

## Career Resources

# Cardiothoracic surgery

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**Abstract.** Cardiothoracic surgeons provide care to neonates, children, adults, and the elderly with a range of disorders of the heart, lungs, esophagus, and major blood vessels of the chest. The field of cardiothoracic surgery continues to thrive among the transformations in thoracic and cardiovascular medicine. This article is intended to provide a guide to medical students and physicians on the training, certification, research, and funding opportunities as well as societies and journals specific to cardiothoracic surgery.

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It is an exciting time in the field of cardiothoracic surgery with major advances and changes in thoracic and cardiovascular surgery. Heart and lung disease has been and likely will continue to be one of the major causes of morbidity and mortality in the United States. Cardiothoracic surgeons have the potential to make a significant difference in the lives of these patients. The patient's increased life expectancy and improved quality of life makes the rewards of cardiothoracic surgery endless.

Cardiothoracic surgeons are specialists in the surgical management of disorders of the heart, lungs, esophagus, and major blood vessels of the chest. Thoracic surgeons treat diseases of the chest including coronary artery disease; cancers of the lung, esophagus, and chest wall; abnormalities of the great vessels and heart valves; birth defects of the chest and heart; tumors in the organs contained in the chest cavity; and transplantation of the heart and lungs. They provide expert, state-of-the-art care that is life-saving, challenging, and complex. Subspecialties include adult cardiac surgery, congenital cardiac surgery, and general thoracic surgery.

## Residency requirements

The thoracic surgery residency allows residents to experience a broad clinical scope in the perioperative, surgical,

and critical care of patients with diseases of the chest. These pathologic diseases include pulmonary, esophageal, mediastinal, chest wall, diaphragmatic, and cardiovascular disorders of all age groups. When completed, residents are expected to be clinically proficient in these areas, as well as knowledgeable in the use of cardiac and respiratory support devices. Although surgical experience constitutes the most important aspect of the program, residents should learn the pathologic and diagnostic aspects of cardiothoracic disorders. The resident learns important skills in diagnostic procedures such as bronchoscopy and esophagoscopy, as well as the interpretation of all appropriate imaging studies (ultrasound, computed tomography, roentgenographic, radionuclide), cardiac catheterization, pulmonary function, and esophageal function studies.

*There are 3 Residency Review Committee–approved training programs, with the American Board of Thoracic Surgery approving the following pathways to certification.*

## Independent program (traditional format) pathway

Medical students apply and complete a full general surgery residency (5 clinical years) in an Accreditation Council for Graduate Medical Education (ACGME)-approved or a Royal College of Physicians and Surgeons of Canada–approved program. Many academic training programs recommend 1 to 2 years of academic research. During the fourth clinical year of general surgery residents apply for a residency position in cardiothoracic surgery. Cardiothoracic

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training varies in length from 2 to 3 years, depending on the program. After completion of the training program, residents apply for certification by both the American Board of Surgery and the American Board of Thoracic Surgery. Subsequently, additional experience may be gained from completing further training in congenital heart surgery, thoracic surgery, heart failure, or transplantation.

### **Integrated pathway**

Medical students apply directly to a 6-year integrated cardiothoracic surgery residency program. The integrated program allows for more focused training in cardiothoracic surgery as well as training in cardiovascular and thoracic disease. Training focuses on surgical skills as well as a multidisciplinary approach including rotations in interventional radiology, interventional cardiology, endovascular surgery, oncology, and pulmonary disease. Residents also gain training in new technologies such as minimally invasive approaches. After completion of the integrated program residents may certify for the American Board of Thoracic Surgery but not the American Board of Surgery. A current list of approved integrated programs can be found on the ACGME web site and the list continues to grow.

### **Joint surgery/thoracic surgery program (the 4 + 3 program)**

Medical students apply to a general surgery residency program and those general surgery residents interested in the joint pathway or fast-track program typically apply after their second clinical year. Only general surgery residents at their own institution are eligible to apply for the fast-track program. Residents accepted into the fast-track program continue to have general surgery training during every year of training and complete a full general surgery chief resident year. Residents completing the fast-track program are board-eligible for both the American Board of Surgery and the American Board of Thoracic Surgery. A current list of approved fast-track or joint programs is located on the ACGME web site.

Each spring, all cardiothoracic surgery residents are required to take an annual in-training examination given by the Thoracic Surgery Directors Association (<http://www.tsda.org>).

### **Congenital cardiac subspecialty certification**

Starting in 2009 the American Board of Thoracic Surgery began offering certification in congenital cardiac surgery. The certification may be obtained by completing 1 of the 2 following pathways. Pathway one is for candidates who have successfully completed a full congenital cardiac residency program approved by the ACGME starting on July 1, 2008, or thereafter. Pathway 2 is for candidates who trained before July 1, 2008. Certification is based on training, current clinical experience, and professional accomplishments in the field.

### **Board certification**

Candidates for certification must complete a minimum of 24 months of residency training in thoracic and cardiovascular surgery in a program accredited by the Residency Review Committee. This must include 12 months of continuous senior responsibility. Education and adequate surgical experience in both general thoracic surgery and cardiovascular surgery are essential parts of any training program, irrespective of the area of cardiothoracic surgery in which the candidate may choose to practice.

