CHAPTER IV

RESULTS

GROUP I (CONTROL ANIMALS)

Effects of an intrarenal arterial infusion of isotonic saline solution

An isotonic saline solution infused directly into the renal artery of left kidney. The hemodynamic changes were compared between the infused and contralateral kidneys. The mean arterial blood pressure (MAP), renal arterial blood pressure (RAP), heart rate (HR) and packed cell volume (PCV) are given in table 1. They did not indicated the significant changes throughout the experimental period.

I: Effects of an isotonic saline infusion on renal hemodynamic changes of the infused kidney.

As shown in table 2, 3, 4, 5 and 6 the results are expressed on mean ± SEM. The effective renal plasma flow (ERPF), renal blood flow (RBF), glomerutar filtration rate (GFR), filtration fraction (F.F.) and renal vascular resistance (RVR) were not altered significantly from the mean control periods. To determine the renal function, plasma creatinine (P_{Cr}) and blood urea nitrogen (BUN) were obtained. Both of them were reduced transiently in the first hour period of post saline infusion. The plasma creatinine was shown insignificantly

whereas blood urea nitrogen reduced significantly from the mean control value of 17.80 $\pm$ 1.14 mg % to 15.60 $\pm$ 0.91 mg% in the period of thirty minutes following postinfusion. The urine flow rate (V) was increased continuously and shown statistical significance in the third, fourth and fifth hour periods (table 6). The filtered loads of sodium (F_{Na}), chloride (F_{Cl}), potassium (F_K) and osmolality (F_{Osm}) were tended to increase as shown in table 4. Plasma concentrations of electrolytes were not changed significantly (table 2). As shown in table 4, the urinary excretion rates of sodium ($U_{Na}V$) and chloride ($U_{Cl}V$) were significantly augmented while the urinary excretion rate of potassium (U_KV) was tended to be high by approximately 30.20 %, 56.60%, 60.40%, 45.30%, 47.20% and 11.30%, respectively. However, the urinary excretion rate of osmolality was increased significantly from the first hour period to the end of experiment. As shown in table 5, the fractional excretion of sodium was transiently decreased after three hours infusion and then elevated throughout the experimental period. The fractional excretion of chloride was also temporarily decreased and following increase in the third, fourth and fifth hour periods. On the other hand, the fractional excretion of potassium was slightly increased but not reached the statistically significant level. As shown in table 6, the osmolar clearance(C_{Osm}) was elevated significantly after one hour postinfusion throughout the end of experiment whereas no significant changes in free water clearance (C_{H_2O}). The urine and plasma osmolality ratio was continuously diminished but not achieved the significantly level

II: Effects of an isotonic saline infusion on renal hemodynamic changes of the contralateral kidney

The renal hemodynamic results of the contralateral kidney are shown in table 7, 8, 9 and 10. After saline infusion, the effective renal plasma flow, renal blood flow, glomerular filtration rate, fractional fraction and renal vascular resistance were not altered significantly from the mean control values throughout the experimental period. As shown in table 10, the urine flow rate was elevated gradually and exhibited the statistical significance from the mean control value of 8.93 ± 2.82 to 22.82 ± 4.45 and 22.92 ± 3.82 µl/min/gram-kidney weight in the third and fourth hour periods, respectively. The filtered load of sodium, chloride, potassium and osmolality were slightly increased in the three hour periods following infusion and almost returned to the mean control values at the end of experiment. However, the fractional excretion of sodium and chloride were slightly increased and accomplished the statistically significant level after two hours infusion (table 9). The fractional potassium excretion was also slightly increased after over two hours infusion and then above the significant level in the third hour period following slight reduction in the end of teh experimental period (table 9). As shown in table 8, the urinary excretion rate of sodium was slightly declined in the thirtieth minute period following increasing significance until the end of experiment. Similar decrease in the urinary excretion rate of sodium after thirty minutes infusion, the urinary excretion rate of chloride was slightly risen but below the statistically significant level at the first and second hour periods. Following three hours postinfusion, the urinary chloride excretion rate was

significantly increased. However, there was no statistically significant alteration of the urinary excretion rate of potassium whereas the urinary osmolar excretion was gradually increased over one hour infusion and reached the significant value at the second, third, fourth and fifth hour periods (table 8). As shown in table 10, the osmolar clearance was constantly augmented and then accomplished the statistically significant level after three hours postinfusion. The urine and plasma osmolality ratio was tended to be low. However, the free water clearance was slightly increased but not significantly over one hour infusion when compared with the mean control period and then continuous reduction until the end of experiment (table 10).

III: Comparison between the infused and contralateral kidneys on renal hemodynamic changes following saline infusion.

The renal hemodynamics of both kidneys were compared and shown in table 11, 12, 13 and figure 2, 3, 4 and 5. They indicate a good correlation of responsive changes without statistically significant difference.

GROUP II (RUSSELL'S VIPER VENOM 0.05 MG/KG BW.)

Effects of an intrarenal arterial infusion of Russell's viper venom 0.05 mg/kg bw.

A small dose of Russell's viper venom infused directly into the renal artery of left kidney. The hemodynamic alterations were investigated comparing between the infused and contralateral kidneys. After initial venom infusion, the mean arterial blood pressure and renal arterial blood pressure were decreased significantly when compared to the mean control values over fiveteen minutes. Both of them were recurred to achieve insignificant level in the thirtieth minute period and maintained these values until the fifth hour period as shown in table 14. Heart rate was gradually diminished and reached a statistically significant level over one hour postinfusion following slight increase and returned to the control value at the end of experiment (table 14). There was slight increase in packed cell volume at the first hour period and then decreased insignificantly throughout the experimental period. About one hour after envenomation, hemolysis associated with hemoglobinuria were usually found. These changes might have some effects on packed cell volume.

I: Effects of Russell's viper venom 0.05 mg/kg bw. on renal hemodynamic changes of the infused kidney.

The intrarenal arterial infusion of Russell's viper venom 0.05 mg/kg bw. caused an exactly sharp decrease in effective renal plasma flow, renal blood flow and glomerular filtration rate and maintained

these low values throughout the experiment. As shown in table 16, there was a significant decline in effective renal plasma flow over three hours and the fifth hour period. Renal blood flow as well as glomerular filtration rate was also significantly decreased all over five hours post venom infusion. The renal vascular resistance was calculated simply from the ratio of renal arterial blood pressure and renal blood flow and expressed in mm.Hg/ml/min. Following venom infusion, the renal vascular resistance was initially elevated, significantly from the mean control of 56.64 ± 7.00 to 132.72 ± 28.31 and 222.75 ± 50.99 mm.Hg/ml/min/gm-kw at the thirtieth minute period and the first hour period . At the second and third hour periods, there was increase in the renal vascular resistance but not significant. It was recurred to reach a significant level at the fourth and fifth hour periods as shown in table 16. It should be noted that the reductions of effective renal plasma flow, renal blood flow and glomerular filtration rate were extremely diminished in the last period whereas the renal vascular resistance was persistently increased. Owing to the fall in glomerular filtration rate and effective renal plasma flow, the filtration fraction was not altered significantly (table 16). Furthermore, the urine flow rate was reduced suddenly and revealed a statistical significance at the end of the period of the first hour (table 19). In the second and third hour periods, it was slightly increased recurrent and then decreased again until the end of experiment. Mean plasma concentrations of sodium, chloride and osmolality were not significantly altered whereas the plasma concentration of potassium was slightly elevated following a significant increment at the fifth hour period as shown in table 15.

The plasma creatinine had a tendency to slight increase but not significant (table 15). Blood urea nitrogen was transiently declined over one hour and then continued to elevate by approximately 8,10%, 15.43%, 26.02%, 28.29% from the second to fifth hour periods, respectively (table 15). At the last hour period of experiment, blood urea nitrogen was more increased than mean control period and indicated the statistical significance as given in table 16. In table 17, there were significantly initial reduction of the mean values of filtered load of sodium and chloride while the urinary sodium and chloride excretion were tended to be low but not significant. Filtered load of potassium was diminished and shown a significant value at the first hour period while the remainder did not achieve a statistically significant level. The urinary excretion rate of potassium was constantly reduced and above a statistically significant level at the first and fifth hour periods. The prominent fall in filtered load of osmolality was indicated a statistical significance while the urinary osmolar excretion rate was also reduced suddenly over one hour and then returned to a non-significant level from the second to the fifth hour periods. As represented in table 18, the fractional excretion of sodium was gradually increased but not significant over three hour and the last period of experiment. However, it was significantly increased at the fourth hour period from the mean control value of 1.71 ± 0.44 to 3.53 ± 0.88%. Furthermore, the fractional excretion of chloride and potassium were tended to be high but below the statistically significant level. These indicated the electrolytes reabsorption was small whereas the failure of glomerular filtration simultaneously occurred, and consequented from persistent increase in renal vascular resistance. The urine flow rate was strikingly reduced, therefore the

renal excretion rates of electrolytes were also diminished. It should also be noted that a period of oliguria was seen in the first hour and following a period of polyuria in the second or third hour period as summarized in table 19. Finally, it was relapsed when compared to the mean control period. The reduction of urine flow rate was presumably reflected the failure of glomerular filtration and tubular reabsorption of electrolytes. As represented in table 19, osmolar elearance was significantly diminished over one hour post initial venom infusion following recovery periods which it was not achieve a statistically significance. On the other hand, free water elearance was expressed negative value and tended to be high but not significant. These indicated tubular reabsorption of water slightly elevated whereas the excretory solute reduced simultaneously when the urine flow rate was also strinkingly declined. The urine and plasma osmolality ratio was gradually increased throughout the experiment period and reached a statistical significance at the fourth hour period (table 19). Hence, the concentrating tubule activity was normal function so that the plasma concentration of osmolalily was unchanged significantly within five hours post venom infusion.

II: Effects of Russell's viper venom 0.05 mg/kg bw. on renal hemodynamic changes of the contralateral kidney.

As shown in table 20, both effective renal plasma flow and renal blood flow were continously reduced throughout the experimental period. They accomplished the level of statistical significance at the first, second, third and fifth hour periods. In half an hour and the fourth hour periods, they were slightly reduced but not reached a

significant value. In contrast, there was initial decrease in the effective renal plasma flow and renal blood flow of the infused kidney as shown in table 16. Over one hour post venom infusion, the renal vascular resistance was significantly elevated and still maintained this value throughout the experiment. The statistically significant analysis indicated no significant difference between renal vascular resistance before experiment and at the second, third and fifth hour periods but differed significantly at the fourth hour period. In addition to, glomerular filtration rate was prominently reduced and reached a statistical significance at the thirtieth minute, second, third, fourth and fifth hour periods. At the first hour period, it had a tendency of reduction but not achieved a significant level. As the renal vascular resistance was persistently increased, the glomerular filtration rate was undergone a simultaneous decrease. Both glomerular filtration rate and effective renal plasma flow were declined proportionally so that the filtration fraction was unchanged significantly. As given in table 23, the urine flow rate was sharply diminished by approximately 54.87% and 49.76% over one hour period and then tended to be high as 34.17% and 32.76% in two or three hours post envenomation. Finally, it was diminished again by approximately 37. 34% and 41.13% at the fourth and fifth hour periods. It was noted that the oliguria period was seen over one hour following polyuria period at the second and third hour periods and at last, it was relapsed at the end of experiment. As shown in table 21, filtered load of sodium and chloride were constantly attenuated over all period but reached a statistical significance at the thirtieth minute and second, third, fourth and fifth hour periods. The filtered load of potassium was diminished similar to the filtered loads of sodium and

chloride, so achieved a statistical significance at the thirtieth minute and the fifth hour periods. Therefore, the filtered load of osmolality was undergone reduction over all the experimental period and differed significantly from the mean control value at the thirtieth minute, second, third, fourth and fifth hour periods (table 21). However, urinary excretion rates of sodium, chloride and potassium were tended to be low but not significantly. Nevertheless, the urinary osmolar excretion reduced significantly over one hour post envenomation and then slightly elevated from the second hour to the fifth hour periods. As shown in table 22, the fractional excretion of sodium was tended to be low over one hour following a gradual increase until the end of experiment but not accomplished a statistical significance. The fractional excretion of chloride was shown to reduce significantly at the first hour period and then slightly elevated by approximately 20.16%, 18.93%, 23.05% and 42.39% after one hour postinfusion, respectiyely. On the other hand, the fractional excretion rate of potassium was gradually increased by approximately 25.44%, 15.61%, 19.40%, 39.42%, 10.16% and 91.76% at the thirtieth minute, first, second, third, fourth and fifth hour periods, respectively (table 22). Similar decrease in the osmolar clearance of the infused kidney, this osmolar clearance of contralateral kidney was also significantly decreased over one hour post venom infusion and after that slightly increased from the second to the fifth hour periods (table 23). Free water clearance was slightly declined in the first hour and then expressed negative values from the second to the last hour periods. No significant change of free water cleacance was exhibited (table 23). The urine and plasma osmolality ratio was tended to be high at the third, fourth and fifth hour periods after slight diminution over one hour postinfusion (table 23).

III: Comparison between the infused and contralateral kidneys on renal hemodynamic changes following Russell's viper venom 0.05 mg/kg bw. infusion.

In comparison with the contralateral kidney, diminution of effective renal plasma flow was significantly more decreased at the thirtieth minute and first hour periods as shown in figure 5. Mean values of renal blood flow were 1.13 ± 2.00, 0.80 ± 0.18 and 1.21 ± 0.52 ml/min/gm-kw at the thirtieth minute, first and fourth hour periods, respectively, of the infused kidney were significantly lower too (figure 5). The glomerular filtration rate was 0.15 ± 0.03 ml/min/gm-kw at the first hour period, therefore, exhibited significantly to be less than when compared with the contralateral kidney (figure 6). As shown in figure 7, the percentapge increase in renal vascular resistance was significantly higher ($P < 0.05$) at the first hour period. After venom infusion, urine flow rate of both kidneys was also diminished but not significant difference when respected to the control period of each other (table 24). Nevertheless, the percentage fall in urine flow rate of the infused kidney was shown to be greater (figure 6). At the first hour period, decrease in filtered loads of sodium and chloride of the infused kidney were significantly greater than the mean value of the same period of the contralateral kidney whereas the filtered load of potassium was not differed significantly (table 25). In figure 8 and 9, the urinary excretion rates of sodium and chloride in both kidneys were not differed significantly. However, urinary excretion rate of potassium of the infused kidney was significantly more decreased than the contralateral kidney too (figure 9)

High fractional excretions of sodium, chloride and potassium of both kidneys were not differed significantly (figure 8,9and 10). These results indicate that tubular reabsorption of both kidneys was exactly diminished but not reached a statistically significant difference. In table 26, osmolar clearance, urinary osmolar excretion rate, free water clearance, urine and plasma osmolality ratio were not significantly differed between both kidneys. These data suggest that the effects of Russell's viper venom 0.05 mg/kg bw. on renal hemodynamics of the direct infused kidney were more changed than the contralateral kidney although both of them were influenced from the general circulatory effects.

GROUP III (RUSSELL'S VIPER VENOM 0.1 MG/KG BW. INFUSION ANIMALS)

Effects of an intrarenal arterial infusion of Russell's viper venom 0.1 mg/kg bw.

A high dose of Russell's viper venom infused directly into the renal artery of left kidney. The hemodynamic changes were studied comparing between the infused and contralateral kidneys. As shown in table 27, both mean arterial blood pressure and renal arterial blood pressure were significantly reduced over fifteen minutes after infusion. Apart from the fifteenth minute period, they started to increase gradually and then returned to insignificant difference of level which compared to the control periods. Heart rate was also reduced significantly at the fifth minute period (table 27). However, it gradually increased and recovered to the control level within thirty mintues after

post envenomation and no further changed until the end of the fifth hour period of experiment. Packed cell volume was significantly diminished throughout the experimental periods when compared with the mean control value. It was found that diminution of the packed cell volume usually associated with hemoglobinuria and hemolysis which occurred after one hour postinfusion.

I: Effects of Russell's viper venom 0.1 mg/kg bw. on renal hemodynamic changes of the infused kidney.

As represented in table 28, 29, 30, 31 and 32, Russell's viper venom 0.1 mg/kg bw. intrarenal arterial infusion caused both effective renal plasma flow and renal blood flow gradually declined and achieved a statistically significant level at the fourth and fifth hour periods (table 29). After initial venom infusion, renal vascular resistance was constantly increased by approximately 177.09%, 213.05%, 121.85%, 165.28% and 139.57%, respectively (table 29). At the fourth hour period, it indicated to show a statistical significance ($P < 0.05$). On account of persistent increase in renal vascular resistance, glomerular filtration rate was continuously declined and above a statistically significant level at the first, second, third and fifth hour periods as given in table 29. The filtration fraction was not significantly altered because of proportional reduction of both glomerular filtration rate and effective renal plasma flow (table 29). In according with the failure of glomerular filtration, urine flow rate diminished gradually by approximately 18.76%, 28.83%, 39.97%, 50.66% and 63.87%, respectively throughout the experimental periods. It is noted that most animals were not able to exhibit urine output

prior to one hour period. As given in table 28, plasma creatinine as well as blood urea nitrogen was constantly increased throughout the experiment. An attenuating increase in plasma creatinine averaged 0.99 ± 0.16, 1.14 ± 0.10, 1.00 ± 0.12, 1.05 ± 0.18 and 1.03 ± 0.15 mg% from the first to the fifth hour period when respected to 0.93 ± 0.03 mg% as the mean control value . Blood urea nitrogen was increased significantly from the mean control value of 13.08 ± 1.14 to 16.84 ± 2.40, 19.72 ± 3.39, 21.32 ± 3.96 and 21.98 ± 4.02 at the second, third, fourth and fifth hour periods, respectively. As represented in table 30, either filtered load of sodium or chloride was continuously decreased over all experimental periods and reached a statistically significant level at the first, second, third and fifth hour periods. Filtered load of potassium was also reduced persistently and shown a significant values in the first, third and fifth hour periods. Filtered load of osmolality was therefore decreased constantly as shown in table 30. The urinary sodium excretion rate was slightly increased all experimental period but increasing value of 2.56 ± 0.62 μEq/min/gm-kw, at the second hour period, was differed significantly when compared to the mean control value of 1.33 ± 0.43 μEq/min/gm-kw. (table 30). No significant difference of urinary excretion rate of chloride between before and after experimental data was indicated as shown in table 30. However, urinary excretion rate of osmolality was slightly elevated over four hour and fluctulated to reduce at the end of experiment whereas the urinary excretion rate of potassium was altered insignificant (table 30). As shown in table 31, there were constant increase in fractional excretion of sodium and chloride and revealed a statistically significant value at the third and fourth hour periods. Nevertheless, attenuating elevation of fractional excretion of potassium was not indicate to show a statistical significance

(table 31). As an increase in fractional excretions of electrolytes were exhibited constantly, the plasma concentration of osmolality was tended to be high but not significantly (table 28). In table 28, plasma concentration of sodium had a tendency of slight elevation but was not achieved significant level. The plasma concentration of chloride was gradually increased over the experimental period and able to reach a significant level at the third and fourth hour periods (table 28). Similar increase in the plasma concentration of potassium was also exhibited significantly at the second hour period besides slight increase over all experimental periods (table 28). As represented in table 32, osmolar clearance was not altered significantly but tend to be be high over all periods. To determine tubular water reabsorption, free water clearance was reduced significantly from the mean control period (table 32). The urine and plasma osmolality ratio was also significantly increased over three hours at the end of experiment thereafter constantly slight increase (table 32). These results indicate that responsible tubular functions for water reabsorption and concentrating urine formation are also normal activity.

II: Effects of Russell's viper venom 0.1 mg/kg bw. on renal hemodynamic changes of the contralateral kidney.

These results are summarized in table 33, 34, 35 and 36. After initial venom infusion, both effective renal plasma flow and renal blood flow were significantly reduced when respected to the mean control periods at the first, third, fourth and fifth hour periods (table 33). Besides the second hour period, they were not achieved a statistical significance. The renal vascular resistance was increased significantly after one hour

post initial venom infusion and then more increased than the control period so that achieved a significant level again at the first, fourth, and fifth hour periods (table 33). It is found that an increase in renal vascular resistance was prolonged throughout experimental period. According to persistent increase in renal vascular resistance, glomerular filtration rate was profoundly reduced and accomplished a significant value over three hours after initial venom infusion (table 33). At the end of experiment, it was slightly elevated and not differed siginificantly from the mean control period. The fall in effective renal plasma flow and glomerular filtration rate was proportionally so that the filtration fraction was not altered significantly (table 33). As shown in table 36, urine flow rate was constantly diminished over all experimental periods but not differed significantly when respected to the mean control value. The diminution of urine flow rate was approximately 24.18%, 42.71%, 50.71%, 54.04% and 67.13% from the first to the fifth hour period, respectively. As given in table 34, filtered load of sodium had a tendency of decrease from mean control value of 82.23 ± 9.75 to 65.41 ± 11.57, 61.61 ± 14.99 and 58.57 ± 13.52 μEq/min/gm-kw after three hours infusion and then slight increase of 70.66 ± 14.55 and 70.33 ± 14.77 μEq/min/gm-kw at the fourth and fifth hour periods. At the second hour period, there was a statistical significance of decrease in filtered load of sodium. However, similar decrease in filtered loads of chloride and potassium was shown in table 34. Over two hours infusion, filtered load of chloride was significantly decreased following insignificant values of remainder at the third, fourth and fifth hour periods. Initial decrease in filtered load of potassium was indicated to show a significance at the first hour period and then not achieved a significant level as summarized in

table 34. Therefore, filtered load of osmolality was also significantly reduced over three hours infusion and not above a significant value at the end of experiment. The urinary sodium excretion rate was slightly elevated throughout the experimental period and able to reach a statistically significant value at the first hour period (table 34). The urinary excretion rates of chloride, potassium, and osmolality were slightly increased but not significantly (table 34). As repersented in table 35, an increase in fractional excretion of sodium which constance all experimental periods was indicated to show a statistical significance over four hours infusion and following slight decrease at the end of experiment. Fractional excretion of chloride was also slightly increased by approximately 31.03%, 55.86%, 99.31%, 51.03% and 13.79% from the first to the fifth hour periods, respectively (table 35). At the same times, the fractional excretion of potassium was slightly increased by approximately 14.20%, 29.66%, 40.65%, 11.17% and 10.71%, respectively (table 35). Certainly, renal tubular reabsorption of electrolytes was reduced during experimental period. As represented in table 36, osmolar clearance was tended to be high but not achieved a statistically significant level. Free water clearance was exactly reduced in all periods of experiment and shown mean value of -7.14 ± 3.81, -10.31 ± 3.02, -10.84 ± 3.07 and -10.18 ± 1.87 µl/min/gm-kw at the second, third, fourth and fifth hour periods, were differed significantly from mean control value of 8.07 ± 7.15 µl/min/gm-kw (table 36). The urine and plasma osmolality ratio was indicated to increase significantly from mean control value of 1.11 ± 0.33 to 1.87 ± 0.29, 1.99 ± 0.26, 2.00 ± 0.23 and 2.28 ± 0.22 at the second, third, fourth and fifth hour periods afterwards slight increase at the first hour period (table 36).

III: Comparison between the infused and contralateral kidneys on renal hemodynamic changes following Russell's viper venom 0.1 mg/kg bw. infusion.

As shown in table 37, 38 and 39 and figure 11, 12, 13, 14 and 15, the effects of Russell's viper venom on both kidneys were compared. It was found that no significant difference of any parameters when compared with the same state of each period by using student's t-test. These results suggest that either the infused kidney or the contralateral kidney was equally affected from the high dose of Russell's viper venom 0.1 mg/kg bw.

Comparison between Russell's viper venom 0.05 mg/kg bw. infused (from group II) and saline infused kidneys (from group I)

As shown in figure 16, both mean arterial blood pressure and renal arterial blood pressure were more reduced than the saline infusion and achieved a statistically significant level over fifteen minutes. Either heart rate or packed cell volume was not significantly different from each other (figure 17). Diminution of effective renal plasma flow and renal blood flow was significantly greater whereas renal vascular resistance was progressively increased and more superior to the saline control at the end of experiment (figure 19 and 21). Over all experimental periods, glomerular filtration rate was more decreased than of the same state comparing (figure 20). Owing to the fall in glomerular filtration rate and effective renal plasma flow, fractional fraction of Russell's viper venom 0.05 mg/kg bw. was therefore signifi-

cantly more reduced at the second and third hour periods (figure 20). During venom experimental period, gradual decrease in urine flow rate was revealed and shown significant difference from the same period of an isotonic saline infusion (figure 21). To determine the renal function test, plasma creatinine and urea nitrogen were obtained. In figure 18, plasma creatinine was not show a statistically significant difference while blood urea nitrogen was tended to be more higher at the fourth and fifth hour periods. Statistical analysis indicated no significant difference from plasma sodium, chloride, potassium and osmolality of both experimental infused kidneys (table 40). During all experimental periods of Russell's viper venom 0.05 mg/kg bw. infused kidney, filtered loads of electrolytes and osmolality were significantly more reduced when compared with the same state of saline infused kidney (table 41 ;figure 22, 23 and 24). The reduction of urinary excretion rate of sodium, chloride, potassium and osmolality were superior to the saline infused kidney from control group (table 41; figure 22, 23 and 24). The constant increase in fractional excretion of sodium, chloride and potassium of Russell's viper venom infused kidney was insignificant difference (figure 22, 23 and 24). In table 41, osmolar clearance was significantly more diminished throughout the experiment than the same state of saline infused kidney whereas free water clearance as well as urine and plasma osmolality was insignificant difference.

Comparison between Russell's viper venom 0.1 mg/kg bw. infused (from group III) and saline infused kidneys (from group I).

