

## Renal Block

### Diuresis Practical-Physiology

#### Objectives:

1. To measure the volume and determine the compositions of urine excreted by 5 groups of volunteers, as follows:
  - a. Control group.
  - b. A group will drink one liter of water.
  - c. A group will drink one liter of water and lie down.
  - d. A group will drink one liter of normal saline.
  - e. A group will take lasix (a diuretic) 20 mg.
2. To explain the mechanisms behind the different data obtained from each of the above volunteers.

#### Material & Methods:

1. **ALL** volunteers will empty their bladders at 8:00am and discard this sample.
2. **Between 8:00am and 10:00am**, the volunteers will behave normally (eat and drink) but they should not go to the rest rooms.
3. **At 10:00am**, **ALL** volunteers will empty their bladders and collect the urine in calibrated containers. This sample is considered the 1<sup>st</sup> urine sample.
4. **At 10:00am**, after collecting the 1<sup>st</sup> sample, each volunteer will ingest what they are assigned to:
  - a. Control----Nothing.
  - b. Two volunteers will drink one liter of water.
  - c. Two volunteers will drink one liter of water and lie down.
  - d. Two volunteers will drink one liter of normal saline.
  - e. Two volunteers will take a tablet of lasix (20 mg).
5. Urine will be collected from each volunteer **every half an hour** after ingestion, **for a total of two hours**.

### **Analysis:**

At the end of the experiment, the following will be done for each of the collected samples;

1. Measure the urine volume.
2. Calculate the flow rate.
3. Measure the urine osmolality.
4. Measure urine sodium and potassium concentration.
5. Measure urine pH.

### **Results:**

1. For each subject, record the results obtained in the table provided.
2. Draw a graph for each of the above values versus time.
  - a. Flow rate vs. time.
  - b. Urine osmolality vs. time.
  - c. Urine sodium concentration vs. time.
  - d. Urine potassium concentration vs. time.
3. Compare between the results obtained from the different groups.
4. Explain the mechanisms underlying the differences seen between the groups.
5. Please submit your report the next day.

**Laboratory sample report:**

Name: \_\_\_\_\_

Age: \_\_\_\_\_

Gender: \_\_\_\_\_

Group:            ☐ Control            ☐ Water only            ☐ Water + lying down  
                     ☐ Saline            ☐ Lasix

Sample No.	1	2	3	4	5	6
Time	10.00	10.30	11.00	11.30	12.00	12.30
Duration	120 min	30 min	30 min	30 min	30 min	30 min
Volume (ml)						
Flow rate (ml/min)						
Na <sup>+</sup> Conc. (mmol/L)						
Rate of Na <sup>+</sup> excretion (μmol/min)						
Total Na <sup>+</sup> excretion (mmol)						
K <sup>+</sup> Conc. (mmol/L)						
Osmolality (mosmol/Kg)						
pH						

**Laboratory sample report:**

Name: \_\_\_\_\_

Age: \_\_\_\_\_

Gender: \_\_\_\_\_

Group:            ☐ Control            ☐ Water only            ☐ Water + lying down  
                     ☐ Saline            ☐ Lasix

Sample No.	1	2	3	4	5	6
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Duration	120 min	30 min	30 min	30 min	30 min	30 min
Volume (ml)						
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Na <sup>+</sup> Conc. (mmol/L)						
Rate of Na <sup>+</sup> excretion (μmol/min)						
Total Na <sup>+</sup> excretion (mmol)						
K <sup>+</sup> Conc. (mmol/L)						
Osmolality (mosmol/Kg)						
pH						

**Laboratory sample report:**

Name: \_\_\_\_\_

Age: \_\_\_\_\_

Gender: \_\_\_\_\_

Group:            ☐ Control            ☐ Water only            ☐ Water + lying down  
                     ☐ Saline            ☐ Lasix

Sample No.	1	2	3	4	5	6
Time	10.00	10.30	11.00	11.30	12.00	12.30
Duration	120 min	30 min	30 min	30 min	30 min	30 min
Volume (ml)						
Flow rate (ml/min)						
Na <sup>+</sup> Conc. (mmol/L)						
Rate of Na <sup>+</sup> excretion (μmol/min)						
Total Na <sup>+</sup> excretion (mmol)						
K <sup>+</sup> Conc. (mmol/L)						
Osmolality (mosmol/Kg)						
pH						

**Laboratory sample report:**

Name: \_\_\_\_\_

Age: \_\_\_\_\_

Gender: \_\_\_\_\_

Group:            ☐ Control            ☐ Water only            ☐ Water + lying down  
                     ☐ Saline            ☐ Lasix

Sample No.	1	2	3	4	5	6
Time	10.00	10.30	11.00	11.30	12.00	12.30
Duration	120 min	30 min	30 min	30 min	30 min	30 min
Volume (ml)						
Flow rate (ml/min)						
Na <sup>+</sup> Conc. (mmol/L)						
Rate of Na <sup>+</sup> excretion (μmol/min)						
Total Na <sup>+</sup> excretion (mmol)						
K <sup>+</sup> Conc. (mmol/L)						
Osmolality (mosmol/Kg)						
pH						

