study was to report on the impact of the Braunwald Research Awards on the careers of the recipients.

Methods

Data were gathered from survey responses of award recipients, direct contact and review of curriculum vitae, exploration of recipient careers through open source information, and a Medline search of recipient publications as of February 2017.

A brief survey was sent to the recipients of the Braunwald awards. In August 2016, a letter was sent to the most recently known addresses of the first 25 Nina Starr Braunwald Award recipients. The letter explained that the TSF was seeking to assess how recipients have fared in their careers with regard to academic progression, subsequent funding, and ongoing academic advancement. We requested that each recipient send a copy of her curriculum vitae. When the 2017 awards were announced in January 2017, these new recipients were included in the study. Responses were received from 23 of the earliest recipients. The curriculum vitae were extracted to obtain current position, leadership positions held, other grants or funding sources received after the Nina Starr Braunwald Award, and number of publications authored.

After review of these data, the missing recipients were evaluated using open source data including CTSNet, LinkedIn, and Google. Current data on all missing recipients were obtained, and their current position and academic ranks were confirmed through review of the university websites where they currently work. A Medline search using PubMed was conducted for each recipient, and titles and abstracts were reviewed briefly to confirm that publications were on cardiac topics. This search provided an up-to-date accounting of publications. Thus, the study population consists of 27 Nina Starr Braunwald Award recipients.

Results of the Nina Starr Braunwald Research and Research Fellowships Awards

Nina Starr Braunwald Awards were awarded in two categories: Braunwald Research Grants, Career Development Awards, and Research Awards to academic surgeons (RA); and Braunwald Resident Research Fellowships (RF) during dedicated time to conduct cardiac surgery research. Twenty-eight Nina Starr Braunwald Awards were given to 27 recipients between 1993 and 2017. One recipient received two awards during her early career. The total amount delivered to awardees was \$2,215,000 from the time of the first award in 1993 to 2017 (Table 1).

Among those who have received Braunwald funding, there are 16 surgeons currently in practice (Fig 2). Nine of these are adult cardiac surgeons, four are congenital heart surgeons, one is a thoracic oncologist, and one is a vascular surgeon. There are eight recipients who are still in



Fig 2. A compilation of selected awardees of The Thoracic Surgery Foundation's Nina Starr Braunwald Research Awards. From left to right, Rosemary Kelly, MD, Jennifer Hirsch-Romano, MD, Kimberly Holst, MD, Jennifer Lawton, MD, and Danielle Gottlieb Sen, MD.

training; with two currently enrolled in cardiothoracic surgery residencies and six currently enrolled in general surgery residencies with plans to enroll in cardiothoracic surgery residencies. One surgeon has retired after a long and successful career, and the remaining three not listed here have either retired or are between positions after completion of fellowships. Of those who have received funding, there are six professors and four associate professors. Many of the recipients of the awards have gone on to academic achievements. Four are now or have been chiefs of cardiac surgery (Johns Hopkins University, Louisiana State University, Minneapolis VA Health Care System, University of Massachusetts), one chair of the Department of Surgery at University of North Carolina, one cardiothoracic surgery residency program director at the University of California, San Diego, one past president of Women in Thoracic Surgery, one surgical director of the New York University Lagone's Ventricular Assist Device Program, and a founder of Play-It Health, a digital health software company dedicated to improving medication compliance among pediatric transplant recipients.

There have been numerous significant contributions to the literature made by Nina Starr Braunwald awardees. There are 956 confirmed publications in which the recipients are lead authors, senior authors, or investigators. These include 639 publications by cardiac surgery faculty, 48 publications by congenital cardiac surgery faculty, 23 publications by thoracic oncology faculty, 165 publications by vascular surgery faculty, and 81 publications by current residents. This summary of cumulative achievement can be best stated by direct quotations from several recipients:

Dr Meena Nathan: "She was a true pioneer and a great role model for me. As the recipient of both the Nina Braunwald Research Fellowship award as a resident and the Braunwald Research Award for junior faculty, I am truly indebted to her. Her drive for perfection and perseverance to achieve her target are the two key messages I have taken to heart and follow daily in my career."

Dr Rosemary Kelly: "She was the first cardiac surgeon in the world to design, build and successfully implant a

prosthetic valve in a human. This extraordinary degree of intellect and talent is inspiring. As a woman cardiothoracic surgeon, I am deeply grateful for the barriers she broke through on the behalf of other women, cardiac surgeons and humanity. She was a cardiac surgeon who performed bold and innovative surgery based on scientific merit and in the face of significant opposition. We are fortunate to have such a courageous and talented pioneer in cardiac surgery."

Dr Kimberly Holst: "Being a Braunwald awardee, in addition to making my research project feasible, has provided numerous opportunities to engage with the cardiothoracic leadership and research communities through both research initiatives and at national meetings which I would not have otherwise had. Furthermore, the continued catalyst for forward progress instilled by Nina Starr Braunwald and her contributions to cardiac surgery has, and will continue to have, an invaluable impact on my career."

Conclusion

The Nina Starr Braunwald Research Awards have been effective in launching many women's careers in cardiothoracic surgery. The most effective use of limited funding has been through awards to committed surgeon scientists early in their careers. Funding for life sciences research has declined enormously, thus making the contributions of professional societies and foundations critically important to progress in science. The legacy of Nina Starr Braunwald has contributed greatly to the development of women surgeon scientists.

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