As represented in figure 16, both mean arterial blood pressure and renal arterial blood pressure were more declined than the saline solution infusion and accomplished a statistically significant level over fifteen minutes. Heart rate as well as packed cell volume was not significantly different from each other (figure 17). As represented in figure 19, effective renal plasma flow was tended to be lower than the saline infused kidney but not differed significantly. However, renal blood flow was significantly more reduced at the fourth hour period than the same state of saline control (figure 19). In figure 21, progressive increase in renal vascular resistance was not differed significantly. Nevertheless, the consistent decrease in glomerular filtration rate after Russell's viper venom 0.1 mg/kg bw. infusion was higher at the fourth hour period (figure 20. Owing to reduction of both glomerular filtration rate and effective renal plasma flow following venom infusion, filtration fraction was consequently lower and differed significantly from the saline infused kidney control at the second hour period (figure 20). At the fourth and fifth hour periods, continued diminution of urine flow rate after venom infusion indicated to show a statistically significant difference from the mean values of the same state (figure 21). Similar decrease in filtered load of electrolytes following venom infusion was significantly less than the same state of saline infused kidney (figure 22, 23 and 24). However, the urinary excretion rate of sodium, chloride and osmolality was not differed significantly (figure 22, 23 ; table 41). The urinary excretion rate of potassium which reduced following venom

administration was revealed a statistically significant value at the third hour period when compared with the mean value of saline control (figure 24). At the third hour period, fractional excretion of sodium and chloride were exceeded but fractional excretion of potassium was not so (figure 22, 23 and 24). Statistically significant analysis was not indicated the difference of osmolar clearance, free water clearance and urine and plasma osmolality ratio between the venom and saline infused kidney (table 41).

Comparison between Russell's viper venom 0.05 mg/kg bw. contralateral (from group II) and saline contralateral kidneys (from group I).

The results are given in table 42 and figure 25, 26, 27, 28, 29 and 30. As shown in figure 25, the consistent decrease in both effective renal plasma flow and renal blood flow were significantly less than the saline contralateral kidney at the fifth hour period. Following initial venom 0.05 mg/kg bw. administration, renal vascular resistance was progressively increased and shown significantly greater at the end of experiment than saline control (figure 27). Gradual decrease in glomerular filtration rate which consequented on the diminution of renal blood flow associated with an increase in renal vascular resistance was significantly greater over all experimental periods than the other (figure 26). In three hours after venom infusion, filtration fraction was more reduced (figure 26). There was no statistically significant difference of urine flow rate between the venom and saline contralateral kidney (figure 27). Continuous reduction of filtered load of electrolytes following venom infusion was signifi-

cantly higher than saline control (figure 28, 29 and 30). The urinary excretions of sodium, chloride, potassium and osmolality were significantly more decreased than the same parameters of the saline contralateral kidney (table 42, figure 28, 29 and 30). No statistically significant difference of fractional excretion of sodium, chloride and potassium was exhibited (figure 28, 29 and 30). In table 42, osmolar clearance following venom administration was reduced and differed significantly from the same state of the saline control whereas both free water clearance and urine and plasma osmolality ratio were not significant difference.

Comparison between Russell's viper venom 0.1 mg/kg bw. contralateral (from group III) and saline contralateral kidneys (from group I).

As given in figure 25 and 26, effective renal plasma flow, renal blood flow, glomerular filtration rate and fractional filtration in the venom contralateral kidney were tended to be lower than the saline contralateral kidney. Following Russell's viper venom 0.1 mg/kg bw. infusion, renal vascular resistance was consistently increased throughout the experiment but not differed significantly from the same state of saline control (figure 27). However, the urine flow rate was significantly more reduced than the other at the fifth hour period (figure 27). Filtered loads of electrolytes and osmolality were not significantly different when compared with the mean value of each the same state of the saline contralateral kidney (table 42; figure 28, 29 and 30). Nonetheless, the urinary excretion rates of sodium and chloride were significantly more reduced whereas the urinary excretion rates

of potassium and also osmolality were not altered differently (table 42 , figure 28, 29 and 30). An increase in fractional excretion of sodium, chloride and potassium was not significantly different from the other (Figure 28, 29 and 30). In table 42, the osmolar clearance was significantly more decreased while the free water clearance and urine and plasma osmolality ratio were not significant difference between both venom and saline contralateral kidneys.

Histopathological changes

After the experiment was finished, both kidneys were removed rapidly prior to the animals were sacrificed. The process of histopathological study was elucidated in chapter II.

Gross appearance

Following removing kidney's capsule, the hemorrhagic spots on the renal surface of the venom infused kidney could be seen prominently and more expaned than the venom contralateral kidney (figure 31 and 32). The pale cortex and pink medulla of both kidneys were observed in longitudinal section. Some small clotting was occationally seen in pelvis. Characteristic urine samples which were obtained before and after venom infusion, showed the difference in color as described in figure 33.

I: Morphological changes in the saline infusion group.

We found that no morphlological changes in either direct infused kidney or the indirect contralateral kidney.

II: Morphological changes in the Russell's viper venom 0.05 mg/kg bw. infusion group.

The morphological changes in the infused and contralateral kidneys were both disclosed similar feature but slightly prominent change in the direct infused kidney. In both the salient features revealed the congestion of the glomeruli with degeneration of proximal tubules diffusely. Tubular necrosis is infrequently noted scattering in the renal parenchyma. Diffuse congestion of the interstitium with few segmented neutrophils infiltration was observed (figure 34).

III: Morphological changes in the Russell's viper venom 0.1 mg/kg bw. infusion group.

Of the two kidneys, the direct infused kidney was slightly more prominent than the indirect contralateral kidney although they seemed to disclose rather similar feature. The renal tubules were undergoing variable degree of degeneration and frequent tubular necrosis (figure 35). There were occationally clumps of red blood cell in tubular lumen and glomeruli as well (figure 35). As shown in figure 36, small number of segmented neutrophils was seen infrequently infiltrating the interstitium. Scatterred foci of interstitial hemorrhage and wedge-shaped area of hemorrhagic necrosis

were noted (figure 37, 38). Although thrombosis could not be identified but the feature seemed to be from vascular occlusion (figure 37, 38).

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Table 1 Effects of an isotonic saline infusion on MAP, RAP, HR, and PCV in five control dogs.

Parameter	control	5 m	15 m	30 m	45 m	60 m	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS	NS	NS	NS
MAP (mm. Hg)	129.00	130.00	133.33	138.00	138.00	134.33	140.33	139.66	140.33	139.00
	±8.06	±7.25	±7.03	±7.10	±8.42	±8.78	±4.76	±5.56	±6.59	±6.83
		NS	NS	NS	NS	NS	NS	NS	NS	NS
RAP (mm. Hg)	129.99	131.00	132.33	135.00	137.33	135.67	138.67	138.99	140.00	138.00
	±8.28	±8.06	±7.57	±6.63	±9.51	±9.90	±4.90	±5.57	±6.01	±7.02
		NS	NS	NS	NS	NS	NS	NS	NS	NS
HR (beat/min)	151.60	132.20	132.40	132.00	142.00	141.00	145.40	154.80	159.80	156.00
	±19.15	±13.19	±10.26	±15.38	±19.66	±18.19	±17.35	±16.52	±17.25	±15.15
				NS		NS	NS	NS	NS	NS
PCV (%)	31.10	-	-	30.30	-	31.00	30.30	30.50	29.90	30.40
	±3.77			±3.74		±3.81	±3.83	±3.76	±3.79	±4.05

Abbreviation : MAP, mean arterial blood pressure; RAP, mean renal arterial blood pressure; HR, heart rate; PCV, packed cell volume. Results are given as mean ± SEM: P value with respect to control; NS = not significant.

Table 2 Effects of an isotonic saline infusion on plasma concentrations of electrolytes, osmolality, creatinine and blood urea nitrogen in five control dogs, compared with the control period.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
P_{Na} (mEq/L)	147.60	148.40	149.20	151.00	147.80	148.00	147.40
	±3.08	±2.04	±3.46	±2.55	±3.43	±4.48	±5.07
		NS	NS	NS	NS	NS	NS
P_{Cl} (mEq/L)	112.60	114.00	114.80	115.2	114.00	114.60	114.80
	±4.99	±6.37	±5.23	±6.69	±6.89	±7.59	±7.35
		NS	NS	NS	NS	NS	NS
P_{K} (mEq/L)	3.72	3.90	3.80	4.02	3.96	4.02	3.94
	±0.11	±0.16	±0.12	±0.07	±0.02	±0.12	±0.14
		NS	NS	NS	NS	NS	NS
P_{Osm} (mOsm/Kg)	307.00	310.08	310.30	309.62	303.90	301.92	303.76
	±3.64	±4.48	±7.94	±2.61	±3.90	±6.54	±4.50
		NS	NS	NS	NS	NS	NS
P_{Cr} (mg %)	0.75	0.66	0.77	0.80	0.69	0.75	0.75
	±0.09	±0.11	±0.06	±0.10	±0.09	±0.08	±0.10
		*	NS	NS	NS	NS	NS
BUN (mg %)	17.80	15.60	16.66	16.68	17.20	17.40	18.18
	±1.14	±0.91	±0.87	±1.56	±1.69	±2.05	±1.55

Abbreviation : P_{Na}, plasma concentration of sodium; P_{Cl}, plasma concentration of chloride; P_{K}, plasma concentration of potassium; P_{Osm}, plasma concentration of osmolality; P_{Cr}, plasma concentration of creatinine; BUN, blood urea nitrogen; NS, not significant; $^{*}P < 0.05$

Table 3 Effects of an isotonic saline infusion on ERPF, RBF, GFR, F.F., and RVR of the infused kidney in five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
ERPF	1.52	1.58	1.76	1.74	1.39	1.49	1.50
(ml/min/gm-kw)	±0.23	±0.28	±0.32	±0.38	±0.37	±0.28	±0.34
		NS	NS	NS	NS	NS	NS
RBF	2.29	2.36	2.65	2.56	2.11	2.37	2.30
(ml/min/gm-kw)	±0.38	±0.48	±0.54	±0.66	±0.63	±0.45	±0.61
		NS	NS	NS	NS	NS	NS
GFR	0.58	0.65	0.70	0.83	0.66	0.63	0.59
(ml/min/gm-kw)	±0.09	±0.09	±0.16	±0.15	±0.14	±0.08	±0.12
		NS	NS	NS	NS	NS	NS
F.F. (%)	34.05	43.48	38.22	51.04	43.40	45.65	43.25
	±4.00	±4.37	±2.62	±5.83	±3.90	±5.37	±5.45
		NS	NS	NS	NS	NS	NS
RVR	64.61	80.62	69.74	95.29	93.32	79.92	110.11
(mm.Hg/ml/min/ gm-kw)	±19.61	±31.74	±25.73	±45.53	±24.22	±29.38	±57.26

Abbreviation : ERPF, effective renal plasma flow; RBF, renal blood flow; GFR, glomerular filtration rate; F.F., filtration fraction; RVR, renal vascular resistance; NS, not significant.

Table 4 Effects of an isotonie saline infusion on filtered load and urinary excretion rate of Na, Cl, K and Osm of the infused kidney in five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
F_{Na} (uEq/min/gm-kw)	84.77 ±13.23	95.19 ±12.60	111.44 ±22.06	123.43 ±21.70	98.24 ±19.66	91.69 ±10.72	89.81 ±14.50
		NS	NS	NS	NS	NS	NS
F_{Cl} (uEq/min/gm-kw)	64.81 ±10.95	72.44 ±9.77	121.66 ±32.58	92.71 ±15.98	73.56 ±12.10	69.98 ±7.45	68.77 ±10.09
		NS	NS	NS	NS	NS	NS
F_{K} (uEq/min/gm-kw)	2.16 ±0.37	2.54 ±0.42	2.89 ±0.57	3.18 ±0.59	2.60 ±0.56	2.41 ±0.29	2.27 ±0.45
		NS	NS	NS	NS	NS	NS
F_{Osm} (uOsm/min/gm-kw)	178.72 ±26.73	199.18 ±27.62	219.61 ±57.08	254.75 ±46.48	198.89 ±41.89	188.01 ±22.97	176.91 ±32.93
		NS	*	*	***	**	*
$U_{Na}V$ (uEq/min/gm-kw)	0.98 ±0.33	0.80 ±0.17	1.28 ±0.28	1.74 ±0.28	2.36 ±0.28	2.88 ±0.55	2.28 ±0.49
		NS	NS	NS	**	*	*
$U_{Cl}V$ (uEq/min/gm-kw)	0.50 ±0.13	0.44 ±0.08	0.64 ±0.12	0.92 ±0.10	1.37 ±0.12	1.92 ±0.38	1.47 ±0.41
		NS	NS	NS	NS	NS	NS
$U_{K}V$ (uEq/min/gm-kw)	0.53 ±0.05	0.69 ±0.11	0.83 ±0.19	0.85 ±0.16	0.77 ±0.08	0.78 ±0.17	0.59 ±0.20
		NS	*	*	**	**	*
$U_{Osm}V$ (uOsm/min/gm-kw)	4.25 ±0.66	4.59 ±0.32	6.10 ±0.55	7.35 ±0.76	7.72 ±0.61	9.06 ±1.23	7.45 ±1.40

Abbreviation : F_{Na}, filtered load of sodium; F_{Cl}, filtered load of chloride; F_{K}, filtered load of potassium; F_{Osm}, filtered load of osmolality; $U_{Na}V$, urinary excretion rate of sodium, $U_{Cl}V$, urinary excretion rate of chloride; $U_{K}V$, urinary excretion rate of potassium, $U_{Osm}V$, urinary excretion rate of osmolality.

Table 5 Effects of an isotonic saline infusion on FE_{Na}, FE_{Cl} and FE_K of the infused kidney in the five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	**	*
FE_{Na} (%)	1.22	0.95	1.29	1.80	2.28	3.23	2.98
	±0.38	±0.24	±0.34	±0.58	±0.85	±0.55	±0.69
		NS	NS	NS	**	**	*
FE_{Cl} (%)	0.89	0.65	0.82	1.31	2.13	2.76	2.71
	±0.28	±0.17	±0.16	±0.46	±0.43	±0.43	±0.44
		NS	NS	NS	NS	NS	NS
FE_K (%)	28.94	27.35	28.35	29.79	34.24	34.36	29.16
	±6.79	±1.82	±3.72	±5.21	±5.93	±7.41	±8.30

Abbreviation : FE_{Na}, fractional excretion of sodium; FE_{Cl}, fractional excretion of chloride; FE_K, fractional excretion of potassium; NS, not significant; $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$.

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Table 6 Effects of an isotonic saline infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the infused kidney in the five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	**	**	*
V	9.24	13.74	18.03	18.81	20.5	21.01	17.41
(µl/min/gm-kw)	±2.62	±4.47	±6.07	±5.68	±3.33	±3.03	±2.52
		NS	**	*	**	***	*
C_{Osm}	13.87	14.87	19.59	23.73	25.39	29.92	24.88
(µl/min/gm-kw)	±2.15	±1.22	±1.57	±2.42	±1.91	±3.77	±4.38
		NS	NS	NS	NS	NS	NS
C_{H_2O}	-4.62	-0.76	-1.57	-4.92	-4.89	-8.91	-7.48
(µl/min/gm-kw)	±3.43	±6.20	±6.99	±5.46	±4.54	±4.91	±5.64
		NS	NS	NS	NS	NS	NS
U/P_{Osm}	2.18	1.76	1.70	1.58	1.43	1.61	1.70
	±0.58	±0.70	±0.56	±0.33	±0.32	±0.35	±0.54

Abbreviation : V, urine flow rate; C_{Osm}, osmolar clearance; C_{H_2O}, free water clearance; U/P_{Osm}, urine and plasma osmolality ratio; NS, not significant; $^{*}P < 0.05$; $^{**}P < 0.01$, $^{***}P < 0.001$

Table 7 Effects of an isotonic saline infusion on ERPF, RBF, GFR, F.F. and RVR of the contralateral kidney in five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
ERPF	1.79	1.67	1.28	1.58	1.42	1.45	1.65
(ml/min/gm-kw)	±0.32	±0.24	±0.26	±0.39	±0.26	±0.25	±0.26
		NS	NS	NS	NS	NS	NS
RBF	2.67	2.44	2.14	2.83	2.25	2.27	2.46
(ml/min/gm-kw)	±0.52	±0.45	±0.41	±0.60	±0.41	±0.43	±0.48
		NS	NS	NS	NS	NS	NS
GFR	0.60	0.71	0.59	0.88	0.63	0.60	0.61
(ml/min/gm-kw)	±0.07	±0.07	±0.10	±0.19	±0.08	±0.05	±0.05
		NS	NS	NS	NS	NS	NS
F.F.(%)	35.01	44.83	47.92	70.41	47.48	47.09	40.41
	±3.19	±4.64	±8.19	±23.58	±4.92	±8.15	±6.24
		NS	NS	NS	NS	NS	NS
RVR	58.36	70.33	82.71	77.14	73.08	74.22	72.21
(mm Hg/ml/min/ gm-kw)	±13.41	±22.45	±28.79	±34.99	±15.88	±17.69	±23.44

Abbreviation : are defined in table 3. Results are given as mean ± SEM. P-value with respect to control; NS, not significant

Table 8 Effects of an isotonic saline infusion on filtered load and urinary excretion rate of Na, Cl, K and Osm of the contralateral kidney in five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
	NS	NS	NS	NS	NS	NS	NS
F_{Na}	84.77	95.19	111.44	123.43	98.24	91.69	89.81
(μEq/min/gm-kw)	±13.23	±12.60	±22.06	±21.70	±19.66	±10.72	±14.50
	NS	NS	NS	NS	NS	NS	NS
F_{Cl}	64.81	72.44	121.16	92.71	73.56	69.98	68.77
(μEq/min/gm-kw)	±10.95	±9.77	±32.58	±15.98	±12.10	±7.45	±10.09
	NS	NS	NS	NS	NS	NS	NS
F_{K}	2.16	2.54	2.89	3.18	2.60	2.41	2.27
(μEq/min/gm-kw)	±0.37	±0.42	±0.57	±0.59	±0.56	±0.29	±0.45
		NS	NS	NS	NS	NS	NS
F_{Osm}	202.10	239.73	216.95	276.15	212.89	213.30	202.81
(μOsm/min/gm-kw)	±33.26	±26.88	±36.81	±58.26	±33.28	±27.02	±29.87
		NS	*	*	***	**	**
$U_{Na}V$	0.98	0.80	1.28	1.74	2.36	2.88	2.28
(μEq/min/gm-kw)	±0.33	±0.17	±0.28	±0.28	±0.28	±0.55	±0.49
		NS	NS	NS	**	**	*
$U_{Cl}V$	0.50	0.44	0.64	0.92	1.37	1.92	1.47
(μEq/min/gm-kw)	±0.13	±0.08	±0.16	±0.10	±0.12	±0.38	±0.41
		NS	NS	NS	NS	NS	NS
$U_{K}V$	0.53	0.69	0.83	0.85	0.77	0.78	0.59
(μEq/min/gm-kw)	±0.05	±0.11	±0.19	±0.16	±0.08	±0.17	±0.20
		NS	NS	*	*	***	NS
$U_{Osm}V$	4.42	5.37	5.59	6.43	9.00	9.68	9.50
(μOsm/min/gm-kw)	±0.68	±0.48	±0.37	±0.71	±0.92	±1.06	±1.34

Abbreaviation : are defined in Table 4. NS, not sinificant, $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$

Table 9 Effects of an isotonic saline infusion on FE_{Na}, FE_{Cl} and FE_K of the contralateral kidney in the five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	*	**	*
FE_{Na}(%)	1.00	1.07	1.27	1.85	3.32	3.03	3.15
	±0.31	±0.37	±0.32	±0.70	±0.77	±0.46	±0.79
		NS	NS	NS	*	**	*
FE_{Cl}(%)	0.70	0.91	1.20	1.46	2.70	2.53	3.16
	±0.19	±0.43	±0.55	±0.66	±0.71	±0.41	±0.82
		NS	NS	NS	***	NS	NS
FE_K(%)	24.03	29.05	35.34	29.35	39.28	38.28	33.97
	±5.01	±2.74	±4.64	±7.35	±5.16	±8.50	±9.28

Abbreviation : are defined in table 5. The results are respected to the control period. $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$

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Table 10 Effects of an isotonic saline infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the contralateral kidney in five control dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	**	**	NS
V	8.93	15.98	19.41	19.82	22.82	22.92	21.03
(µl/min/gm-kw)	±2.82	±6.34	±7.65	±6.49	±4.45	±3.82	±4.97
		NS	NS	NS	*	***	**
C_{Osm}	14.38	17.29	17.99	20.77	29.52	31.87	31.10
(µl/min/gm-kw)	±2.15	±1.47	±1.08	±2.29	±2.79	±3.01	±4.10
		NS	NS	NS	NS	NS	NS
C_{H_2O}	-5.45	-1.31	1.41	-0.95	-6.70	-8.95	-10.06
(µl/min/gm-kw)	±3.29	±5.91	±7.69	±6.59	±4.24	±5.27	±6.39
		NS	NS	NS	NS	NS	NS
U/P_{Osm}	2.31	1.87	1.58	1.36	1.48	1.60	1.84
	±0.59	±0.73	±0.58	±0.32	±0.36	±0.38	±0.49

Abbreviation : are defined in table 6. NS, not significant;

$^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$

Table 11 Effects of an isotonic saline infusion on ERPF, RBF, GFR, FF and RVR in the control group. Comparison between the infused and contralateral kidneys. (n = 5)

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
ERPF (ml/min/gm-kw)							
- infused kidney	1.52±0.23	1.58±0.28	1.76±0.32	1.74±0.38	1.39±0.37	1.49±0.28	1.50±0.34
- contralateral kidney	1.79±0.32	1.67±0.24	1.28±0.26	1.58±0.39	1.42±0.26	1.45±0.25	1.65±0.26
P-value	NS	NS	NS	NS	NS	NS	NS
RBF (ml/min/gm-kw)							
- infused kidney	2.28±0.38	2.36±0.48	2.65±0.54	2.56±0.66	2.11±0.63	2.37±0.45	2.30±0.61
- contralateral kidney	2.67±0.52	2.44±0.45	2.14±0.41	2.83±0.60	2.25±0.41	2.27±0.43	2.46±0.48
P-value	NS	NS	NS	NS	NS	NS	NS
GFR (ml/min/gm-kw)							
- infused kidney	0.58±0.09	0.65±0.09	0.70±0.16	0.83±0.15	0.66±0.14	0.63±0.08	0.59±0.12
- contralateral kidney	0.59±0.07	0.71±0.07	0.59±0.10	0.88±0.19	0.63±0.08	0.60±0.05	0.61±0.05
P-value	NS	NS	NS	NS	NS	NS	NS
F.F. (%)							
- infused kidney	34.05±4.0	43.48±4.37	38.22±2.62	51.04±5.8	43.40±3.90	45.65±5.37	43.25±5.45
- contralateral kidney	35.01±3.19	44.83±4.64	47.92±8.19	70.4±23.57	47.48±4.92	47.09±8.15	40.41±6.24
P-value	NS	NS	NS	NS	NS	NS	NS
RVR (mm Hg/ml/min/gm-kw)							
- infused kidney	64.61±19.61	80.62±31.74	69.74±25.73	95.29±45.53	93.82±24.22	79.92±29.38	110.11±57.26
- contralateral kidney	58.36±13.41	70.33±22.47	82.71±28.79	77.14±34.99	73.08±15.88	74.22±17.69	72.21±23.45
P-value	NS	NS	NS	NS	NS	NS	NS

Abbreviation : NS, not significant.

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Table 12 Effects of an isotonic saline infusion on V, $U_{Osm}V$, C_{Osm}, C_{H_2O} and U/P_{Osm} in the control group. Comparison between the infused and contralateral kidneys. (n = 5)

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
V (µl/min/gm-kw)							
- infused kidney	8.93±2.82	15.98±6.34	19.41±7.65	19.82±6.49	22.82±4.45	22.92±3.82	21.03±4.97
- contralateral kidney	9.24±2.62	13.74±4.47	18.03±6.07	18.81±5.68	20.50±3.33	21.01±3.03	17.41±2.52
P-value	NS	NS	NS	NS	NS	NS	NS
$U_{Osm}V$ (µl/min/gm-kw)							
- infused kidney	4.25±0.66	4.59±0.32	6.10±0.55	7.35±0.76	7.72±0.61	9.06±1.23	7.45±1.40
- contralateral kidney	4.42±0.68	5.37±0.48	5.59±0.37	6.43±0.71	9.00±0.92	9.68±1.06	9.50±1.34
P-value	NS	NS	NS	NS	NS	NS	NS
C_{Osm} (µl/min/gm-kw)							
- infused kidney	13.87±2.15	14.87±1.22	19.59±1.57	23.73±2.42	25.39±1.91	29.92±3.77	24.88±4.38
- contralateral kidney	14.38±2.15	17.29±1.47	17.99±1.08	20.77±2.29	29.52±2.79	31.80±3.01	31.10±4.10
P-value	NS	NS	NS	NS	NS	NS	NS
C_{H_2O} (µl/min/gm-kw)							
- infused kidney	-4.62±3.43	-0.76±6.20	-1.57±6.99	-4.92±5.46	-4.89±4.54	-8.91±4.91	-7.48±5.64
- contralateral kidney	-5.45±3.29	-1.31±5.91	1.41±7.69	-0.95±6.59	-6.70±4.24	-8.95±5.27	-10.06±6.39
P-value	NS	NS	NS	NS	NS	NS	NS
U/P_{Osm}							
- infused kidney	2.18±0.58	1.76±0.70	1.70±0.56	1.58±0.33	1.43±0.32	1.61±0.35	1.70±0.54
- contralateral kidney	2.31±0.59	1.87±0.73	1.58±0.58	1.36±0.32	1.48±0.36	1.60±0.38	1.84±0.49
P-value	NS	NS	NS	NS	NS	NS	NS

Abbreviation : NS, not significant

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Table 13 Effects of an isotonic saline infusion on F_{Na}, F_{Cl}, F_K and F_{Osm} in the control group. Comparison between the infused and contralateral kidneys (n = 5)

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
F_{Na} (μEq/min/gm-kw)							
- infused	84.77	95.19	111.44	123.43	98.24	91.69	89.81
kidney	±13.23	±12.60	±22.06	±21.70	±19.66	±10.72	±14.50
- contralateral	87.98	104.85	96.31	132.92	92.54	93.03	89.05
kidney	±10.10	±9.58	±9.42	±28.45	±10.64	±3.50	±6.74
P-value	NS	NS	NS	NS	NS	NS	NS
F_{Cl} (μEq/min/gm-kw)							
- infused	64.81	72.44	121.16	92.71	73.56	69.98	68.77
kidney	±10.95	±9.77	±32.58	±15.98	±12.10	±7.45	±10.09
- contralateral	66.59	79.88	73.43	102.43	70.89	71.49	69.24
kidney	±7.19	±7.34	±6.18	±23.45	±8.56	±2.72	±6.43
P-value	NS	NS	NS	NS	NS	NS	NS
F_K (μEq/min/gm-kw)							
- infused	2.16	2.54	2.89	3.18	2.60	2.41	2.27
kidney	±0.37	±0.42	±0.57	±0.59	±0.56	±0.29	±0.45
- contralateral	2.24	2.78	2.48	3.41	2.49	2.29	2.34
kidney	±0.30	±0.36	±0.32	±0.76	±0.30	±0.17	±0.22
P-value	NS	NS	NS	NS	NS	NS	NS
F_{Osm} (μEq/min/gm-kw)							
- infused	178.72	199.18	219.61	254.75	198.89	188.01	176.91
kidney	±26.73	±27.62	±57.08	±46.48	±41.89	±22.97	±32.93
- contralateral	202.10	239.73	216.95	276.15	212.89	213.20	202.81
kidney	±33.26	±26.88	±36.81	±58.26	±33.28	±27.02	±29.87
P-value	NS	NS	NS	NS	NS	NS	NS

Abbreviation : NS, not significant

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Table 14 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on MAP, RAP, HR and PCV in eight dogs.

