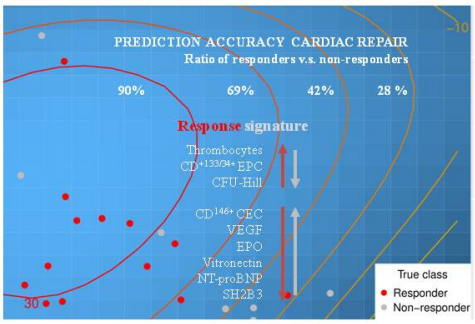
HEART FUNCTION REPAIR IS DEPENDENT ON BONE MARROW RESPONSE

Rostock researchers unravel heart disease mechanism in bone marrow stem cells



ROSTOCK, DEUTSCHLAND, July 31, 2017 /EINPresswire.com/ -- Stem cell therapies for heart disease have failed so far, much to the high expectations of scientists, patients and society to get objective clinical proof for heart repair, despite abundant research proof in animal studies. The Rostock University cardiac surgeon, Prof. Gustav Steinhoff, and his research team, have now unraveled the cause of failure in bone marrow stem cell response and published their results in EBioMedicine. In the randomized double-blinded placebo-controlled phase 3 PERFECT-trial studying stem cell therapy in bypass patients, forty percent of all patients were identified as having a suppressed bone marrow response for repair related to the regulatory gene SH2B3. This results in a deficit of circulating stem cells and prevents new blood vessel growth in the heart muscle, required to avoid progressive heart failure.

This pilot trial was financed by the Ministry of Research and Education in Germany and the EU for the development of highly standardized stem cell therapies, and was performed between 2009 through March 2016 to assess clinical safety and efficacy of intramyocardial CD133+ bone marrow derived cell application and coronary bypass surgery. The multicentre trial included the six main German university heart centers Bad Oeynhausen, Berlin, Hamburg, Hannover, Leipzig, Rostock, the German stem cell isolation product specialist Miltenyi-Biotech GmbH, Bergisch—Gladbach, and scientists in Freiburg, Munich and Göttingen.

Professor Gustav Steinhoff is the principal investigator of the publication and has spent one year analyzing the data with a specialist team of university and biotech company researchers. “It was an enormous puzzle. After unblinding, the clinical results of the study did not at all reveal the expected results of the stem cell therapy. But there was a surprising overall improvement in all treated patients irrespective of stem cell therapy, leading to a 10% gain of heart pump function.” said Gustav Steinhoff, who pioneered cardiac stem cell therapy with the first intramyocardial treatment in 2001, initiating the first Phase I trial in the field. ”And then we discovered that 40% of the patients did not show improved heart function at all, whereas the 60% of reactive patients had a mean increase of 17% pump function and better long-term survival.” The researchers succeeded in finding a diagnostic biomarker signature in the peripheral blood of patients by using an artificial intelligence machine learning computer analysis system, allowing pretreatment identification of patient responders for improved heart

function. Using this new computer-aided diagnostic technology, responsive patients can be accurately identified prior to treatment with bypass surgery and stem cells.

Highlights of the study
1. Heart function improvement is dependent on circulating endothelial progenitor cells.
2. Suppression of bone marrow response is associated to SH2B3 gene expression
3. Peripheral blood angiogenesis response can be predicted by a biomarker signature

Publication release:

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Abstract:
CARDIAC FUNCTION IMPROVEMENT AND BONE MARROW RESPONSE
Outcome analysis of the randomized PERFECT phase III clinical trial of intramyocardial CD133+ application after myocardial infarction
E-BioMedicine http://dx.doi.org/10.1016/j.ebiom.2017.07.022

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