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Expansion and Characterization of Regulatory T cell Populations from Acute Kidney Injury Patients

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Objectives: Acute renal injury occurs in 5% of hospitalized patients and 30% of critically ill patients. The mechanism of acute renal injury is complex. Previous studies have shown that the immune inflammatory response plays an important role in acute kidney injury. Regulatory T cells, one of the CD4-positive T cells, express IL-2 receptor (CD25). Foxp3 (Forkhead Box P3), a transcription factor that regulates immunosuppressive activity, and FoxP3-positive regulatory T cells are the drugs normal kidney monocytes, which accounts for 2%. Recent studies have shown that regulatory T cells play a role in protecting the kidney and are the expected immunotherapy target in acute renal injury. In this study, regulatory T cells were isolated and proliferated from patients with acute renal injury to confirm the kidney prognosis. Regulatory T cells that proliferated in vitro were re-administered to the same patient to reduce kidney damage, prevent chronic kidney disease, and reduce the occurrence of end-stage renal disease (ESRD).

Methods: This study included 30 adult patients diagnosed with AKI at Kosin University Gospel Hospital from March to December 2020. Differentiation and expansion of Tregs were determined using flow cytometry to compare Treg subpopulations. Tregs were defined as $CD4^{+}CD25^{high}CD127^{low/-}FoxP3^{+}$ cells.

Results: In patients with acute renal injury, the number of regulatory T cells increased immediately after the decrease in renal function, and the number of regulatory T cells was normalized after the renal function was restored.

Conclusions: In patients with acute renal injury, the number of regulatory T cells increased immediately after the decrease in renal function, and the number of regulatory T cells was normalized after the renal function was restored. In the future, it is expected to reduce kidney damage, the occurrence of chronic kidney disease, and end-stage kidney disease by re-administering regulatory T cells grown in vitro to the same patient.

Table 1. Baseline characteristics

Variables	Baseline (n = 29)	At 3 months (n = 19)
Age	60.97 ± 6.17	62.21 ± 5.07
Sex 0/1	3(10.3%) / 26(89.7%)	0(0%) / 19(100%)
Body weight (kg)	70.44 ± 13.48	74.13 ± 11.52
Height (cm)	163.21 ± 15.89	168.57 ± 5.8
Systolic BP (mmHg)	129.03 ± 25.8	126.95 ± 16.19
Diastolic BP (mmHg)	76.45 ± 13.56	72.68 ± 9.86
Pulse rate (frequency/minute)	80.14 ± 15.48	79 ± 17.62
Body temperature (℃)	36.44 ± 0.26	36.44 ± 0.33
Respiratory rate (frequency/minute)	19.52 ± 0.91	19.47 ± 0.9
Creatinine(CR)	1.98 ± 0.84	1.86 ± 0.54

Table 2. Results between baseline and at 3 months by paird T test

Variable	Mean difference		Confidence interval	t	p.value	Variable
FoxP3	All cell count		80.37	(-798.51, 959.25)	0.19	0.85
	Lymphocyte count		286.58	(-836.13, 1409.29)	0.54	0.6
	Lymphocyte		3.23	(-7.41, 13.86)	0.64	0.53
	CD4(+)	gating cell count	-183.84	(-624.43, 256.74)	-0.88	0.39
		total(%)	-2.09	(-6.38, 2.2)	-1.02	0.32
		gated(%)	-5.39	(-11.35, 0.57)	-1.9	0.07
	CD4(+)/ CD25(+)	gating cell count	-15.68	(-409.66, 378.29)	-0.08	0.93
		total(%)	-0.41	(-4.24, 3.42)	-0.22	0.83
		gated(%)	10.32	(0.06, 20.58)	2.11	0.05
	CD127(0)/FoxP3(+)	gating cell count	63.47	(26.8, 100.15)	3.64	<0.01
		total(%)	0.64	(0.27, 1)	3.68	<0.01
		gated(%)	6.5	(2.38, 10.63)	3.31	<0.01