

## CHAPTER IV

### RESULTS

#### Heart rate and exercise capacity.

At the pretest, the maximal external work load reached by the control subjects average  $143.75 \pm 11.57$  W, maximal oxygen capacity average  $34.75 \pm 3.25$  ml/kg./min. and their final heart rate was on average  $163.37 \pm 4.72$  beats/min. In contrast, the athletes' maximal external work load average  $184.37 \pm 12.93$  W and maximal oxygen capacity average  $49.125 \pm 4.7$  ml/kg./min. The value of maximal external work load and maximal oxygen capacity in athletes were strikingly high when compared with the control subjects ( $P < 0.05$ ). The final heart rate was on average  $165 \pm 5.95$  in the control subjects, which not different when compared with the athletes ( $P < 0.05$ ) (Table 4).

	Athletes	Control
No. of subjects	12	12
Mean age	$23.5 \pm 3.5$	$23.38 \pm 3.42$
Max. watt	$184.375 \pm 12.93$	$143.75 \pm 11.57$
VO <sub>2</sub> max.(ml/kg./min)	$49.125 \pm 4.7$	$34.75 \pm 3.25$
Max HR.	$165 \pm 5.95$	$163.37 \pm 4.72$

**Table 4**

**Plasma osmolality, bicarbonate, lactate and blood lactate (Fig. 6-8)**

The plasma osmolality was increased significantly ( $p < 0.05$ ) by 8.25 mosm/kg.(2.81%) and 5.35 mosm/kg.(1.82%) at the 80% of maximal exercise capacity in the control subjects and athlete subjects, respectively, whereas the plasma bicarbonate concentration was decreased significantly ( $p < 0.05$ ) by 5.38 mmol/kg and 6.69 mmol/L., respectively. Plasma and blood lactate concentration were significantly ( $P < 0.001$ ) elevated at peak exercise time for both groups(8 mM, 6.4 mM in athletes and 8.5 mM, 7.1 mM in control subjects for plasma and blood lactate respectively). However, plasma and intra-erythrocyte lactate(blood lactate) concentration were not different from each other at rest in both groups but plasma concentration were significantly increased over the intra-erythrocytes level at peak exercise and 10 minutes after exercise.

**Plasma and erythrocyte sodium (Fig. 9-10)**

The plasma sodium concentration increased significantly ( $P < 0.05$ ) at the 80% of maximal exercise capacity both in control and in athletes. In control subjects, the plasma sodium concentration increased average 3.38 mmol/L. and 1.5 mmol/L. in athletes. The intraerythrocyte sodium concentration did not change significantly in athletes both during the 80% of maximal exercise capacity and in recovery period, but in control, the intraerythrocyte sodium concentration decreased significantly in recovery period, average ( $P < .01$ ) 0.72 mmol/L. from the resting period(T-0).



### **Plasma potassium and erythrocyte potassium (Fig. 11-12)**

The plasma potassium concentration increased significantly during the 80% of maximal exercise capacity in control subjects, this increase ( $P < .05$ ) averaged 0.4 mmol/L. In athletes, the plasma potassium slightly increased (average 0.2 mmol/L), but not significantly. The intraerythrocyte potassium concentration did not change significantly during the 80% of maximal exercise capacity and recovery period, both in control and in athletes.

### **Ouabain binding site and Na-K-ATPase activity (Fig.13-14)**

Ouabain binding site per cell did not change significantly during the 80% of maximal exercise capacity and recovery period, both in control and athletes. Na-K-ATPase activity decreased significantly in control subjects in recovery period of exercise. In athletes, Na-K-ATPase activity did not change significantly during the 80% of maximal exercise capacity and recovery period.

### **Plasma magnesium and erythrocyte magnesium (Fig. 15-16)**

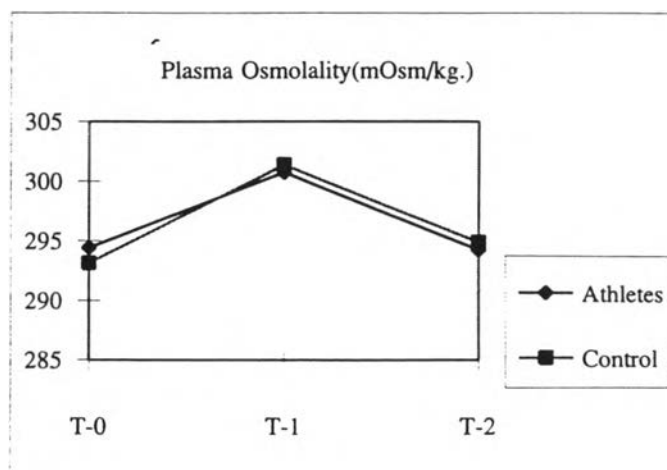
The plasma magnesium concentration increased significantly ( $P < .01$ ) during the 80% of maximal exercise both in controls and athletes, average .09 mmol/L in athletes and .138 mmol/L in control. The intraerythrocyte magnesium concentration did not change

significantly during the 80% of maximal exercise and recovery period, both in controls and athletes.

