

Influence of Adipose-derived Regenerative Cells for the Treatment of Osteoarthritis of the Knee.

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Introduction

- Adipose-derived regenerative cells (ADRCs) are a mixed cell population that includes cells with multilineage potential similar to that of bone marrow-derived mesenchymal stem cells, including the capacity for chondrogenic differentiation.
- On this basis, we conducted a clinical study on the use of this cell population in patients with osteoarthritis (OA) of the knee.

Methods

- Fifty-seven patients with varus OA of the knee (41 women and 16 men) were treated with intra-articular injection of 5×10^7 ADRCs between September 2017 and March 2018.
- The mean follow-up period was 8.7 ± 3.0 months and the mean age at surgery was 69.4 ± 6.9 years.
- ADRCs were prepared using the Celution[®]800/CRS system from the patients' abdominal or breech subcutaneous fat.
- Schema of treatment procedures is shown in Figure 1.

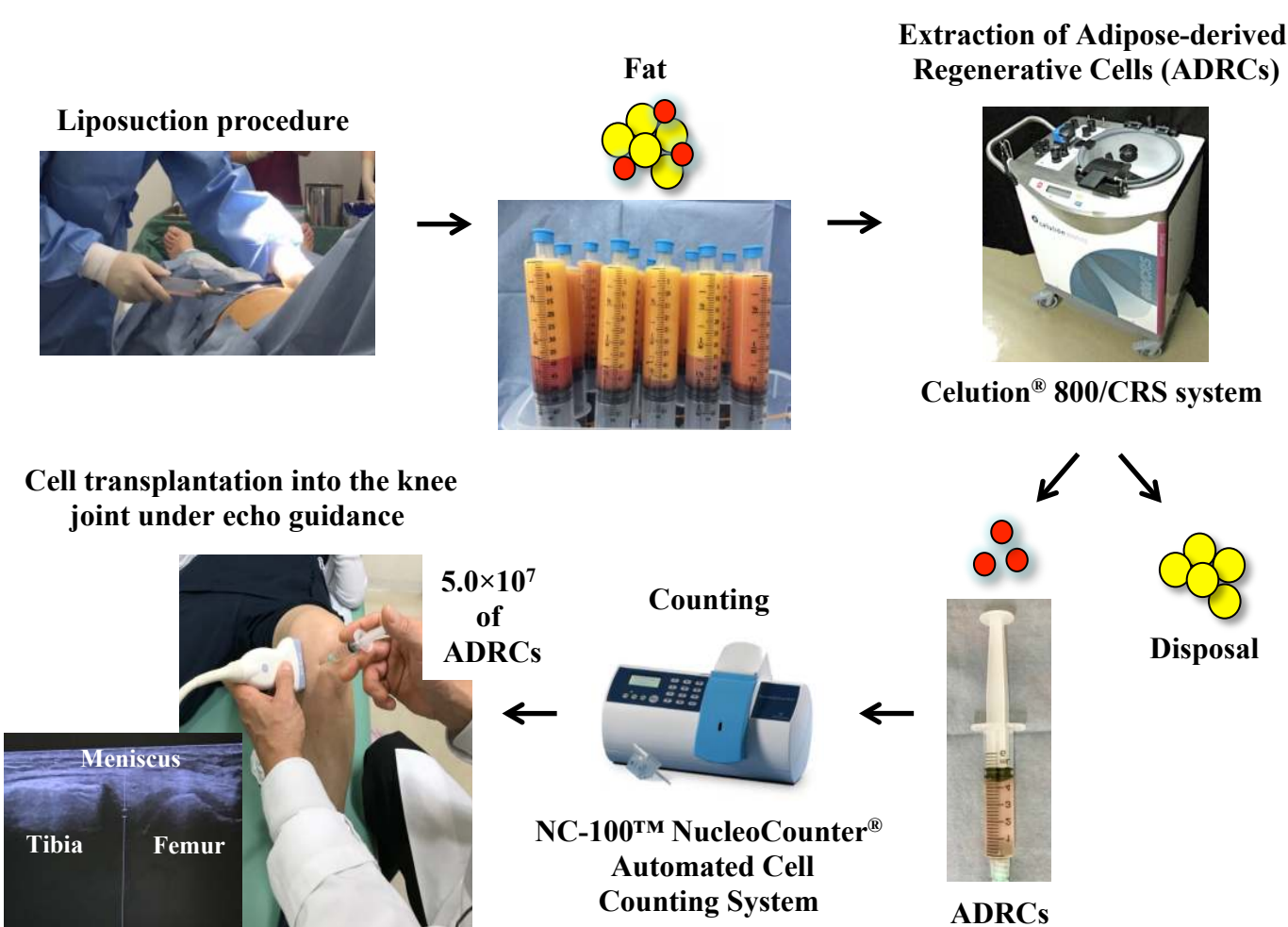


Figure 1

Clinical evaluations

- Range of motion
- Muscle force with knee extension and flexion
- Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)
- Visual analog scale (VAS) for pain (0-100)
- Knee injury and Osteoarthritis Outcome Score (KOOS)

Structural evaluations

- Hip-knee-ankle angle (HKA)
- T2 mapping value using magnetic resonance imaging

