

# Instrument for Minimally Invasive Cardiac Surgery

## TECHNICAL FIELD

Medical Device: Cardiovascular Surgery (2005-0703)

## BACKGROUND

Minimally invasive cardiac surgery has become increasingly important in managing patients with various cardiovascular disorders requiring open heart surgery. Increasingly novel instrumentation has been developed to facilitate such interventions. Companies with special interest and expertise in these areas have taken the lead in advancing such technology and providing better care for patients and their families. Additionally, the introduction of robotics technology and variations of surgical approaches have augmented the application and techniques for an increasingly diverse patient population.

Our physicians and scientists have been working on instrumentation that could facilitate the techniques of open heart surgery in the most extreme form of minimally invasive cardiac surgery: in the fetus. A byproduct of this technology is an invention that allows for facile and alternative cannulation techniques for conducting minimally invasive cardiac surgery.



## APPLICATIONS

**Cardiovascular Surgery**

## ADVANTAGES

- **Modification of technology well-known to cardiac surgery community**
- **Facilitates minimally invasive surgery**
- **Simplicity of technique**
- **Reduced/absent blood loss with use**

## INVESTIGATOR

Pirooz Eghtesady, MD  
Cardiothoracic surgery  
Cincinnati Children's Hospital Medical Center

## STATUS

Patent applications pending.

## CONTACT

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## TECHNOLOGY

The standard right angle cannula used during cardiac surgery requires the technical expertise and skill of multiple individuals and is associated with significantly greater blood loss. Further, it has limited application during surgical approaches conducted via minimally sized incisions or alternative incisions (e.g., thoracotomy). While groin cannulation has facilitated and overcome some of these limitations, the standard groin cannulas can also be limited in certain circumstances (e.g., patients with peripheral vascular disease—not uncommon among cardiac patients) and also require an additional incision (groin) in a patient that could otherwise be left without. Finally, these cannulas often do not have the same hemodynamic and flow advantages as standard angled cannulas, leading to the necessity of additional technologies such as vacuum assist and their associated costs and disadvantages.

Our right-angle cannula is designed to overcome these limitations, allowing for easy introduction of these angled cannulas (with better and optimal flow profiles) using the Seldinger technique, a simple method normally used for introducing catheters into vessels over a guide wire. In addition, the invention virtually eliminates any blood loss from standard cannulation, a feature that is of increasing importance to cardiac surgeons and patients (and their desire to miniaturize circuits and avoid blood exposure).

We are currently seeking a company that is interested in manufacturing and marketing this device.

# Instrument for Minimally Invasive Cardiac Surgery

## THE INVENTOR

Pirooz Eghtesady, MD, Ph.D.  
Surgical Director, Pediatric Cardiac Transplantation  
Division of Pediatric Cardiothoracic Surgery

## BACKGROUND

**Minor, Physics:** California State University, Fresno (1981-83)

**BS / MS:** Biochemistry, UCLA (1983-87)

**MD / PhD:** Molecular Biology and Immunology, UCLA School of Medicine (1987-93)

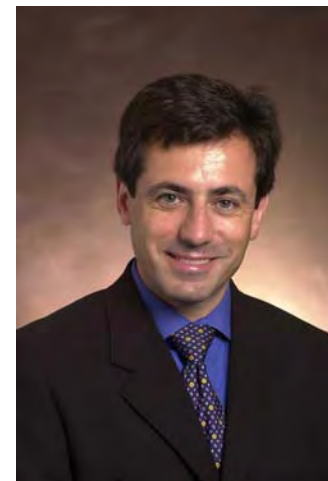
**Residency:** Stanford University Hospital, Resident in General Surgery (1993-98)

**Residency:** Johns Hopkins Hospital, Resident in Cardiothoracic Surgery (1998-2001)

**Fellowship:** Broussais Hospital, Paris, France, Professor Alain Carpentier's Service, Fellow in Cardiovascular Surgery (1999)

**Fellowship:** Marie Lannelongue Hospital, Paris, France, Professor Claude Planche's Service, Fellow in Pediatric Cardiac Surgery (1999)

**Fellowship:** UCSF / Stanford University Hospital, Fellow in Pediatric Cardiac Surgery (2001-02)



Dr. Eghtesady takes a multidisciplinary approach to his research efforts, which include collaborations with the clinical efforts of the Fetal Care Center and Fetal Cardiology Program and Cincinnati Children's Hospital Medical Center. Together with his collaborators, Dr. Eghtesady is interested in developing clinically useful tools and protocols for maternal-fetal cardiac intervention and surgery. To aid in this work, ovine fetal models of various congenital heart diseases have been developed and studied.

The laboratory's research emphasis is primarily on fetal aortic stenosis and Hypoplastic Left Heart Syndrome (HLHS). Studies are also underway to better understand potential etiologic mechanisms in fetal defects. In addition, the lab is studying the potential utility of natriuretic peptides as biomarkers of fetal cardiovascular well-being and as a candidate selection marker for fetal cardiac intervention. Most recently, the focus has been on the potential role of maternal strep exposure in pathogenesis of HLHS.

In addition to the basic laboratory research, Dr. Eghtesady is also involved in several clinical research projects, including a multi-institutional NIH-sponsored project conducted by the Pediatric Heart Network, studying the optimal surgical therapy for newborns affected by HLHS.

### Recent Publications

Lam CT, Sharma S, Baker RS, Hilshorst J, Lombardi J, Clark KE, **Eghtesady P.** *Fetal Stress Response to Fetal Cardiac Surgery.* Annals of Thoracic Surgery. 2008 May; 85(5): A1-A70, e24-e-31, 1719-27.

Ashcraft T, Jones K, Border W, **Eghtesady P,** Pearl J, Khoury P, Manning PB. *Factors Affecting Long Term Risk of Aortic Arch Re-Coarctation Following the Norwood Operation.* Annals of Thoracic Surgery. 85(4); 1397-1402.

Baker RS, Lam CT, Heeb EA, Hilshorst JL, Ferguson RE, Lombardi J, **Eghtesady P.** *A Simple Solution is "Prime" for Fetal Cardiopulmonary Bypass.* ASAIO J. 2007 November/December; 53(6):710-715.