



Enhancing Patient Care with EECP Therapy

***ANVI™ Multispeciality Clinic,
Andheri (w), Mumbai***

www.anvimultispecialityclinic.com

INTRODUCTION



- Welcome to ANVI™ Multispeciality Clinic's introduction to Enhanced External Counter Pulsation (EECP) Therapy.
- This presentation aims to provide essential information to facilitate informed decision-making when considering EECP therapy.



What is EECP Therapy?

- EECP therapy, also known as Enhanced External Counter Pulsation, is a non-invasive outpatient treatment for cardiovascular conditions such as Angina, Heart Failure, and Coronary Artery Disease.
- It is popularly referred to as the "Natural Bypass Treatment For Heart."
- EECP can be considered as a "Second Heart" or "a Heart to a Heart".



Is EECP Therapy Invasive?

- No, EECP therapy is entirely a non-invasive treatment, making it a safe option for patients who are not suitable candidates for invasive procedures.



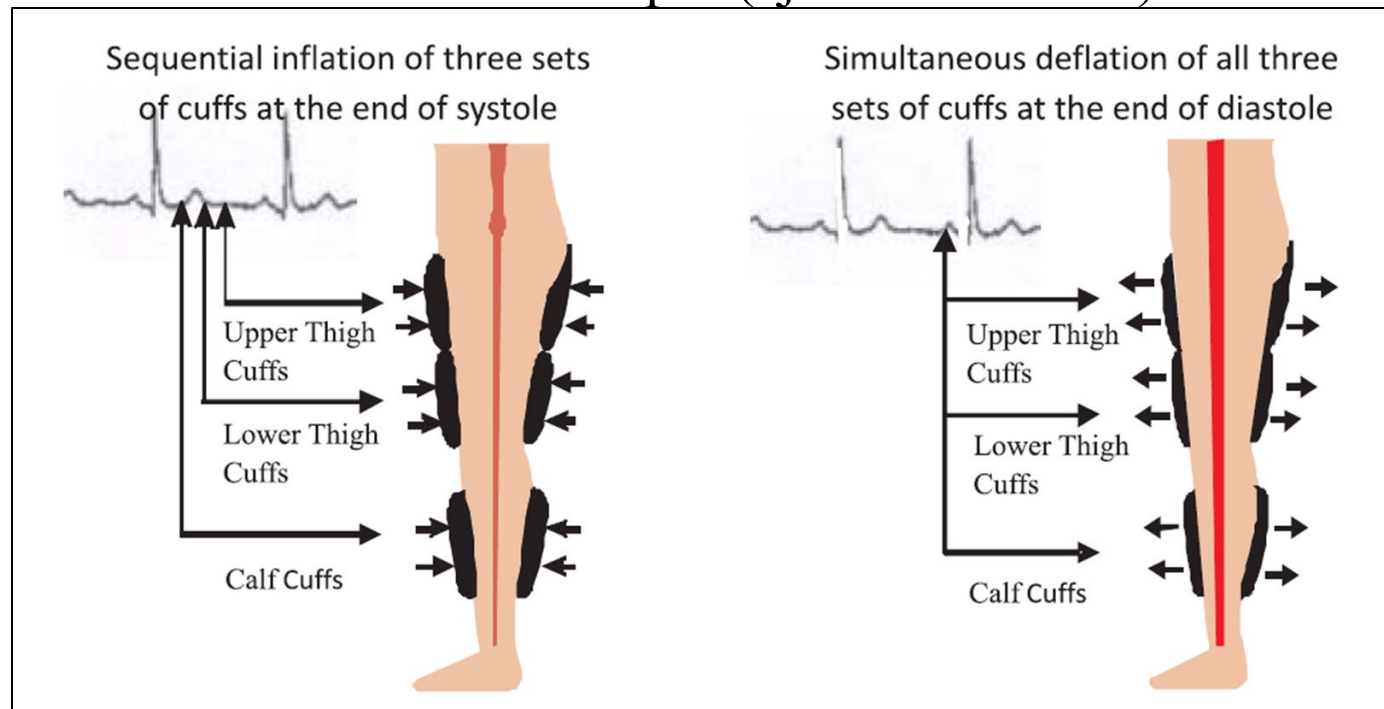
Procedure Overview

- During an EECF session, patients lie on a specialised treatment bed wrapped in pneumatic cuffs around their calves, lower and upper thighs, and buttocks.
- The cuffs inflate and deflate sequentially to create a high pressure counter-pulse which is in sync with the diastolic phase of each cardiac cycle under an Electrocardiographic (ECG) trigger.