- These clinical and structural evaluations were performed preoperatively and at 1, 3, and 6 months postoperatively and compared among the four time periods using repeated measures analysis of variance ($p < 0.05$).

Results

- The mean extension angle and muscle force of knee flexion at 6 months postoperatively were significantly better than those preoperatively.
- The mean total scores of WOMAC, VAS, and KOOS at 3 and 6 months postoperatively were significantly better than those preoperatively (Table 1).
- There was no significant difference in the mean HKA angle among the four time periods.
- The mean T2 mapping values of the lateral tibia at 6 months postoperatively were significantly higher than those preoperatively (Table 2, Figure 2).

Conclusions

- The short-term clinical evaluation of the effect of intra-articular ADRC injection on knee OA was excellent. Intra-articular ADRC injection is a novel and innovative approach for treating patients with knee OA.

	WOMAC	Mean value \pm S.D.	P value	VAS	Mean value \pm S.D.	P value
Preoperative		32.40 \pm 17.62		Preoperative	48.21 \pm 22.79	
1 month		26.37 \pm 15.36	0.051	1 month	31.65 \pm 19.35	<0.01*
3 months		22.95 \pm 16.18	<0.01*	3 months	30.51 \pm 19.44	<0.01*
6 months		22.67 \pm 16.29	<0.01*	6 months	29.93 \pm 20.18	<0.01*
	KOOS	Mean value \pm S.D.	P value			
Preoperative		56.31 \pm 14.92				
1 month		63.40 \pm 15.51	0.01*			
3 months		65.32 \pm 15.40	<0.01*			
6 months		66.38 \pm 14.97	<0.01*			