Parameter	control	5m	15m	30m	45m	60m	2 hr	3 hr	4 hr	5 hr
		**	**	NS	NS	NS	NS	NS	NS	NS
MAP (mm Hg)	129.99	66.04	100.79	120.21	130.63	132.29	142.08	137.04	133.12	135.83
	±8.95	±11.53	±9.98	±12.30	±9.88	±10.69	±7.16	±5.64	±7.64	±7.11
		**	**	NS	NS	NS	NS	NS	NS	NS
RAP (mm Hg)	122.29	62.92	91.04	112.29	119.79	122.09	127.33	126.50	123.12	125.42
	±8.15	±11.90	±9.75	±11.06	±7.74	±7.39	±2.55	±4.19	±6.30	±6.23
		**	NS	**	*	*	NS	NS	NS	NS
HR (beat/min)	142.88	123.13	131.00	121.63	124.63	128.75	128.25	135.63	138.50	140.63
	±6.33	±9.06	±8.02	±6.99	±6.75	±5.49	±7.32	±8.06	±9.17	±11.04
				NS		NS	NS	NS	NS	NS
PCV (%)	30.75	-	-	32.72	-	31.28	29.38	28.38	27.63	27.81
	±2.31			±2.42		±2.40	±2.44	±2.16	±2.01	±2.03

Abbreviation : MAP, mean arteral blood pressure; RAP, mean renal arterial blood pressure; HR, heart rate; PCV, packed cell volume. Results are given as mean ± SEM. P value with respect to control $^{*}P < 0.05$, $^{**}P < 0.01$; NS, not significant

Table 15 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on P_{Na}, P_{Cl}, P_{K}, P_{Osm}, P_{Cr} and BUN in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
P_{Na} (mEq/L)	144.00 ±1.56	144.13 ±1.73	147.13 ±1.32	147.25 ±1.83	144.38 ±3.13	145.75 ±1.58	142.75 ±2.27
		NS	NS	NS	NS	NS	NS
P_{Cl} (mEq/L)	117.38 ±2.18	117.75 ±2.34	119.13 ±2.00	118.25 ±1.79	118.75 ±1.26	120.38 ±1.72	121.00 ±2.73
		NS	NS	NS	NS	NS	*
P_{K} (mEq/L)	3.41 ±0.09	3.39 ±0.10	3.61 ±0.11	3.6 ±0.10	3.79 ±0.14	3.91 ±0.11	3.93 ±0.17
		NS	NS	NS	NS	NS	NS
P_{Osm} (mOsm/kg)	299.08 ±4.81	303.31 ±3.53	304.53 ±2.93	307.06 ±3.15	307.45 ±3.60	309.10 ±2.99	308.18 ±5.03
		NS	NS	NS	NS	NS	NS
P_{Cr} (mg %)	0.87 ±0.10	0.92 ±0.10	0.93 ±0.11	0.99 ±0.35	0.90 ±0.10	0.89 ±0.07	0.93 ±0.09
		NS	NS	NS	NS	NS	*
BUN (mg %)	15.68 ±1.53	15.24 ±1.29	14.96 ±1.29	16.95 ±1.39	18.10 ±1.79	19.76 ±1.69	20.21 ±1.94

Abbreviation : are defined as table 2. $^{*}P < 0.05$, NS = not significant

Table 16 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on ERPF, RBF, GFR, F.F. and RVR of the infused kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		***	**	***	*	NS	*
ERPF	1.87	0.77	0.57	0.83	1.04	0.88	0.64
(ml/min/gm-lw)	±0.20	±0.14	±0.14	±0.22	±0.23	±0.40	±0.20
		**	***	***	**	*	**
RBF	2.71	1.13	0.80	1.18	1.45	1.21	0.89
(ml/min/gm-kw)	±0.29	±2.00	±0.18	±0.31	±0.32	±0.52	±0.28
		**	**	*	*	*	*
GFR	0.47	0.21	0.15	0.21	0.26	0.22	0.17
(ml/min/gm-kw)	±0.07	±0.06	±0.03	±0.05	±0.06	±0.05	±0.05
		NS	NS	NS	NS	NS	NS
F.F. (%)	26.39	24.94	28.57	29.14	30.59	37.40	27.13
	±3.29	±3.93	±3.05	±3.15	±3.32	±7.06	±5.83
		*	*	NS	NS	*	**
RVR	52.64	132.72	222.75	239.23	170.61	280.12	232.87
(mm.Hg/ml/min. $gm\text{-}kw^{-1}$)	±7.00	±28.31	±50.99	±83.57	±69.43	±85.08	±47.16

Abbreviation : are defined in table 3. NS, not significant;

$^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$.

Table 17 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K, $U_{Na}V$ $U_{Cl}V$, U_KV and $U_{Osm}V$ of the infused kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		*	**	*	*	*	*
F_{Na} (μEq/min/gm-kw)	67.42 ±9.21	30.85 ±8.73	22.92 ±4.31	31.39 ±6.73	38.63 ±0.11	32.52 ±6.43	23.72 ±6.80
		*	**	*	*	*	*
F_{Cl} (μEq/min/gm-kw)	54.81 ±7.12	24.38 ±6.66	18.08 ±3.20	25.10 ±5.60	31.40 ±7.23	27.17 ±5.65	20.58 ±6.31
		NS	*	NS	NS	NS	NS
F_K (μEq/min/gm-kw)	1.58 ±0.20	0.71 ±0.20	0.56 ±0.10	0.78 ±0.19	1.05 ±0.27	0.89 ±0.19	0.65 ±0.18
		**	**	*	*	*	*
F_{Osm} (μOsm/min/gm-kw)	140.03 ±19.25	69.33 ±23.52	46.87 ±8.35	65.26 ±14.22	80.36 ±17.55	69.14 ±14.16	51.76 ±15.53
		NS	NS	NS	NS	NS	NS
$U_{Na}V$ (μEq/min/gm-kw)	1.30 ±0.48	0.45 ±0.12	0.43 ±0.77	0.75 ±0.11	0.88 ±0.17	0.82 ±0.18	0.84 ±0.23
		NS	NS	NS	NS	NS	NS
$U_{Cl}V$ (μEq/min/gm-kw)	1.10 ±0.44	0.29 ±0.07	0.25 ±0.05	0.36 ±0.07	0.40 ±0.09	0.43 ±0.09	0.43 ±0.08
		NS	*	NS	NS	NS	*
U_KV (μEq/min/gm-kw)	0.47 ±0.05	0.33 ±0.13	0.23 ±0.05	0.33 ±0.08	0.35 ±0.07	0.32 ±0.06	0.29 ±0.05
		*	*	NS	NS	NS	NS
$U_{Osm}V$ (μOsm/min/gm-kw)	5.28 ±1.19	2.51 ±0.66	2.33 ±0.43	3.39 ±0.47	3.64 ±0.57	3.11 ±0.66	3.33 ±0.70

Abbreviation : are defined in table 4. $^{*}P < 0.05$, $^{**}P < 0.01$

Table 18 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on FE_{Na}, FE_{Cl} and FE_K of the infused kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	*	NS
FE_{Na} (%)	1.71	1.91	3.17	3.67	4.19	3.53	17.46
	±0.44	±0.51	±1.62	±1.14	±1.53	±0.88	±12.39
		NS	NS	NS	NS	NS	NS
FE_{Cl} (%)	1.72	1.60	2.42	2.47	1.79	2.58	14.80
	±0.52	±0.47	±1.26	±0.99	±0.41	±0.89	±11.86
		NS	NS	NS	NS	NS	NS
FE_K (%)	31.05	47.65	46.70	53.01	35.86	45.05	175.03
	±3.52	±11.71	±8.48	±13.43	±5.84	±8.13	±115.93

Abbreviation : are defined in table 5. NS = not significant

*$P < 0.05$.

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Table 19 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the infused kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	*	NS	NS	NS	NS
V	17.63	6.86	5.45	7.91	7.97	6.88	6.87
(µl/min/gm-kw)	±5.17	±1.73	±0.79	±0.94	±1.19	±1.05	±1.22
		*	*	NS	NS	NS	NS
C_{Osm}	17.74	8.30	7.62	11.04	11.77	10.99	10.75
(µl/min/gm-kw)	±4.04	±2.22	±1.41	±1.51	±1.79	±1.66	±2.18
		NS	NS	NS	NS	NS	NS
C_{H_2O}	-0.18	-1.43	-2.17	-3.13	-3.8	-4.12	-3.88
(µl/min/gm-kw)	±3.99	±1.41	±0.87	±0.78	±0.79	±0.82	±1.6
		NS	NS	NS	NS	*	NS
U/P_{Osm}	1.24	1.22	1.36	1.33	1.50	1.57	1.58
	±0.18	±0.14	±0.12	±0.08	±0.11	±0.13	±0.20

Abbreviation : are defined in table 6. *P < 0.05

NS = not significant

Table 20 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on ERPF, RBF, GFR, F.F. and RVR of the contralateral kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	**	**	*	NS	**
ERPF	2.11	1.51	1.45	1.14	1.40	1.42	0.66
(ml/min/gm-kw)	±0.27	±0.35	±0.20	±0.24	±0.37	±0.49	±0.22
		NS	**	*	*	NS	**
RBF	3.08	2.20	2.10	1.71	2.09	2.11	1.03
(ml/min/gm-kw)	±0.43	±0.51	±0.26	±0.29	±0.46	±0.61	±0.31
		*	NS	*	**	**	*
GFR	0.46	0.29	0.35	0.32	0.28	0.31	0.23
(ml/min/gm-kw)	±0.05	±0.05	±0.05	±0.05	±0.05	±0.06	±0.07
		NS	NS	NS	NS	NS	NS
F.F. (%)	24.24	23.57	28.34	30.62	24.61	30.29	34.57
	±3.38	±3.78	±5.91	±5.32	±4.47	±6.80	±3.95
		*	**	NS	NS	*	NS
RVR	46.81	77.39	71.21	158.04	108.25	120.66	212.23
(mm Hg/ml/ min/gm-kw)	±8.10	±21.59	±16.13	±53.61	±41.24	±41.95	±56.12

Abbreviation : are defined in table 3. $^{*}P < 0.05$, $^{**}P < 0.01$.

Table 21 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K, F_{Osm}, $U_{Na}V$, $U_{Cl}V$, U_KV and $U_{Osm}V$ of the contralateral kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		*	NS	*	*	*	*
F_{Na}	65.49	42.10	51.11	46.63	40.12	44.81	32.95
(μEq/min/gm-kw)	±6.93	±7.15	±5.46	±6.44	±6.82	±7.10	±7.69
		*	NS	*	*	*	*
F_{Cl}	53.44	33.96	41.25	37.74	33.61	36.93	29.08
(μEq/min/gm-kw)	±5.46	±5.38	±4.12	±5.61	±6.03	±5.59	±7.37
		*	NS	NS	NS	NS	*
F_K	1.55	0.99	1.26	1.17	1.08	1.21	0.91
(μEq/min/gm-kw)	±0.15	±0.17	±0.14	±0.19	±0.21	±0.20	±0.21
		*	NS	*	*	*	*
F_{Osm}	136.40	88.61	106.30	97.65	86.13	94.90	72.58
(μOsm/min/gm-kw)	±14.55	±14.81	±11.84	±14.23	±14.61	±14.65	±17.94
		NS	NS	NS	NS	NS	NS
$U_{Na}V$	1.54	0.67	0.83	1.25	1.39	1.22	1.35
(μEq/min/gm-kw)	±0.55	±0.22	±0.30	±0.38	±0.44	±0.39	±0.39
		NS	NS	NS	NS	NS	NS
$U_{Cl}V$	1.46	0.42	0.52	0.73	0.78	0.75	0.74
(μEq/min/gm-kw)	±0.63	±0.14	±0.21	±0.29	±0.30	±0.23	±0.25
		NS	NS	NS	NS	NS	NS
U_KV	0.48	0.36	0.41	0.39	0.43	0.40	0.44
(μEq/min/gm-kw)	±0.09	±0.05	±0.07	±0.06	±0.07	±0.06	±0.08
		*	*	NS	NS	NS	NS
$U_{Osm}V$	5.71	3.21	3.43	4.95	4.69	4.98	5.16
(μOsm/min/gm-kw)	±1.30	±0.53	±0.67	±0.90	±1.19	±0.99	±1.13

Abbreviation : are defined in table 4. *$P < 0.05$.

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Table 22 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on FE_{Na}, FE_{Cl} and FE_{K} of the contralateral kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
FE_{Na} (%)	2.22	1.83	1.72	3.69	4.08	3.15	4.99
	±0.66	±0.65	±0.65	±1.67	±1.47	±1.12	±1.95
		NS	*	NS	NS	NS	NS
FE_{Cl} (%)	2.43	1.31	1.29	2.92	2.89	2.99	3.46
	±0.87	±0.45	±0.54	±1.53	±1.26	±0.91	±1.61
		NS	NS	NS	NS	NS	NS
FE_{K} (%)	30.82	38.66	35.63	36.80	42.97	33.95	59.10
	±5.07	±2.80	±7.20	±5.51	±5.63	±4.68	±15.60

Abbreviation : are defined in table 5. *P < 0.05,

NS = not significant

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Table 23 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the contralateral kidney in eight dogs.

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS	NS
V	22.71	10.25	11.41	14.95	15.27	14.23	13.37
(µl/min/gm-kw)	±7.60	±2.52	±2.78	±4.23	±4.84	±4.78	±4.50
		*	*	NS	NS	NS	NS
C_{Osm}	19.22	10.61	11.20	16.13	16.46	16.10	16.52
(µl/min/gm-kw)	±4.38	±1.78	±2.18	±2.89	±3.57	±3.08	±3.59
		NS	NS	NS	NS	NS	NS
C_{H_2O}	3.50	0.35	0.21	-1.18	-1.19	-1.87	-3.16
(µl/min/gm-kw)	±4.68	±1.45	±1.29	±2.06	±2.35	±2.22	±2.13
		NS	NS	NS	NS	NS	NS
U/P_{Osm}	1.22	1.18	1.13	1.29	1.35	1.45	1.53
	±0.19	±0.13	±0.15	±0.15	±0.18	±0.17	±0.21

Abbreviation : are defined in table 6. $^{*}P < 0.05$,
NS = not significant

Table 24 Effect of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on RVR, V and F.F. Comparison between the infused and contralateral kidneys. (n = 8)

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
RVR (mm.Hg/ml/min.gm-kw^{-1})							
- infused kidney	52.64	132.72	222.75	239.23	170.61	280.12	232.87
	±7.06	±28.31	±50.99	±83.57	±69.43	±85.08	±47.16
- contralateral kidney	46.81	77.39	71.21	158.04	108.25	120.66	212.23
	±8.10	±21.59	±16.13	±53.61	±41.24	±41.95	±56.12
P-value	NS	NS	NS	NS	NS	NS	NS
V (µl/min/gm-kw)							
- infused kidney	17.63	6.86	5.45	7.91	7.97	6.88	6.87
	±5.17	±1.73	±0.79	±0.94	±1.19	±1.05	±1.22
- contralateral kidney	22.71	10.25	11.41	14.95	15.27	14.23	13.37
	±7.60	±2.52	±2.78	±4.23	±4.84	±4.78	±4.50
P-value	NS	NS	NS	NS	NS	NS	NS
F.F. (%)							
- infused kidney	26.39	24.94	28.57	29.14	30.59	37.40	27.13
	±3.29	±3.93	±3.05	±3.15	±3.32	±7.06	±5.83
- contralateral kidney	24.24	23.57	28.34	30.62	24.61	30.29	34.57
	±3.38	±3.78	±5.91	±5.32	±4.47	±6.80	±3.95
P-value	NS	NS	NS	NS	NS	NS	NS

Abbreviation : RVR, renal vascular resistance; V, urine flow rate; F.F., filtration fraction.
NS, not significant.

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Table 25 Effects of an intrarenal arterial Russell's viper vanom 0.05 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K and F_{Osm}. Comparison between the infused and contralateral kidneys (n = 8)

Parameter	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
F_{Na} (μEq/min/gm-kw)							
- infused kidney	67.42	30.85	22.92	31.39	38.63	32.52	23.72
	±9.21	±8.73	±4.31	±6.73	±0.11	±6.43	±6.80
- contralateral kidney	65.49	42.10	51.11	46.63	40.12	44.81	32.95
	±6.93	±7.15	±5.46	±6.44	±6.82	±7.10	±7.69
P-value	NS	NS	P < 0.05	NS	NS	NS	NS
F_{Cl} (μEq/min/gm-kw)							
- infused kidney	54.81	24.38	18.08	25.10	31.40	27.17	20.58
	±7.12	±6.66	±3.20	±5.60	±7.23	±5.65	±6.31
- contralateral kidney	53.44	33.96	41.25	37.44	33.61	36.93	29.08
	±5.46	±5.38	±4.12	±5.61	±6.03	±5.59	±7.37
P-value	NS	NS	P < 0.05	NS	NS	NS	NS
F_K (μEq/min/gm-kw)							
- infused kidney	1.58	0.71	0.56	0.78	1.05	0.89	0.65
	±0.20	±0.20	±0.10	±0.19	±0.27	±0.19	±0.18
- contralateral kidney	1.55	0.99	1.26	1.17	1.08	1.21	0.91
	±0.15	±0.17	±0.14	±0.19	±0.21	±0.20	±0.21
P-value	NS	NS	NS	NS	NS	NS	NS
F_{Osm} (μOsm/min/gm-kw)							
- infused kidney	140.03	69.33	46.87	65.26	80.36	69.14	51.76
	±19.25	±23.52	±8.35	±14.22	±17.55	±14.16	±15.53
- contralateral kidney	136.40	88.61	106.30	97.65	86.13	94.90	72.58
	±14.55	±14.81	±11.84	±14.23	±14.61	±14.65	±17.94
P-value	NS	NS	P < 0.005	NS	NS	NS	NS

Abbreviation : F_{Na}, filtered load of sodium; F_{Cl}, filtered load of chloride; F_K, filtered load of potassium; F_{Osm}, filtered load of osmolality.

Table 26 Effects of an intrarenal arterial Russell's viper venom 0.05 mg/kg bw. infusion on $U_{Osm}V$, U/P_{Osm}, C_{Osm} and C_{H_2O}. Comparison between infused and contralateral kidneys. (n = 8)

Parameters	control	1/2 hr	1 hr	2 hr	3 hr	4 hr	5 hr
$U_{Osm}V$ (µl/min/gm-kw)							
- infused kidney	5.28	2.51	2.33	3.39	3.64	3.11	3.33
	±1.19	±0.66	±0.43	±0.47	±0.57	±0.66	±0.70
- contralateral kidney	5.71	3.21	3.43	4.95	4.69	4.98	5.16
	±1.30	±0.53	±0.67	±0.90	±1.19	±0.99	±1.13
P-value	NS	NS	NS	NS	NS	NS	NS
U/P_{Osm}							
- infused kidney	1.24	1.22	1.36	1.33	1.50	1.57	1.58
	±0.18	±0.14	±0.12	±0.08	±0.11	±0.13	±0.20
- contralateral kidney	1.22	1.18	1.13	1.29	1.35	1.45	1.53
	±0.19	±0.13	±0.15	±0.15	±0.18	±0.17	±0.21
P-value	NS	NS	NS	NS	NS	NS	NS
C_{Osm} (µl/min/gm-kw)							
- infused kidney	17.74	8.30	7.62	11.04	11.77	10.99	10.75
	±4.04	±2.22	±1.41	±1.51	±1.79	±1.66	±2.18
- contralateral kidney	19.22	10.61	11.20	16.13	16.46	16.10	16.52
	±4.39	±1.78	±2.18	±2.89	±3.57	±3.08	±3.59
P-value	NS	NS	NS	NS	NS	NS	NS
C_{H_2O} (µl/min/gm-kw)							
- infused kidney	-0.18	-1.43	-2.17	-3.13	-3.8	-4.12	-3.88
	±3.99	±1.41	±0.87	±0.78	±0.79	±0.82	±1.6
- contralateral kidney	3.5	0.35	0.21	-1.18	-1.19	-1.87	-3.16
	±4.68	±1.45	±1.29	±2.06	±2.35	±2.22	±2.13
P-value	NS	NS	NS	NS	NS	NS	NS

Abbreviation : $U_{Osm}V$, urinary excretion rate of osmolality, U/P_{Osm}, urine and plasm osmolality ratio C_{Osm}, osmolar clearance; C_{H_2O}, free water clearance; NS, not significant.

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Table 27 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on MAP, RAP, HR and PCV, compared with the control period. (n = 5)

Parameter	control	5 m	15 m	30 m	45 m	1 hr	2 hr	3 hr	4 hr	5 hr
		**	*	NS	NS	NS	NS	NS	NS	NS
MAP (mm Hg)	142.33	38.93	67.00	114.33	150.00	156.66	162.00	159.33	157.33	152.67
	±14.93	±10.50	±14.26	±10.40	±9.25	±13.05	±11.87	±10.61	±8.48	±9.98
		**	*	NS	NS	NS	NS	NS	NS	NS
RAP (mm Hg)	136.00	38.33	65.67	113.33	143.67	152.99	158.99	151.67	148.11	145.00
	±9.17	±10.00	±13.85	±10.23	±9.61	±13.60	±11.56	±7.99	±6.20	±8.28
		*	NS	NS	NS	NS	NS	NS	NS	NS
HR (beat/min)	142.80	101.60	115.40	141.40	144.20	156.20	162.60	166.80	164.80	166.80
	±10.46	±9.28	±10.95	±7.93	±8.10	±12.96	±15.43	±11.47	±12.37	±12.5
						*	**	*	**	*
PCV (%)	32.1	-	-	-	-	29.4	27.4	25.96	23.7	23.0
	±1.93					±2.27	±1.41	±1.52	±1.27	±1.14

Abbreviation : are defined in table 2. $^{*}P < 0.05$; $^{**}P < 0.01$; NS, not significant

Table 28 Effect of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on P_{Na}, P_{Cl}, P_{K}, P_{Osm}, P_{Cr} and BUN, compared with the control period. (n = 5)

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS
P_{Na} (mEq/L)	145.20 ±0.97	147.8 ±2.11	147.4 ±1.96	148.20 ±1.96	148.20 ±2.18	147.8 ±2.69
		NS	NS	*	**	*
P_{Cl} (mEq/L)	115.60 ±1.72	118.20 ±1.96	118.80 ±1.96	121.60 ±2.02	122.60 ±2.75	121.40 ±2.98
		NS	*	NS	NS	NS
P_{K} (mEq/L)	3.54 ±0.18	3.64 ±0.14	4.04 ±0.09	4.08 ±0.17	4.14 ±0.21	4.0 ±0.18
		NS	NS	NS	NS	NS
P_{Osm} (mOsm/kg)	317.96 ±2.44	318.00 ±4.85	323.88 ±7.67	323.00 ±2.67	315.76 ±4.40	320.28 ±6.40
		NS	NS	NS	NS	NS
P_{Cr} (mg %)	0.93 ±0.03	0.99 ±0.16	1.14 ±0.10	1.00 ±0.12	1.05 ±0.18	1.03 ±0.15
		NS	*	*	*	*
BUN (mg %)	13.08 ±1.14	15.66 ±2.31	16.84 ±2.40	19.72 ±3.39	21.32 ±3.96	21.98 ±4.02

Abbreviation : are defined in table 3. $^{*}P < 0.05$, $^{**}P < 0.01$, NS, not significant

Table 29 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on ERPF, RBF, GFR, F.F. and RVR of the infused kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	*	*
ERPF (ml/min/gm-kw)	1.61 ±0.18	1.05 ±0.19	1.16 ±0.29	1.12 ±0.21	0.92 ±1.72	0.97 ±0.13
		NS	NS	NS	**	**
RBF (ml/min/gm-kw)	2.37 ±0.23	1.48 ±0.29	1.60 ±0.41	1.52 ±0.27	1.19 ±0.22	1.26 ±0.17
		*	*	**	NS	*
GFR (ml/min/gm-kw)	0.59 ±0.09	0.40 ±0.14	0.41 ±0.14	0.34 ±0.10	0.35 ±0.06	0.41 ±0.09
		NS	NS	NS	NS	NS
F.F. (%)	38.20 ±8.12	34.91 ±7.23	32.78 ±3.96	31.57 ±6.49	40.83 ±7.36	44.58 ±8.67
		NS	NS	NS	*	NS
RVR (mmHg/ml/min. $gm\text{-}kw^{-1}$)	54.64 ±3.99	151.4 ±67.25	171.05 ±84.26	121.22 ±31.06	144.95 ±30.05	130.90 ±28.81

Abbreviation : are defined in table 4. $^{*}P < 0.05$; $^{**}P < 0.01$.