Mechanism of Action

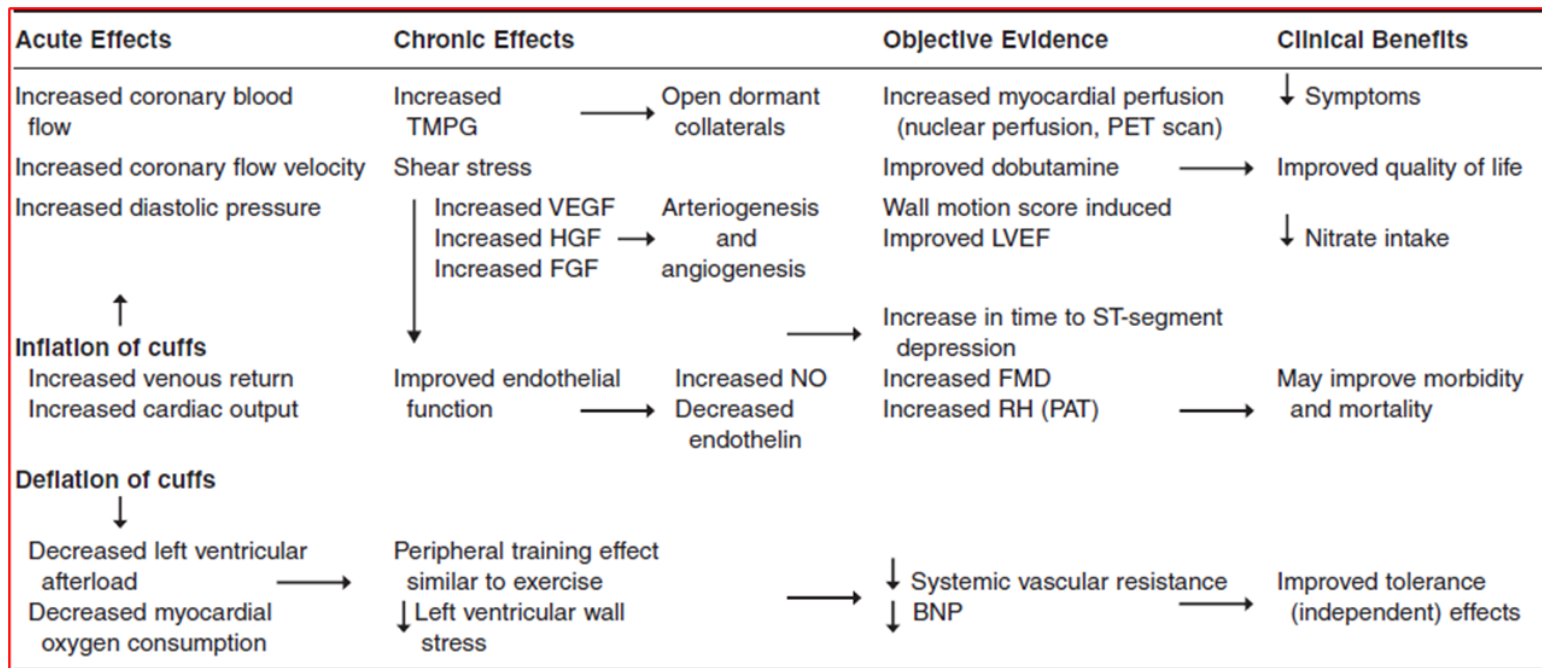
- EECP Therapy enhances the formation of collateral circulation and hence blood supply to the salvageable heart muscles compromised by the blocked blood vessels (coronaries).
- By generating the “Counter-pulsation”, EECP treatment leads to increased blood flow to the coronaries (vessels supplying blood to heart muscles) and hence coronary perfusion.
- The systolic unloading of the left ventricle may gradually increase the ventricular output (ejection fraction).





