

Editorial: Enhanced External Counterpulsation (EECP) Therapy: An Underutilized tool in diabetic patients

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Abbreviations

- **ACCF:** American College of Cardiology Foundation
- **AHA:** American Heart Association
- **ACP:** American College of Physicians
- **AATS:** American Association for Thoracic Surgery
- **PCNA:** Preventive Cardiovascular Nurses Association
- **SCAI:** Society for Cardiovascular Angiography and Interventions
- **STS:** Society of Thoracic Surgeons
- **EECP:** Enhanced external counterpulsation

Keywords: Enhanced external counterpulsation, Diabetic patients, non-invasive intervention

Abstract:

An underutilized tool in the cardiovascular armamentarium, for Cardiologists and Endocrinologists in particular to be aware of, is **Enhanced External Counterpulsation (EECP) Therapy**. EECP is recognized as a valuable therapeutic option for patients with **Coronary Artery Disease** and **Diabetes Mellitus**. The mechanism by which this technique exerts favorable results may also offer the "over-30" generation a viable option for the prevention and treatment of endothelial dysfunction, particularly in early insulin resistance, thereby helping diminish vascular aging.

EECP may also improve athletic performance and can serve as a valuable component of cardiovascular fitness programs for competitive sports teams and individual athletes.

Developed at Harvard in the early 1950s to enhance the development of coronary collateral circulation, EECP has since been shown in multiple clinical trials to provide benefits not only to patients with vascular disease but also to healthy individuals, including athletes, particularly in exercise recovery.

How EECP Works

EECP Therapy delivers oxygenated blood to every vital organ of the body. This mechanical increase in oxygenated blood flow has demonstrated documented improvements in individuals with:

- Diabetes, Vascular Erectile Dysfunction , Alzheimer's Disease , Parkinson's Disease
- Peripheral Vascular Disease , Coronary Artery Disease , Kidney Dysfunction , Restless Leg Syndrome , Tinnitus , Memory Loss , Stroke, Diabetic Retinopathy

Established Clinical Evidence

External Counterpulsation Therapy (EECP and ECP Therapy) has demonstrated significant benefit in many cardiac patients and has been discussed in several respected, peer-reviewed journals, including the **New England Journal of Medicine** and the **Journal of the American College of Cardiology**. To qualify for reimbursement through the U.S. Medicare and many private insurance providers worldwide, patients generally must meet established clinical criteria.

Candidate Selection Criteria

Documented Coronary Artery Disease

Objective evidence of cardiovascular disease demonstrated by:

- Angiography, Stress Testing, Nuclear Imaging, Echocardiography, Electrocardiography (EKG) , Holter Monitoring.

Symptoms During Physical Exertion

Patients are generally comfortable at rest, but less-than-ordinary physical activity may produce: Chest Pain, Shortness of Breath, Fatigue, Palpitations

Inoperable Patients

Patients with: Excessive procedural risk , Significant co-morbid conditions, Advanced age, Refusal of further invasive procedures

Inadequate Relief From Medication

Patients who: Continue to experience symptoms despite medical therapy , Experience medication-related side effects , Require excessive use of nitrates or Ranexa®

EECP Therapy has been shown to reduce, and in some cases eliminate, the need for certain anti-anginal medications.

Athletic Performance and Recovery

EECP may enhance athletic performance and shorten recovery times after exercise through improved clearance of lactic acid accumulation. Benefits have also been reported in sports injury recovery and rehabilitation programs.

Mechanism of Action

EECP utilizes inflatable cuffs wrapped around the lower extremities to increase venous return and augment diastolic blood pressure.

The cuffs inflate sequentially from the calves to the thighs during diastole and deflate instantaneously during systole.

This process:

- Increases coronary perfusion pressure
- Reduces peripheral vascular resistance
- Improves left ventricular diastolic filling
- Enhances endothelial function
- Improves flow-mediated vasodilation

Additional proposed mechanisms include:

- Recruitment of collateral circulation
- Reduction of oxidative stress
- Reduction of pro-inflammatory cytokines

FDA Approval and Treatment Protocol

EECP received approval from the U.S. Food and Drug Administration (FDA) in 1995 for patients with coronary artery disease and refractory angina who have failed standard revascularization procedures and aggressive pharmacotherapy.

A standard treatment course consists of:

- 35 sessions
- 1 hour per session
- 5 days per week

Contraindications

- Decompensated Heart Failure, Severe Peripheral Artery Disease, Severe Aortic Regurgitation, Aortic Aneurysm.

Clinical Outcomes

Multiple randomized controlled trials, observational studies, and registry analyses have demonstrated improvements in Angina Class, Exercise Duration, Myocardial Perfusion, Quality of Life, Functional Capacity

2012 Guideline Recommendation ACCF/AHA/ACP/AATS/PCNA/SCAI/STS Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease

Class IIb Recommendation

EECP may be considered for the relief of refractory angina in patients with Stable Ischemic Heart Disease (SIHD).

Level of Evidence: B

Patient Populations to Consider

Post-Revascularization Patients

Patients who have undergone:

- Coronary Artery Bypass Grafting (CABG)
- Percutaneous Coronary Intervention (PCI)

within the previous five years or longer.

Diabetic Patients

Particularly those with: Cardiac Autonomic Neuropathy ,Silent Ischemia ,Exercise Intolerance ,Increased Surgical Risk

Sedentary Lifestyle Patients

Individuals who avoid activity due to symptoms and discomfort and who may benefit from improved coronary and peripheral vascular function.

Additional Considerations

- Small Vessel Disease,Diffuse Coronary Disease,Left Ventricular Diastolic Dysfunction
- Incomplete Revascularization, Inoperable Coronary Lesions ,Congestive Heart Failure with Documented Ischemia , Reduced Functional Capacity
- Exercise Intolerance

INOCA (Ischemia with No Obstructive Coronary Artery Disease)

Particularly common in:

- Females,Hypertension ,Diabetes Mellitus ,Insulin Resistance ,Hyperlipidemia
- Chronic Inflammatory Disease ,Smokers
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Primary Mechanisms

Coronary Microvascular Dysfunction (CMD)

The smallest coronary vessels fail to dilate appropriately, limiting oxygen-rich blood delivery.

Coronary Vasospastic Disorders

Temporary spasms of the coronary arteries reduce blood flow and provoke symptoms.

Symptoms and Conditions Commonly Evaluated

- Palpitations, Fatigue, Arrhythmias, Leg Pain , Coronary Artery Disease ,Angina
- Chest Pain ,Shortness of Breath, Cardiomyopathy ,Heart Failure ,COVID
- Post-COVID Syndrome ,Peripheral Vascular Disease ,Erectile Dysfunction

Specific Risks of EECF

Occasionally, patients may experience:

- Mild skin irritation beneath the treatment cuffs ,Muscle discomfort
- Joint discomfort ,Temporary fatigue during the first week of treatment

Rarely, patients may develop shortness of breath requiring hospitalization and treatment.

The editorial presented above contains the author's genuine thoughts. For readers interested in exploring further, the list below includes numerous highly recommended resources

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