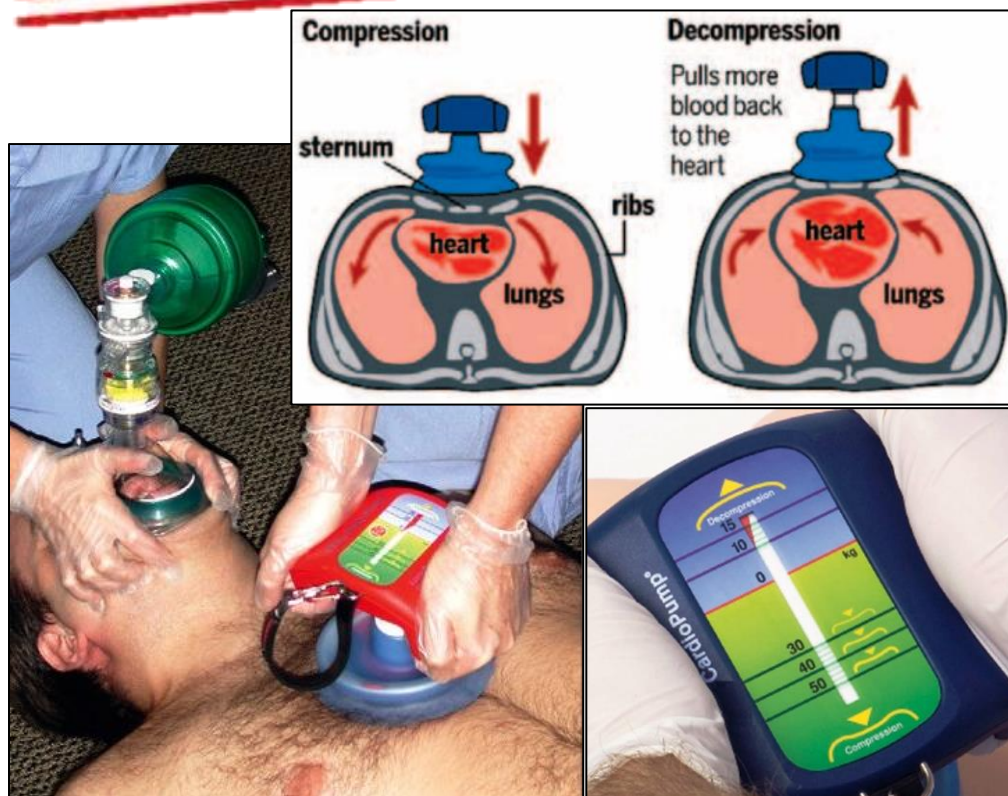




**NORTHWEST
COMMUNITY
EMERGENCY
MEDICAL
SERVICES
SYSTEM**

**TUESDAY
3 Nov 2015
1030 am
NCH Rm 1-11**

RESEARCH & DEVELOPMENT



Part 6: Alternative Techniques and Ancillary Devices for Cardiopulmonary Resuscitation

2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

2015 Recommendation—New

The existing evidence, primarily from 1 large RCT of low quality, does not support the routine use of ACD-CPR+ITD as an alternative to conventional CPR. The combination may be a reasonable alternative in settings with available equipment and properly trained personnel (Class IIb, LOE C-LD).

Active Compression-Decompression CPR and Impedance Threshold Device^{ALS 579}

ACD-CPR is performed by using a handheld device with a suction cup applied over the midsternum of the chest. After chest compression, the device is used to actively lift up the anterior chest during decompressions. The application of external negative suction during decompression enhances the negative intrathoracic pressure (vacuum) generated by chest recoil, thereby increasing venous return (preload) to the heart and cardiac output during the next chest compression. ACD-CPR is believed to act synergistically with the ITD to enhance venous return during chest decompression and improves blood flow to vital organs during CPR. Commercially available ACD-CPR devices have a gauge meter to guide compression and decompression forces and a metronome to guide duty cycle and chest compression rate. The use of ACD-CPR in comparison with conventional CPR was last reviewed for the 2010 Guidelines. Since the 2010 Guidelines, new evidence is available regarding the use of ACD-CPR in combination with the ITD.

2015 Evidence Summary

The combination of ACD-CPR with an ITD has been studied in 4 RCTs reported in 5 publications.^{9,13-16} Two of these trials evaluated ACD-CPR with the ITD in comparison with ACD-CPR alone.^{9,13} The first of these used femoral artery catheters to measure improved hemodynamic parameters but found no difference in ROSC, 24-hour survival, or survival to hospital discharge.⁹ In a follow-up RCT of 400 patients, the ACD-CPR with a functioning ITD increased 24-hour survival, but again there was no difference in survival to hospital discharge or survival with good neurologic function as compared with the ACD-CPR with sham ITD group.¹³

The remaining 2 RCTs compared ACD-CPR with the ITD versus conventional CPR. The first was a single-center RCT in which 210 patients were randomly assigned to ACD-CPR+ITD or conventional CPR after intubation by the advanced life support team, which arrived on scene a mean of 9.5 minutes after the 9-1-1 call.¹⁴ The chest compression and ventilation rates in both arms were 100/min and 10 to 12 breaths/min, respectively. The ROSC, 1-hour, and 24-hour rates of survival were all significantly improved in the ACD-CPR+ITD group as compared with conventional CPR, but survival to hospital discharge and survival with favorable neurologic outcome were not significantly different. The second trial is the ResQ trial, which was conducted in 7 distinct geographic regions of the United States. In the ResQ trial, conventional CPR was performed with compressions at 100/min, with a compression-to-ventilation ratio of 30:2 during basic life support and ventilation rate of 10/min after intubation. In the ACD-CPR+ITD group, compressions were performed at a rate of 80/min and ventilation at a rate of 10/min. In the intervention arm, a metronome was used to guide the compression rate, a force gauge was used to guide compression depth and recoil, and timing lights on the ITD were used to guide ventilation rate. Two analyses of data from the ResQ trial have been published; the first was restricted to OHCA of presumed cardiac etiology,¹⁵ and the second included all enrolled patients.¹⁶ The complete trial enrolled 2738 patients (conventional CPR=1335, ACD-CPR+ITD=1403) before it was terminated early because of funding constraints.¹⁶ Survival to hospital discharge with favorable neurologic function (modified Rankin Scale score of 3 or less) was greater in the ACD-CPR+ITD group as compared with the conventional CPR group: 7.9% versus 5.7% (odds ratio, 1.42; 95% confidence interval, 1.04–1.95), and this difference was maintained out to 1 year. For survival to hospital discharge with favorable neurologic function, this translates into a number needed to treat of 45 with very wide confidence limits (95% confidence interval, 25–333), making interpretation of the true clinical effect challenging. There was no difference in the overall incidence of adverse events, although pulmonary edema was more common with ACD-CPR+ITD as compared with conventional CPR (11.3% versus 7.9%; $P=0.002$). The ResQ Trial had a number of important limitations, including lack of blinding, different CPR feedback elements between the study arms (ie, co-intervention), lack of CPR quality assessment, and early termination. Although improved neurologic function was noted with the use of the ACD-CPR+ITD combination at both hospital discharge and 1-year follow-up, additional trials are needed to confirm these findings.