Mechanism of Action

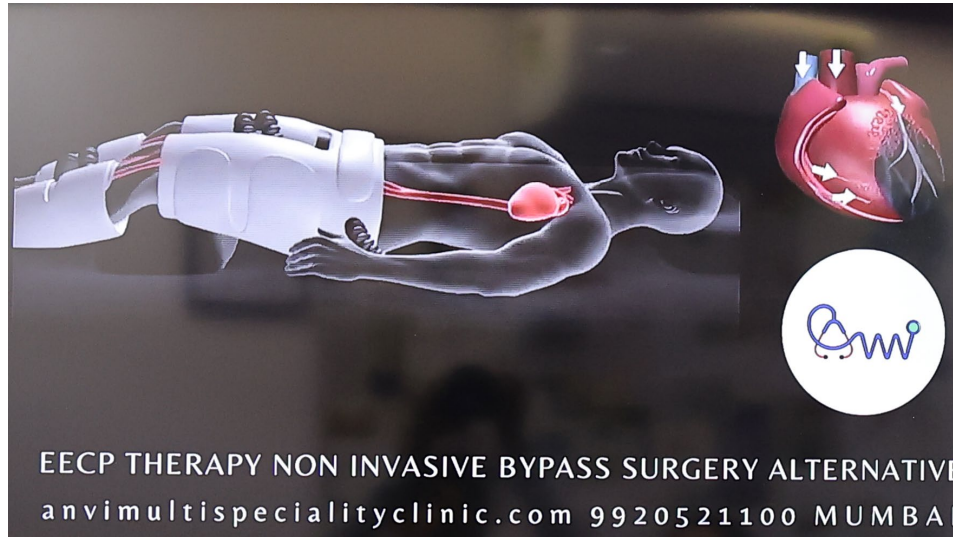
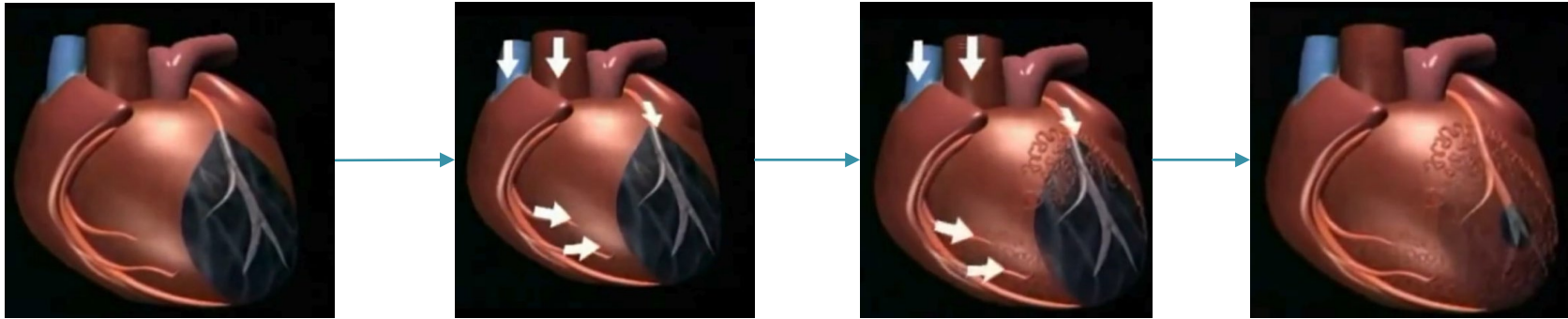
- EECP treatment increases the release of NO and PGE2 by causing shear stress on the inner lining of blood vessels causing dilatation of coronaries and hence blood flow to heart muscles.
- The simultaneous release of factors like VEGF increase angiogenesis (blood vessels formation) and hence aid in formation of collaterals and increase coronary microcirculation.



Mechanism of Action (Contd..)

