

# Institutional report - Experimental

## The impact of competitive flow on distal coronary flow and on graft flow during coronary artery bypass surgery

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### Abstract

To determine the impact of left anterior descending-competitive flow (LAD-CF) on distal coronary flow (LAD-DF) and on left internal mammary artery-graft flow (LIMA-GF), we performed a quantitative blood-flow analysis in a swine model of a LIMA-to-LAD coronary artery bypass graft (CABG). In six swine, a LIMA-to-LAD CABG was performed. LAD blood-flow was measured bilaterally to the LIMA-to-LAD anastomosis, in the LIMA and in the pulmonary artery (cardiac output, CO) along with the LIMA pulsatility index (LIMA-PI) and the left ventricular pressure (LVP). PreCABG measurements were followed by postCABG measurements at five levels of LAD-CF: 100%, 75%, 50%, 25% and 0% after gradually snaring down a snare placed proximally of the LAD-CF flow-probe. PreCABG CO and LVP remained unchanged postCABG. LAD-DF was reduced significantly postCABG (-33%,  $P=0.0001$ ). Reduction of the LAD-CF (at 75%, 50%, 25% and 0%) resulted in significant increase of LIMA-GF (q38%, q63%, q113%, q225%,  $P=0.036$  at all LAD-CF levels), reduced PI (6.8, 5.7, 4.1, 3.1, 2.5) with simultaneous increase of LAD-DF (q8%,  $P<NS$ , q8%,  $P<NS$ , q17%,  $P<NS$ , q50%,  $P<0.0044$ ). Decreased LAD-CF resulted in increased LADDF, increased LIMA-GF and decreased LIMA-PI. To the best of our knowledge, this is the first study where blood-flow was directly and simultaneously measured in all the components of the LIMA-to-LAD anastomosis.

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**Keywords:** Competitive flow; Left anterior descending; Left internal mammary artery; Coronary artery bypass graft