**Laboratory sample report:**

Name: \_\_\_\_\_

Age: \_\_\_\_\_

Gender: \_\_\_\_\_

Group:            ☐ Control            ☐ Water only            ☐ Water + lying down  
                     ☐ Saline            ☐ Lasix

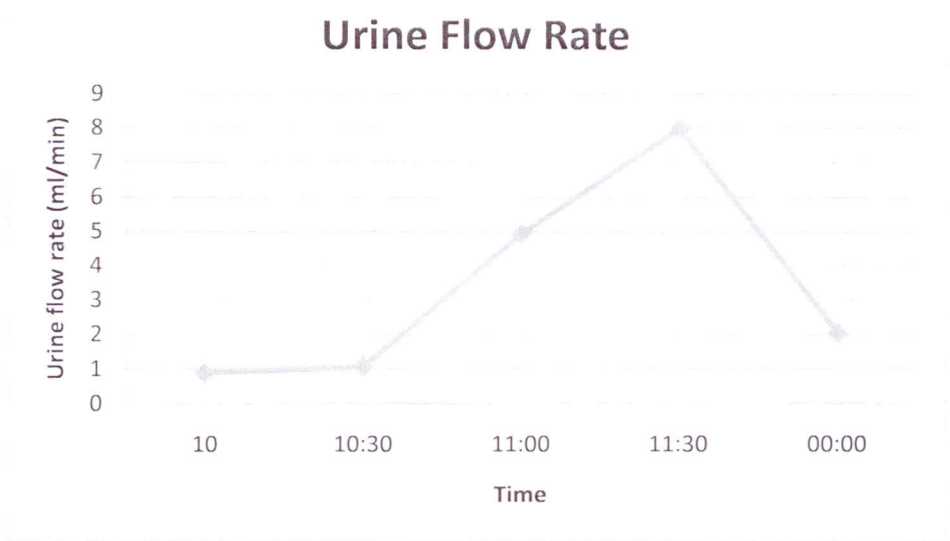
Sample No.	1	2	3	4	5	6
Time	10.00	10.30	11.00	11.30	12.00	12.30
Duration	120 min	30 min	30 min	30 min	30 min	30 min
Volume (ml)						
Flow rate (ml/min)						
Na <sup>+</sup> Conc. (mmol/L)						
Rate of Na <sup>+</sup> excretion (μmol/min)						
Total Na <sup>+</sup> excretion (mmol)						
K <sup>+</sup> Conc. (mmol/L)						
Osmolality (mosmol/Kg)						
pH						



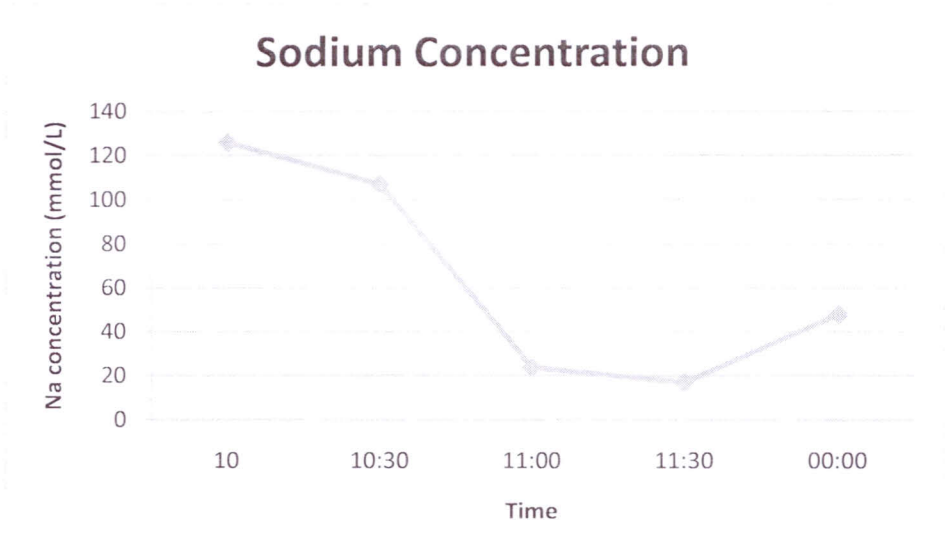
**Example:** (I expect the same to be done by each student)  
This is an example done with previous data obtained from a subject who drank one liter of water.

Sample no.	1	2	3	4	5
Time	10.00	10:30	11:00	11:30	12:00
Duration	120 min	30 min	30 min	30 min	30 min
Volume (ml)	107	32	148	240	62
Flow rate (ml/min)	0.89	1.06	4.93	8	2.07
Na <sup>+</sup> Conc. (mmol/L)	126	107	24	17	48
Rate of Na <sup>+</sup> excretion (μmol/min)					
Total Na <sup>+</sup> excretion (mmol)					
K <sup>+</sup> Conc. (mmol/L)	7.4	12	3.9	3.6	12
Osmolality (mosmol/Kg)	266	238	55.8	41	120





**Graph (1).** Shows the changes in flow rate (ml/min) in a subject who drank water (at 10:00am) over a period of two hours.



**Graph (2).** Shows the changes in  $\text{Na}^+$  concentration (mmol/L) in a subject who drank water (at 10:00am) over a period of two hours.

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