Table 30 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K, F_{Osm}, $U_{Na}V$, $U_{Cl}V$, U_KV and $U_{Osm}V$ of the infused kidney in five dogs compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		*	*	**	NS	*
F_{Na} (μEq/min/gm-kw)	85.87±13.47	59.49±20.41	60.23±20.43	50.48±14.14	51.23±9.39	59.77±11.61
		*	*	*	NS	*
F_{Cl} (μEq/min/gm-kw)	67.92 ±9.90	47.01±15.53	48.21±15.87	41.35±11.47	42.63±8.28	49.03 ±9.20
		*	NS	*	NS	*
F_K (μEg/min/gm-kw)	2.14 ±0.44	1.51 ±0.57	1.67 ±0.60	1.42 ±0.43	1.42±0.25	1.63 ±0.34
		*	*	**	NS	*
F_{Osm} (μOsm/min/gm-kw)	187.77±29.49	125.79±41.51	130.86±43.02	110.14±31.17	109.37±20.45	130.12±26.33
		NS	*	NS	NS	NS
$U_{Na}V$ (μEq/min/gm-kw)	1.33 ±0.43	2.24 ±0.49	2.56 ±0.62	2.41 ±0.49	2.07±0.34	1.58 ±0.36
		NS	NS	NS	NS	NS
$U_{Cl}V$ (μEq/min/gm-kw)	1.07 ±0.41	1.43 ±0.54	1.63 ±0.60	1.56 ±0.39	1.38±0.23	1.01 ±0.18
		NS	NS	NS	NS	NS
U_KV (μEq/min/gm-kw)	0.57 ±0.16	0.45 ±0.06	0.46 ±0.12	0.50 ±0.11	0.54±0.08	0.47 ±0.05
		NS	NS	NS	NS	NS
$U_{Osm}V$ (μOsm/min/gm-kw)	5.65 ±1.46	6.69 ±1.02	7.25 ±1.72	7.11 ±1.41	6.70±1.09	5.55 ±1.08

Abbreviation : are defined in table 5. *P < 0.05; **P < 0.01

Table 31 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/Kg bw. infusion on FE_{Na}, FE_{Cl} and FE_{K} of the infused kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	**	*	NS
FE_{Na} (%)	1.38	9.13	6.32	5.18	4.43	2.79
	±0.45	±5.78	±2.09	±0.41	±0.78	±0.58
		NS	NS	**	*	NS
FE_{CL} (%)	1.49	8.43	5.45	3.95	3.49	2.20
	±0.60	±6.09	±2.35	±0.39	±0.49	±0.37
		NS	NS	NS	NS	NS
FE_{K} (%)	25.79	57.61	40.23	40.07	40.84	31.90
	±4.99	±27.73	±13.54	±5.32	±4.68	±4.44

Abbreviation : are defined in table 6. $^{*}P < 0.05$; $^{**}P < 0.01$; NS, not significant

Table 32 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the infused kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS
V	24.52	19.92	17.45	14.72	12.11	8.86
(µl/min/gm-kw)	±8.87	±7.74	±7.02	±4.09	±2.02	±1.04
		NS	NS	NS	NS	NS
C_{Osm}	17.70	21.04	22.37	22.01	21.31	17.34
(µl/min/gm-kw)	±4.53	±3.14	±5.28	±4.39	±3.69	±3.44
		NS	*	*	*	*
C_{H_2O}	6.76	-1.11	-4.92	-7.28	-9.19	-8.47
(µl/min/gm-kw)	±5.66	±5.37	±4.56	±3.82	±3.30	±2.82
		NS	NS	*	*	*
U/P_{Osm}	1.02	1.48	1.53	1.65	1.82	1.96
	±0.32	±0.35	±0.27	±0.28	±0.26	±0.24

Abbreviation : are defined in table 7. $^{*}P < 0.05$

NS, not significant.

Table 33 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on ERPF, RBF, GFR, V and RVR of the contralateral kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		**	NS	*	*	*
ERPF (ml/min/gm-kw)	1.71 ±0.09	1.34 ±0.09	1.07 ±0.27	1.14 ±0.11	1.09 ±0.03	1.12 ±0.10
		**	NS	**	**	**
RBF (ml/min/gm-kw)	2.52 ±0.14	1.89 ±0.08	1.44 ±0.36	1.54 ±0.13	1.42 ±0.02	1.46 ±0.12
		*	*	*	NS	NS
GFR (ml/min/gm-kw)	0.57 ±0.07	0.44 ±0.08	0.42 ±0.10	0.40 ±0.09	0.48 ±0.10	0.48 ±0.11
		NS	NS	NS	NS	NS
F.F. (%)	31.40 ±4.51	35.31 ±9.43	45.30 ±9.13	35.28 ±7.90	44.36 ±9.97	55.55 ±14.06
		**	NS	*	*	*
RVR (mm Hg/ml/min, gm-kw)$^{-1}$	50.30 ±1.46	89.80 ±6.14	185.01 ±78.44	102.37 ±11.78	104.40 ±5.50	104.05 ±13.99

Abbreviation : as defined in table 4. $^{*}P < 0.05$; $^{**}P < 0.01$.

Table 34 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K, F_{Osm}, $U_{Na}V$, $U_{Cl}V$, U_KV and $U_{Osm}V$ of the contralateral kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	*	NS	NS	NS
F_{Na} (μEq/min/gm-kw)	82.23 ±9.75	65.41±11.57	61.61±14.99	58.27±13.52	70.66±14.55	70.33±14.77
		*	*	NS	NS	NS
F_{Cl} (μEq/min/gm-kw)	65.17 ±7.05	51.97 ±8.54	49.39±11.67	47.79±10.99	58.03±11.23	57.69±11.64
		*	NS	NS	NS	NS
F_K (μEq/min/gm-kw)	2.04 ±0.33	1.63 ±0.34	1.70 ±0.43	1.63 ±0.41	1.97 ±0.43	1.91 ±0.43
		*	*	*	NS	NS
F_{Osm} (μOsm/min/gm-kw)	179.84±21.17	139.35±22.46	133.82±31.25	127.08±29.82	150.11±30.27	152.99±33.35
		**	NS	NS	NS	NS
$U_{Na}V$ (μEq/min/gm-kw)	1.14 ±0.38	1.84 ±0.49	2.26 ±0.70	2.27 ±0.54	2.02 ±0.35	1.53 ±0.28
		NS	NS	NS	NS	NS
$U_{Cl}V$ (μEq/min/gm-kw)	0.96 ±0.34	0.92 ±0.42	1.30 ±0.54	1.33 ±0.42	1.18 ±0.29	0.85 ±0.20
		NS	NS	NS	NS	NS
U_KV (μEq/min/gm-kw)	0.53 ±0.12	0.51 ±0.07	0.48 ±0.13	0.61 ±0.13	0.57 ±0.09	0.53 ±0.04
		NS	NS	NS	NS	NS
$U_{Osm}V$ (μOsm/min/gm-kw)	5.22 ±1.14	5.97 ±1.40	7.44 ±1.43	7.44 ±1.31	6.99 ±1.07	5.91 ±0.84

Abbreviaiton : as defined in table 5.

Table 36 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on V, C_{Osm}, C_{H_2O} and U/P_{Osm} of the contralateral kidney in five dogs, compared with the control period.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
		NS	NS	NS	NS	NS
V	24.61	18.66	14.10	12.13	11.31	8.09
(µl/min/gm-kw)	±9.79	±9.53	±5.57	±2.98	±1.74	±0.58
		NS	NS	NS	NS	NS
C_{Osm}	16.54	18.76	23.07	23.06	22.02	18.33
(µl/min/gm-kw)	±3.55	±4.32	±4.50	±4.12	±3.71	±2.71
		NS	*	*	*	*
C_{H_2O}	8.07	-0.93	-7.14	-10.31	-10.84	-10.18
(µl/min/gm-kw)	±7.15	±6.52	±3.81	±3.02	±3.07	±1.87
		NS	*	**	*	**
U/P_{Osm}	1.11	1.58	1.87	1.99	2.00	2.28
	±0.33	±0.29	±0.29	±0.26	±0.23	±0.22

Abbreviation : as defined in table 7. *P < 0.05; **P < 0.01

Table 37 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on RVR, V and F.F. Comparison between the infused and contralateral kidneys. (n = 5)

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
RVR (mm Hg/ml/min.gm-kw^{-1})						
- infused kidney	54.64	151.64	171.05	121.22	144.95	130.90
	±3.99	±67.25	±84.26	±31.06	±30.05	±28.81
- contralateral	50.30	89.80	185.01	102.37	104.40	104.50
kidney	±1.46	±6.14	±78.44	±11.78	±5.50	±13.99
P-value	NS	NS	NS	NS	NS	NS
V (µl/min/gm-kw)						
- infused kidney	24.52	19.92	17.45	14.72	12.11	8.86
	±8.87	±7.74	±7.02	±4.09	±2.02	±1.04
- contralateral	24.61	18.66	14.10	12.13	11.31	8.09
kidney	±9.79	±9.53	±5.57	±2.98	±1.74	±0.58
P-value	NS	NS	NS	NS	NS	NS
F.F. (%)						
- infused kidney	38.20	34.91	32.78	31.57	40.83	44.58
	±8.12	±7.23	±3.96	±6.49	±7.36	±8.67
- contralateral	31.40	35.31	45.30	35.28	44.36	55.55
kidney	±4.51	±9.43	±9.13	±7.90	±9.97	±14.06
P-value	NS	NS	NS	NS	NS	NS

Abbreviation : as defined in table 24. NS, not significant.

Table 38 Effects of an intrarenal arterial Russell's viper venom 0.1 mg/kg bw. infusion on F_{Na}, F_{Cl}, F_K and F_{Osm}. Comparison between the infused and contralateral kidneys. (n = 5)

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
F_{Na} (μEq/min/gm-kw)						
- infused kidney	85.87	59.49	60.23	50.48	51.23	59.77
	±13.47	±20.41	±20.43	±14.14	±9.39	±11.61
- contralateral	82.23	65.41	61.61	58.27	70.66	70.33
kidney	±9.75	±11.57	±14.99	±13.52	±14.55	±14.77
P-value	NS	NS	NS	NS	NS	NS
F_{Cl} (μEq/min/gm-kw)						
- infused kidney	67.92	47.01	48.21	41.85	42.63	49.03
	±9.90	±15.53	±15.87	±11.47	±8.28	±9.20
- contralateral	65.17	51.97	49.39	47.79	58.03	57.69
kidney	±7.05	±8.54	±11.67	±10.99	±11.23	±11.64
P-value	NS	NS	NS	NS	NS	NS
F_K (μEq/min/gm-kw)						
- infused kidney	2.14	1.51	1.67	1.42	1.42	1.63
	±0.44	±0.57	±0.60	±0.43	±0.25	±0.34
- contralateral	2.04	1.63	1.70	1.63	1.97	1.91
kidney	±0.33	±0.34	±0.43	±0.41	±0.43	±0.43
P-value	NS	NS	NS	NS	NS	NS
F_{Osm} (μOsm/min/gm-kw)						
- infused kidney	187.77	125.79	130.86	110.14	109.37	130.12
	±29.49	±41.51	±43.02	±31.17	±20.45	±26.33
- contralateral	179.84	139.35	133.82	127.08	150.11	152.99
kidney	±21.17	±22.46	±31.25	±29.82	±30.27	±33.35
P-value	NS	NS	NS	NS	NS	NS

Abbreviation : as defined in table 25. NS, not significant.

Table 39 Effects of an intrarenal arterail Russell's viper venom 0.1 mg/kg bw. infusion on $U_{Osm}V$, U/P_{Osm}, C_{Osm} and C_{H_2O}. comparison between the infused and contralateral kidneys. (n = 5)

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
$U_{Osm}V$ (μOsm/min/gm-kw)						
- infused kidney	5.65	6.69	7.25	7.11	6.70	5.55
	±1.46	±1.02	±1.72	±1.41	±1.09	±1.08
- contralateral	5.22	5.97	7.44	7.44	6.99	5.91
kidney	±1.14	±1.40	±1.43	±1.31	±1.07	±0.84
P-value	NS	NS	NS	NS	NS	NS
U/P_{Osm}						
- infused kidney	1.02	1.48	1.53	1.65	1.82	1.96
	±0.32	±0.35	±0.27	±0.28	±0.26	±0.24
- contralateral	1.11	1.58	1.87	1.99	2.00	2.28
kidney	±0.33	±0.29	±0.29	±0.26	±0.23	±0.22
P-value	NS	NS	NS	NS	NS	NS
C_{Osm} (μl/min/gm-kw)						
- infused kidney	17.7	21.04	22.37	22.01	21.31	17.34
	±4.53	±3.14	±5.28	±4.39	±3.69	±3.44
- contralateral	16.54	18.76	23.07	23.06	22.02	18.33
kidney	±3.55	±4.32	±4.50	±4.12	±3.71	±2.71
P-value	NS	NS	NS	NS	NS	NS
C_{H_2O} (μl/min/gm-kw)						
- infused kidney	6.76	-1.11	-4.92	-7.28	-9.19	-8.47
	±5.66	±5.37	±4.56	±3.82	±3.30	±2.82
- contralateral	8.07	-0.93	-7.14	-10.31	-10.84	-10.18
kidney	±7.15	±6.52	±3.81	±3.02	±3.07	±1.87
P-value	NS	NS	NS	NS	NS	NS

Abbreviation : as defined in table 26. NS, not significant.

Table 40 Comparison between the venom and the saline groups on P_{Na}, P_{Cl}, P_K and P_{Osm}.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
P_{Na} (mEq/L)						
- Saline control	147.60±3.08	149.20±3.46	151.00±2.55	147.80±3.43	148.00±4.48	147.40±5.07
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	144.00±1.56	147.13±1.32	147.25±1.83	144.38±3.13	145.75±1.58	142.75±2.27
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	145.20±0.97	147.80±2.11	147.40±1.96	148.20±1.96	148.20±2.18	147.80±2.69
P_{Cl} (mEq/L)						
- Saline control	112.60±4.99	114.80±5.23	115.20±6.69	114.00±6.89	114.60±7.59	114.80±7.35
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	117.38±2.18	119.13±2.00	118.25±1.79	118.75±1.26	120.38±1.72	121.00±2.73
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	115.60±1.72	118.20±1.96	118.80±1.96	121.60±2.02	122.60±2.75	121.40±2.98
P_K (mEq/L)						
- Saline control	3.72±0.11	3.80±0.12	4.02±0.07	3.96±0.02	4.02±0.12	3.94±0.14
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	3.41±0.09	3.61±0.11	3.60±0.10	3.79±0.14	3.91±0.11	3.93±0.17
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	3.54±0.18	3.64±0.14	4.04±0.09	4.08±0.17	4.14±0.21	4.00±0.18
P_{Osm} (mOsm/kg)						
- Saline control	307.00±3.64	310.30±7.94	309.62±2.61	303.90±3.90	310.92±6.54	303.76±4.50
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	299.08±4.81	304.53±2.93	307.06±3.15	307.45±3.60	309.10±2.99	308.18±5.03
	NS	NS	NS	**	NS	NS
- RVV 0.1 mg	317.96±2.44	318.00±4.85	323.88±7.67	323.00±2.67	315.76±4.40	320.28±6.40

Abbreviation : RVV, Russell's viper venom; P_{Na}, plasma concentration of sodium; P_{Cl}, plasma concentration of chloride; P_K, plasma concentration of potassium; P_{Osm}, plasma concentration of osmolality; NS, not signisicant, $^{*}P < 0.05$

Table 41 Comparison between the venom infused and the saline infused kidneys on F_{Osm}, $U_{Osm}V$, C_{Osm} and U/P_{Osm}.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
F_{Osm} (µOsm/min/gm-kw)						
- Saline control	178.72±26.73	219.18±57.08	254.75±46.48	198.89±41.89	188.01±22.97	176.91±32.93
- RVV 0.05 mg	NS 140.03±19.25	** 46.87 ±8.35	*** 65.26±14.22	* 80.36±17.55	*** 69.14±14.16	** 51.76±15.53
- RVV 0.1 mg	NS 187.77±29.49	NS 125.79±41.51	NS 130.86±43.02	NS 110.14±31.17	* 109.37±20.45	NS 130.12±26.33
$U_{Osm}V$ (µOsm/min/gm-kw)						
- Saline control	4.25 ±0.66	6.10 ±0.55	7.35 ±0.76	7.72 ±0.61	9.06 ±1.23	7.45 ±1.40
- RVV 0.05 mg	NS 5.28 ±1.19	*** 2.33 ±0.43	*** 3.39 ±0.47	*** 3.64 ±0.57	*** 3.11 ±0.66	* 3.33 ±0.70
- RVV 0.1 mg	NS 5.65 ±1.46	NS 6.69 ±1.02	NS 7.25 ±1.72	NS 7.11 ±1.41	NS 6.70 ±1.09	NS 5.55 ±1.08
C_{Osm} (µl/min/gm-kw)						
- Saline control	13.87 ±2.15	19.59 ±1.57	23.73 ±2.42	25.39 ±1.91	29.92 ±3.77	24.88 ±4.38
- RVV 0.05 mg	NS 17.74 ±4.04	*** 7.62 ±1.41	*** 11.04 ±1.51	*** 11.77 ±1.79	*** 10.99 ±1.66	** 10.75 ±2.18
- RVV 0.1 mg	NS 17.70 ±4.53	NS 21.04 ±3.14	NS 22.37 ±5.28	NS 22.01 ±4.39	NS 21.31 ±3.69	NS 17.34 ±3.44
C_{H_2O} (µl/min/gm-kw)						
- Saline control	-4.62 ±3.43	-1.57 ±6.99	-4.92 ±5.46	-4.89 ±4.54	-8.91 ±4.91	-7.48 ±5.64
- RVV 0.05 mg	NS -0.18 ±3.99	NS -2.17 ±0.87	NS -3.13 ±0.78	NS -3.80 ±0.79	NS -4.12 ±0.82	NS -3.88 ±1.60
- RVV 0.1 mg	NS 6.76 ±5.66	NS -1.11 ±5.37	NS -4.92 ±4.56	NS -7.28 ±3.82	NS -9.19 ±3.30	NS -8.47 ±2.82
U/P_{Osm}						
- Saline control	2.18 ±0.58	1.70 ±0.56	1.58 ±0.33	1.43 ±0.32	1.61 ±0.35	1.70 ±0.54
- RVV 0.05 mg	NS 1.24 ±0.18	NS 1.36 ±0.12	NS 1.33 ±0.08	NS 1.50 ±0.11	NS 1.57 ±0.13	NS 1.58 ±0.20
- RVV 0.1 mg	NS 1.02 ±0.32	NS 1.48 ±0.35	NS 1.53 ±0.27	NS 1.65 ±0.28	NS 1.82 ±0.26	NS 1.96 ±0.24

Abbreviation : RVV, Russell's viper venom; F_{Osm}, filtered load of osmolality; $U_{Osm}V$, urinary excretion rate of osmolality; C_{Osm}, osmolar clearance; C_{H_2O}, free water clearance; U/P_{Osm}, urine and plasma osmolality ratio; NS, not significant; $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$

Table 42 Comparison between the venom contralateral and the saline contralateral kidneys on F_{Osm}, $U_{Osm}V$, C_{Osm}, C_{H_2O} and U/P_{Osm}.

Parameter	control	1 hr	2 hr	3 hr	4 hr	5 hr
F_{Osm} (µOsm/min/gm-kw)						
- Saline control	202.10±33.26	216.95±36.81	276.15±58.26	212.89±33.28	213.30±27.02	202.81±29.87
	NS	*	**	**	**	**
- RVV 0.05 mg	136.40±14.55	106.30±11.84	97.65±14.23	86.13±14.61	94.90±14.65	72.58±17.94
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	179.84±21.17	139.35±22.46	133.82±31.25	127.08±29.82	150.11±30.27	152.99±33.35
$U_{Osm}V$ (µOsm/min/gm-kw)						
- Saline control	4.42 ±0.68	5.59 ±0.37	6.43 ±0.71	9.00 ±0.92	9.68 ±1.06	9.50 ±1.34
	NS	*	NS	*	**	*
- RVV 0.05 mg	5.71 ±1.30	3.43 ±0.67	4.95 ±0.90	4.69 ±1.19	4.98 ±0.99	5.16 ±1.13
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	5.22 ±1.14	5.97 ±1.40	7.44 ±1.43	7.44 ±1.31	6.99 ±1.07	5.91 ±0.84
C_{Osm} (µl/min/gm-kw)						
- Saline control	14.38 ±2.15	17.99 ±1.08	20.77 ±2.29	29.52 ±2.79	31.87 ±3.01	31.10 ±4.10
	NS	*	NS	*	**	*
- RVV 0.05 mg	19.22 ±4.38	11.20 ±2.18	16.13 ±2.89	16.46 ±3.57	16.10 ±3.08	16.52 ±3.59
	NS	NS	NS	NS	NS	*
- RVV 0.1 mg	16.54 ±3.55	18.76 ±4.32	23.07 ±4.50	23.06 ±4.12	22.02 ±3.71	18.33 ±2.71
C_{H_2O} (µl/min/gm-kw)						
- Saline control	-5.45 ±3.29	1.41 ±7.69	-0.95 ±6.59	-6.70 ±4.24	-8.95 ±5.27	-10.06 ±6.39
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	3.50 ±4.68	0.21 ±1.29	-1.18 ±2.06	-1.19 ±2.35	-1.87 ±2.22	-3.16 ±2.13
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	8.07 ±7.15	-0.93 ±6.52	-7.14 ±3.81	-10.31 ±3.02	-10.84 ±3.07	-10.18 ±1.87
U/P_{Osm}						
- Saline control	2.31 ±0.59	1.58 ±0.58	1.36 ±0.32	1.48 ±0.36	1.60 ±0.38	1.84 ±0.49
	NS	NS	NS	NS	NS	NS
- RVV 0.05 mg	1.22 ±0.19	1.13 ±0.15	1.29 ±0.15	1.35 ±0.18	1.45 ±0.17	1.53 ±0.21
	NS	NS	NS	NS	NS	NS
- RVV 0.1 mg	1.11 ±0.33	1.58 ±0.29	1.87 ±0.29	1.99 ±0.26	2.00 ±0.23	2.28 ±0.22

Abbreviation : are defined in table . NS, not significant; $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

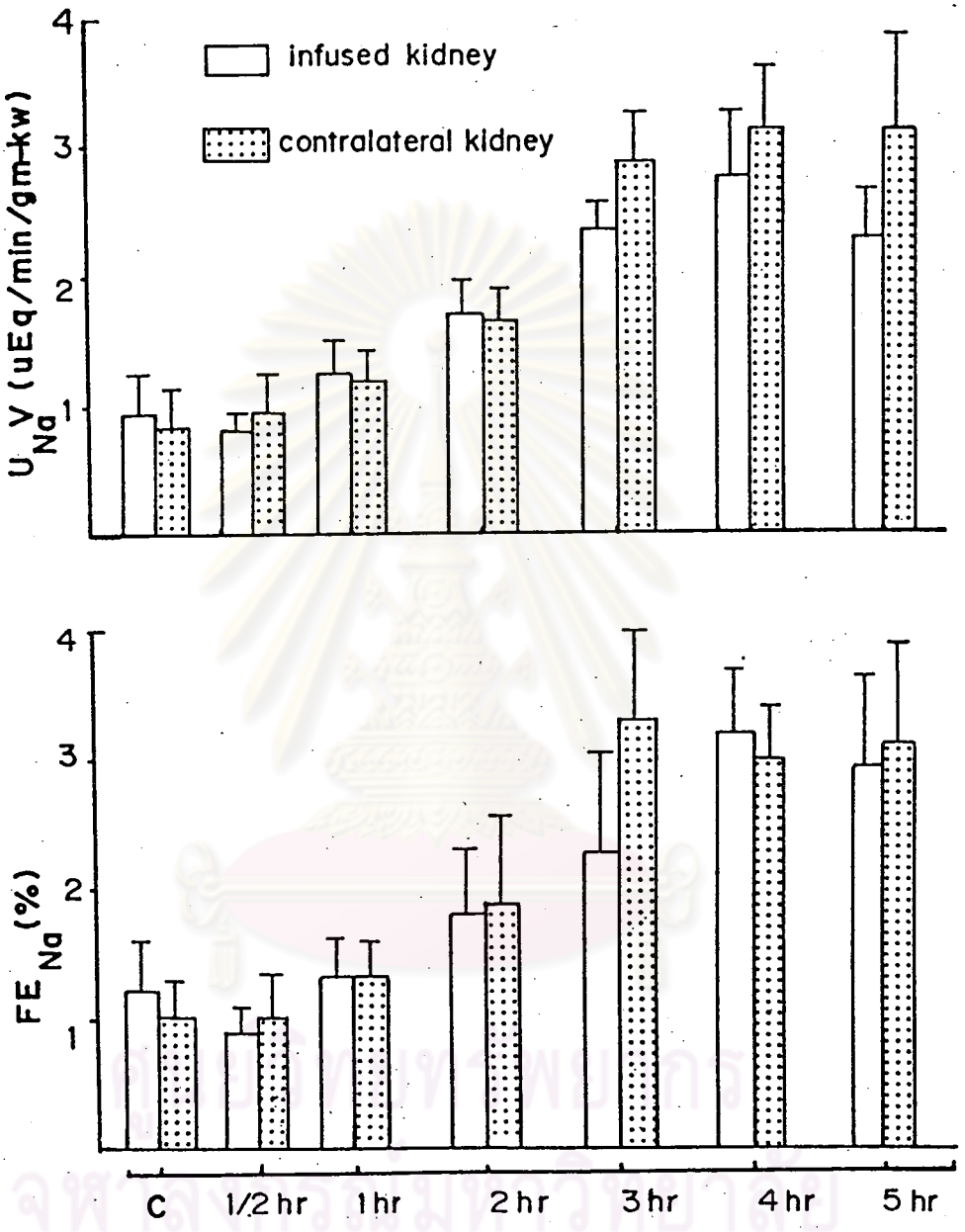

Fig 2 : Effects of an isotonic saline infusion on $U_{Na}V$ and FE_{Na} in both the infused and contralateral kidneys of control group. Results are mean $\pm$ SEM. Statistical difference between both kidneys at the same state was tested by Student's paired t-test. (n = 5)

