Stanford Advanced Lung Support Program
The Stanford Advanced Lung Support Program is a comprehensive approach to the management of patients with severe respiratory failure and end-stage lung disease. This multidisciplinary program brings together pulmonologists, cardiothoracic surgeons, and other specialists from Stanford Health Care to provide full spectrum care to patients with severe lung disease who require mechanical ventilation, extracorporeal membrane oxygenation (ECMO), or lung transplantation. Our clinical experience and surgical expertise allow us to deliver exceptional care to each patient.
World Class Experience

Stanford is known for its distinguished tradition of pioneering cutting-edge medical therapies. Our program treats the most complex and critically ill patients and remains committed to advancing the field of transplant surgery and providing advanced lung support options.

Unsurpassed Expertise

Stanford Health Care is a tertiary referral center with nationally recognized pulmonologists and cardiothoracic surgeons who diagnose and treat a wide spectrum of pulmonary conditions, including:

- Acute respiratory failure
- Acute respiratory distress syndrome (ARDS)
- Chronic obstructive pulmonary disease (COPD)
- Bronchiectasis
- Cystic fibrosis
- Pulmonary hypertension
- Interstitial lung disease

The treatment approach for each disease depends on the phase of illness and severity. For patients with severe respiratory failure or lung disease that has progressed to end-stage, our team may use advanced life support technologies while treating the underlying disease process, awaiting recovery in lung function, or undergoing evaluation for lung transplantation.
Lung Support

Mechanical Ventilation
A mechanical ventilator is a device that supports lung function by moving oxygen in and carbon dioxide gas out of the lungs. It involves placement of a plastic breathing tube into the major airway, called the trachea. This machine can assist lungs with vital gas exchange and may allow time for damaged lungs to recover.

Stanford is an ECMO Center of Excellence recognized by the Extracorporeal Life Support Organization (ELSO).

Extracorporeal Membrane Oxygenation (ECMO)
ECMO is a form of advanced life support. This mechanical device can temporarily replace the function of the lungs or heart, which may allow time for the lungs to heal or provide support for patients who are undergoing a transplant evaluation. The ECMO machine is made up of a circuit that includes cannulas, tubing, a pump, an oxygenator, and a heat exchanger. An experienced team oversees the ECMO circuit to provide continuous support for the patient while minimizing the risk of complications that can be associated with use of the machine.

Ambulatory ECMO

https://www.jtcvs.org/article/S0022-5223(18)30622-6/fulltext

Watch the video clip at the end of this article to see Stanford surgeons demonstrate using ambulatory ECMO to bridge a patient with end-stage pulmonary arterial hypertension to a heart-lung transplant.
Types of ECMO

- Veno-venous ECMO (VV ECMO) supports or replaces the function of the lungs. Deoxygenated blood is removed from the body’s venous system and oxygenated blood is returned into the venous system.

- Veno-arterial ECMO (VA ECMO) supports or replaces the function of the lungs and heart. Deoxygenated blood is removed from the body's venous system and oxygenated blood is returned into the arterial system.

- Alternative configurations, including the use of hybrid veno-venous and veno-arterial ECMO circuits, can be used to meet each patient’s physiologic needs.

ECMO for Transplant

- Mobility: Special ECMO cannulas and circuit configurations may be used to promote greater patient mobility and comfort. The ability to maintain physical strength while on ECMO can play an important role in a successful lung transplant.

- The use of ECMO without a mechanical ventilator is used whenever possible to avoid additional lung injury, allow for lung recovery, and improve patient comfort.
Leaders in Lung Transplantation

A lung transplant is a surgical procedure to replace diseased or failing lungs with healthy lungs, usually from a deceased donor. Lung transplantation can be a definitive treatment therapy for a variety of lung diseases.

The Stanford Advanced Lung Support Program is one of few in the nation that has the experience and capability to perform complex transplant operations. Our team evaluates every case and presents all available treatment options to patients and families.

Stanford is recognized as a high-volume transplant center and has been ranked among the top 10% of most active lung transplant programs nationwide. We typically perform 50-60 lung transplants every year.
Stanford Health Care achieves excellent lung transplant outcomes, with one-year survival rates better than the national average. According to the Scientific Registry of Transplant Recipients, lung transplant patients at Stanford have an estimated one-year survival rate of 97%.

(Report published 7/2022)

Stanford has always been a place for hope, especially for patients who have been told they do not have any. We feel everyone deserves a chance, no matter how complex their case may be, and patients can expect world-class care by our Stanford physicians and surgeons.

