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Circulating endothelial cells and endothelial progenitor cells in relation to the severity of primary hypertension in children

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Introduction: Endothelial dysfunction contributes to the progression of primary hypertension. Circulating endothelial cells (CECs) and endothelial progenitor cells (EPCs) have been used as indicators of endothelial dysfunction and related to the degree of hypertension in adults. Little is known about the changes of CECs and EPCs in children with primary hypertension. This study is to examine CECs and EPCs in children with different degrees of primary hypertension and their changes after the treatments.

Methods: We enrolled three age- and sex-matched groups of children (age 11.5 ± 2.93 yrs), including 64 with primary hypertension (PH), 30 with pre-hypertension (PHP) and 30 healthy children. In PH group, patients were divided into two groups with target organ damage (TOD, $n=30$) and without (non-TOD, $n=34$) based on clinical tests. CECs and EPCs were measured by flow cytometry. Non-TOD group received 6-month treatment with recommended diet and exercise regime; TOD group had additional antihypertensive agents (angiotensin-converting enzyme inhibitor and calcium antagonist). Data were collected before and after the treatment period.

Results: CECs in PHP and HP groups were higher than those in healthy group (41.43 ± 11.52 cell/ul, 45.59 ± 25.72 cell/ul, and 21.23 ± 8.91 cell/ul, $P < 0.05$), while EPCs lower (12.90 ± 7.73 cell/ul, 12.70 ± 7.98 cell/ul, and 22.47 ± 15.32 cell/ul, $P < 0.05$). CECs in TOD group (48.35 ± 19.48 cell/ul) were higher than those in non-TOD group (43.35 ± 19.64 cell/ul, $P < 0.05$), while EPCs lower (12.60 ± 7.98 cell/ul, 13.85 ± 8.15 cell/ul, $P < 0.05$). After 6-month treatment of diet and exercise in non-TOD group, CECs reduced to 30.88 ± 29.64 cell/ul ($p < 0.05$). EPCs did not change significantly. No significant changes were found in TOD group, attributable to different organ damages and antihypertensive agents.

Conclusions: Children with pre-hypertension and primary hypertension have endothelial dysfunction as indicated by CECs and EPCs, particularly those with TOD. Healthy diet and exercise regime may help to improve endothelial function.