

Transplant surgery

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To become a transplant surgeon, it is necessary to first complete a residency in general surgery, followed by a fellowship in solid-organ transplantation.

General Surgery Residency

Many transplant surgeons first develop an interest in transplantation while training in general surgery; therefore, the choice of a residency for general surgery may already have been made with other considerations or priorities in mind. However, if a student has already decided on a career in transplantation while still in medical school and before applying for a general surgery residency, the choice of program may become more relevant. If this is the case, during the interview process, applicants should look for a general surgery residency that offers not only a good broad-based training in general surgery, but also research experience in an area relevant to transplantation, such as immunology, infectious disease, clinical transplantation, or critical care. The best information often can be obtained from other residents in a particular institution, or from the National Residency Matching Program (www.nrmp.aamc.org).

In assessing the potential transplant experience available to a resident, applicants should take into consideration the number of cases performed annually, the number of fellows and upper-level residents on the transplant service, and the number of surgical cases. The largest transplant programs may not necessarily offer the best experience to residents because of an overabundance of fellows. Also, it is important to pay attention to the national reputation and mentoring skills of the Transplant Program Director because his/her recommendations will be important in securing a fellowship position on completion of general surgery training. A formal match process was initiated in 2005 (www.nrmp.org, www.ast.org). The application and interview process for fellowship training should take place during the fourth clinical year of residency. Match results are announced in August of the fifth clinical year. Although research experience is not required, many applicants have had

some formal experience during their residency for a 1- to 2-year period. Most others have at least written a clinical article or case reports that show some objective interest in transplant surgery or a related topic. Some research opportunities are discussed later.

Transplant Fellowship

The aim of a transplant surgery fellowship training program is to develop proficiency in the surgical and medical management of patients with end-stage organ disease. Candidates for such training must have completed a residency that satisfies the educational requirements for certification by the American Board of Surgery or the American Board of Urology. A list of accredited programs is available from the Association of Transplant Surgeons (ASTS, <http://www.ast.org/fellowshiptraining.cfm>).

More than 50 approved programs for solid organ transplantation exist in the United States, but only approximately 20 of these are approved for all abdominal organs (liver, kidney, and pancreas). The length of the program is usually 2 years for training in liver, kidney, and pancreas transplantation, and programs accept 1 to 2 trainees per year. Applications should be made directly to the individual Transplant Program Director as soon as possible. Although some transplant surgeons later choose to specialize in one organ, it is better to train in a program that offers experience in all 3 areas. The program also should provide instruction in histocompatibility/immunology, infectious disease, and the preoperative and postoperative management of patients who require transplantation, as well as in performance and interpretation of special diagnostic techniques necessary for the management of rejection and other problems in transplant recipients.

Activity of the training program must be sufficient to ensure adequate exposure to the surgical procedures relevant to transplantation. To qualify for accreditation by the ASTS, a transplant surgery fellowship program must have 75 patients available for each transplant fellow to serve as the principal surgeon over the course of their training. In addition, for accreditation in kidney, liver, and pancreas transplantation, each transplant fellow must perform at least 30 kidney transplants, 45 liver transplants, and 15 pancreas transplants over the course of their fellowship. At least 25 multi-organ procurements should be performed annually. The length of the fellowship period should be no less than

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Table 1
Grant support

Award	Eligibility	Years	Amount per year
ASTS–Roche Laboratories Surgical Scientist Scholarship: 2 recipients/year	Surgical resident postgraduate year 3	2	\$35,000
ASTS–NKF/ASTS Folkert Belzer MD Research Award: 1 recipient	Surgical resident postgraduate year 3	2	\$35,000
ASTS–Novartis Fellowship in Transplantation	Qualified surgeon who will have completed an approved ACGME residency program or its foreign equivalent in a major surgical discipline by 7/1/03	2	\$42,500
ASTS–Fujisawa, USA Faculty Development Award: 1 recipient	Junior faculty member 0–3 years postfellowship	2	\$35,000
ASTS–Midlevel Faculty Research Award	Assistant or associate professor and attendant appointment	2	\$35,000
Roche Presidential Travel Award: 2 recipients per year	Investigator ≤42 years of age	1	\$10,000
ASTS Collaborative Scientist Research Award	ASTS Member and collaborating scientist (member or nonmember)	2	\$42,500

ACGME = Accreditation Council for Graduate Medical Education.

