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## PHYSICIAN GUIDE

### Overview

Counterpulsation therapy is a non-invasive technique employing sequential inflation of three sets of lower extremity cuffs during diastole, with deflation at the onset of systole. Counterpulsation Therapy increases venous return, augments diastolic pressure and provides presystolic unloading. Counterpulsation provides benefits of decreased anginal frequency, improved exercise tolerance and improved stress myocardial perfusion in patients with chronic angina. It has been postulated from its similarities to the IABP that the hemodynamic effects of Counterpulsation result in collateral recruitment and/or development.

### FDA Status

Counterpulsation is FDA cleared for: Angina Pectoris, Acute MI and Cardiogenic Shock. FDA 510(k) approval #K872034 date 09/18/87.

### Treatment Objectives

Counterpulsation demonstrates a potent ability to increase cardiac output and significantly augments retrograde diastolic flow. Due to its additional action of increasing venous return, the effect of ECPT on cardiac output may be superior to the intra-aortic balloon pump (IABP).

In a 1996 study presented to the ACC, the following changes were noticed during ECPT:

Change in cardiac output = 60%

Increase in average DTVI (diastolic time velocity integral) = 227%

Increase in average (D/S) TVI = 116%

### **NOTES:**

$$\% \text{ Change in cardiac output} = \frac{(STVI \times HR)_{EECP} - (STVI \times HR)_{baseline}}{(STVI \times HR)_{baseline}}$$

### Patient Selection Criteria

Patients who were identified as Angina Pectoris patients, Acute MI and Cardiogenic shock, are candidates for ECPT.



## Contraindications

- Cardiac catheterization within 1-2 weeks.
- Cardiac surgery within 3 months.
- Arrhythmia such as A-fib, Atrial flutter or ventricular tachycardia.
- Atrial pacemakers
- Aneurysm.
- Pregnancy.
- Bleeding diathesis (Coumadin therapy with PT > 15).
- Severe hypertension (> 180/110 mmHg).
- Severe Peripheral Vascular Disease (PVD) and/or phlebitis.
- Aortic insufficiency where regurgitation would prevent diastolic augmentation.

## Preliminary Testing

The following baseline measurements and test results must be provided by the referring physician prior to preliminary testing:

**Blood pressure**, less than 180/110 mmHg; Resting EKG ; Physician clearance from other contraindications (such as surgery, pregnancy, etc). In order to eliminate the possibility of other clinical contraindications, the following testing should be performed:

**Doppler Echocardiogram** - Pulsed Doppler measurements of flow in the descending aorta to rule out the presence of regurgitation.

**Abdominal Ultrasound** - To rule out aneurysm  
Duplex Vascular Ultrasound of the extremities - to rule out deep vein thrombosis

**Cardiac Gated SPECT nuclear stress test** - To evaluate the extent of cardiac disease pre and post ECPT therapy.