Table 1

	Anterior T2 mapping value			Central T2 mapping value			Posterior T2 mapping value		
	Medial femur	Mean value \pm S.D.	P value	Medial femur	Mean value \pm S.D.	P value	Medial femur	Mean value \pm S.D.	P value
Preoperative	45.8 \pm 4.4			47.7 \pm 3.3			52.7 \pm 2.4		
1 month	47.8 \pm 4.0	0.37		48.3 \pm 5.5	0.76		51.3 \pm 3.5	0.47	
3 months	48.3 \pm 4.8	0.25		50.0 \pm 4.2	0.27		52.6 \pm 3.5	0.99	
6 months	49.5 \pm 4.9	0.10		51.4 \pm 4.3	0.08		53.5 \pm 3.3	0.63	
	Medial tibia			Medial tibia			Medial tibia		
Preoperative	40.6 \pm 2.8			41.1 \pm 2.8			40.2 \pm 3.0		
1 month	41.5 \pm 3.0	0.33		42.0 \pm 2.7	0.26		41.4 \pm 3.1	0.14	
3 months	42.2 \pm 3.0	0.07		40.9 \pm 2.5	0.80		41.1 \pm 2.3	0.25	
6 months	42.9 \pm 3.4	0.01*		42.4 \pm 2.9	0.10		41.6 \pm 2.6	0.08	
	Lateral femur			Lateral femur			Lateral femur		
Preoperative	42.0 \pm 4.3			45.4 \pm 4.8			45.4 \pm 4.8		
1 month	43.0 \pm 4.2	0.33		47.0 \pm 5.1	0.18		47.0 \pm 5.1	0.18	
3 months	43.0 \pm 4.1	0.33		46.1 \pm 3.9	0.56		46.1 \pm 3.9	0.56	
6 months	43.6 \pm 4.0	0.13		47.4 \pm 4.4	0.10		47.4 \pm 4.4	0.10	
	Lateral tibia			Lateral tibia			Lateral tibia		
Preoperative	39.1 \pm 2.1			38.0 \pm 1.7			37.7 \pm 2.7		
1 month	40.3 \pm 3.3	0.14		38.7 \pm 2.0	0.20		38.6 \pm 3.0	0.25	
3 months	40.7 \pm 3.0	0.04*		38.7 \pm 2.1	0.17		38.6 \pm 2.9	0.24	
6 months	40.7 \pm 3.3	0.049*		39.2 \pm 2.5	0.03*		38.9 \pm 3.0	0.12	

Table 2

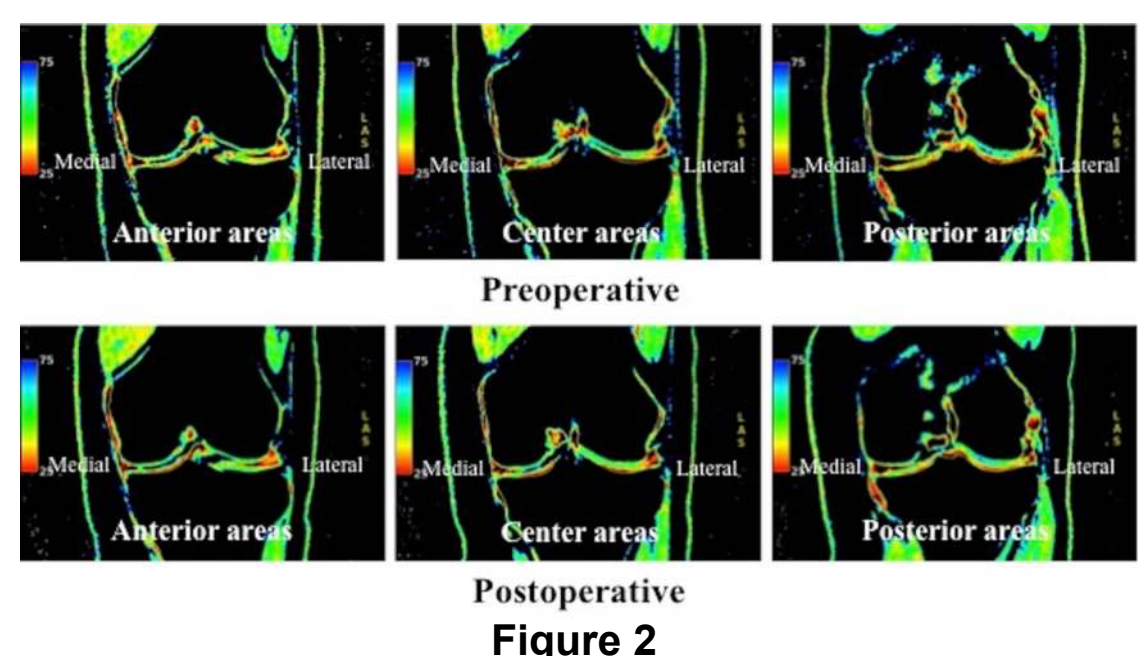


Figure 2