24 months. Programs that offer training in kidney-only or liver-only transplantation should offer at least 12 months of clinical training, with the balance of the 2-year fellowship spent in additional clinical or laboratory work. Programs that offer training in both renal and extrarenal transplantation, including multi-organ procurement, should offer at least 18 months of clinical training, with the balance of the 2-year fellowship spent in additional clinical work or laboratory experience.

The fellow also must gain experience in the evaluation of living donors, and procurement and preservation of organs obtained from cadaver donors. The trainee also must have continuity of experience in the postoperative and long-term follow-up care of transplant recipients. Finally, participation in basic science research or clinical research is strongly encouraged.

Board Certification

No board certification is available in transplant surgery, but ASTS accreditation is required. ASTS accreditation is available on completion of an ASTS-approved program after the individual has been in practice as a transplant surgeon for a year. Currently, no formal recertification requirements are necessary for transplant surgery. However, transplant surgeons are expected to keep their General Surgery Certification current and are summarized in Table 1.

Grant Funding and Research Fellowships

A number of awards are available through industry and societies. Local, regional, and national societies (see Membership in transplant societies section for more detail) may offer more opportunities. The following are some potential sources of funding.

Medical students

Medical students interested in transplant surgery should try to identify a mentor early in their careers. For students interested in a formal research experience, there may be institutional or departmental funds to support a research project.

Residents

Again, it is important to identify a mentor in the transplant community as early as possible. The mentor should

assist with introduction to relevant societies, choice of fellowship programs, research projects, and letters of recommendation. Often there is a good opportunity for research at the resident's institution. Other possibilities for additional funding are shown in Table 1.

Transplant fellows

Usually a Program Director will have some projects already fully funded and suitable for a short period of research.

Faculty

Individual institutions may offer research funding for junior faculty as part of a recruitment package. This information generally is available from the department chair or the dean of the medical school.

Membership in Transplant Societies

Local and regional transplant surgery societies offer open membership and provide opportunities for education or networking. The local Organ Procurement Organization (<http://www.aopo.org/aopo/>) is often a good place to begin. Several national societies are listed in the reference section. Full membership details are available on their web pages. Membership criteria vary by organization, but almost anyone can attend the annual clinical meetings.

ASTS

Membership in the ASTS is open to surgeons, physicians, and nonphysician scientists actively engaged in transplantation. Full membership requires certification by American Board of Surgery and training in an approved program. In certain instances, a recommendation of the membership committee along with the approval of the council, membership may be granted for equivalent experience. Surgeon members should have current active involvement as a staff member of a clinical transplant team for at least 6 months, and the applicant should have a minimum of 3 publications in peer-reviewed journals in the field of transplantation or immunology, including primary authorship of at least 1 article. Members must make available, if requested, their

patient records to a review body of the Society for ethical reasons. Other categories of membership are available for trainees, and anyone interested in transplantation can attend the annual meetings.

The following web sites are available for further information:

- International Liver Transplantation Society (ILTS). Available from: <http://www.ilts.org/>.
- American Association for the Study of Liver Disease (AASLD). Available from: <http://www.aasld.org/>.
- Surgical Infection Society (SIS). Available from: <http://www.surgicalinfection.org/site/index.html>.
- American Society of Transplantation (AST, formerly ASTP). Available from: <http://www.a-s-t.org/meetings.htm>.
- United Network for Organ Sharing (UNOS). Available from: www.unos.org.
- National Kidney Foundation (NKF). Available from: www.kidney.org.
- International Pancreas Transplant Registry (IPTR). Available from: www.iptr.umn.edu.
- International Islet Transplant Registry (ITR). Available from: <http://www.med.uni-giessen.de/itr/>.
- The Cell Transplant Society. Available from: www.celltx.org.