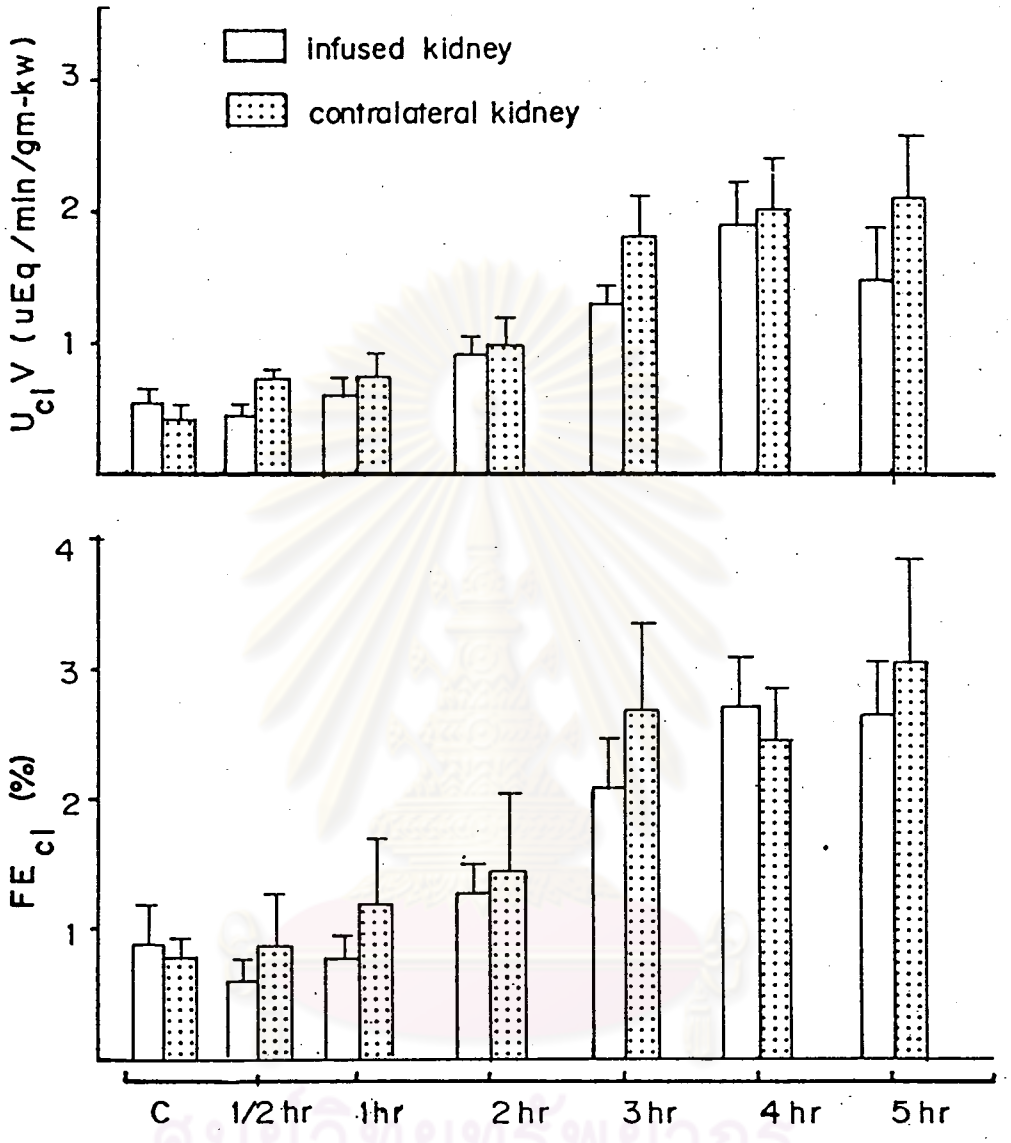

Fig 3 : Effects of an isotonic saline infusion on $U_{Cl}V$ and FE_{Cl} in both the infused and contralateral kidneys of control group. Results are the means $\pm$ SEM. Statistical difference between both kidneys at the same state was tested by Student's paired t-test. (n = 5)

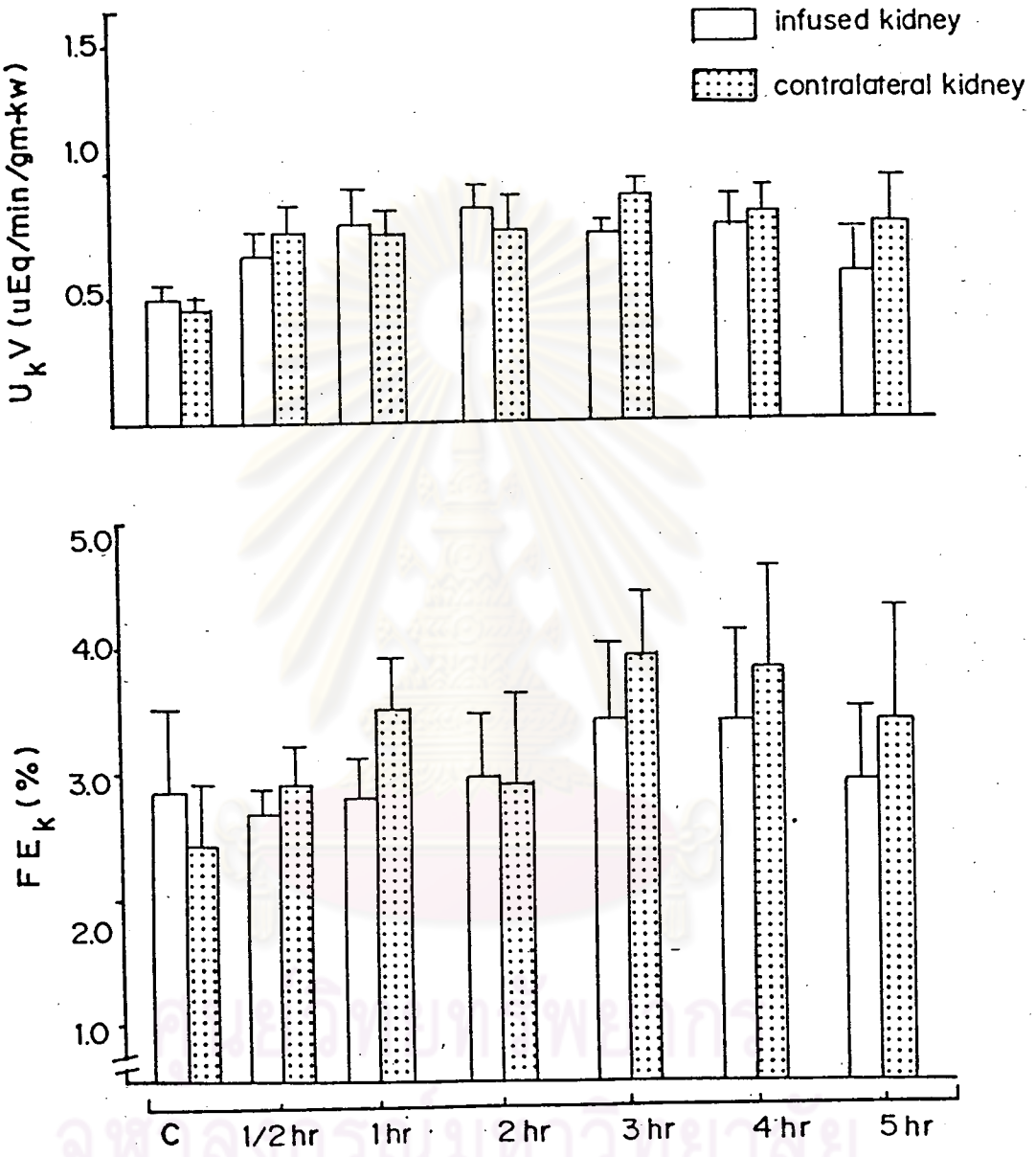

Fig 4 : Effects of an isotonic saline infusion on U_KV and FE_K in both the infused and contralateral kidneys of control group. Bars indicated SEM. Statistical difference between both kidneys at the same state was tested by Student's paired t-test. (n=5)

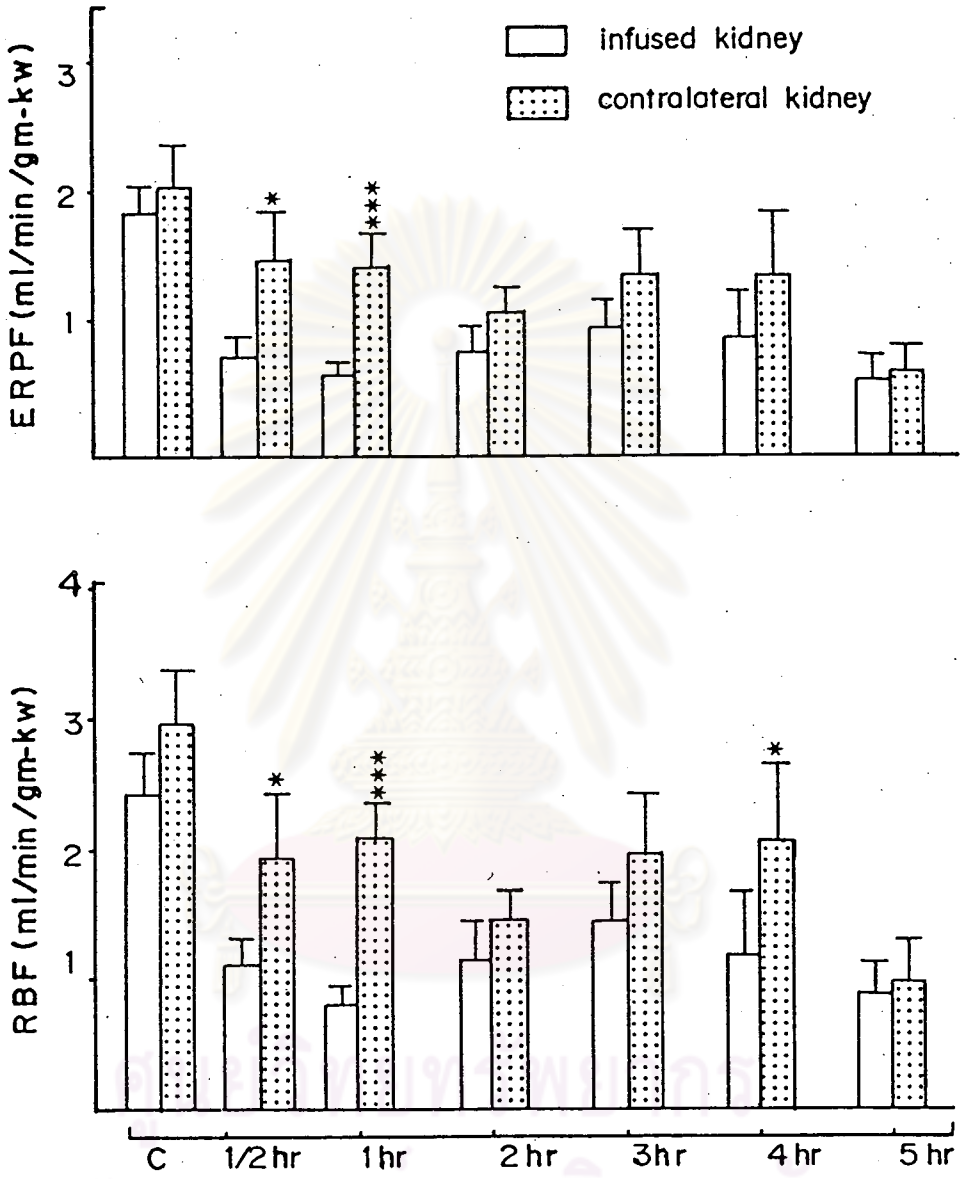

Fig 5 : Effects of RVV 0.05 mg/kg bw. on ERPF, RBF in both the infused and contralateral kidneys. Values are the means $\pm$ SEM. Statistical difference between both kidneys at the same state was tested by Student's paired t-test. $*P < 0.05$; $***P < 0.001$.

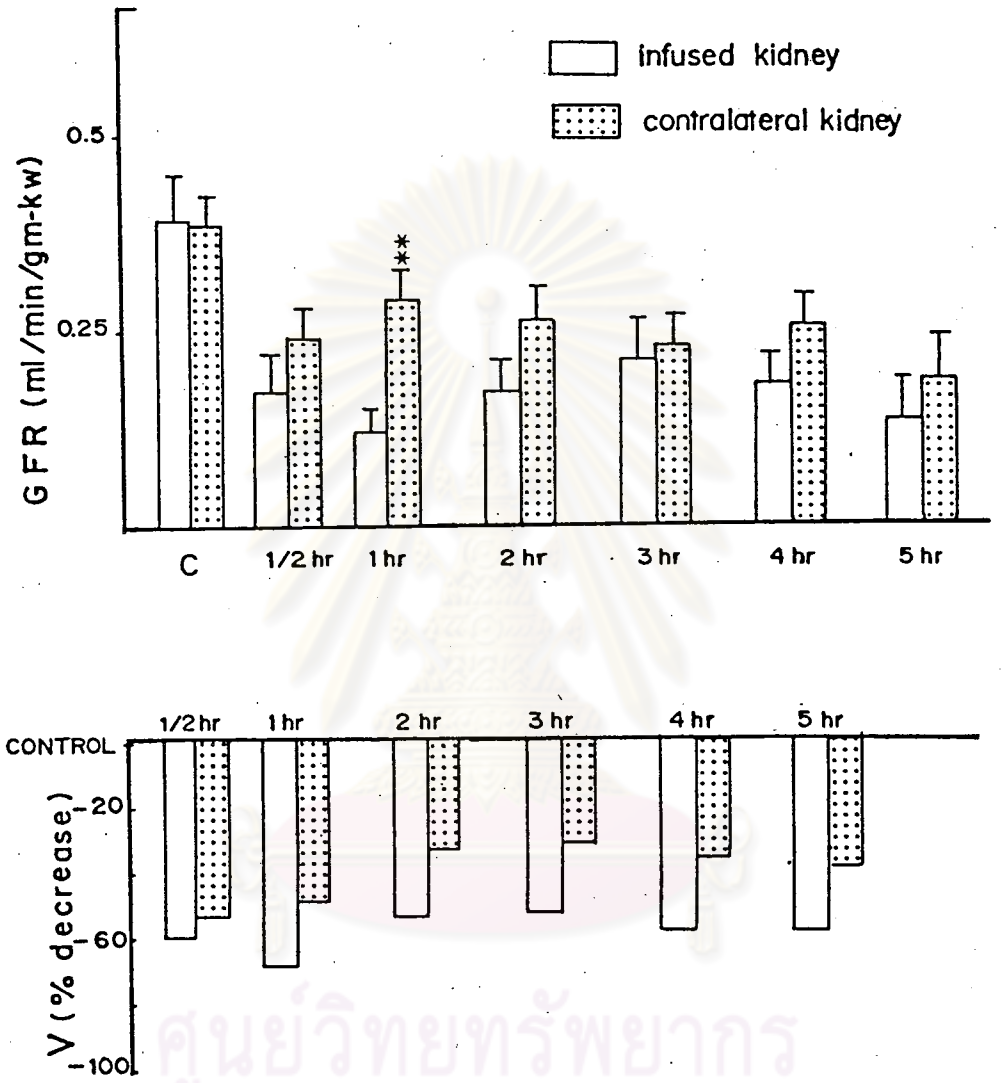

Fig 6 : Effects of Russell's viper venom 0.05 mg/kg bw. on GFR and V in both the infused and contralateral kidneys. Values are the means $\pm$ SEM. and decrease in percentage change, respectively. Statistical difference of GFR between both kidneys at the same state was tested by Student's paired t-test. $^{**}P < 0.01$ (n = 8)

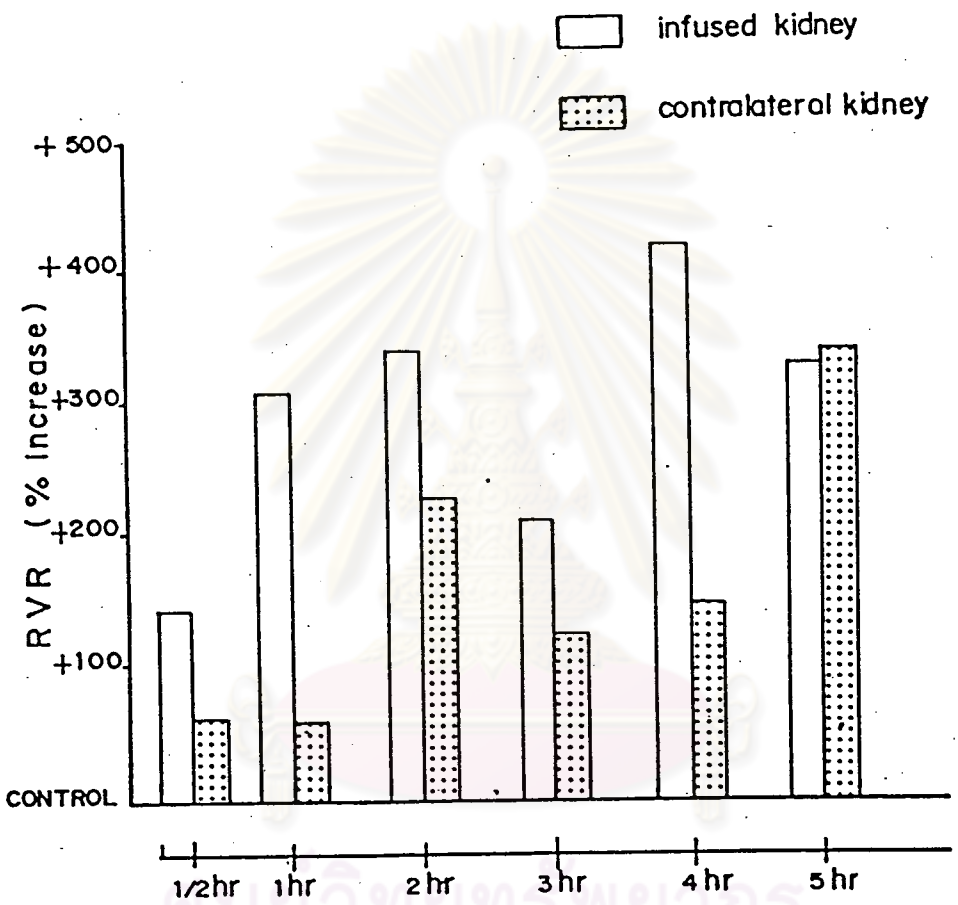

Fig 7 : Effects of Russell's viper venom 0.05 mg/kg bw. on RVR in both the infused and contralateral kidneys. Data are presented as increase in percentage changes. (n = 8)

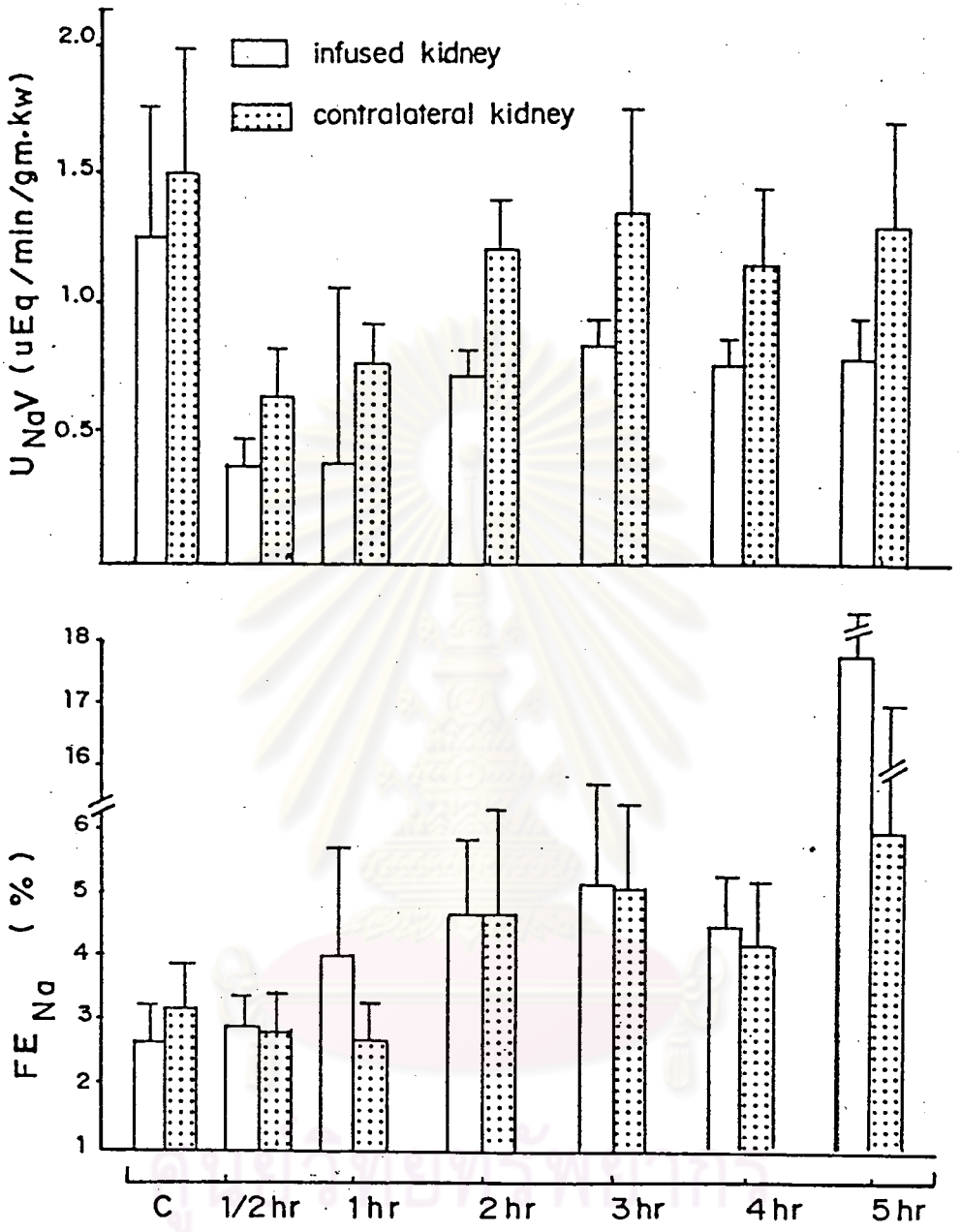

Fig 8 : Effects of Russell's viper venom 0.05 mg/kg bw. on $U_{Na}V$ and FE_{Na} in both the infused and contralateral kidneys. Values are the means $\pm$ SEM. Statistical difference between both kidneys was tested by Student's paired t-test. (n = 8)

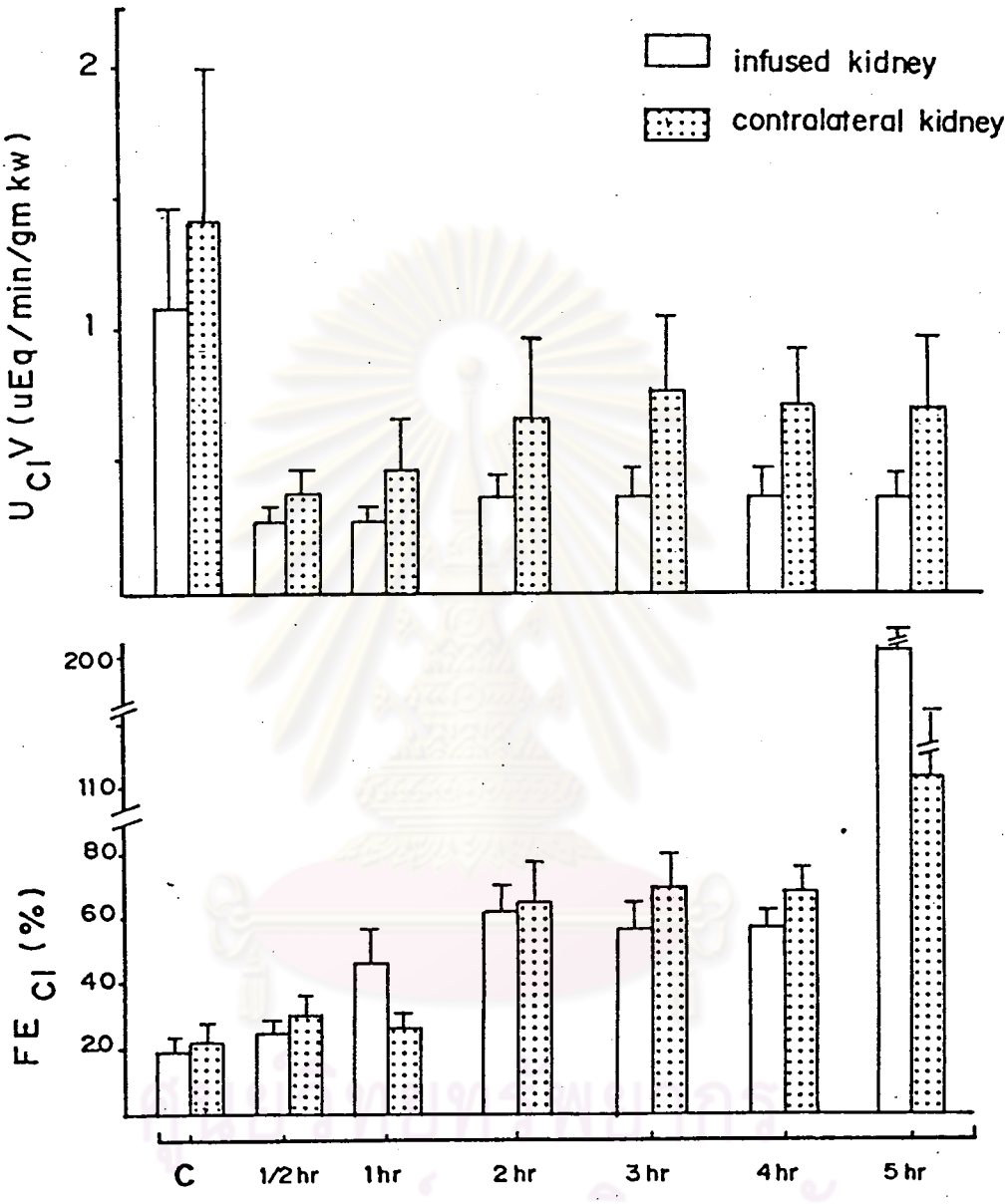

Fig 9 : Effects of Russell's viper venom 0.05 mg/kg bw. on $U_{Cl}V$ and FE_{Cl} in both the infused and contralateral kidneys. Values are the means $\pm$ SEM. Statistical difference between both kidneys was tested by Student's paired t-test. (n = 8) .

