

Corso Teorico-Pratico

*Trattamento
dell'Insufficienza Respiratoria Acuta
mediante Supporto Extracorporeo*

Centro di Simulazione
Fondazione IRCCS Policlinico, Mangiagalli e Regina Elena
Milano
2009

Il circuito extracorporeo: Tipologie possibili



FONDAZIONE IRCCS
POLICLINICO SAN MATTEO

Giorgio Iotti

Anestesia e Rianimazione 2

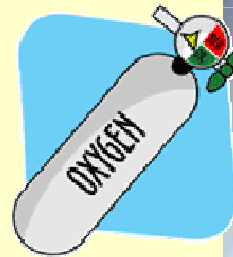
Pavia

Inquadramento Diagnostico Fisiopatologico

INSUFFICIENZA RESPIRATORIA

PUMP FAILURE - **IPERCAPNICA**

LUNG FAILURE - **IPOSSIEMICA**



The Lancet · Saturday 12 August 1967

**ACUTE RESPIRATORY DISTRESS
IN ADULTS**

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INSUFFICIENZA RESPIRATORIA

PUMP FAILURE - **IPERCAPNICA**

LUNG FAILURE - **IPOSSIEMICA**

- Ossigeno
- Ventilazione protettiva
- ↓ spazio morto
- Pronazione
- Manovre di reclutamento
- iNO
- Attività resp. spontanea



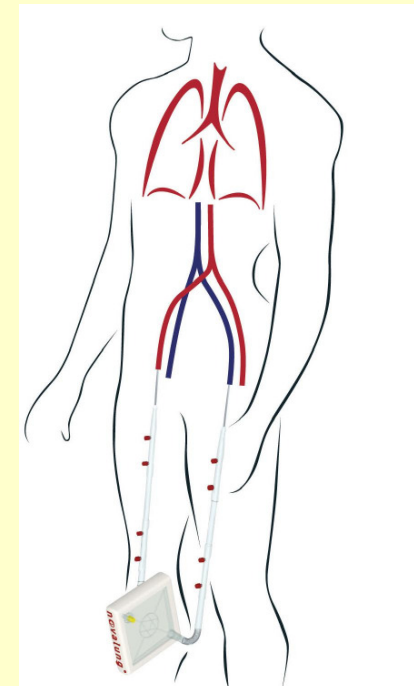
**UTILIZZO OTTIMALE / MASSIMALE
DELL'ORGANO MALATO**

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**UTILIZZO OTTIMALE / MASSIMALE
DELL'ORGANO MALATO**

**SOSTITUZIONE con
ORGANO ARTIFICIALE**

INSUFFICIENZA RESPIRATORIA

PUMP FAILURE - **IPERCAPNICA**

LUNG FAILURE - **IPOSSIEMICA**



Supporto Respiratorio Extracorporeo

- Prelevo del sangue
- Lo tratto con uno scambiatore di gas
Extra Corporeo a Membrana
 - Rimozione di CO₂ (CO₂R) ECCO₂R
 - + Ossigenazione (O) ECMO
- Reinfondo il sangue trattato

JAMA 1979; 242:2193-6

Extracorporeal membrane oxygenation in severe acute respiratory failure. A randomized prospective study.

Zapol WM, Snider MT, Hill JD, Fallat RJ, Bartlett RH, Edmunds LH, Morris AH, Peirce EC 2nd, Thomas AN, Proctor HJ, Drinker PA, Pratt PC, Bagniewski A, Miller RG Jr.