**Plasma Osmolality**

Time	Athletes	Control
T-0	294.4	293.13
T-1	300.75	301.38
T-2	294.25	294.88

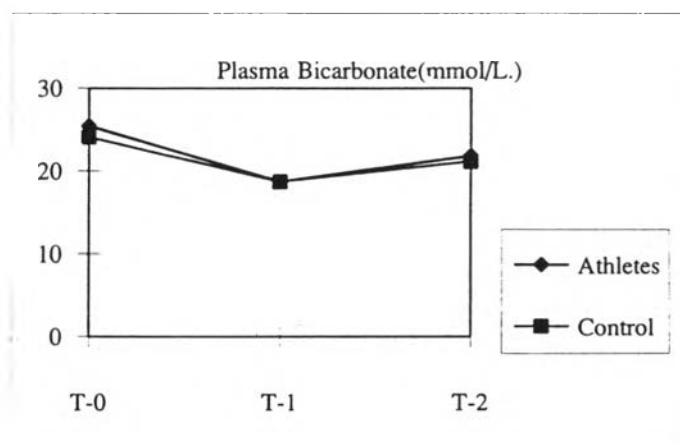
Fig. 6



**Plasma Bicarbonate**

Time	Athletes	Control
T-0	25.39	24.08
T-1	18.7	18.7
T-2	21.78	21.12

Fig 7

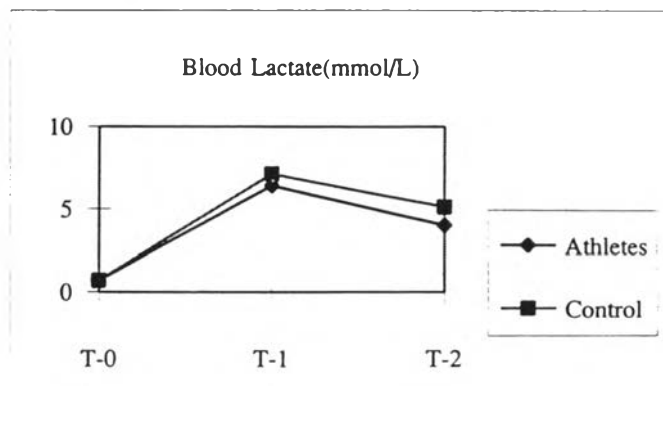


T-0 = At rest

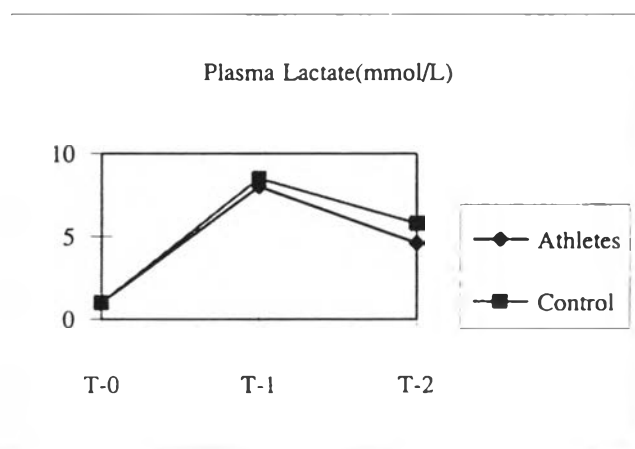
T-1 = 80% of maximal exercise capacity

T-2 = 10 minutes after exercise

Time	Athletes	Control
T-0	0.7	0.7
T-1	6.4	7.1
T-2	4	5.1



Time	Athletes	Control
T-0	1	1
T-1	8	8.5
T-2	4.6	5.8



**Fig 8**

T-0 = At rest

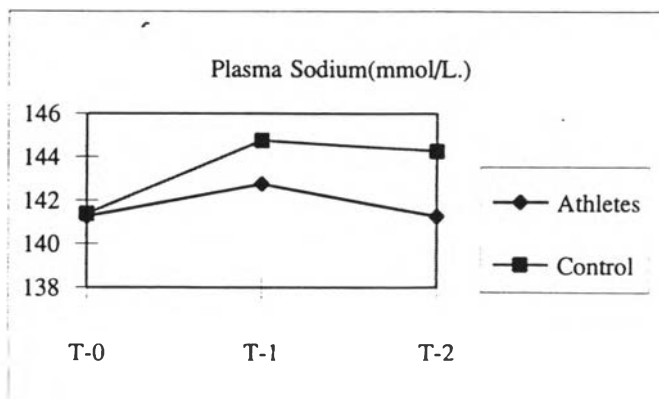
