Is EPCs Dysfunction in Patients with Diabetes Correctable by Tight Glycemic Control?

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Background: Recent evidence has shown that endothelial progenitor cells (EPCs) have an important role in repair process following vascular injury, and that in patients with diabetes; EPC number and function are significantly reduced. We have previously shown that a period of tight glycemic control improves the level and function of EPCs in patients with uncontrolled diabetes. However, it is unclear whether following such intensive control; EPCs behave reassemble to EPCs in non-diabetes. We, therefore, aimed to examine whether after intensive glycemic control EPCs number and function are similar to the EPC profile in non-diabetes.

Methods: 25 patients with treated diabetes, who underwent intensive glycemic control for a period of 3-4 months, were compared to 25 matched non diabetic subjects. The proportion of peripheral mononuclear cells (PMNCs) expressing VEGFR-2, CD133 and CD34 were evaluated by flow cytometry. EPCs colony forming units (CFUs) were grown from PMNCs characterized and counted following 7 days of culture. Functional properties of the cultured cells were evaluated by the MTT proliferation and viability assay, and migration assay using the modified Boyden chamber.

Results: The two groups (n=25) were well-matched. The proportion of cells co-expressing VEGFR-2, CD133 and CD34 was similar for both diabetes and non diabetes groups (VEGFR-2+CD34+: 1.12±0.15% vs. 1.14±0.14%; VEGFR-2+CD133+: 0.66±0.11% vs. 0.72±0.11%, respectively). However, the number of EPC CFUs in the diabetes group was lower compared to the non-diabetes group (10.96±1.71 vs. 15.4±1.9 colonies per well, respectively, P=0.0011). Furthermore, the same trend was observed in the functional tests: MTT viability test and migration were reduced in the diabetic compared to control group.

Conclusions: Following a period of tight glycemic control numbers of circulating EPCs increase to a level similar to that of subjects without diabetes, but their functional properties remain attenuated.