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## The propionyl-L-carnitine hypothesis: An alternative approach to treating heart failure<sup>☆</sup>

[Roberto Ferrari](#), MD, PhD<sup>ab</sup>, [Federica De Giuli](#), MD<sup>ab</sup>

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### Abstract

Propionyl-L-carnitine (PLC) is a naturally occurring compound that has been considered for the treatment of congestive heart failure (CHF). The rationale for its use in this pathology is related to its effects on cardiac and skeletal muscle. Chronic treatment with PLC improves the contraction of isolated and aerobic perfused rabbit hearts. The compound improves energy metabolism and myocardial contractility in different experimental models of heart failure, such as pressure-overloaded rats, infarct model of heart failure, and rabbit with streptozotocin-induced diabetes. In general, the effect of PLC is apparent in situations of high energy demand such as those induced by increased workload. It therefore seems likely that PLC is able to correct some metabolic steps of the process that leads to heart failure. In addition, PLC may be helpful in heart failure because of its specific action on peripheral skeletal muscle. Administration of PLC in patients with CHF improves skeletal muscle metabolism by increasing pyruvate flux into the Krebs cycle and by decreasing lactate production. These effects occur in the absence of major hemodynamic and neuroendocrinologic changes and may underlie the ability of PLC to increase exercise performance in patients with heart failure. In a randomized study of 50 patients with mild CHF, PLC increased the maximal exercise time, reduced lactate production, and improved left ventricular ejection fraction. There have been two large-scale trials on the effects of PLC on both cardiac and peripheral muscle function in CHF. One is ongoing; the other one, which just ended, failed to show an improvement in exercise capacity in the population studied. A benefit was evident only in a subgroup of patients with preserved ejection fraction and impaired baseline exercise duration.

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<sup>a</sup> Chair of Cardiology, University of Brescia, Brescia, Italy

<sup>b</sup> Cardiovascular Research Center, "Salvatore Maugeri" Foundation, Gussago, Brescia, Italy

Reprint requests: Professor Roberto Ferrari, Cattedra di Cardiologia, Università degli Studi di Brescia, c/o Spedali Civili, P.le Spedali Civili, 1, 25123 Brescia, Italy.

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