T-1 = 80% of maximal exercise capacity

T-2 = 10 minutes after exercise

Plasma Sodium

	Athletes	Control
T-0	141.25	141.38
T-1	142.75	144.75
T-2	141.25	144.25

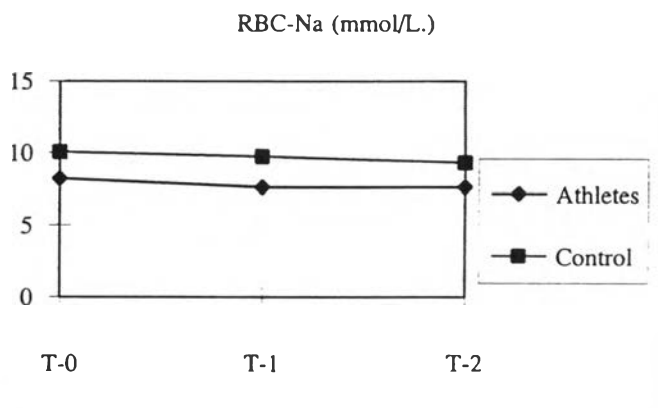
Fig. 9



RBC- Sodium

	Athletes	Control
T-0	8.2	10.04
T-1	7.62	9.72
T-2	7.61	9.31

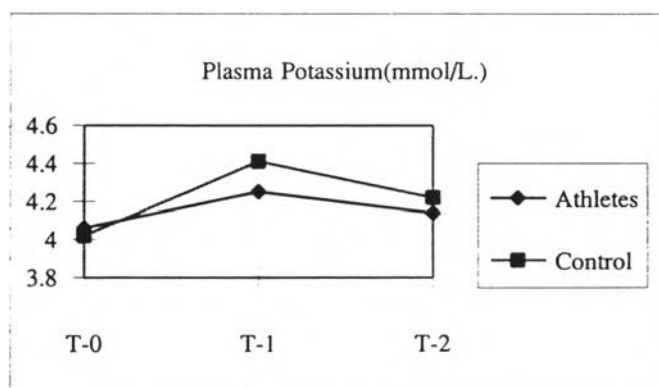
Fig. 10



Plasma Potassium

	Athletes	Control
T-0	4.06	4.02
T-1	4.25	4.41
T-2	4.14	4.22

Fig. 11



T-0 = At rest

T-1 = 80% of maximal exercise capacity

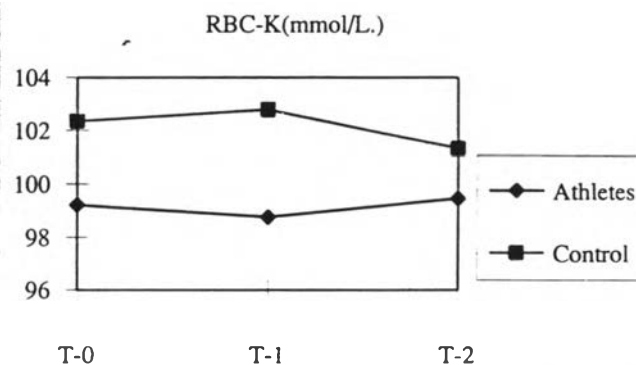
T-2 = 10 minutes after exercise

RBC-K(mmol/L.)