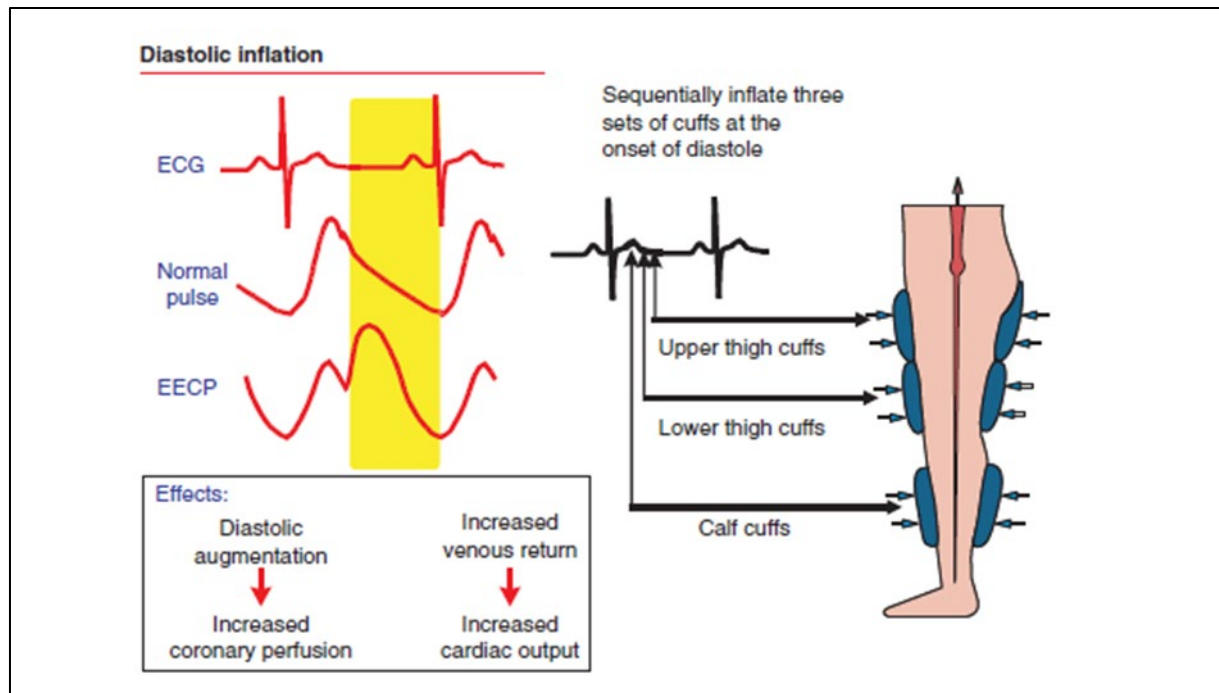


- With daily sessions of the EECP, gradually the collateral circulation of the coronaries start forming and opening. This leads to improved blood flow to the Heart muscles, Reducing Myocardial Oxygen Demand and enhance cardiac function.
- EECP has also been shown to have anti-inflammatory effects in patients with symptomatic angina.



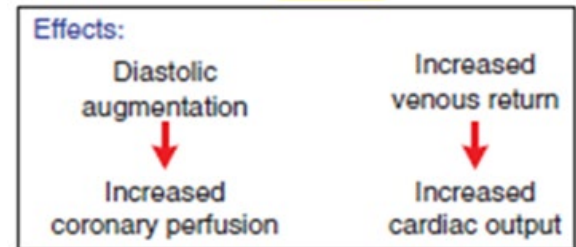
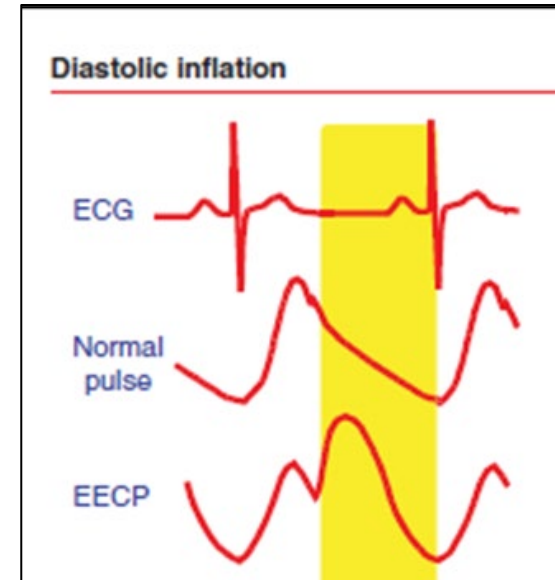
What does “Counter Pulsation” mean?

- With the sequential inflation of the pneumatic cuffs from below upwards under high pressure a pressure waveform during the counter (or reverse) phase of normal cardiac pulsation in diastole (Heart Ventricular relaxation phase) is generated. This is known as “Counterpulsation”.



