Extracorporeal Membrane Oxygenation (ECMO) is used as oxygen therapy for patients with severe respiratory or cardiac failure, which consists of specific heart-lung machine. The main purpose of ECMO is to guarantee patient receives adequate oxygen delivery, while minimizing Cardiopulmonary output. Cardiac output and arterial oxygen content will equate to adequate oxygen supply of ECMO machine. Careful monitoring of patient ensures they receive systemic needs and healthy equilibrium. Usually, ventilators are sufficient in supplying the patient with oxygen through a tracheal tube, but they increase the metabolic demands of the body, as well as increasing the demand on the cardiopulmonary system. ECMO offers an approach which reduces injury to patient, by eliminating the unnatural mechanical stimulation of breathing from a ventilator.

How does it work?
- Drain venous blood and pump it through an artificial lung
- CO2 is removed and O2 is added
- Oxygenated blood is returned to the patient either through a vein (VV configuration) or artery (AV configuration)

Materials
When it comes to the main materials for an ECMO exam, the main four that comes to mind are the different types of cannulae that are used. The first one used is the Access Cannulae. This is used to drain the blood from the venous system into the ECMO circuitry. Two versions of the access cannulae include single stage (drains blood near a short region of the puncture site) or multi stage (drains blood from the side holes through the longer end of cannula). The next one is the Return Cannulae. This cannulae will deliver blood back to the patient from the ECMO circuit. Third in the series of cannulae would be the Distal Perfusion Cannulae. With this item, blood will be delivered antegrade (blood goes within normal flow) into the femoral artery away from the ECMO return cannula to maintain perfusion to the leg. The last cannula that is used is the Double-Lumen Cannulae. This certain type of cannula provide both access and return blood flow into the vascular system. Length all dictates where the cannula is used. Long cannulae are 55 centimeters, and are used for the venous system. Short cannulae are usually between 15-25 centimeters and access venous blood through the jugular vein.

Methods
The two main forms of completing an Extracorporeal Membrane Oxygenation exam are Veno-arterial and Veno-venous. In a (VA) ECMO exam, a long cannulae is placed in the right common femoral vein to remove blood, while an arterial cannula is placed in the right femoral artery to insert the blood. When doing this certain exam on adults, it is a plus if the femoral artery is accessed because insertion is just simpler that way. For a (VV) ECMO exam, the cannulae are inserted into the right common femoral vein for drainage and the right internal jugular vein for infusion. A remix of this exam would be to use a Double-Lumen cannulae and insert them into the right internal jugular vein, and when blood is drained from the SVC and IVC, the cannulae would return the blood directly into the right atrium.

Summary
For cardiac support, Veno-Arterial ECMO is used
For respiratory failure, Veno-Venous ECMO is used

The ECMO team must choose their patients wisely. They only use ECMO on people that are already dying, therefore the end result of survivors is scarce. Mortality rates are still high for ECMO patients, but more research is able to be done because dying patients with lung and heart failure. If ECMO can save one out of ten patients, even that is a success. This will be an integral part as more studies and improvements arise.

Future
In the past, big bulky machines took up a lot of the room. Now, ECMO machines are much smaller and less bulky, along with less complications and risk.

In the beginning, it was not advisable to keep a patient on ECMO for more than 5 days. With advanced technology, we are now able to keep a patient on ECMO for months.

With advancements, ECMO machines can now be managed by an ICU nurse as opposed to having a doctors in the room 24/7. However, a specialist still has to be readily available.

Background
1930: first attempt at extracorporeal support
  - John H. Gibbon developed a roller pump device and an oxygenator, which was used during open heart surgery.
  - 1953: first successful human intracardiac operation using ECMO
  - Mechanical extracorporeal pump oxygenator
  - Mayo-Gibbon pump oxygenator made available for commercial use
1955: further development of Gibbon’s oxygenator
1959: National Heart, Lung and Blood Institute in the USA published results of ECMO support
  - Disappointing 90% of patients died
  - ECMO can support patients, but did not stop lungs from deteriorating
  - ECMO stopped
1989: Extracorporeal Life Support Organization (ELSO)
  - Clinicians created to study and observe how ECMO can be improved
  - They were the minority
  - However, small improvements, like improving ventilation, in technique over time were made
  - Till this day, still a progressive experiment