## RBC Potassium

	Athletes	Control
T-0	99.21	102.34
T-1	98.76	102.79
T-2	99.46	101.32

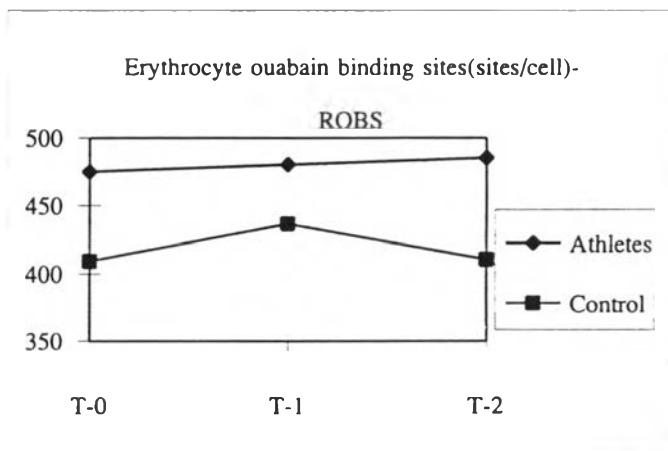
Fig. 12



## ROBS

	Athletes	Control
T-0	475	409.38
T-1	480.13	436.5
T-2	485.126	410.5

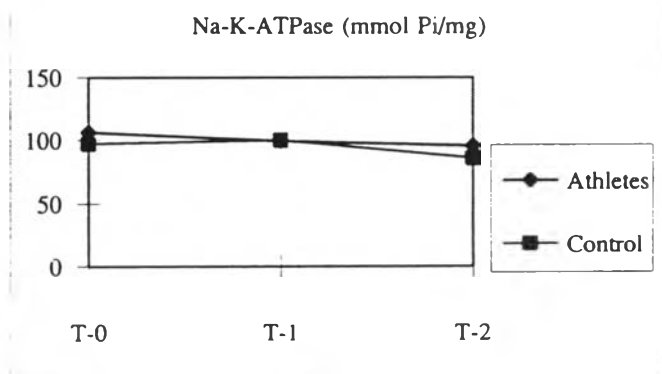
Fig. 13



## Na-K-ATPase activity

	Athletes	Control
T-0	106.02	97.12
T-1	99.05	99.89
T-2	95.24	85.62

Fig. 14



T-0 = At rest

T-1 = 80% of maximal exercise capacity

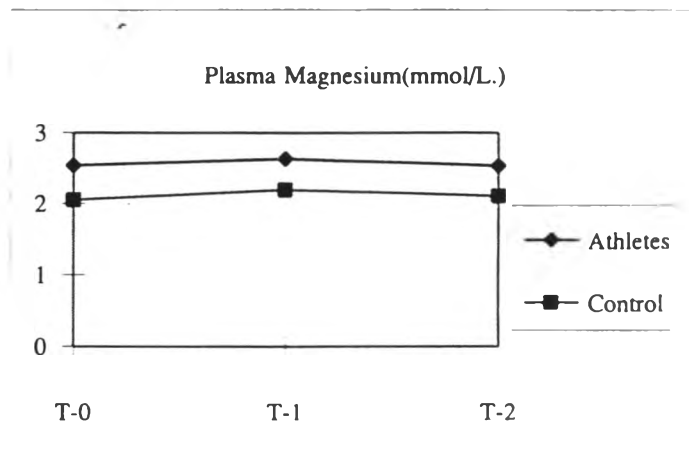
T-2 = 10 minutes after exercise



## Plasma Magnesium

	Athletes	Control
T-0	2.54	2.05
T-1	2.63	2.19
T-2	2.53	2.1

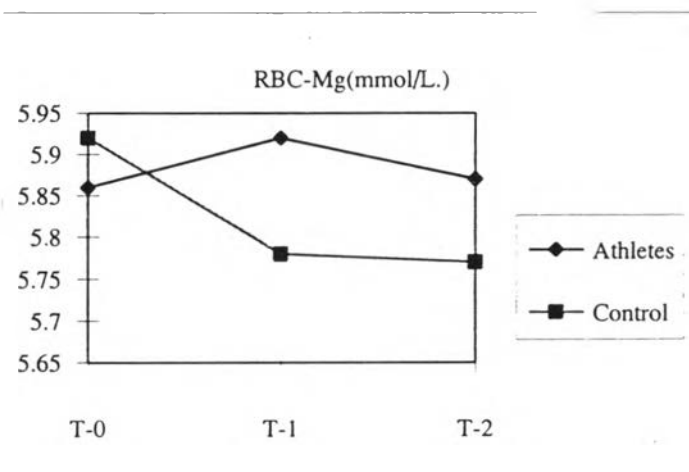
Fig. 15



## RBC- Magnesium

	Athletes	Control
T-0	5.86	5.92
T-1	5.92	5.78
T-2	5.87	5.77

Fig. 16



T-0 = At rest

T-1 = 80% of maximal exercise capacity

T-2 = 10 minutes after exercise