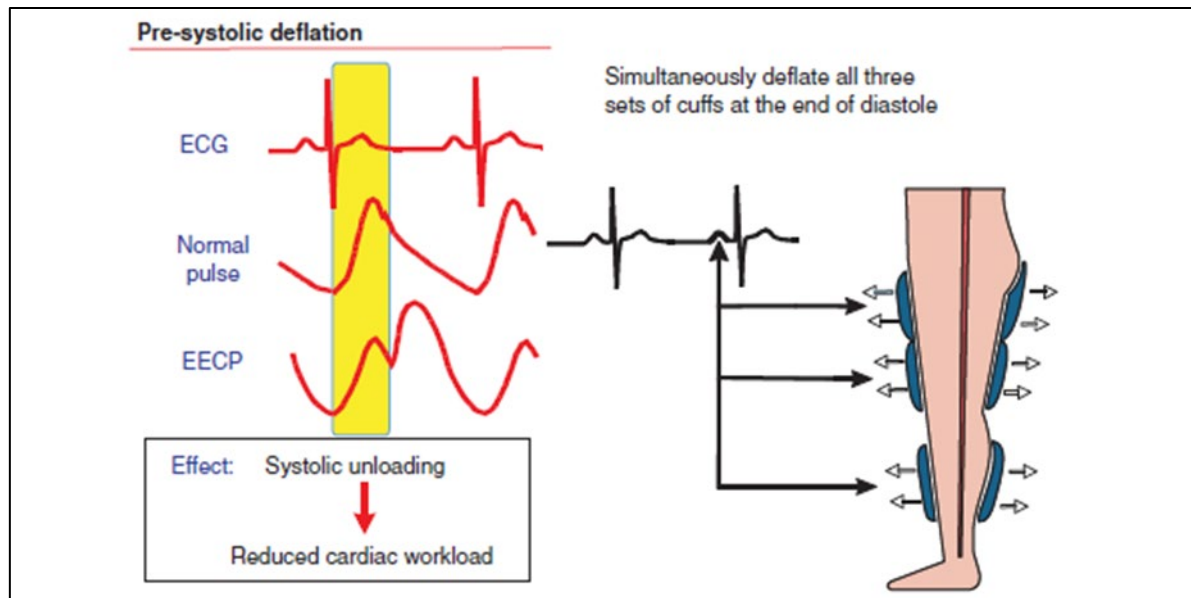
How does “Counter Pulsation” increase Coronary Blood Flow?

The Counter Pulsation leads to an augmentation (increase) of aortic pressure during diastole (relaxation phase of cardiac cycle) against the closed aortic valve. This enhances blood flow to the coronaries (vessels supplying blood to heart muscles) and hence coronary perfusion.



What does “Systolic Unloading” mean?

After the sequential high pressure inflation of the pneumatic cuffs, all the cuffs are deflated suddenly during the systole (Electrocardiographic triggered deflation). This causes suction like effect, which reduces the afterload and is called “Systolic Unloading” of the Left Ventricle of Heart.



Who can take EECPP Treatment?

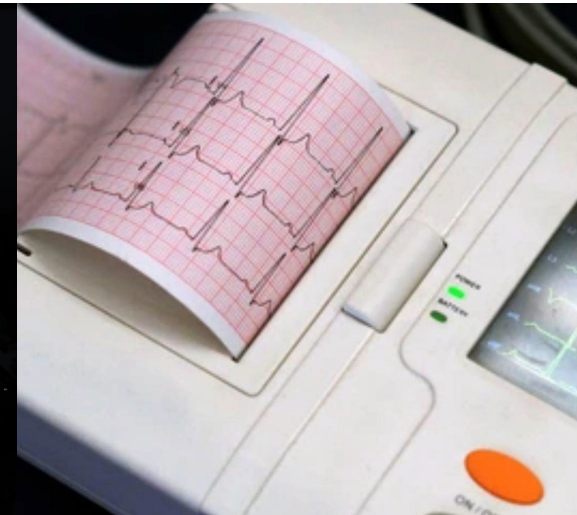


Ideal candidates for EECPP therapy include patients with:

