The Association between Bicuspid Aortic Valve Function on Circulating Endothelial Progenitor Cells

Vaturi, Mordehay[1]; Perl, Leor[1]; Leshem-Lev, Dorit[1]; Dadush, Oshrat[1]; Bental, Tamir[1]; Shapira, Yaron[1]; Yedidya, Idit[1]; Greenberg, Gabi[1]; Kornowski, Ran[1]; Sagie, Alexander[1]; Battler, Alexander[2]; Lev, Eli[2]

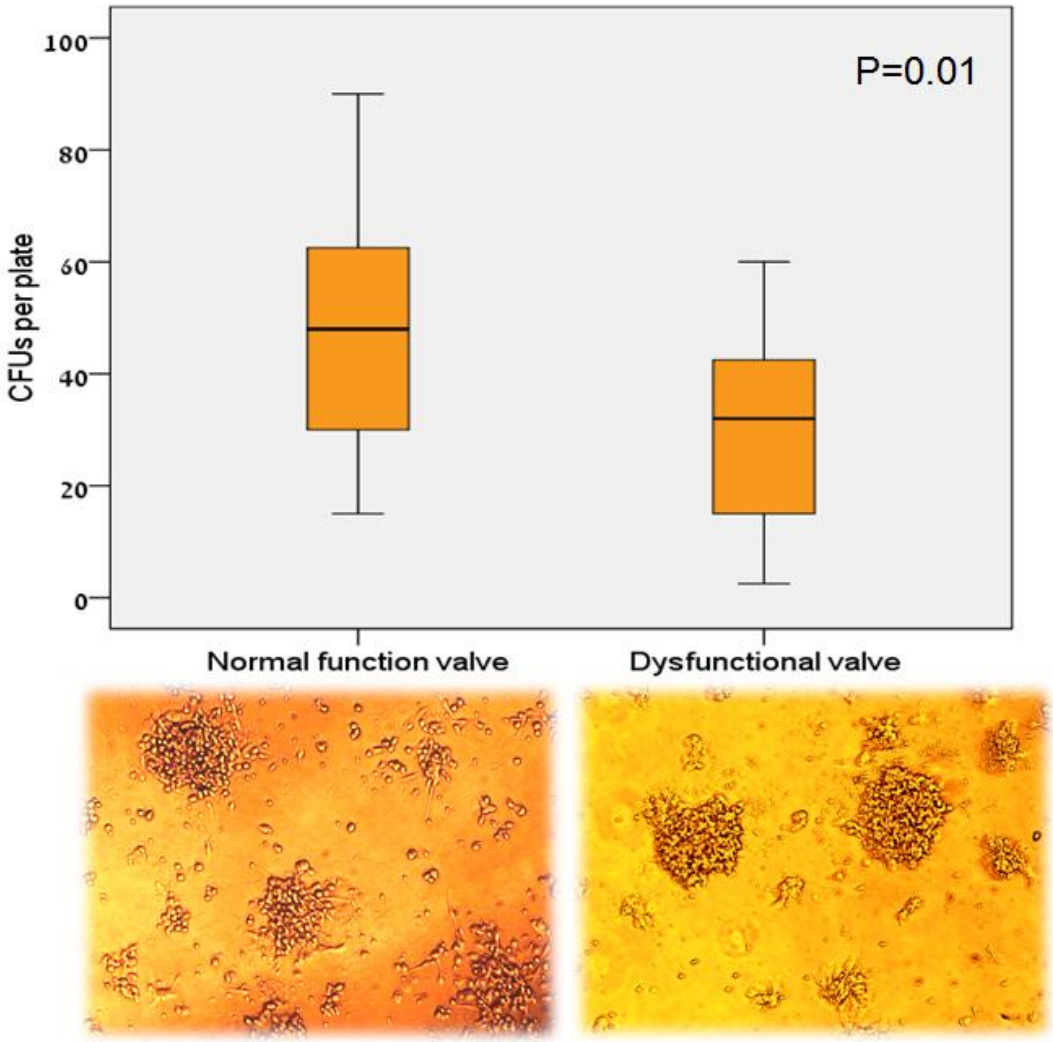
[1]Rabin Medical Center, Petach Tikva, Israel; [2]Rabin Medical Center, The Felsenstein Medical Research Institute, Petach Tikva, Israel

Background: Patients with bicuspid aortic valve (BAV) may gradually develop significant valve dysfunction, whereas others remain free of dysfunction. The factors which determine the prognosis of BAV remain unclear. Since endothelial progenitor cells (EPCs) have a role in the repair of endothelial surfaces following injury, we hypothesized that EPCs may also be involved in preventing BAV degeneration. Accordingly, we aimed to compare EPC level and function in patients with BAV with vs. without valve dysfunction.

Methods: The study group included 22 patients with BAV and significant valve dysfunction (≥ moderate aortic regurgitation and/or ≥ moderate aortic stenosis). The control group included 28 patients with BAV without valve dysfunction. All patients had one blood sample taken. The proportion of peripheral mononuclear cells (PMNCs) expressing VEGFR-2, CD133 and CD34 was evaluated by flow cytometry. EPC colony forming units (CFUs) were grown from PMNCs, characterized and counted following 7 days of culture.

Results: The two groups had similar clinical characteristics except for higher prevalence of hypertension in the dysfunctional valve group. The number of EPC CFUs was lower in the dysfunctional valve group [32 (15-42.5) vs. 48 (30-62.5) CFUs/plate, respectively, P=0.01, Figure], and the migratory capacity of the cells in this group was reduced. In addition, the proportion of cells co-expressing VEGFR-2, CD133 and CD34 tended to be lower in the dysfunctional valve group.

Conclusions: Patients with BAV and significant valve dysfunction appear to have circulating EPCs with impaired functional properties. These findings require validation by further studies, but may contribute to understanding the pathogenesis of BAV degeneration.
<IMAGE01> Lower number of CFUs per plate among the patients with dysfunctional BAV. Representative EPC colonies are depicted below the respective bars (magnification X 10). Results expressed as medians (25th-75th percentile).


P=0.01
CFUs per plate
100
80
60
40
20
0
Normal function valve
Dysfunctional valve