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## The nature and enigma of the noncoronary collateral circulation

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Notwithstanding the fact that the coronary collateral circulation (CCC) is the only blood supply warranting ongoing attention, the human heart benefits from a small additional source of blood, called noncoronary collateral myocardial blood flow (NCCMBF) or noncoronary collateral circulation (NCCC). It consists of a small blood supply reaching the heart through a micro-vascular network arising from the bronchial, esophageal, pericardial and diaphragmatic arteries. These small channels enter the heart through the pericardial reflections surrounding the pulmonary and systemic veins, connecting with the vasa vasorum of the aorta and pulmonary artery. The left and right internal mammary arteries (ITAs), along with their collateral branches, are among these non-coronary sources. Under certain circumstances the ITAs have a high potential for developing collateral branches. In the case of severe Leriche syndrome or with chronic obstruction of the abdominal aorta, the ITAs can serve as the main or even sole source of blood supply to the lower limbs. Communication is also possible between the ITAs and the native coronary arteries. This has been demonstrated by angiography in living patients, both for right and left coronary artery disease. Postmortem angiography in patients with ischemic heart disease has demonstrated such connections in 12% of cadavers. The Vineberg operation of the 1940s was based on the plastic potential of the ITAs. It consisted of ITA implantation into the left ventricular wall, with development of an extensive collateral network visible at angiography even at very long-term follow-up. It has been recently demonstrated that in ischemic conditions there is a functional, ischemia-reducing extracardiac coronary artery supply via natural ipsilateral ITA anastomosis. Herein, the available data on the non-coronary blood supply to the human heart have been reviewed.

### Biography

Marco Picichè completed his Graduation in Medicine at University of Florence in 1995 and Cardiac Surgery Residency at Tor Vergata University of Rome in 2000. He has worked as an Assistant at Saint Luc Hospital, Catholic University of Louvain, Brussels (1999-2001), as a Clinic Head/Hospital Assistant at universities of Clermont-Ferrand (2003-2004) and Montpellier (2004-2007). In Canada, he authored a research project on "Noncoronary collateral circulation," which was submitted to the annual research competition at Québec Heart & Lung Institute, Laval University, and received the competition's highest grant. In September 2011, he completed his PhD in Therapeutic Innovations from Paris-Sud University. He is the Editor in Chief of the book *Dawn and Evolution of Cardiac Procedures-Research Avenues in Cardiac Surgery and Interventional Cardiology*. Currently, he is a Consultant Cardiac Surgeon in Italy.

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