- Coronary Artery Disease.
- Refractory angina.
- Awaiting invasive interventions such as coronary angioplasty or bypass surgery.
- Co-morbid conditions making them unfit for invasive interventions such as coronary angioplasty or bypass surgery.
- History of having undergone coronary angioplasty/Bypass surgery but still having symptoms.
- Ischemic or Idiopathic Cardiomyopathy.
- Stable Heart Failure (NYHA Class II & III)
- Left Ventricular Dysfunction (EF < 35%)
- Cardiac Syndrome X (Microvascular Angina)

Treatment Benefits

- EECp therapy has potential to improve Symptoms, Exercise Capacity, Walking Distance and Quality of life in patients with cardiovascular conditions.
- After completing the treatment course, patients experience improvements in objective measures such as the 6-minute walk test, Echocardiographic parameters, and subjective symptoms and wellbeing.
- It may also have positive effects on other vital organs and overall well-being.



Treatment Protocol

- EECP therapy consists of 35-40 sessions, each lasting 45-60 minutes.
- Patients are monitored throughout the sessions, and parameters such as Blood Pressure, Oxygen Saturation, and ECG are closely monitored.
- At ANVI™ Multispeciality Clinic, EECP Treatment is given after complete assessment and in full supervision of Dr. Asmita D. Chaturvedi, M.B.B.S.; M.D.(Medicine)





Clinical Evidence

Multiple randomised controlled trials and meta-analyses have demonstrated the efficacy of EECP therapy in improving angina symptoms, exercise capacity, and quality of life in patients with refractory angina and heart failure.

The Effect of Enhanced External Counterpulsation Therapy and Improvement of Functional Capacity in Chronic Heart Failure patients: a Randomized Clinical Trial

Starry H. Rampengan¹, Joedo Prihartono², Minarma Siagian³, Suzanna Immanuel⁴

EECP: A non-Invasive therapy for refractory angina

Beaini Y, Morley C. EECP: A non-invasive therapy for refractory angina. The Practitioner 2009;253(1715):27-31

Enhanced external counterpulsation: A unique treatment for the “No-Option” refractory angina patient

Jose Caceres MD¹ | Patricia Atal MD¹ | Rohit Arora MD² | Derek Yee Editor¹

Enhanced External Counterpulsation (EECP): Historical Background in the Treatment of Coronary Artery Disease and Its Emerging Role in Chronic Heart Failure

Özlem SORAN, MD, FACC, FESC

Associate Professor of Medicine, Cardiovascular Institute, Director of EECP Research Lab, University of Pittsburgh, Pennsylvania, USA

Enhanced External Counterpulsation as Initial Revascularization Treatment for Angina Refractory to Medical Therapy

C.P. Fitzgerald^a, W.E. Lawson^b, J.C.K. Hui^b, E.D. Kennard^c for the IEPR Investigators

^aHeart Care Clinic of Arkansas, Little Rock, Ark., ^bState University of New York, Stony Brook, N.Y., ^cUniversity of Pittsburgh, Pittsburgh, Pa., USA

Chapter 20

Enhanced External Counterpulsation (EECP): A Non-Invasive Out-Patient Procedure to Revascularize the Heart Muscle Without Open Heart Surgery

Fouad I. Ghaly, M.D.

President and Founder, Longevity & Rejuvenation Clinics of California

The Role of Enhanced External Counter Pulsation Therapy in Clinical Practice

Umesh Sharma, MD, FACP; Heidi K. Ramsey, BS, RCEP; and Tahir Tak, MD, PhD, FACC

The Safety and Efficacy of Enhanced External Counterpulsation as a Treatment for Angina in Patients With Aortic Stenosis

Debra L. Braverman, MD; Len Braitman, PhD; Vincent M. Figueiredo, MD



Clinical Evidence

Enhanced external counterpulsation improves systolic blood pressure in patients with refractory angina

Alex R. Campbell, MD,² Daniel Satran, MD,² Andrey G. Zenovich, MSc,² Kayla M. Campbell,² Julia C. Espel, BS,² Theresa L. Arndt, RN, MA,² Anil K. Poulouse, MD,² Charlene R. Boisjolie, RN, MA,² Kim Juusola, RN,^b Bradley A. Bart, MD,^b and Timothy D. Henry, MD² *Minneapolis, MN*

ENHANCED EXTERNAL COUNTERPULSATION IMPROVES ENDOTHELIAL FUNCTION AND EXERCISE CAPACITY IN PATIENTS WITH ISCHEMIC LEFT VENTRICULAR DYSFUNCTION

