

AUTOLOGOUS TRANSPLANTATION OF BONE MARROW MONONUCLEAR CELL IN TYPE 1 AND TYPE 2 INSULIN DEPENDENT DIABETES MELLITUS PATIENTS

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Background: Recent reports have shown that bone marrow-derived stem cell (BMSCs) may contribute to islet regeneration. The goal of our study was to evaluate the safety and efficacy of autologous bone marrow mononuclear cell (ABMNCs) transplantation for patients with Type 1 and 2 insulin dependent diabetes mellitus.

Methods: From June 2005 to January 2007, 28 patients consecutive patients (8 Type 1 diabetes (T1DM) and 20 type 2 insulin dependence diabetes (T2IDM) who were receiving maximal medical therapy including insulin treatment for five years before enrollment into the study. Median time of disease for T2IDM patients was 13 years (range 5-23) without presence of pancreatic islet auto-antibodies. After IRB approval and signed informed consent, bone marrow was harvested and ABMNCs were isolated and infused directly into the pancreas via selective arterial endovascular catheters. Glucose, HbA1c and C peptide were measured before transplantation and after 12 months. HOMA2 Calculator v2.2 (The University of Oxford, UK) was used to calculate IR and % B (*if Glucose : 3.0 to 25.0 mmol/L and C-peptide : 0.2 to 3.5 nmol/L).

Results: There were no study related complications during or after transplantation. At 1 year follow-up, mean daily insulin requirement was the same in group T1DM and significantly reduced in group T2IDM, from 42.5 to 4.5 U/d ($t=7.94$, $p<0.001$). Ten of the twenty (50%) T2IDM established complete insulin independence. Data is shown in table 1.

Table 1. Median values pre and post transplantation

	Pre	Post	t	p
T2IDM (n=20)				
Fasting Glucose (mmol/L)	10.8	6.6	3.98	0.01
Glycosylated HbA1c (%)	9.6	8.1	3.98	0.01
C Peptide (nmol/L)	0.50	0.84	5.11	<0.01
HOMA 2 IR (n=17)*	2.2	2.26	0.94	0.92
HOMA 2 % B (n=17)*	42.4	130.2	4.88	<0.01
T1DM (n=8)				
Fasting Glucose (mmol/L)	10.1	11.1	1.382	0.21
Glycosylated HbA1c (%)	8.65	8.7	0.45	0.66
C Peptide (nmol/L)	0.17	0.16	1.00	0.35

Conclusions: The use of autologous bone marrow mononuclear cell (ABMNCs) transplantation for T1DM and T2IDM is safe. However in this pilot study, only patients with T2IDM have significant improvement in pancreatic function demonstrated by better glycemic and HbA1c control, and are associated with a significant independence of insulin. This has formed the foundation for a randomized multi-center study which is currently in progress.