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The Protective Effects of Apelin on Contrast-Induced Nephropathy

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Objectives: Contrast-induced nephropathy (CIN) is a well-known type of acute kidney injury, while there are no effective methods to prevent CIN except for administration of saline yet. Apelin is an endogenous peptide with vasodilatory and cardiostimulatory effects elevating systemic and renal circulation. Thus, we aim to investigate the protective role of apelin on CIN in the study.

Methods: Total of twenty-two Sprague-Dawley rats were used in the study. The rats were divided into Vehicle (V, n=4), Apelin (A, n=4), Contrast (C, n=7), and Apelin-Contrast (AC, n=7) groups. All groups were given 50 mg/kg of gentamicin intravenously from day 1 (D1) to D6 for inducing CIN. Total 300 microgram/kg of apelin subcutaneously and 1.8 g Id/kg of contrast (Iohexol, Omnipaque™) intravenously were given according to each group on D7. We collected blood and 24-hour urine samples on D0 and D9 which is the time of 48 hours after contrast administration.

Results: The results showed that serum creatinine (Cr) increased significantly only in C group (1.59 +/- 0.75 to 2.28 +/- 1.32 mg/dL, p=0.044), while did not in other groups including AC group. The C group also showed a significantly increased urinary excretion of Cr suggesting renal tubular damage. The other parameters including urinary volume and creatinine clearance did not show the significant differences.

Conclusions: Based on the results of serum Cr in the study, we suggest that apelin could prevent CIN. But, the results are insufficient to support the protective role of apelin on CIN, and thus we need more data through analysis of kidney tissues.

Table 1. Change of serum and urine parameters

Table 1. Changes in serum creatinine (SCr), creatinine clearance (CrCl), 24-hour urinary volume (UV) and urinary creatinine excretion in vehicle, apelin, contrast, and apelin-contrast groups between Pre (before contrast use) and Post 48H (48 hours after contrast use)

	Day	Vehicle	Apelin	Contrast	Apelin / Contrast
SCr (mg/dL)	Pre	2.3 ± 0.5	2.0 ± 0.4	1.6 ± 0.8	2.2 ± 0.4
	Post 48H	2.8 ± 0.3	2.9 ± 1.4	2.3 ± 1.3 *	2.6 ± 0.9
CrCl (mL/min/100g)	Pre	10.0 ± 3.8	13.7 ± 4.1	17.5 ± 7.2	11.4 ± 2.7
	Post 48H	11.4 ± 2.2 *	12.3 ± 5.3	19.1 ± 12.6	14.5 ± 6.5
24-hour UV (mL)	Pre	13.5 ± 10.0	15.1 ± 6.1	16.7 ± 5.68	12.4 ± 5.0
	Post 48H	11.3 ± 5.1	17.1 ± 7.5	18.0 ± 6.9	13.0 ± 2.0
Urine Cr Excretion (mg/day)	Pre	9.6 ± 3.0	11.0 ± 2.0	10.7 ± 3.6	10.7 ± 2.3
	Post 48H	15.1 ± 3.4 *	15.0 ± 6.2	16.1 ± 3.8 *	16.8 ± 6.7

Values are presented as mean ± standard deviation, *P<0.05 statistically significant

Figure 1. Change of serum creatinine in four groups between pre- and post contrast periods

