use. The analogy of a comparison between "unproven herbal approach versus tested scientific study" must be considered.

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Emerging new concepts of myocardial laser revascularization

To the Editor:

Zenati, Cohen, and Griffith¹ express support for the development of centers in which different revascularization procedures would be performed in the same patient by teams composed of interventional cardiologists and cardiovascular surgeons. Will myocardial laser revascularization (MLR), either percutaneous or surgical, find its place in such teamwork when its original idea of perfusion of the left ventricle from its cavity is no longer valid?²

In the meantime, a new concept trying to explain why MLR has been beneficial to some patients has emerged: angiogenesis as a nonspecific response of the myocardium to injury. All the same, this concept is usually considered unfit to serve as a vehicle for MLR because this procedure leads only rarely to the improvement of objective parameters such as cardiac perfusion and function, exercise capacity, and survival.²

Before MLR is abandoned, we must be sure that it (1) has been used correctly and (2) was applied to suitable patients. I am afraid this has not always been the case.

Angiogenesis fulfills its purpose only if a source of oxygenated blood is available. This condition provided, angiogenesis diminishes ischemia solely if it leads to the development of collateral vessels linking the ischemic with the well-perfused myocardium.³ In agreement with these concepts, cardiomyocyte death induced by MLR would lead to inflammatory angiogenesis and wound healing reaction. Newly formed capillaries would connect blood vessels of the lased ischemic region with blood vessels of neighboring well-perfused areas. The angiogenesis would not subside after the healing of laser channels because friction between noncom-

pliant laser channel scars and the contractile surrounding myocardium would induce continuous injury and inflammation.⁴ New capillaries would not regress because of a pressure gradient between the well-perfused myocardium and the ischemic region.³ The remodeling of capillary-sized collaterals into arterioles and arteries would complete the revascularization, that is, the collateralization of the ischemic region.

Contrary to the above hypotheses, MLR has been used mostly in patients with diffuse multivessel end-stage coronary artery disease with contraindications to percutaneous transluminal coronary angioplasty and coronary artery bypass grafting. It is obvious that angiogenesis is of no use if the whole ventricle is ischemic. On the contrary, the use of MLR in combination with coronary artery bypass grafting and/or coronary angioplasty (as it would be practiced in integrated revascularization centers) is an excellent idea. The conventional techniques would provide the source of well-oxygenated blood wherever possible, and MLR would facilitate the development of collateral vessels in the areas inaccessible for traditional revascularization. It is worthy of note that Mirhoseini, Shelgikar, and Cayton,⁵ the inventors of MLR, used this method in combination with coronary artery bypass grafting when they started to apply it to patients. This undoubtedly explains their success. Recently, Trehan and colleagues⁶ used MLR in combination with minimally invasive coronary artery bypass grafting and claimed excellent results. All this suggests that MLR, if used in conjunction with other methods of revascularization, will find its place in the therapeutic armamentarium used against ischemic heart disease.

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Reply to the Editor:

We enjoyed reading Beranek's comments and discussion of myocardial laser revascularization (MLR). Our concept of integrated coronary revascularization is in constant evolution, as new techniques become available both to the cardiac sur-