DT Beck, Ph.D.¹, JS Martin, Ph.D.², DP Casey, Ph.D.³, JC Avery, M.S.⁴, PD Sardina, M.S.⁴, and RW Braith, Ph.D.⁴

Enhanced External Counterpulsation Improves Peripheral Artery Flow-Mediated Dilatation in Patients With Chronic Angina

A Randomized Sham-Controlled Study

Randy W. Braith, PhD; C. Richard Conti, MD; Wilmer W. Nichols, PhD; Calvin Y. Choi, MD; Matheen A. Khuddus, MD; Darren T. Beck, MS; Darren P. Casey, PhD

Enhanced External Counterpulsation (EECP) Therapy: Current Evidence For Clinical Practice And Who Will Benefit?

G. N. Prasad¹, S. Ramasamy¹, Joy M. Thomas¹, Pradeep G. Nayar¹, Madhu N. Sankar¹, N. Sivakadaksham², K. M. Cherian¹

¹Dr. K.M. Cherian's Frontier Lifeline Hospital, Chennai, Tamil Nadu
²Siva's Cardiac Care Clinic.

Efficacy of Enhanced External Counterpulsation in Patients With Chronic Refractory Angina on Canadian Cardiovascular Society (CCS) Angina Class

An Updated Meta-Analysis

Chunmei Zhang, MD, Xiangjuan Liu, PhD, Xiaomeng Wang, MD, Qi Wang, MD, Yun Zhang, PhD, and Zhiming Ge, PhD

“No-option” Patients—Role of Enhanced External Counterpulsation

Anil Kumar Gothwal¹, Sanjay Mittal²

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²Escorts Heart Institute and Research Centre, New Delhi

ENHANCED EXTERNAL COUNTERPULSATION REDUCES INDICES OF CENTRAL BLOOD PRESSURE AND MYOCARDIAL OXYGEN DEMAND IN PATIENTS WITH LEFT VENTRICULAR DYSFUNCTION

Darren T. Beck, Ph.D.¹, Darren P. Casey, Ph.D.², Jeffrey S. Martin, Ph.D.³, Paloma D. Sardina, M.S.⁴, and Randy W. Braith, Ph.D.⁴

Safety and effectiveness of enhanced external counterpulsation (EECP) in refractory angina patients: A systematic reviews and meta-analysis

Seyed Mansoor Rayegani¹, Saeed Heidari², Majid Maleki³, Maryam Seyed-Nezhad⁴, Maryam Heidari⁵, Seyed Ehsan Parhizgar⁶, Mohammad Moradi-Joo^{6*}

The Effect of EECP on Ischemic Heart Failure: a Systematic Review

Ling Xu^{1,2,3,4}, Ming Cui^{1,2,3,4}, Wei Zhao^{1,2,3,4}

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doi:10.1111/j.1365-2796.2005.01604.x

The immediate and long-term outcome of enhanced external counterpulsation in treatment of chronic stable refractory angina

P. H. LOH¹, A. A. LOUIS¹, J. WINDRAM¹, A. S. RIGBY¹, J. COOK¹, S. HURREN¹, N. P. NIKOLAY¹, J. CAPLIN² & J. G. F. CLELAND^{1,2}

CLINICAL STUDIES

Myocardial Ischemia

The Multicenter Study of Enhanced External Counterpulsation (MUST-EECP): Effect of EECP on Exercise-Induced Myocardial Ischemia and Anginal Episodes

Rohit R. Arora, MD,* Tony M. Chou, MD,† Diwakar Jain, MD,‡ Bruce Fleishman, MD,§ Lawrence Crawford, MD,¶ Thomas McKiernan, MD,¶ Richard W. Nesto, MD#
New York, New York; San Francisco, California; New Haven, Connecticut; Columbus, Ohio; Pittsburgh, Pennsylvania; Maywood, Illinois; Boston, Massachusetts

Efficacy of Enhanced External Counter Pulsation on Clinical Parameters and Health-Related Quality of Life in Coronary Heart Disease patients with Diabetes Mellitus

Vikram Singh^{1*}, Girija Kumari², Bimal Chhajer³ and Mulavagili Vijayasimha¹



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