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Targeting insulin resistance in type 2 diabetes via immune modulation of cord blood-derived multipotent stem cells (CB-SCs) in stem cell educator therapy

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Abstract

We have developed a Stem Cell Educator therapy in which a patient's blood is circulated through a closed-loop system that separates mononuclear cells by aphaeresis, briefly co-cultures them with CB-SCs, and returns the educated cells to the patient's circulation. In an open-label, phase1/phase 2 study, patients (N = 36) with long-standing T2D were divided into three groups (Group A, n = 18; Group B, n = 11; and Group C with impaired β-cell function, oral medications + insulin, n = 7). All subjects received one treatment with the Stem Cell Educator. Clinical findings indicate that T2D patients achieve improved metabolic control and reduced inflammation markers after receiving Stem Cell Educator therapy. Median glycated hemoglobin (HbA_1C) in Group A and B was significantly reduced from 8.61% ± 1.12 at baseline to 7.9% ± 1.22 at 4 weeks (p = 0.026), 7.25% ± 0.58 at 12 weeks (p = 2.62E-06), and 7.33% ± 1.02 at one year post treatment (p = 0.0002). Homeostasis model assessment (HOMA) of insulin resistance (HOMA-IR) demonstrated that insulin sensitivity was improved post treatment. Notably, the β-cell function in Group C subjects was markedly recovered, as indicated by the restoration of C-peptide levels (0.36 ± 0.19 ng/ml at baseline vs 1.12 ± 0.33 ng/ml at one year post treatment, p = 0.00045). Mechanistic studies revealed that Stem Cell Educator therapy reverses immune dysfunctions through immune modulation on monocytes and balancing Th1/Th2/Th3 cytokine production. Stem Cell Educator therapy is a safe and innovative approach that produces lasting improvement in metabolic control for individuals with moderate or severe T2D.

Biography

Dr.Yong Zhao has completed his M.D. and Ph.D from Shanghai Second Military Medical University and postdoctor at University of Chicago. He worked as Assistant Professor at University of Illinois at Chicago for 8 years. Currently, he is an Associated Scientist at Hackensack University Medical Center. He identified a novel type of stem cells from human cord blood and developed the Stem Cell Educator therapy. He own 8 patents. He has published more than 30 papers. He received several national and international awards. His works were press released in major media such as CNN, USA Today, Reuter, and EurekAlert.