

## Number of Circulating Endothelial Progenitor Cells as a Predictive Biomarker of Heart Failure

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### Abstract

Recent clinical trials have shown that the circulating Endothelial Progenitor Cells (EPCs) may act as a powerful endogenous reparative system in several cardiovascular diseases including Heart Failure (HF). Indeed, endothelial repair and restoring endothelial function is considered a target for several treatment approaches, which are widely used in HF care. It is known that a number of circulating EPCs decreased sufficiently depending on severity of cardiac dysfunction. Moreover, lowered count of EPCs was found promising biomarker of HF-related outcomes. Nowadays there is a large body of evidence regarding considerable discriminant of lowered EPCs with different immune phenotypes in HF with different etiologies. The short commentary is depicted the role of measurement of EPC count in HF individuals aimed to improve the predictive value of contemporary used biomarker-based scales.

**Keywords:** Heart failure; Endothelial progenitor cells; Prognosis; Outcomes

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### Biomarker of Heart Failure

Recent clinical studies have shown that Endothelial Progenitor Cells (EPCs) could tailor risk discrimination in Heart Failure (HF) irrespective etiological origin of cardiac dysfunction [1-3]. Indeed, EPCs that are involved in the endothelial repair, angiogenesis, neovascularization and attenuation of vascular function contribute in pathogenesis of HF acting as endogenous repair system [4,5]. Formerly, an exhaustion of circulating number of EPCs labeled as CD34+ and/or CD133+, AC133+, endothelial cell markers (CD309, CD31, CD 144) was found in patient with asymptomatic and symptomatic HF, while there are several controversies regarding the role of different immune phenotypes of EPCs in tissue reparation [6-9]. Additionally, there is a suggestion that the lowered number of EPCs in circulation may significantly relate to pre-existed cardiovascular risk factors including diabetes, obesity, impaired fasting glucose, hypothyroidism [10-13].

However, there are at least two immune phenotypes of EPCs labelled as early outgrowth EPCs and late outgrowth EPCs and isolated from similar source having similar markers expressing on their surfaces, i.e., CD144, CD309, CD45 [14,15]. Late outgrowths EPCs may shape endothelial colony cells and they produce more nitric oxide and better attenuate capillary structure than

early EPC [14]. In contrast to late EPC, early EPCs are able to syntheses and secretion of broad spectrum of pro-angiogenic and angiopoietic cytokines including Vascular Endothelial Growth Factor (VEGF) and interleukin (IL)-6 [15]. Finally, we do not exactly know whether both immune phenotypes of EPCs distinguishing their ability to shaping endothelial cell colony in culture. Additionally, there are no a large number of clinical studies opened a clear explanation what immune phenotypes of circulating EPCs play the most prominent role in endothelial regeneration and consequently could be a better biomarker of HF-related outcomes [16].

In this context, there are some findings confirming the discriminative value of EPC count depletion in peripheral blood in HF individuals.

Koller et al. [3], reported that EPCs, defined as triple-positive cells (CD34+CD45-CD309+) was a significant and independent inverse predictor of mortality of HF as ischemic as well as non-ischemic etiology. There is evidence that the number of circulating non-hematopoietic EPCs with immune phenotypes CD14+CD309+ and CD14+CD309+Tie2+ could demonstrate more pretty discriminative value in ischemia-induced HF than CD45+ CD309+EPCs [1,10,13]. Therefore, lowered number of CD14+CD309+Tie2+EPCs may suggest shaping systolic cardiac

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dysfunction, whereas hematopoietically originated EPCs did not exhibit predictive value in HF with preserved pump function [11]. Moreover, incorporation of number of CD14+CD309+Tie2+EPCs as a predictive biomarker into biomarker risk score for cumulative cardiovascular events in HF patients may sufficiently improve sensitivity, specificity, reliability and final discriminative value of the scale [17]. Thus, there is great need to address further clinical studies the issue regarding a choice of more optimal immune phenotype of EPCs from those that have been screened as candidates for predictors in HF. It may be extremely important to improve the predictive value of contemporary used biomarker-based scales and implement them into a routine clinical practice.

## Conclusion

In conclusion, Circulating EPCs act a powerful reparative system in several cardiovascular disease including HF. Number of circulating EPCs are probably promising biomarker of HF-related outcomes because lowered count of one was recently found at the early stage of cardiac dysfunction and it related closely to unfavorably outcomes. Nowadays there is a large body of evidence regarding considerable discriminant of lowered EPCs with different immune phenotypes in HF with different etiologies that requires analyzing in detail whether various EPC immune phenotypes are similar in prediction of HF outcomes or this is not true.

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