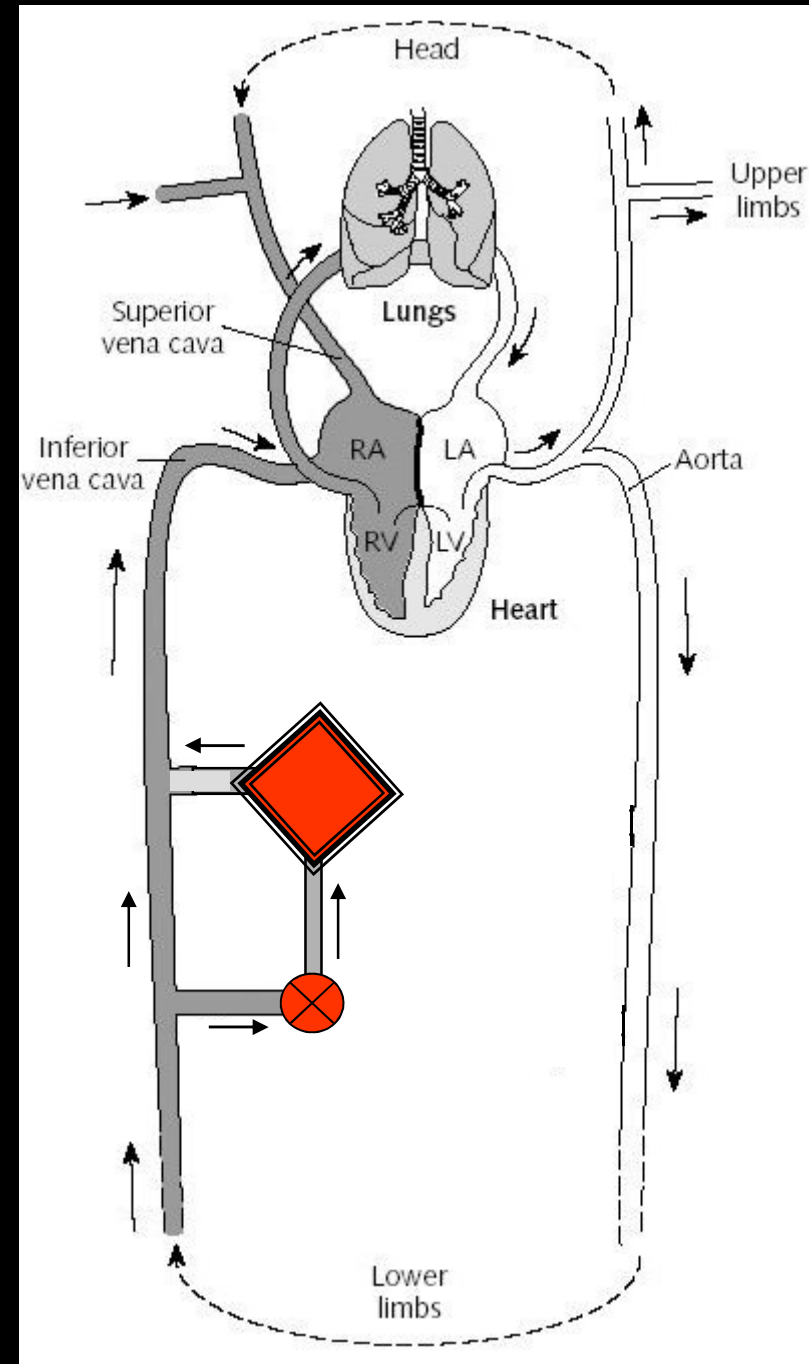


Nine medical centers collaborated in a prospective randomized study to evaluate prolonged extracorporeal membrane oxygenation (ECMO) as a therapy for severe acute respiratory failure (ARF). Ninety adult patients were selected by common criteria of arterial hypoxemia and treated with either conventional mechanical ventilation (48 patients) or mechanical ventilation supplemented with partial venoarterial bypass (42 patients). Four patients in each group survived. The majority of patients suffered acute bacterial or viral pneumonia (57%). All nine patients with pulmonary embolism and six patients with posttraumatic acute respiratory failure died. The majority of patients died of progressive reduction of transpulmonary gas exchange and decreased compliance due to diffuse pulmonary inflammation, necrosis, and fibrosis. **We conclude that ECMO can support respiratory gas exchange but did not increase the probability of long-term survival in patients with severe ARF.**

VV ECMO

Rimozione di CO₂

Ossigenazione



Low-Frequency Positive Pressure Ventilation with Extracorporeal
Carbon Dioxide Removal (LFPPV-ECCO₂R):
An Experimental Study

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G. IAPICHINO, MD*
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J. PIERCE, DVM†
Bethesda, Maryland||

Anesth Analg 57: 470: 1978

Preliminary Communication

TREATMENT OF ACUTE RESPIRATORY FAILURE WITH LOW-FREQUENCY POSITIVE-PRESSURE VENTILATION AND EXTRACORPOREAL REMOVAL OF CO₂