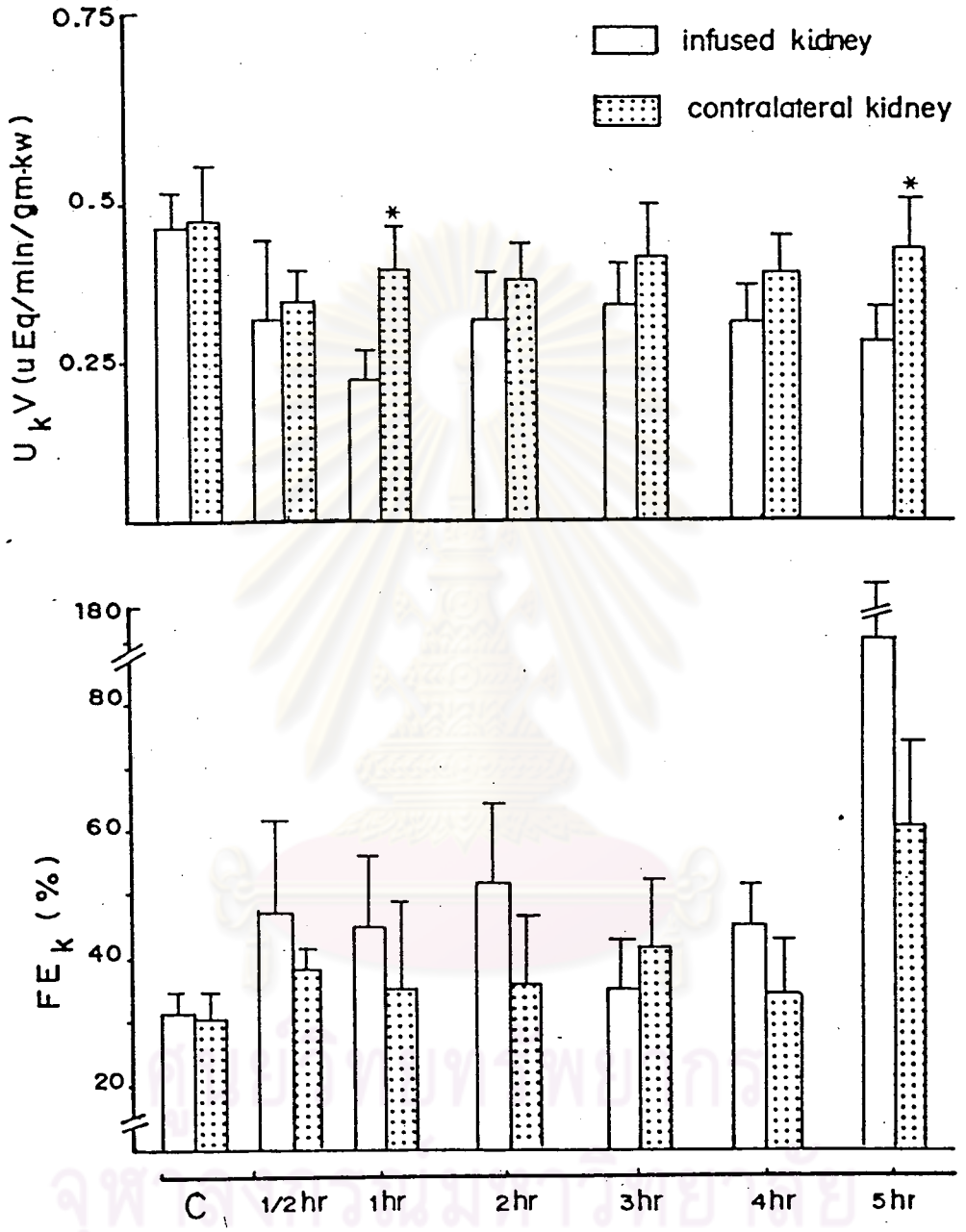

Fig 10 : Effects of Russell's viper venom 0.05 mg/kg bw. on $U_K V$ and FE_K in both the infused and contralateral kidneys. Values are the means $\pm$ SEM. Statistical difference between both kidneys was tested by Student's paired t-test.*$p < 0.05$ (n = 8)

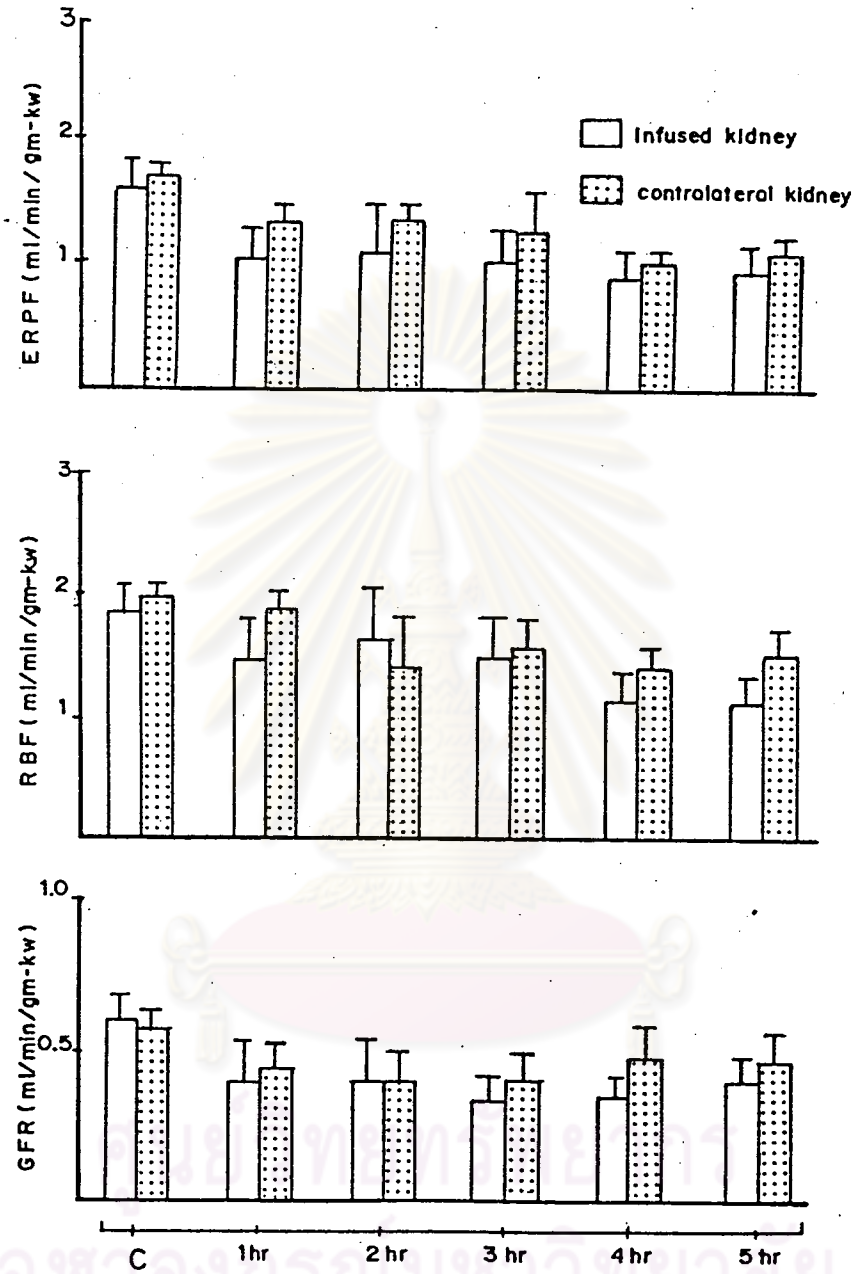

Fig 11 : Effects of Russell's viper venom 0.1 mg/kg bw. on ERPF, RBF and GFR in both the infused and contralateral kidneys. Bars indicated SEM. Statistical difference between both kidneys at the same state was tested by Student's paired t-test. (n = 5)

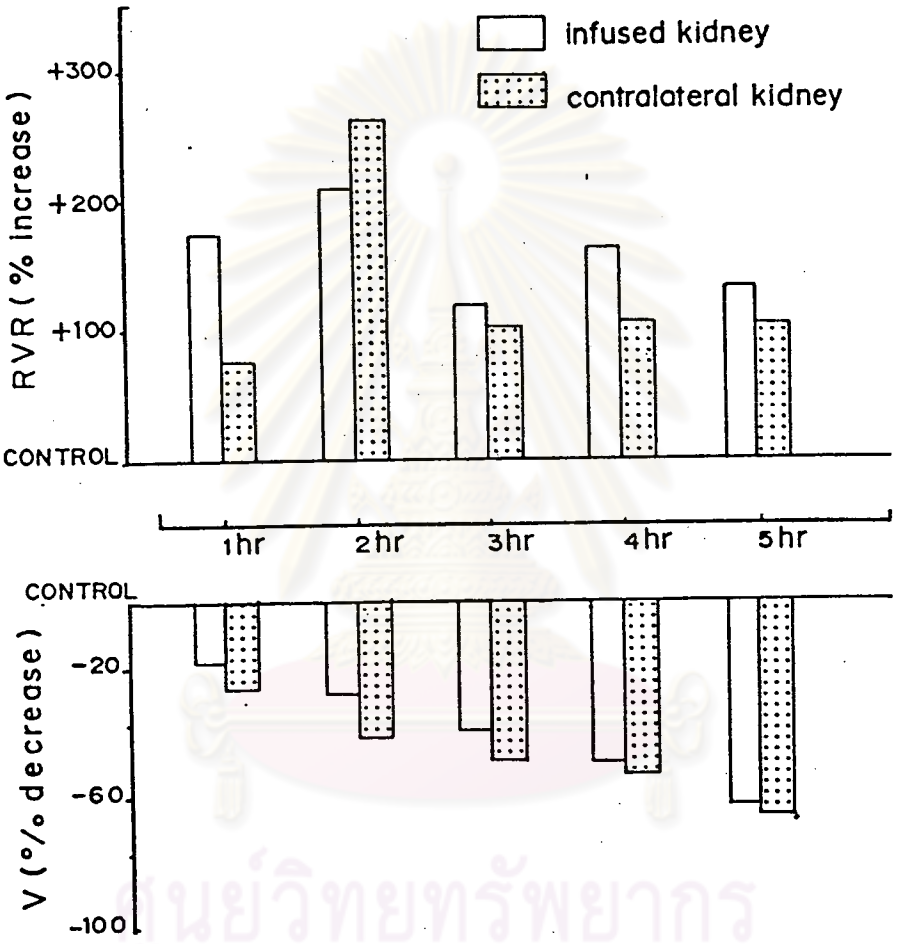

Fig 12 : Effects of Russell's viper venom 0.1 mg/kg bw. on RVR and V in both the infused and contralateral kidneys. Data are presented as an increase and a decrease in percentage changes, respectively, (n = 5)

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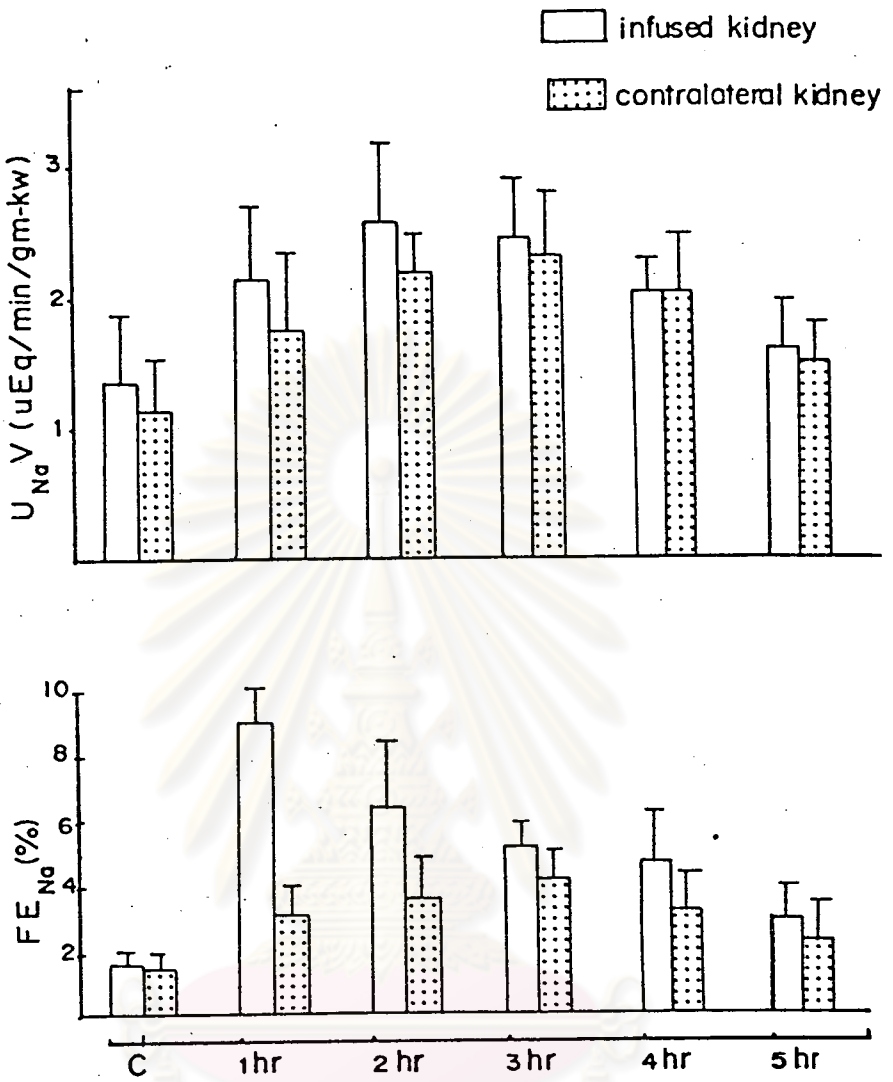

Fig 13 : Effects of Russell's viper venom 0.1 mg/kg bw. on $U_{Na}V$ and FE_{Na} in both the infused and contralateral kindeys. Results are the means $\pm$ SEM. Statistical difference between both kidneys at the same state was tested by Student's t-test. (n = 8)

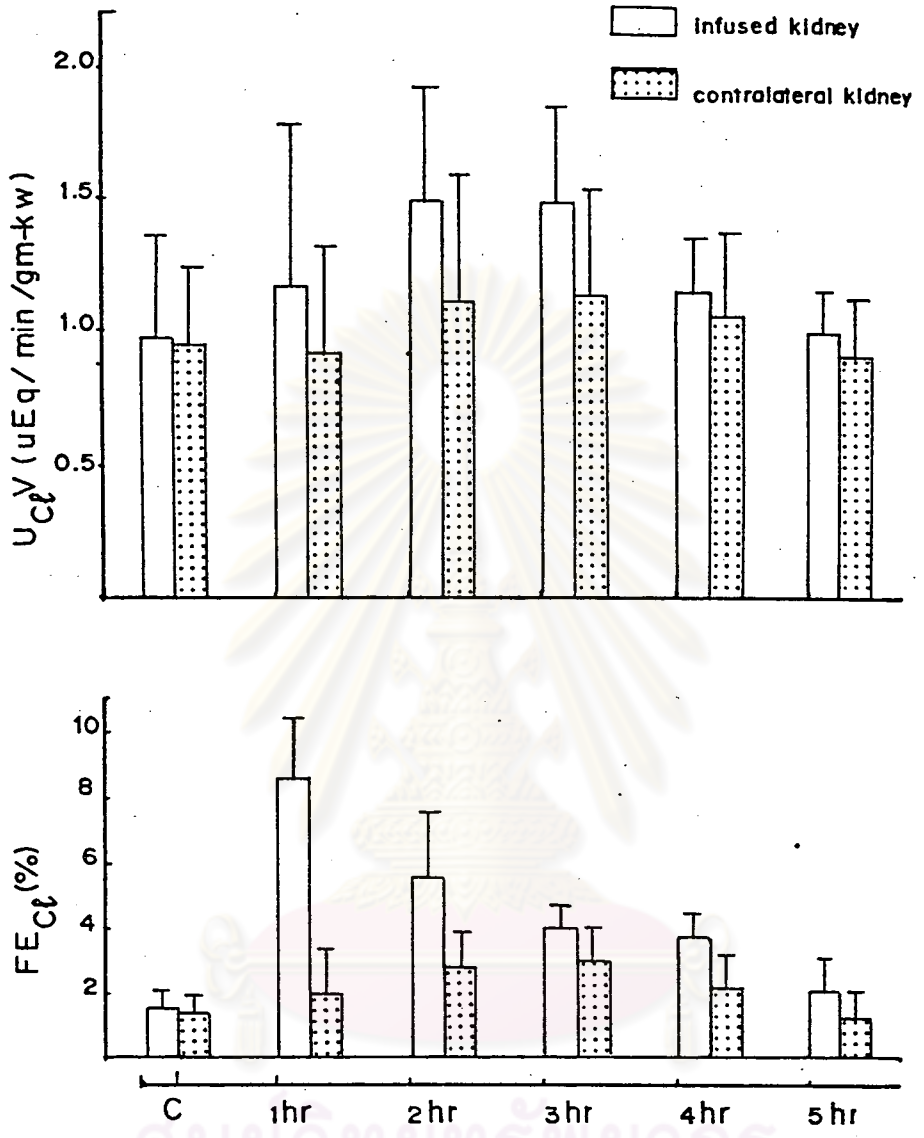

Fig 14 : Effects of Russell's viper venom 0.1 mg/kg bw. on $U_{Cl}V$ and FE_{Cl} in both the infused and contralateral kidneys. Results are the means $\pm$ SEM. Statistical difference between both kidneys was tested by Student's paired t-test. (n = 8)

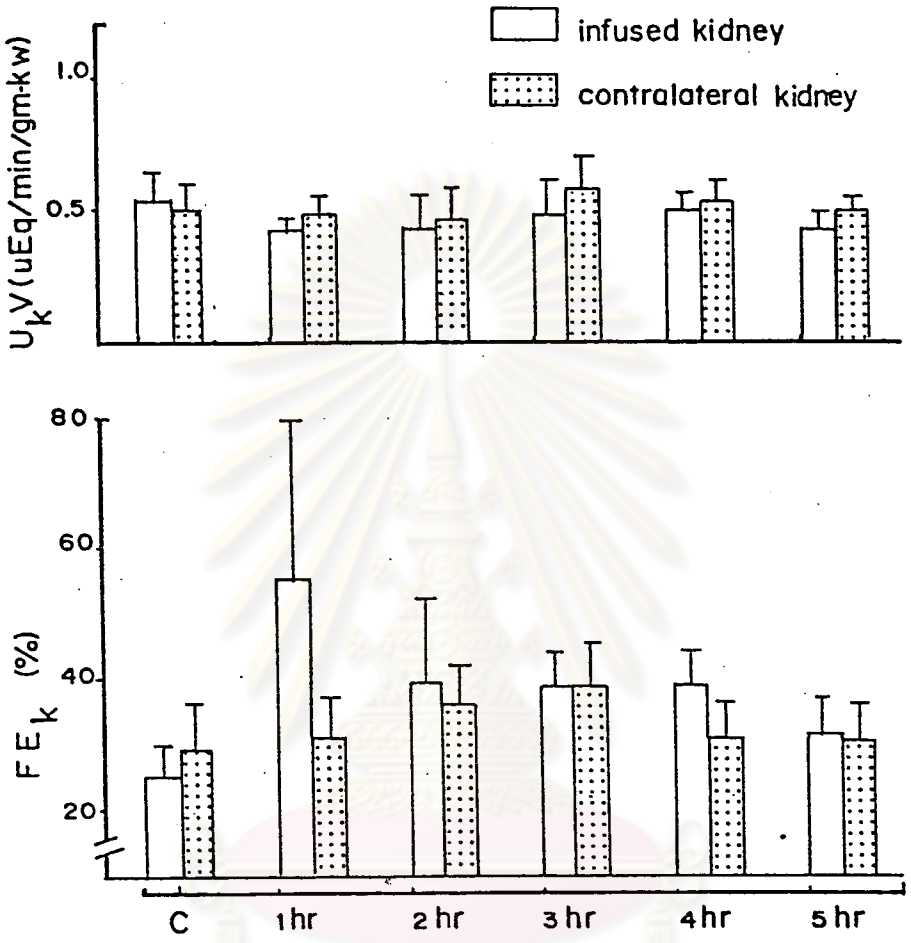

Fig 15 : Effects of Russell's viper venom 0.1 mg/kg bw. on $U_K V$ and FE_K in both the infused and contralateral kidneys. Results are the means $\pm$ SEM. Statistical difference between both kidneys was tested by Student's paired t-test. (n = 8)

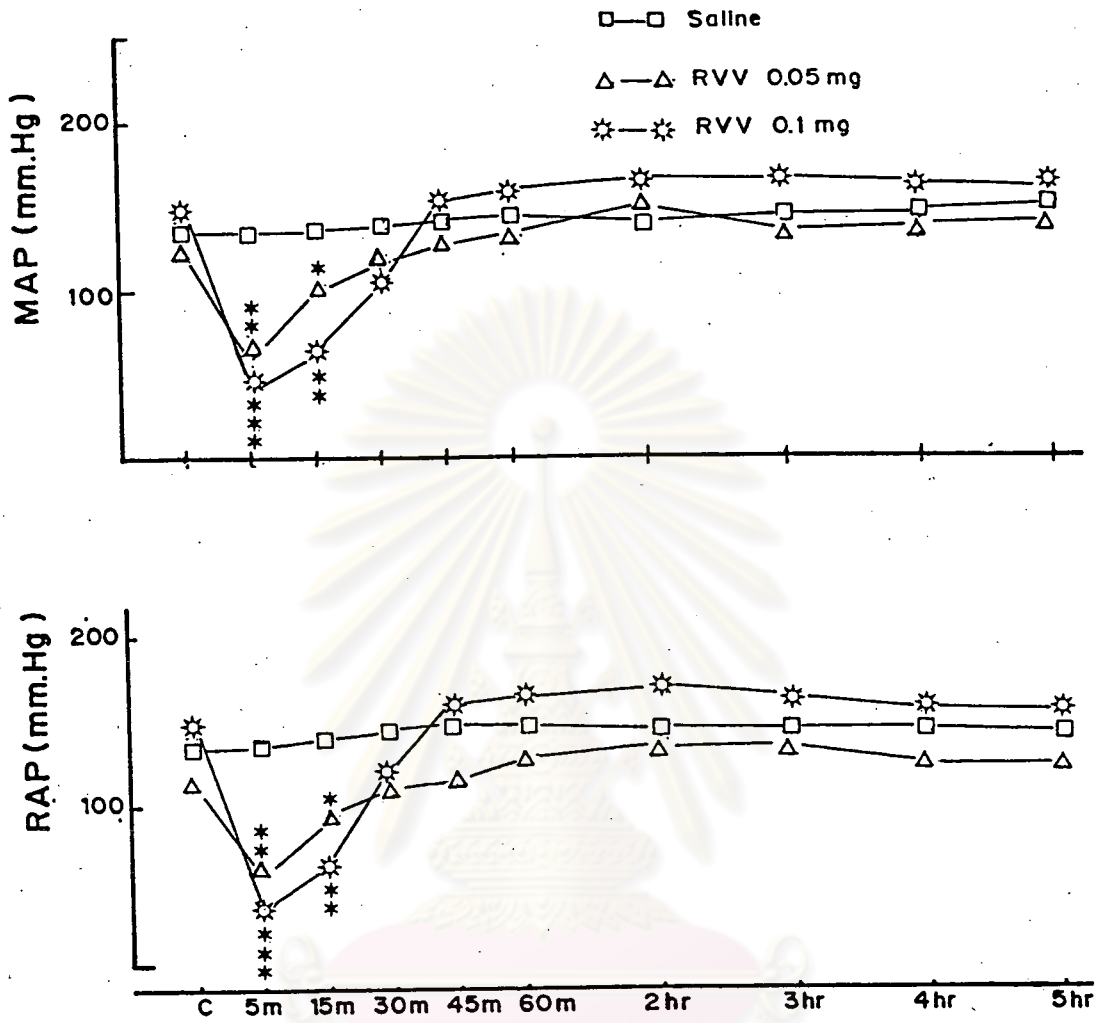

Fig 16 : The effects of both Russell's viper venom 0.05 mg/kg bw. and 0.1 mg/kg bw. on MAP and RAP, compared with the saline control group at the same state. Each point on the curves represents the mean value. Statistical difference was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$

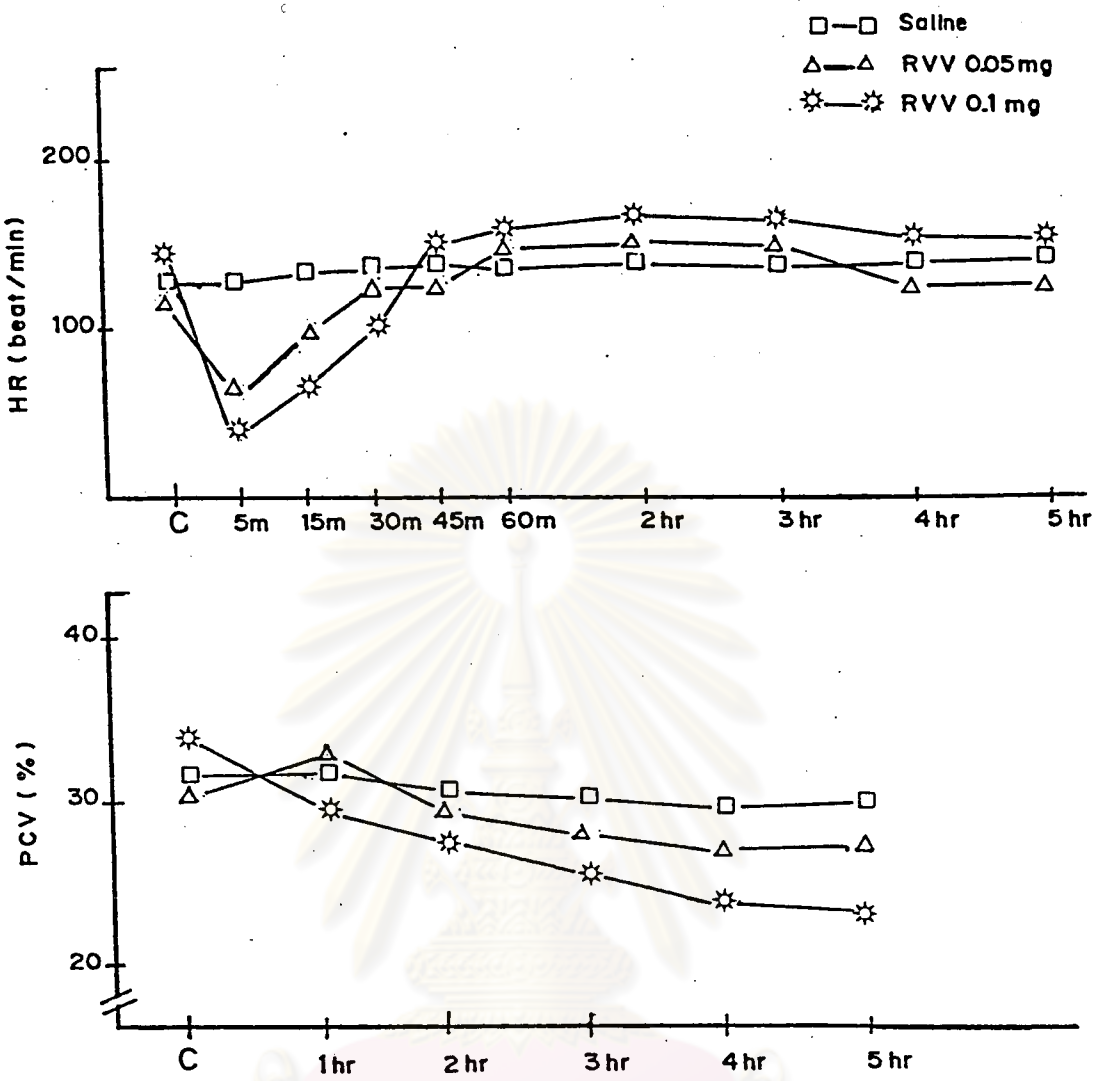

Fig 17 : The effects of both Russell's viper venom 0.05 mg/kg bw. and 0.1 mg/kg bw. on HR and PCV, compared with the saline control group at the same state. Each point on the curves shows the mean value. Statistical difference was tested by Student's unpaired t-test.