Minimal surgical experience requirements for volume and type of cases are required to qualify to sit for the Board examination. A list of these requirements, as well as additional information, is available on the American Board of Thoracic Surgery web site (<http://www.abts.org>). The board conducts 2 types of examinations. The written examination represents uniform coverage of all areas of thoracic surgery testing cognitive skills. After successful completion of the written examination the candidate will be eligible to take the oral examination.

### **Research opportunities and funding**

#### **Medical students**

The American Association for Thoracic Surgery (AATS) offers a Summer Intern Scholarship Program that was established in 2007 to introduce the field of cardiothoracic surgery to first- and second-year medical students. The program allows medical students to broaden their educational experience by providing scholarships to spend 8 weeks during the summer working in an AATS member's cardiothoracic surgery department.

#### **Surgery residents**

Recommendations from cardiothoracic surgeons on research opportunities are strongly encouraged for surgery resident interested in a career in cardiothoracic surgery. There are many opportunities for clinical and basic science research in the areas of thoracic surgery, cardiac surgery, and congenital or pediatric cardiac surgery that are available at institutions with cardiothoracic research laboratories. Cardiothoracic Surgery Network (CTSNet): <http://www.ctsnet.org> and the AATS <http://www.aats.org> web sites have many of these opportunities updated on a regular basis. Individual programs often have their own web sites with opportunities posted and are regularly updated (<http://www.healthsystem.virginia.edu/internet/surgery/res-thoracic.cfm>).

The Thoracic Surgery Foundation for Research and Education (TSFRE) is dedicated to increasing the knowledge base of cardiothoracic surgery and to enhancing the knowledge of all thoracic surgeons. The Foundation is supported

by the 4 major thoracic surgery professional societies: the AATS, the Society of Thoracic Surgeons (STS), the Southern Thoracic Surgical Association (STSA), and the Western Thoracic Surgical Association (WTSA). The TSFRE provides fellowships and research grants to surgeons and surgical trainees in the field of cardiothoracic surgery.

The TSFRE also provides the Nina Starr Braunwald Career Development Award to female cardiac surgeons in their first 10 years of academic practice in the cardiac surgery unit investigating areas in cardiac surgery, cardiology, or allied disciplines. Dr. Nina Braunwald was the first board-certified thoracic surgeon and this fund was established to provide career development awards and research fellowships for women in academic surgery.

## Research funding

Research funding is available through the National Institutes of Health (NIH), the National Cancer Institute, or the National Heart, Lung, Blood Institute as either participants in already established projects or through a supplemental project to a major grant. Funded projects through the NIH are listed on the NIH web site. The TSFRE has been generous in matching many K08 and K23 awards through the National Heart, Lung, Blood Institute or the National Cancer Institute to aid in providing protected time to young academic cardiothoracic surgeons.

## Professional societies

Cardiothoracic surgical organizations can be accessed by way of the Cardiothoracic Surgery Network (<http://www.CTSNet.org>).

## The STS

The STS is the largest thoracic surgical organization in the world, representing surgeons, researchers, and allied health professionals. The society is devoted to enhance the ability of cardiothoracic surgeons to provide the highest quality patient care through education, research, and advocacy. Active members must be certified by the American Board of Thoracic Surgery, the American Osteopathic Board of Surgery in Thoracic and Cardiovascular Surgery, or the Royal College of Physicians and Surgeons of Canada. Membership is designed to encourage younger surgeons and residents to participate in Society activities. International membership is designed for thoracic surgeons trained outside the United States and Canada.

## The AATS

The AATS was founded in 1917 by pioneers in the field of thoracic surgery. Since then, the AATS has progressed to an

international organization of more than 1,200 members, representing the world's foremost cardiothoracic surgeons from more than 35 countries around the world. Surgeons in the AATS have shown a record of distinction in the field of cardiothoracic surgery and have made meritorious contribution to cardiothoracic knowledge or surgical treatment. The annual meeting, research grants and awards, educational symposia and courses, and the AATS official journal, the *Journal of Thoracic and Cardiovascular Surgery*, all strengthen its commitment to science, education, and research.

## Regional societies

The STSA and the WTSA are 2 important regional societies that are available for membership. STSA membership is limited to thoracic surgeons practicing in the southern regions of the United States or who have completed a thoracic residency training program in the STSA region (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia, District of Columbia, US territories, and commonwealths in the Caribbean). WTSA membership is for cardiothoracic surgeons within the geographic limits of the Association (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, and the provinces of Alberta and British Columbia).

## Journals

There are dozens of journals that deal with thoracic and cardiovascular surgery and medicine. The 2 major American journals devoted to cardiothoracic surgery are the *Journal of Thoracic and Cardiovascular Surgery* and the *Annals of Thoracic Surgery*. Many important articles also appear in the *Asian Cardiovascular and Thoracic Annals* and the *European Journal of Cardiothoracic Surgery*.

Access to these journals, and other valuable information for thoracic surgeons and residents, is available through the CTSNet. CTSNet, Inc, is a not-for-profit corporation jointly created by the STS, the AATS, and the European Association for Cardio-thoracic Surgery. CTSNet also includes 48 cardiothoracic surgical societies around the world. CTSNet aims to provide a comprehensive, web-based repository of information for those interested or in the field of cardiothoracic surgery. Thousands of surgeons access this information resource daily to research cases, communicate with colleagues, explore the field's journals, investigate devices, find out about meetings, engage in lively discussions, and conduct private electronic meetings.