

Cardiopulmonary Resuscitation



Cardiopulmonary resuscitation creates ventilation and cardiac output in an attempt to maintain the myocardium until defibrillation can be attempted.

External cardiac compression is often the only means available for producing cardiac output, but it is not particularly effective.

Chances of re-establishing a normal heartbeat depend on the coronary blood flow created during CPR (*Ann. Em er. Med.*, 1984).

Coronary Blood Flow (mL/Min/G)	Outcome
0.1	Can't Revive
0.3	Hard To Revive
0.5	Easy To Revive

Repeated injection of large doses of epinephrine may raise arterial pressure, thus improving coronary blood flow (*Crit. Care Med.*, 1993).





Protocol	Coronary Perfusion Pressure (mmHg)
No Epinephrine	15
Epi (0.02 mG/kG)	20
Epi (0.2 mG/kG)	35

In this exercise, we'll produce cardiac arrest by fibrillating the heart. CPR will then be started and the hemodynamic details can be observed. Defibrillation will be attempted at 10 minutes.

The Cardiopulmonary Resuscitation Protocol

Click **Restart** to reestablish initial conditions and then record control values.

Go to  **Ventricles** and click the fibrillate now button. Note that the heart is no longer pumping blood. Then go to  **Misc. Treatments** and set the CPR switch to on. Record the acute hemodynamic effects of cardiac arrest plus CPR. Advance time and record data.



Blood Pressure (mmHg)





Cardiac Output (mL/Min)

Heart Rate (Beats/Min)

Stroke Volume (mL)



Left Heart (Coronary) Blood Flow (mL/Min)



Arterial pO₂ (mmHg)

Blood pH

Blood [Lactate-] (mEq/L)

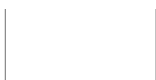


Total Ventilation (L/Min)





Sympathetic Ganglia Firing (Hz)

Time	Control	30 Sec	1 Min	10 Min
Blood Pressure				



Cardiac Output				
Heart Rate				
Stroke Volume				
Coronary Flow				
Arterial pO ₂				
Blood pH				
Blood [Lac-]				
Ventilation				
Symp Activity				

You can go to  **Structure / Function** to monitor changes in organ function with time.

 **Charts** shows neurological signs.

After 10 minutes, go to  **Misc. Treatments** to attempt defibrillation.

The probability of successful defibrillation decreases 5% with each passing minute of CPR.

Design a strategy for re-establishing a normal heartbeat after 20 minutes of CPR.



Design a strategy for re-establishing a normal heartbeat after 10 minutes of cardiac arrest with no life support followed by a period of 10 minutes of CPR.

References

Ann. Em er. Med. 13:79, 1984.

Crit. Care Med. 21:413, 1993.