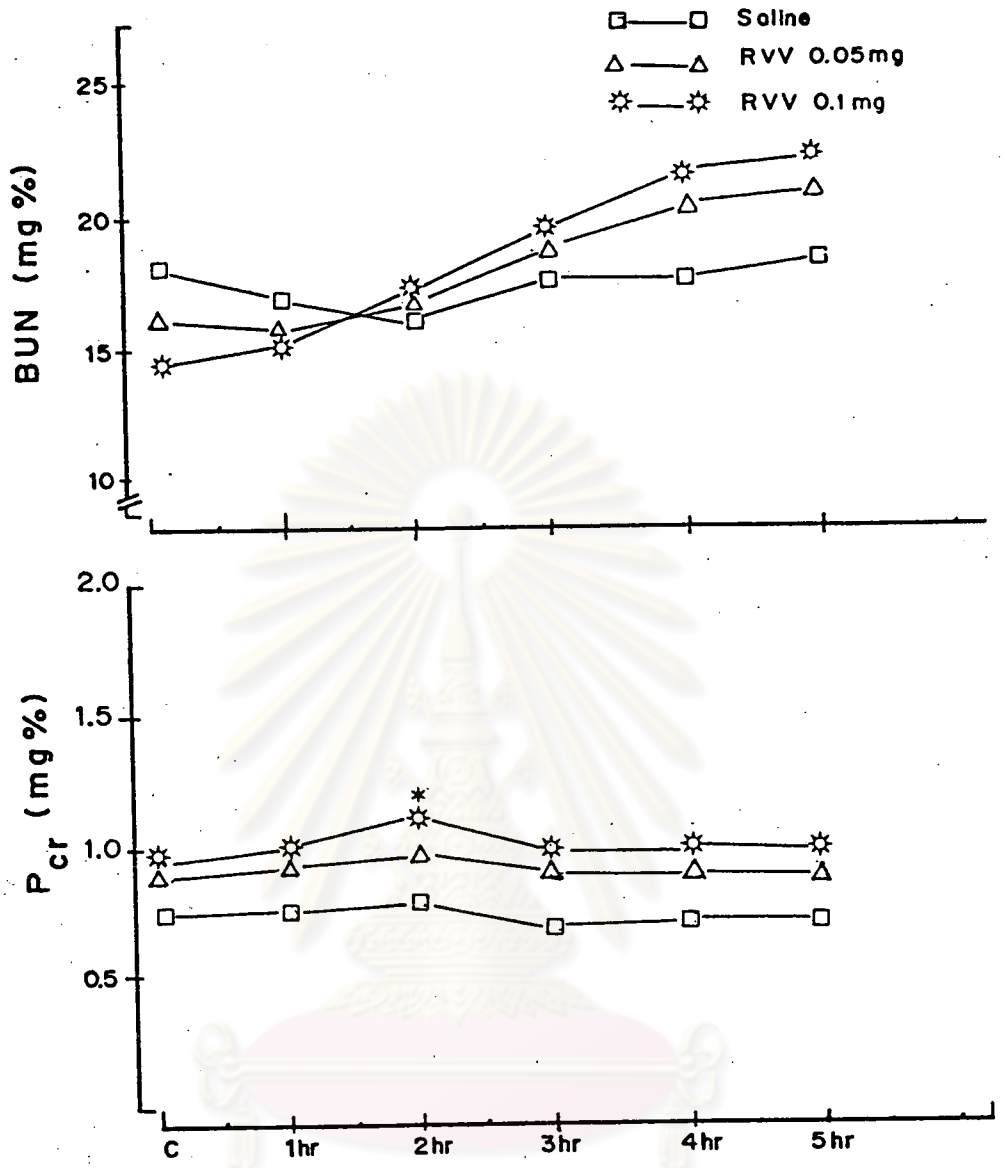

Fig 18 : Illustrates the effects of both Russell's viper venom 0.05 mg/kg bw. and 0.1 mg/kg bw. on BUN and P_{Cr}, compared with the saline control group at the same state. Each point on the curves represents the mean value. Statistical difference was tested by Student's unpaired t-test. $*P < 0.05$.

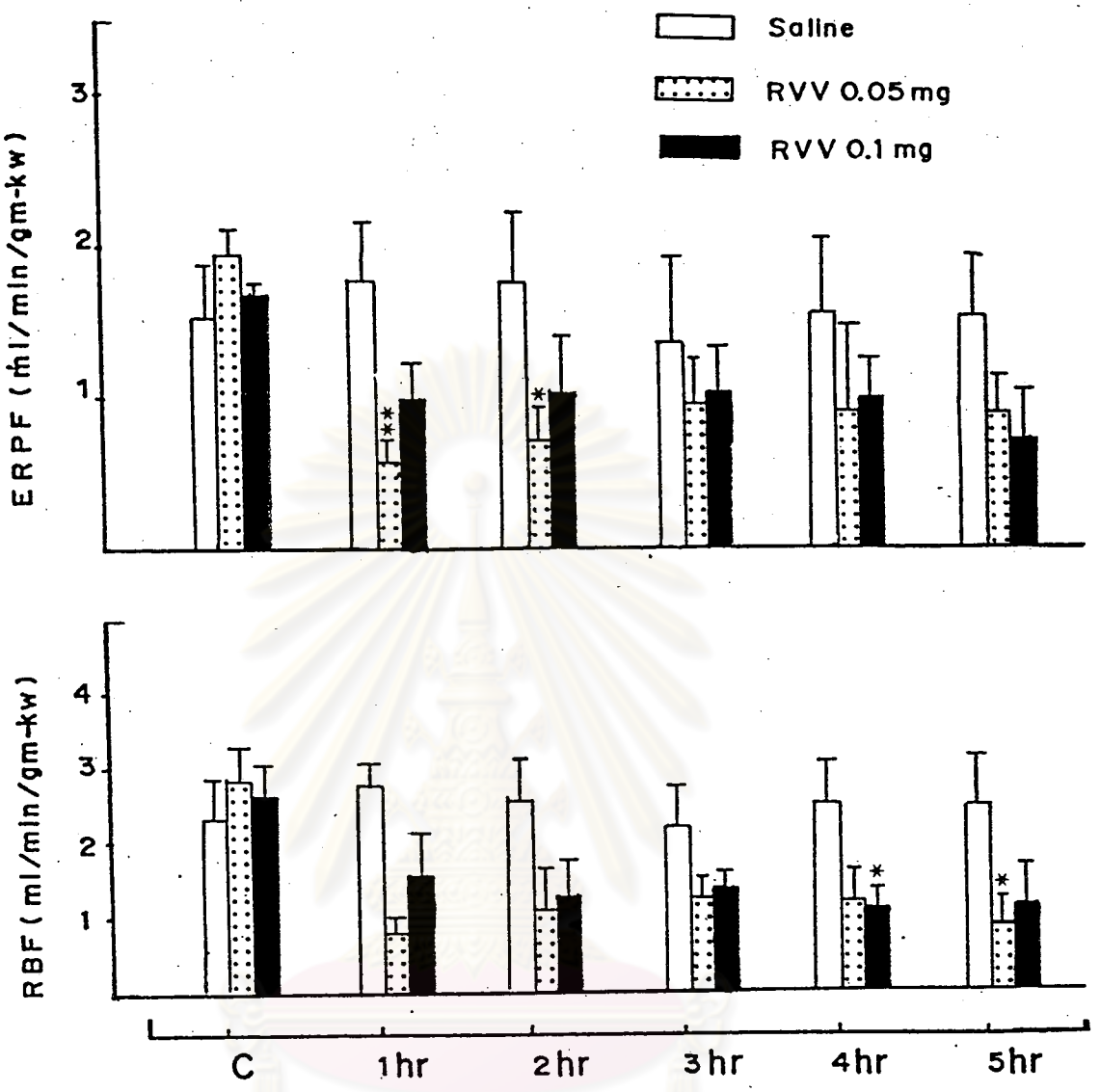

Fig 19 : Comparison between the venom infused and the saline infused kidneys on ERPF and RBF. Values are the means ± SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test.*P < 0.05; **P < 0.01

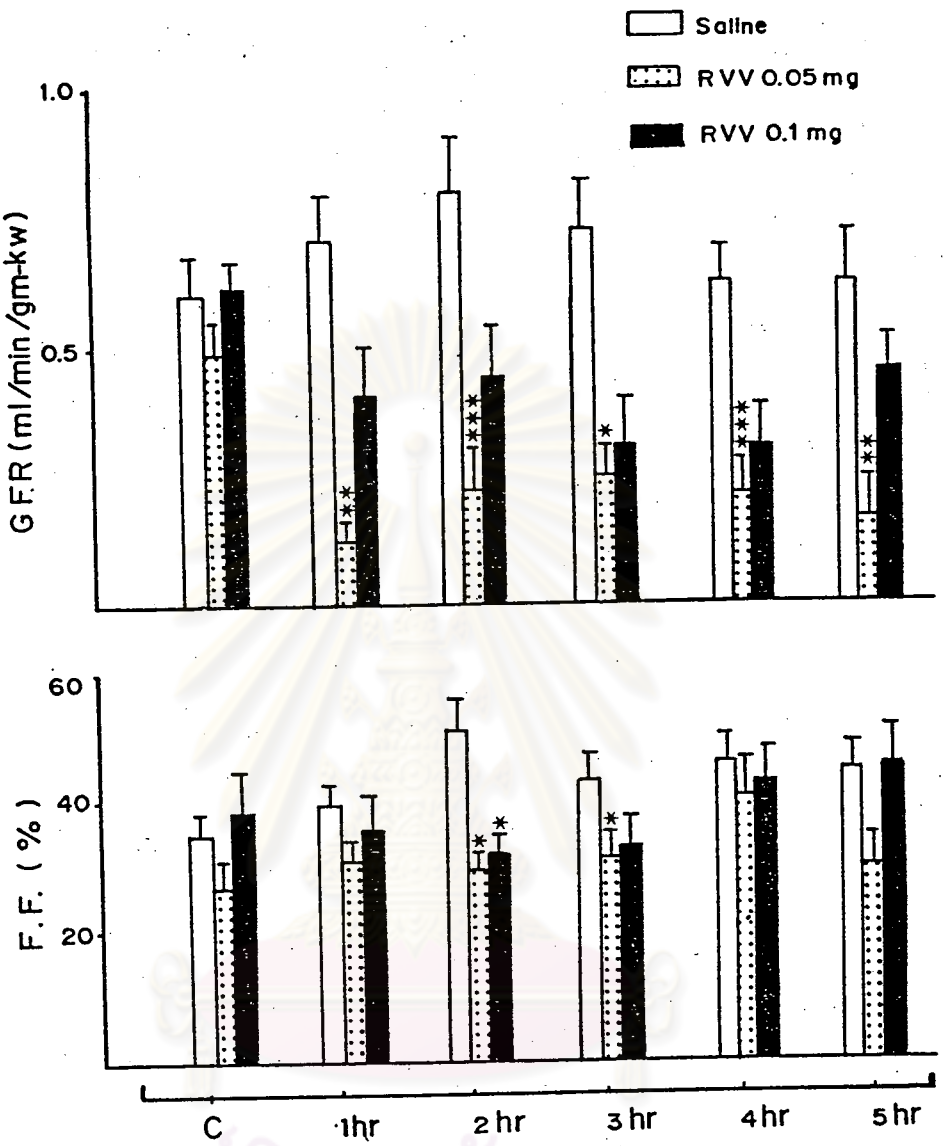

Fig 20 : Comparison between the venom infused and the saline infused kidneys on GFR and F.F. Values are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$

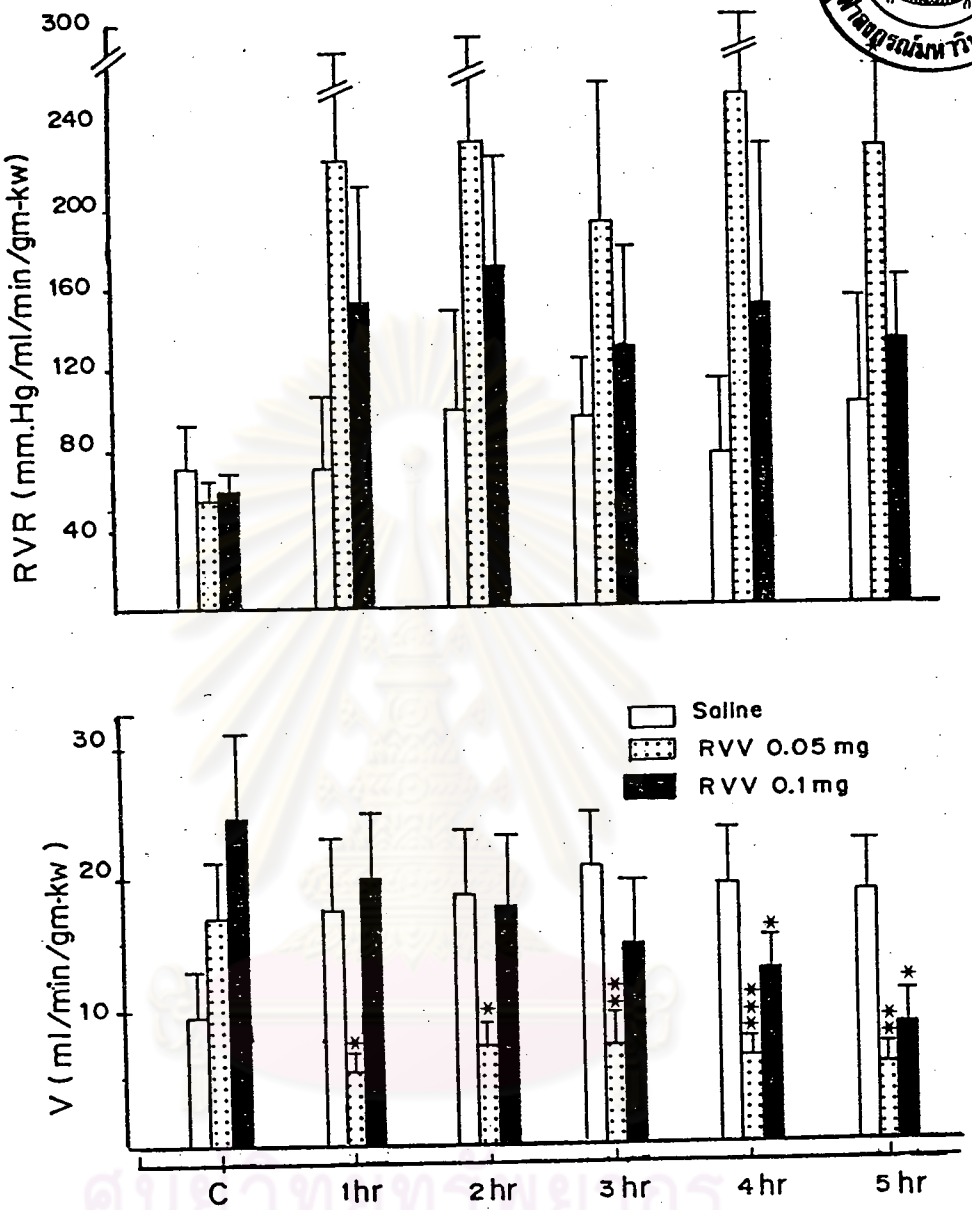

Fig 21 : Comparison between the venom infused and the saline infused kidneys on RVR and V. Results are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$

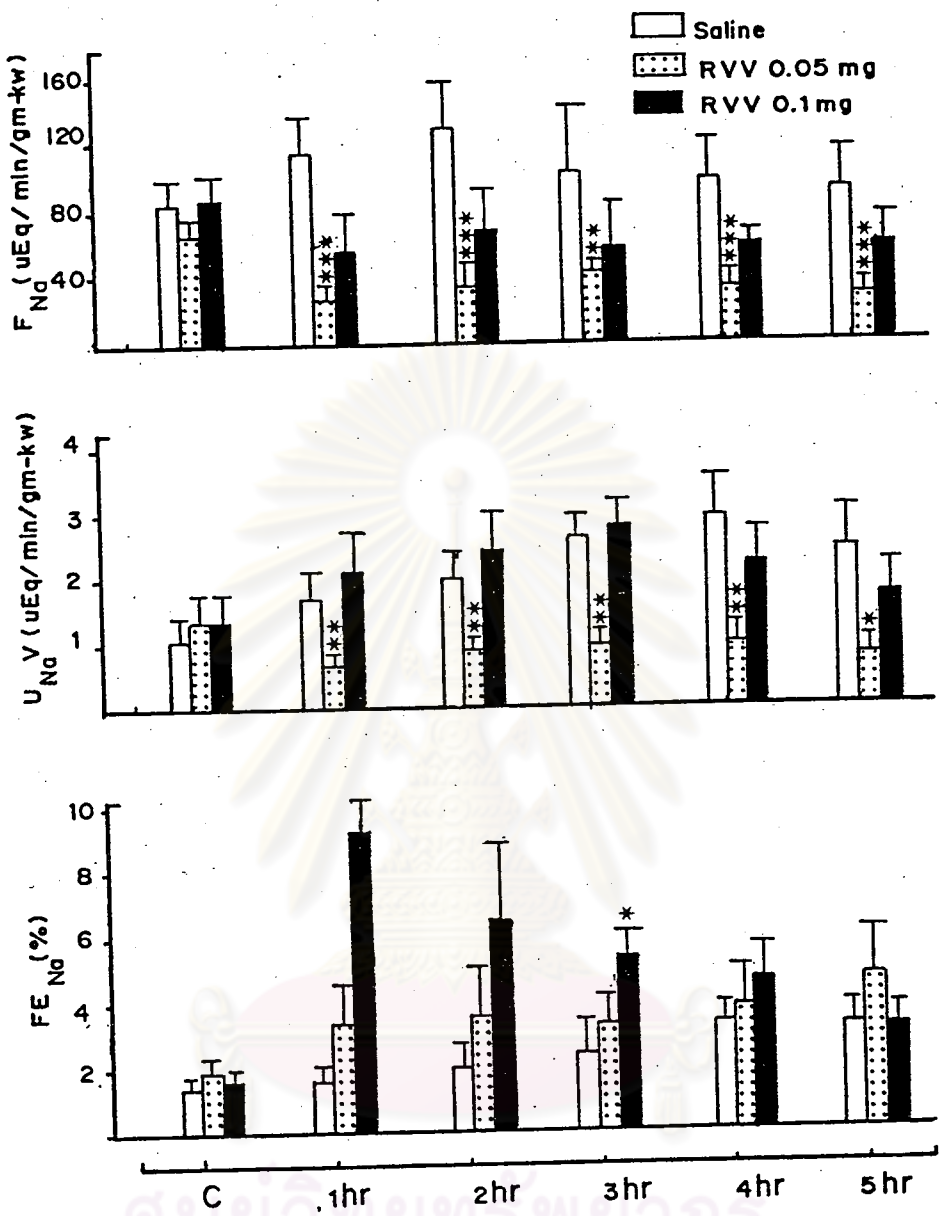

Fig 22 : Comparison between the venom infused and the saline infused kidneys on F_{Na}, $U_{Na}V$ and FE_{Na}. Bars indicated SEM. Statistical difference between each of both kidneys was tested by Studen's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$

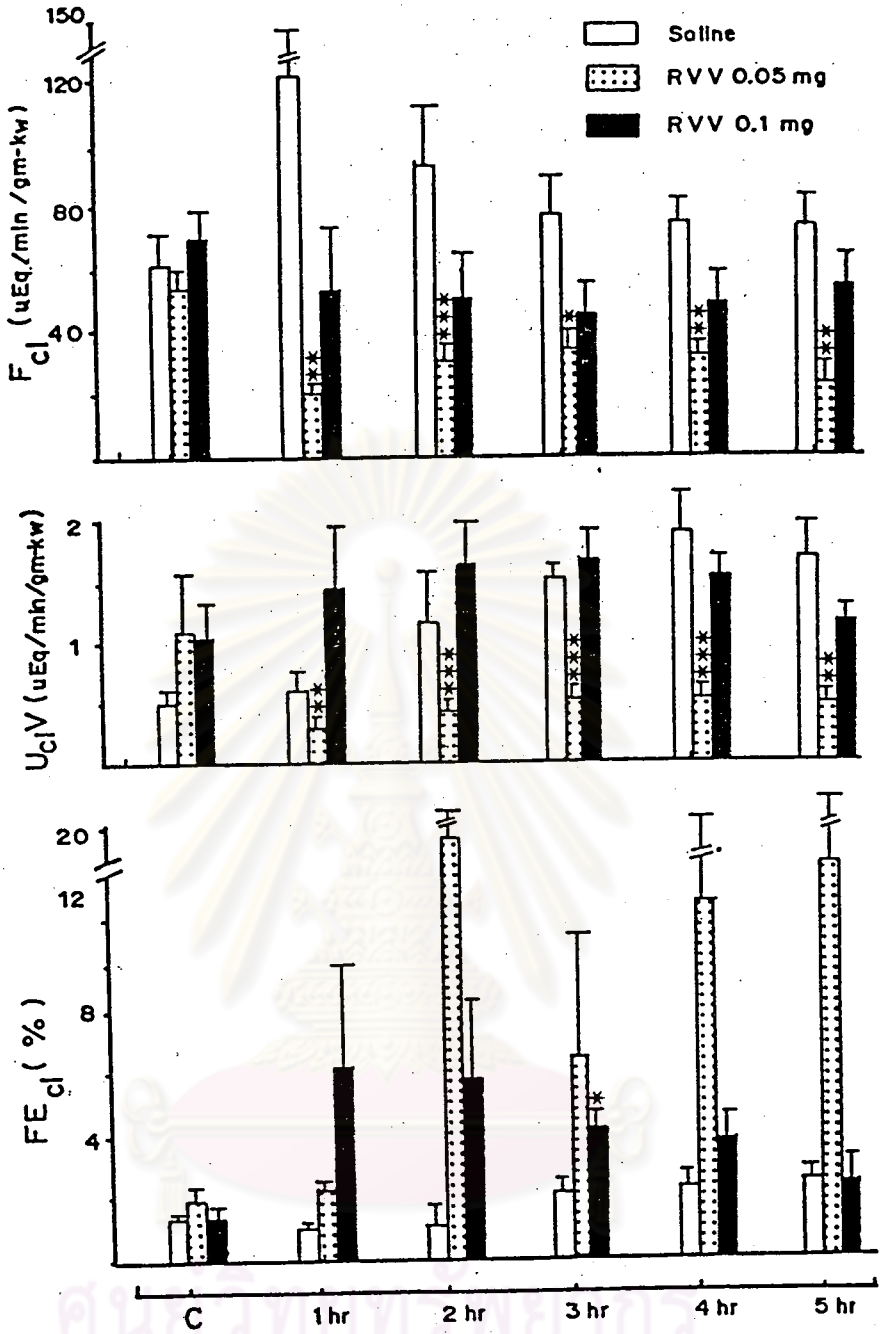

Fig 23 : Comparison between the venom infused and the saline infused kidneys on F_{Cl}, $U_{Cl}V$ and FE_{Cl}. Results are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$.