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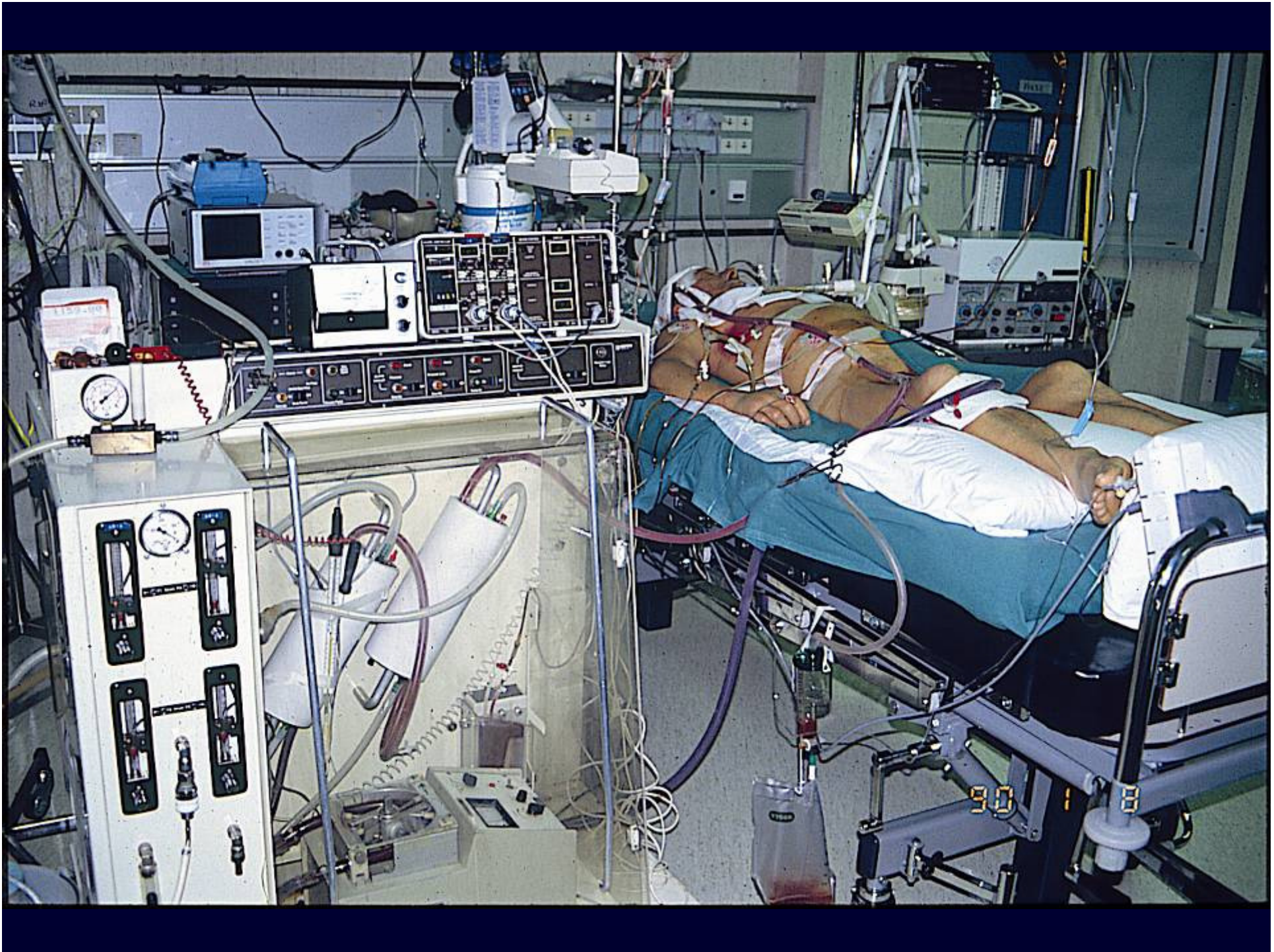
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**Istituto di Anestesiologia e Rianimazione, †Istituto di Clinica Medica VII, and ‡Istituto di Clinica Chirurgica III, Università di Milano; and §National Institutes of Health, Bethesda, Maryland, U.S.A.*

Summary Terminal respiratory failure was reversed in three patients with a combination of extracorporeal CO₂ removal through a membrane lung and oxygen diffusion into the diseased lungs between mechanical breaths induced at a frequency of 2–3/min. The technique seems to prevent the pulmonary barotrauma and extrapulmonary derangements caused by conventional mechanical ventilation.

