An omics approach to purifying vascular progenitor cells for therapeutic potential

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Circulating vascular progenitor cells contribute to the pathological vasculogenesis of cancer whilst on the other hand offer much promise in therapeutic revascularization in post-occlusion intervention in cardiovascular disease. However, their characterization has been hampered by the many variables to produce them as well as their described phenotypic and functional heterogeneity. Herein we have isolated, enriched for and then characterized a human umbilical cord blood derived CD133+ population of non-adherent endothelial forming cells (naEFCs). Functional studies demonstrated that these naEFCs (i) bound *Ulex europaeus* lectin, (ii) demonstrated acetylated-low density lipoprotein uptake, (iii) increased vascular cell adhesion molecule (VCAM-1) surface expression in response to tumor necrosis factor and (iv) in co-culture with mature endothelial cells increased the number of tubes, tubule branching and loops in a 3-dimensional in vitro matrix. More importantly, naEFCs placed *in vivo* generated new lumen containing vasculature lined by CD144 expressing human endothelial cells (ECs). Extensive genomic and proteomic analyses of the naEFCs identified ~60 surface biomarkers not previously described on vascular progenitors. Moreover, these markers were not detected on donor-matched mature endothelial cells. Herein, we describe the role of new adhesion molecules and transcription factors which control naEFC fate and function. We suggest that the distinct population of naEFCs identified and characterized here represents a new valuable therapeutic target to control aberrant vasculogenesis.

Biography

Claudine S Bonder completed her PhD at Flinders University in South Australia and postdoctoral studies from the University of Calgary in Alberta, Canada. She is the Head of the Vascular Biology and Cell Trafficking Laboratory at the Centre for Cancer Biology in Adelaide, South Australia, has published more than 40 papers in reputed journals and serves as an editorial board member of the journal Microcirculation.

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