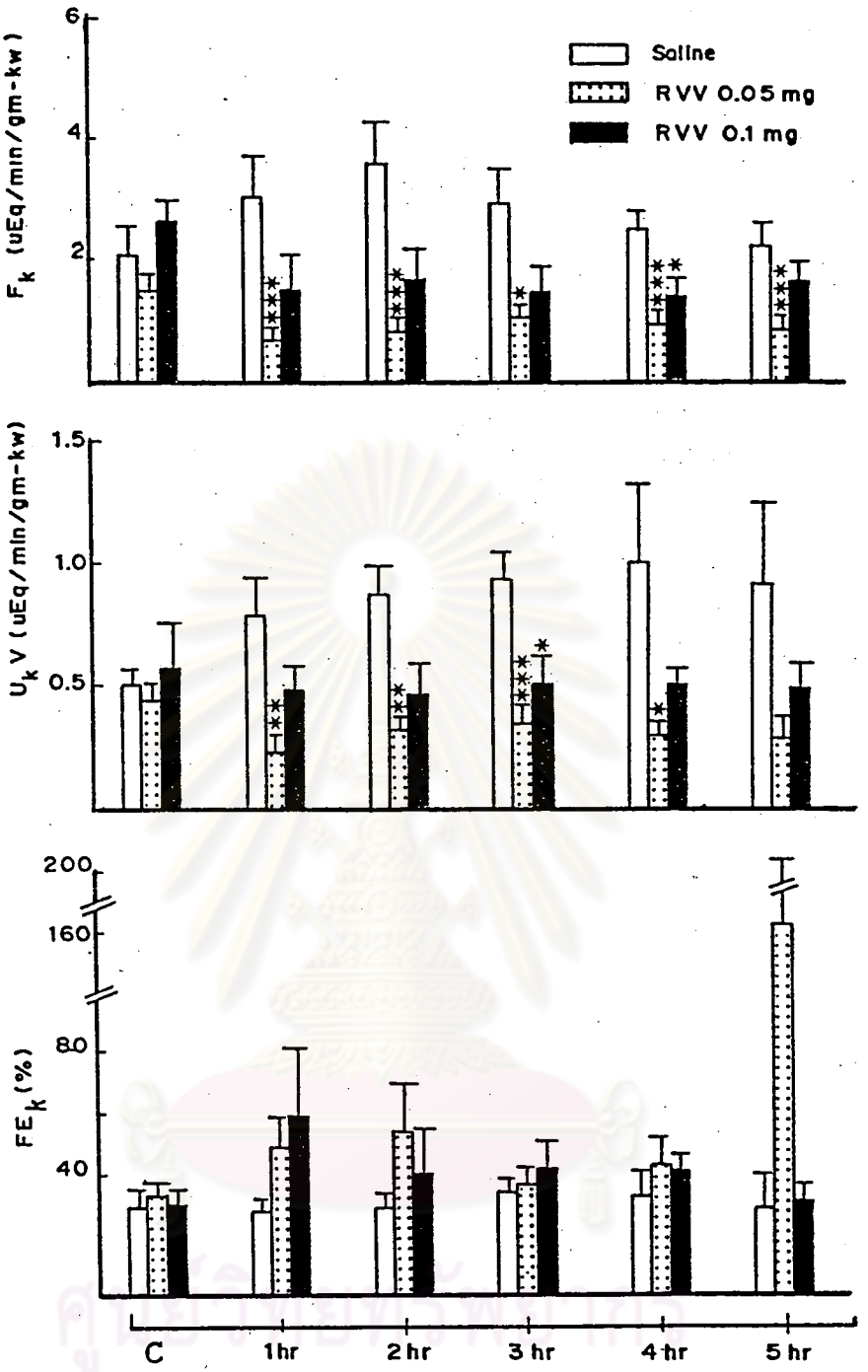

Fig 24 : Comparison between the venom infused and the saline infused kidneys on F_K, $U_K V$ and FE_K. Results are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$

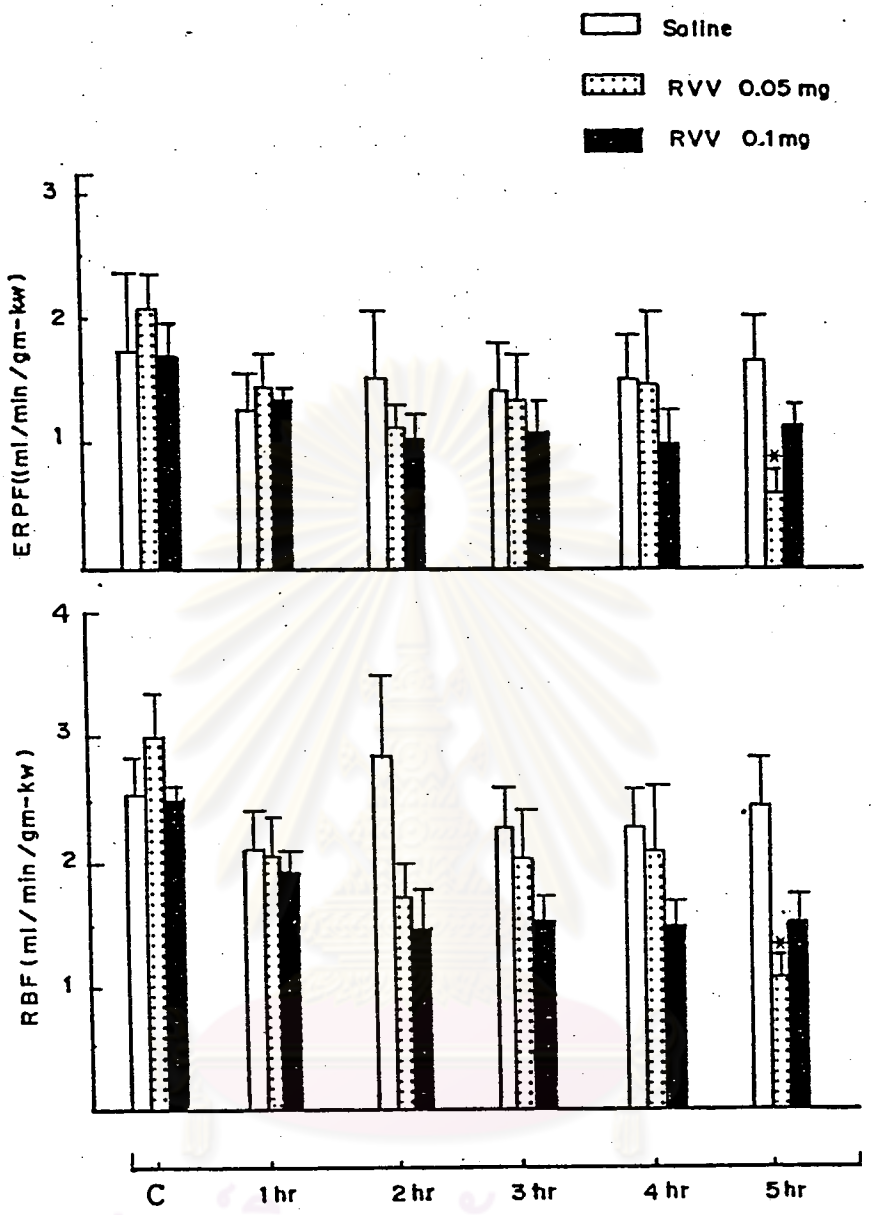

Fig 25 : Comparison between the venom contralateral and the saline contralateral kidneys on ERPF and RBF. Values are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. * $P < 0.05$.

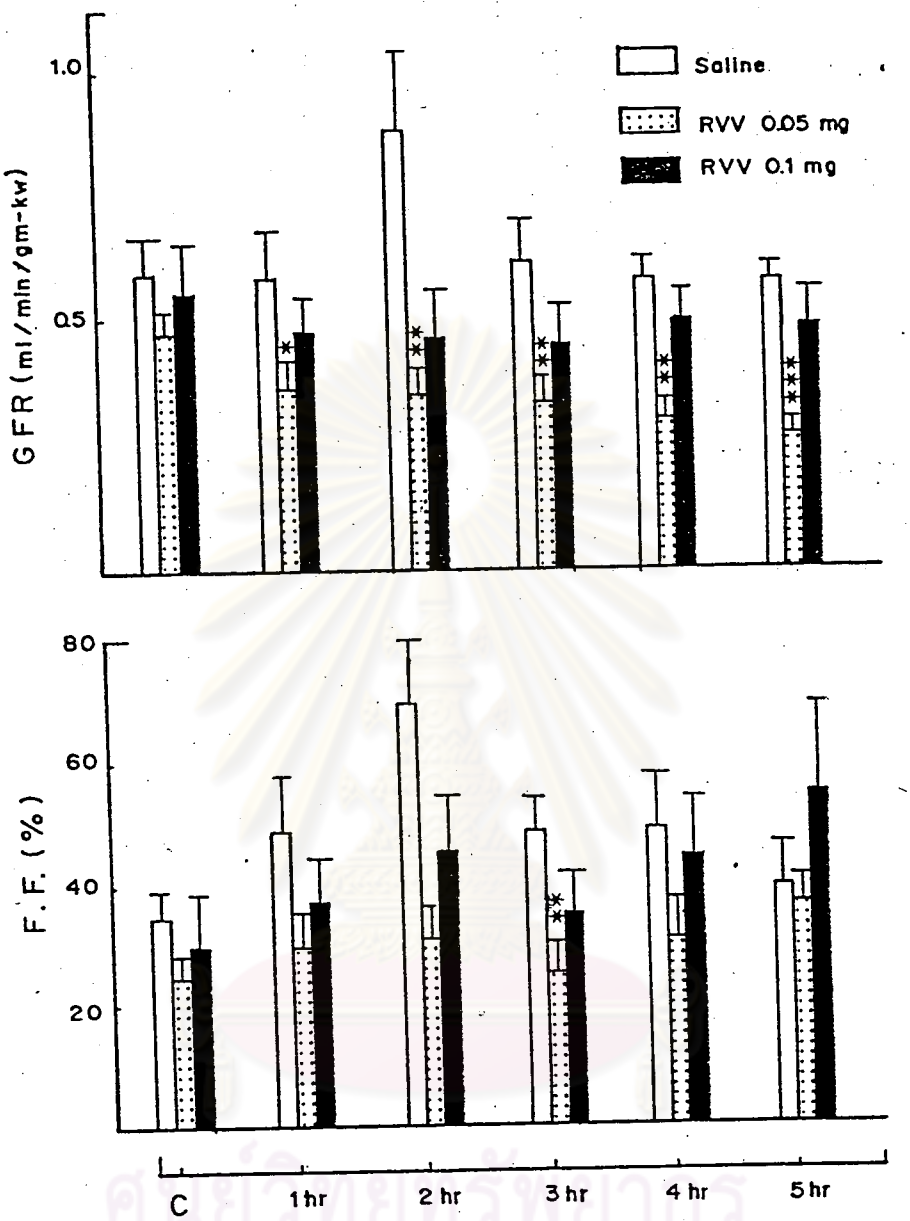

Fig 26 : Comparison between the venom contralateral and the saline contralateral kidneys on GFR and F.F. Values are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$.

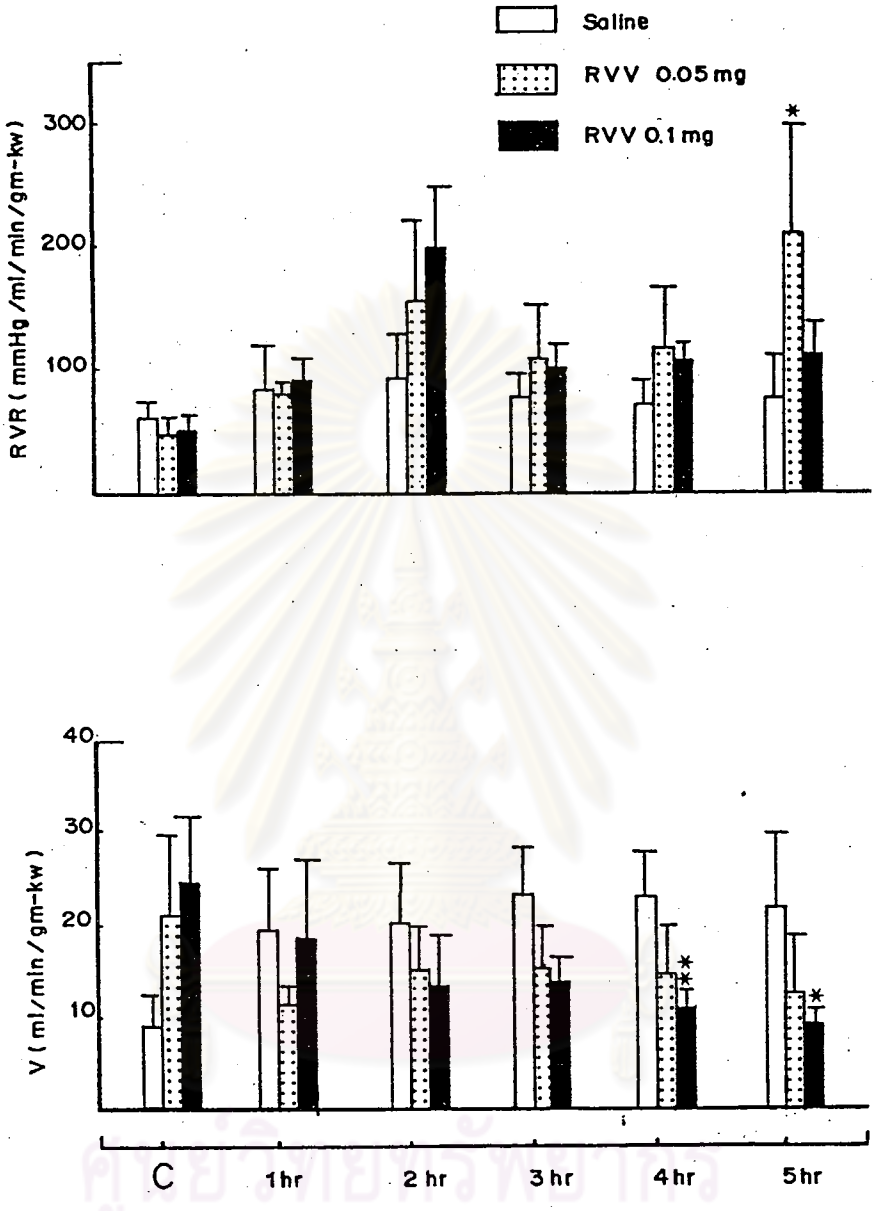

Fig 27 : Comparison beteen the venom contralateral and the saline contralateral kidneys on RVR and V. Results are the means ± SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. *P < 0.05; ** P < 0.01

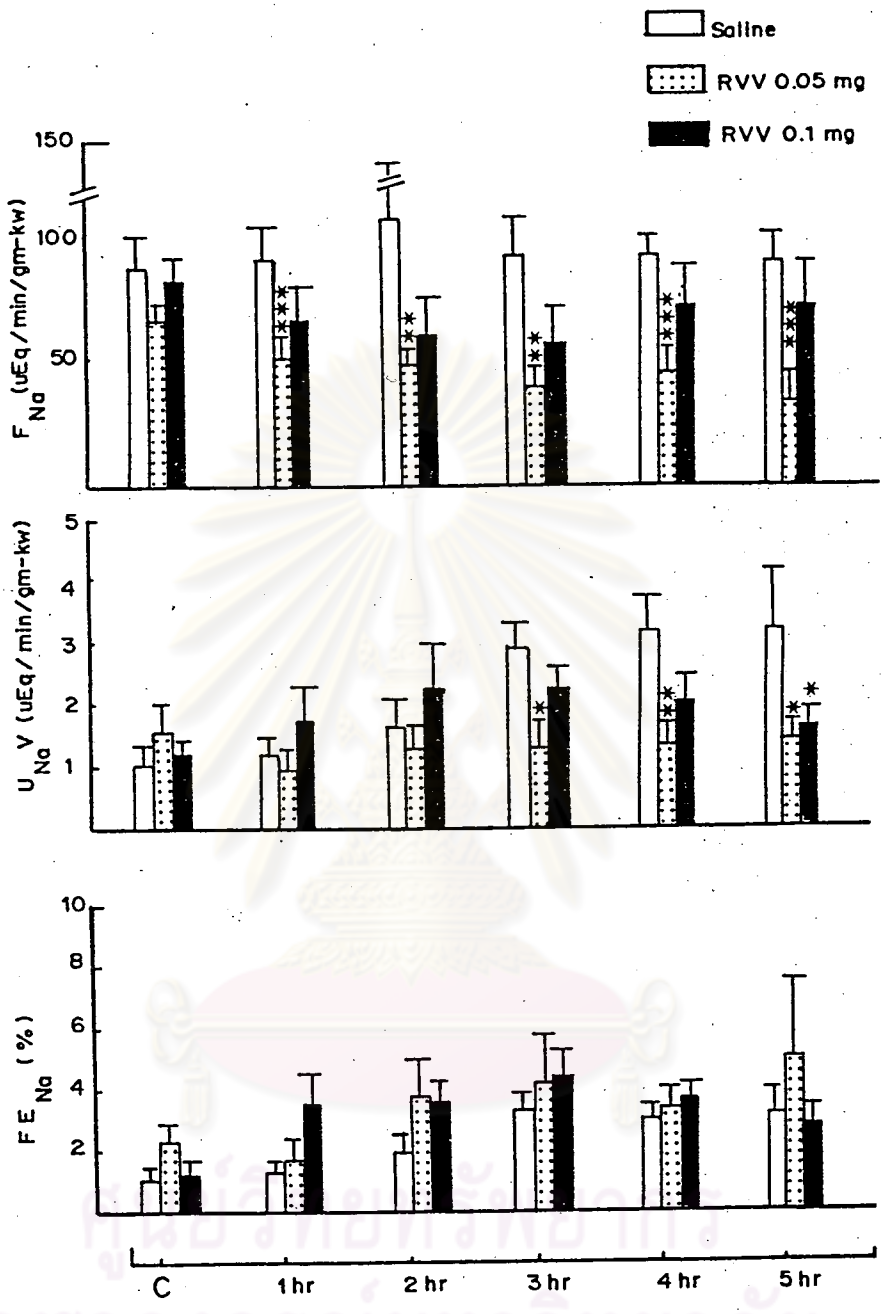

Fig 28 : Comparison between the venom contralateral and the saline contralateral kidneys on F_{Na}, $U_{Na}V$ and FE_{Na}. Bars indicated SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. $*P < 0.05$; $**P < 0.01$; $***P < 0.001$.

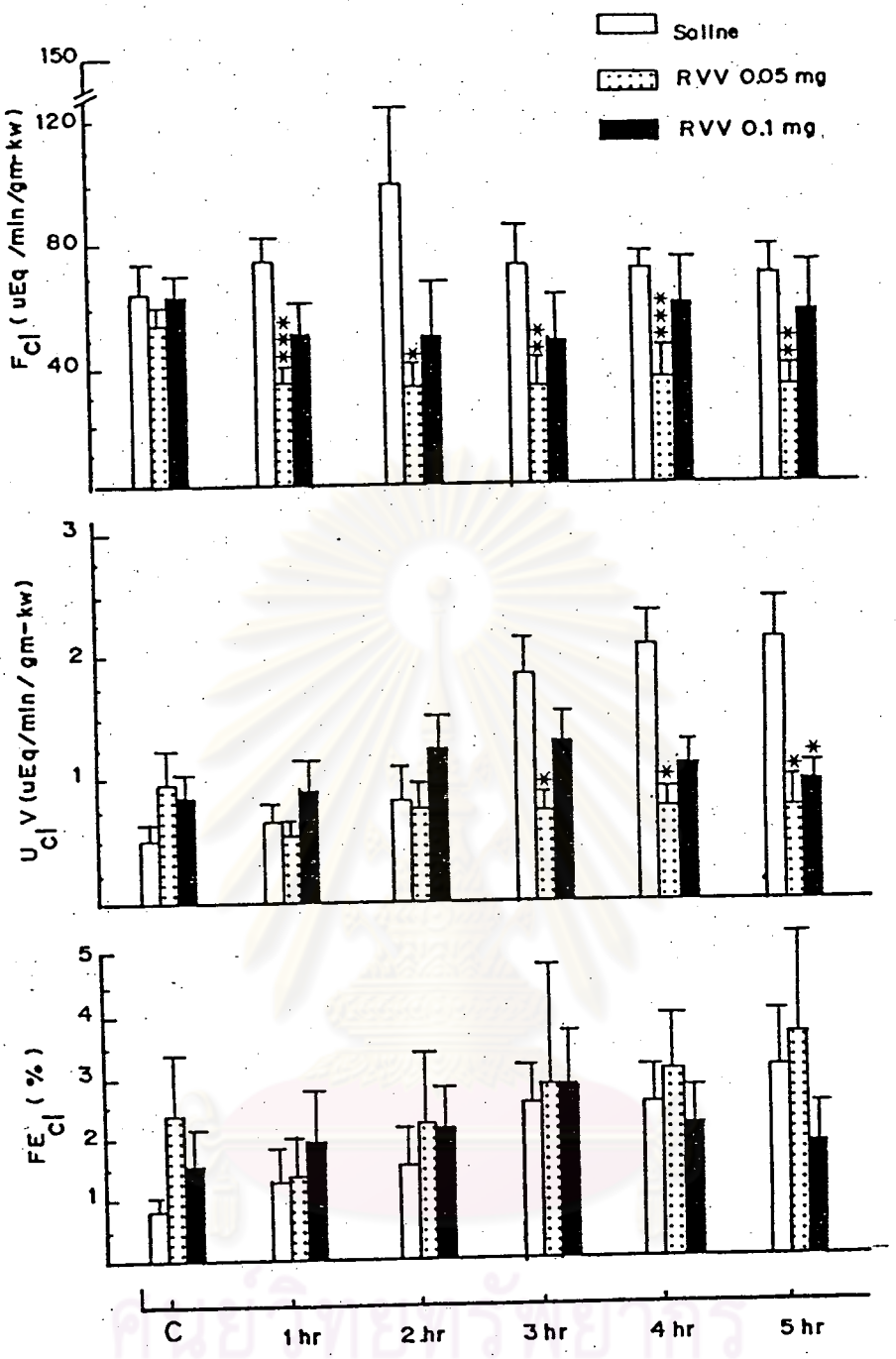

Fig 29 : Comparison between the venom contralateral and the saline contralateral kidneys on F_{Cl}, $U_{Cl}V$ and FE_{Cl}. Results are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test

$*P < 0.05$; $**P < 0.01$; $***P < 0.001$

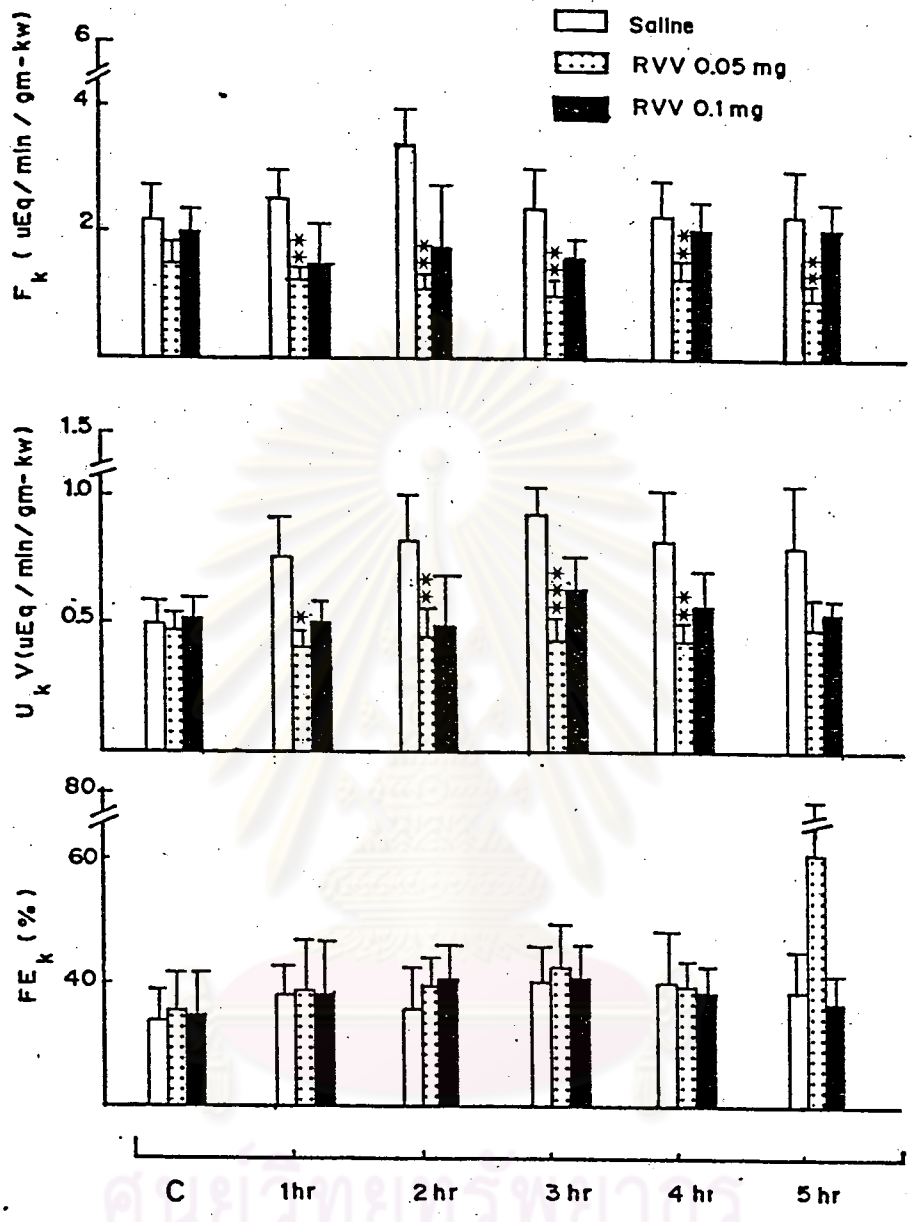

Fig 30 : Comparison between the venom contralateral and the saline contralateral kidneys on F_K, $U_K V$ and FE_K. Results are the means $\pm$ SEM. Statistical difference between each of both kidneys was tested by Student's unpaired t-test. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$