Does ECMO Actually Work?
Jeffrey DellaVolpe, MD

What is the purpose of ECMO?

Does ECMO actually work?

No!
10% survival in both groups!

What went wrong?
High vent pressures/FiO2 in both groups
10 days of mechanical ventilation prior to ECMO!
2L/day of bleeding & 2.5L/day transfusion requirement!
Irreversible lung fibrosis at autopsy
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**ECMO Trials**
-Gattinoni. Low-Frequency Positive-Pressure Ventilation With Extracorporeal CO2 Removal in Severe Acute Respiratory Failure. JAMA 1986

**ECMO over the next 20 years....**

**THE LANCET**
Efficacy and economic assessment of conventional ventilatory support versus extracorporeal membrane oxygenation for severe adult respiratory failure (CESAR): a multicentre randomised controlled trial

63% v. 47% survival at 6 months without disability

**Also happening in 2009...**

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**ECMO Trials**
- Gattinoni. Low-Frequency Positive-Pressure Ventilation With Extracorporeal CO2 Removal in Severe Acute Respiratory Failure. JAMA 1986
- Peek. Efficacy and economic assessment of conventional ventilatory support versus extracorporeal membrane oxygenation for severe adult respiratory failure (CESAR): a multicentre randomised controlled trial. Lancet 2009
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201 influenza patients
68 supported by ECMO

2009: the debate intensifies...

• Large, pragmatic study
• 63% v. 47% survival
• Cost effective

• 24% of patients transferred to an ECMO center did not receive ECMO
• Higher tidal volumes at non-ECMO centers

EOLIA results

Mortality 35% v 46%

As opposed to 2009, no controversies in 2018...

If a dog wore pants would he wear them like this or like this?
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EOLIA results – not so simple...

Mortality 35% vs 46% → 28% crossover

What to do with a 28% crossover?

Does p value matter?

Is severity the right way to select for ECMO?

Are we asking the right question?

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Asking the right question: what are we treating?

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Asking the right question: should severity be the reason for choosing ECMO?
- P:F ratio
- Oxygenation index
- Refractory hypercapnea
- Murray score
- PIPER score

→ 28% crossover

Does ECMO actually work?
- Improper use of technology?
- No diagnosis used in selection
- Assumption that ARDS was reason we needed ECMO
- Severity necessitated ECMO in all trials

Is ECMO on the decline?

Annual Respiratory Adult Runs

Annual Cardiac Adult Runs
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Maybe it should be?

Post cardiomyopathy shock

Are we asking the right question?

Cardiogenic shock

ECMO as spectrum of mechanical circulatory support
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Amount of vasopressor support needed

Mortality and vasopressor requirement in cardiogenic shock

Mortality

Amount of vasopressor support needed

ECMO for ventilation support

Mechanical ventilation

Driving pressure

Tidal volumes

CO2 clearance in ECMO

Bottom line:
While oxygen increase by ECMO circuit is limited to 30%, CO2 can be decreased by almost 100%!

New patient populations for ECMO?

Asthma

Unable to ventilate
Unable to oxygenate
Obstruction with HD instability

Failure to intubate?
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Prevention of intubation?
- Mechanical ventilation
- Progressive weakness/diabetes
- Ventilation dependence
- Death
- Frailty
- Tracheostomy

Bridge to transplant
- ECMO as BTT
- Cannulation once listed to reduce vent/sedation
- Rescue for patients on ECMO with failure to wean

Bridge to transplant
- Facilitate rehabilitation

Extracorporeal CPR (ECPR)

ECPR
Does ECMO Actually Work?
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Prehospital identification for ECPR?

Pulmonary Embolism

Utilization of Veno-Arterial Extracorporeal Membrane Oxygenation for Massive Pulmonary Embolism
Chester Paisley, MD, Anthony Kowal, BS, Pamela Garza, MD, Maxwell Baikie, BS, Franceke Bahls, MD, MPH, Daniel L. Hez, MD, James S. Gore, MD, St M. Park, MD, Steven P. Gollan, MD, and Zachary N. Son, MD
Division of Cardiology, University of Texas Health Science Center at Houston Department of Internal Medicine, University of Texas Health Science Center at Houston, Houston, TX

Complex airway

High risk electrophysiology procedures

Elective ECMO use for induction or surgery
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Post transplant

Primary graft dysfunction
Ischemic/reperfusion injury
Vasodilation
Right heart failure

Right heart failure post VAD

Regionalized ECMO Care

Transplant/bailout
Cath lab
Surgical backup
Intensive care
Neurointensivist

What kind of tool is ECMO?

Questions?

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