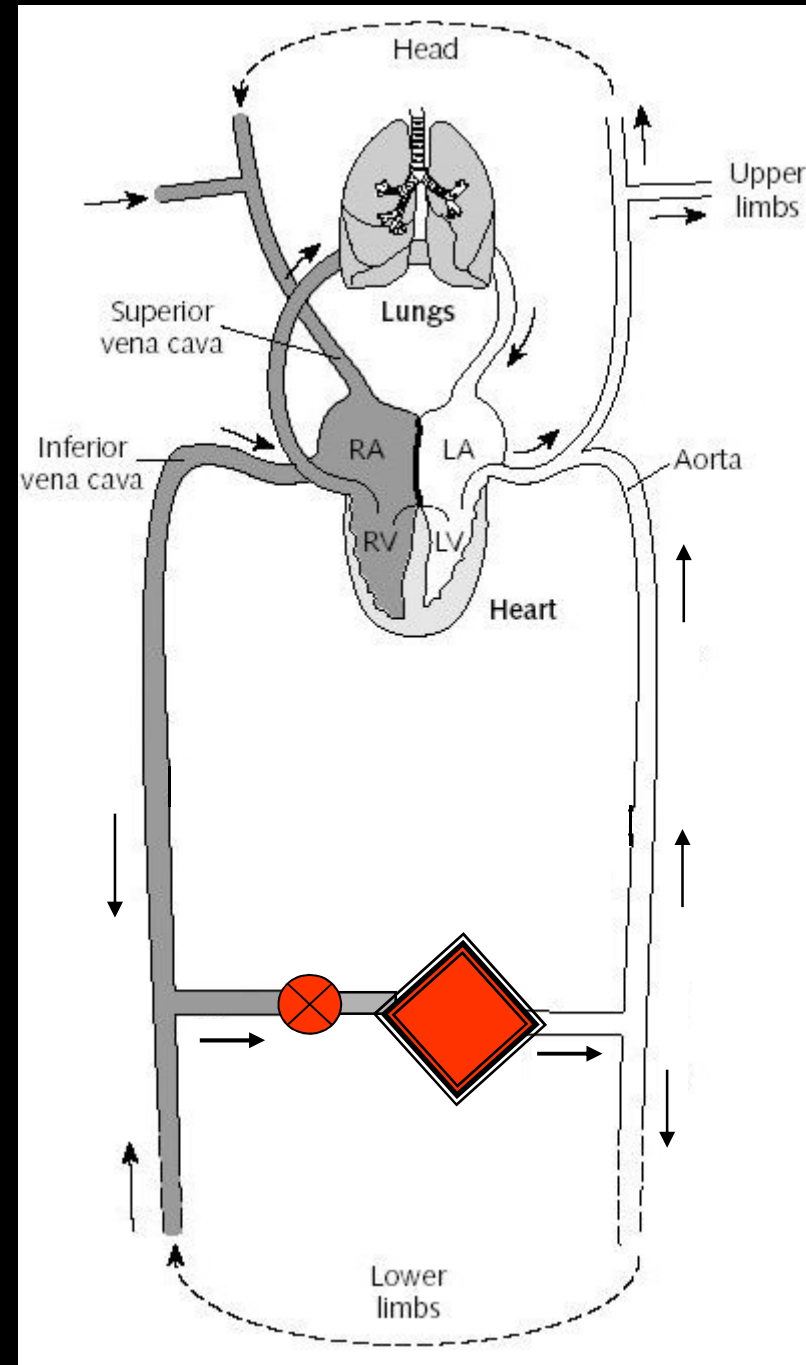


va ECMO

Rimozione di CO₂

Ossigenazione

Assist. Cardiaca



vaECMO respiratoria: problemi

- Fortissima dipendenza dal supporto extracorporeo
- Ridotta perfusione polmonare
- Scarsa ossigenazione del sangue in uscita da VS (coronarie, tronchi sovraortici)
- Problemi di perfusione distale della zona dipendente dall'arteria incannulata
- Embolizzazione sistemica