— John W. MacArthur, MD, cardiothoracic surgeon and Surgical Director of the Lung Transplant Program
Transplant Care Pathway

• **Initial Transfer Request:** The patient’s medical provider contacts our transfer center for ECMO or transplant evaluation.

• **Transplant Evaluation:** Patients are transferred to Stanford Health Care. Our team completes an expedited review of the patient’s medical history, functional and nutritional status, and social support.

• **Listing:** If accepted by the transplant committee, patients are activated on the waitlist. Organ donation and allocation occurs through a nationally regulated system that considers factors including blood type, geographic region, and lung allocation score to match donors with patients. Organ offers are reviewed and accepted by our transplant pulmonologists and surgeons.

• **Transplant Surgery:** Our team of experienced cardiothoracic surgeons typically complete the operation within three to five hours, depending on patient and donor factors.

• **Recovery:** The patient is closely monitored in the intensive care unit immediately following surgery. As the body becomes accustomed to the new lungs and transplant medication regimen, they are transferred to progressive care units to continue recovery and prepare for discharge to home or specialized centers that can assist patients with additional rehabilitation needs.

• **Lifelong Maintenance:** Our established transplant clinic provides long-term care with regular surveillance and management of transplant-related medications for each recipient.

---

### Transplant Surgeons

- **Jack Boyd, MD**
  Cardiothoracic surgeon

- **Maria E. Currie, MD, PhD**
  Cardiothoracic surgeon

- **Brandon A. Guenthart, MD**
  Cardiothoracic surgeon

- **William Hiesinger, MD**
  Cardiothoracic surgeon

- **Anson Lee, MD**
  Cardiothoracic surgeon

- **John W. MacArthur, MD**
  Cardiothoracic surgeon

- **Yasuhiro Shudo, MD, PhD**
  Cardiothoracic surgeon

- **Joseph Woo, MD**
  Cardiothoracic surgeon
World’s first lung-kidney transplant following COVID infection at Stanford

John, a 54-year-old man, was diagnosed with COVID pneumonia and acute respiratory distress syndrome (ARDS) that required mechanical ventilation and ECMO support. The infection resulted in severe lung damage and kidney failure that required dialysis treatment. He was accepted at Stanford Hospital for a transplant evaluation and transferred from Tacoma, Washington. Stanford’s experienced care team focused on John’s physical rehabilitation while evaluating him for organ transplant. Stanford surgeons operated on John, completing a successful bilateral lung and kidney transplantation – the first such operation in the world following COVID infection. John was transferred to an acute rehabilitation center, and ultimately, he was discharged home.

Read the full article
Referral Information

Evaluation for ECMO

ECMO services are provided by the Stanford Department of Cardiothoracic Surgery. Contact the Transfer Center to request ECMO services for critically ill patients or to transfer patients on ECMO who may require evaluation for lung transplantation. The transfer process will depend on the medical condition of each patient.

Transfer Center Information

Transfer Center
Phone: 1-800-800-1551 (24 hours – 7 days a week)
Fax: 650-723-6505

Physician Helpline
Phone: 1-866-742-4811
Fax: 650-320-9443
Hours: Monday – Friday, 8:00 a.m. – 5 p.m. (PST)
After hours: Call the hospital page operator at 650-723-4000 and ask for the physician on call

Department of Cardiothoracic Surgery
Phone: 650-724-7500
Fax: 650-736-0901
**Evaluation for Lung Transplantation**

**Inpatient Transfer**
For hospitalized patients requiring lung transplant evaluation, contact the Transfer Center for more information.

**Outpatient Referral**
The patient’s doctor will need to request an evaluation by the Stanford Lung Transplant team. The referral request can be sent to the referral center via fax, email, or through the online portal PRISM. The Lung Transplant team will review the patient’s previous medical records and determine if additional tests are necessary.

**Stanford Referral Center**
Fax: 650-320-9443
Email: ReferralCenter@stanfordhealthcare.org

**Online Portal (PRISM)**
Our online portal, known as **PRISM** (Physician Referral Information at Stanford Medicine), provides a streamlined platform for community physicians to send referrals, check on referral status, access medical records, and message Stanford providers.

Online access:
www.prism.stanfordhealthcare.org/prism

**Lung Transplant Program Clinic**
Once referrals have been submitted, patients and healthcare providers can check on the status of their referral by calling the Lung Transplant Program Clinic or online through PRISM.

Phone: 650-723-3633