Bridge to Lung Transplantation With the Extracorporeal Membrane Ventilator Novalung in the Venovenous Mode: The Initial Hannover Experience

STEFAN FISCHER,* MARIUS M. HOEPER,† SANDRA TOMASZEK,* ANDRE SIMON,* JENS GOTTLIEB,† TOBIAS WELTE,† AXEL HAVERICH,*
AND MARTIN STRUEBER*

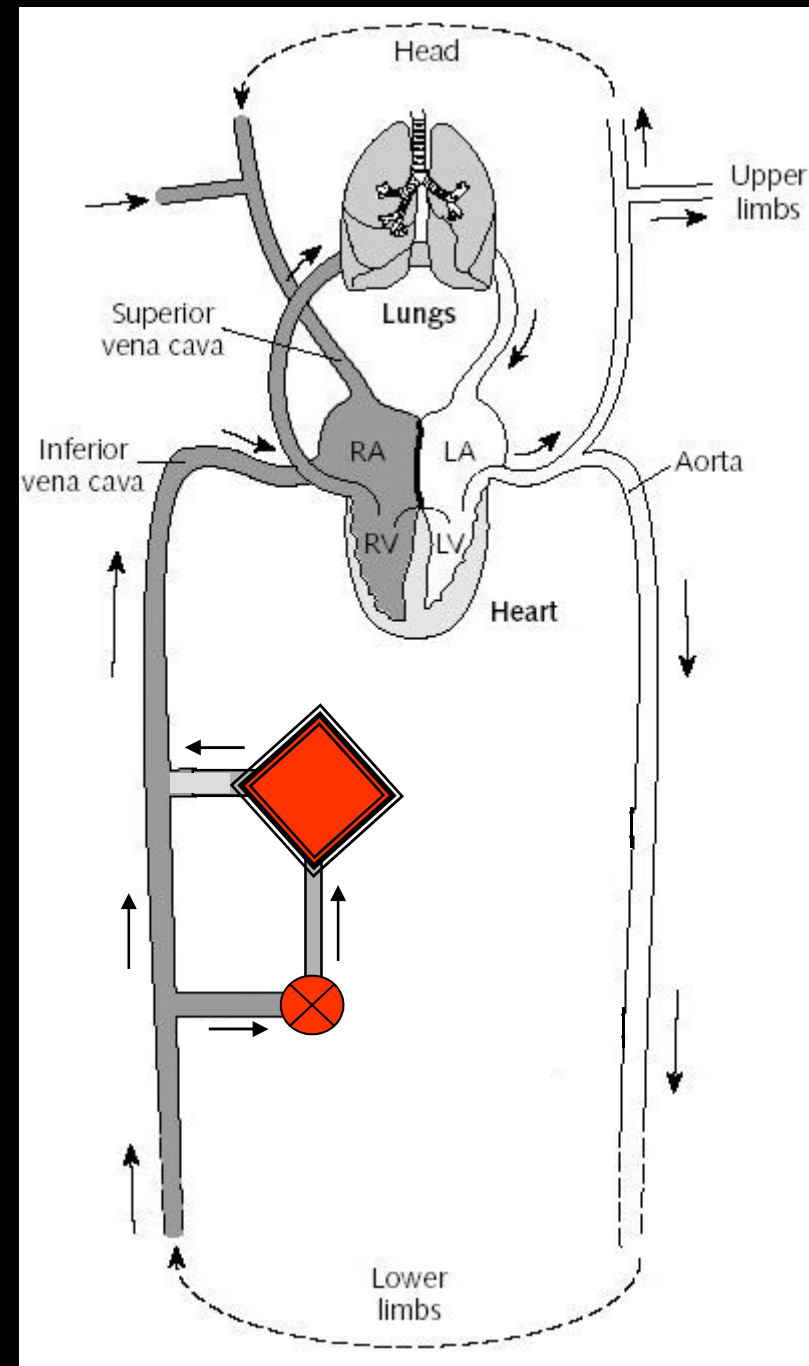
ASAIO Journal 2007; 53:168–170.



VV ECMO

Rimozione di CO₂

Ossigenazione



vvECMO: limiti

- Capacità di ossigenazione: non consente un supporto totale
- Assistenza cardiaca: nessuna, se non indiretta