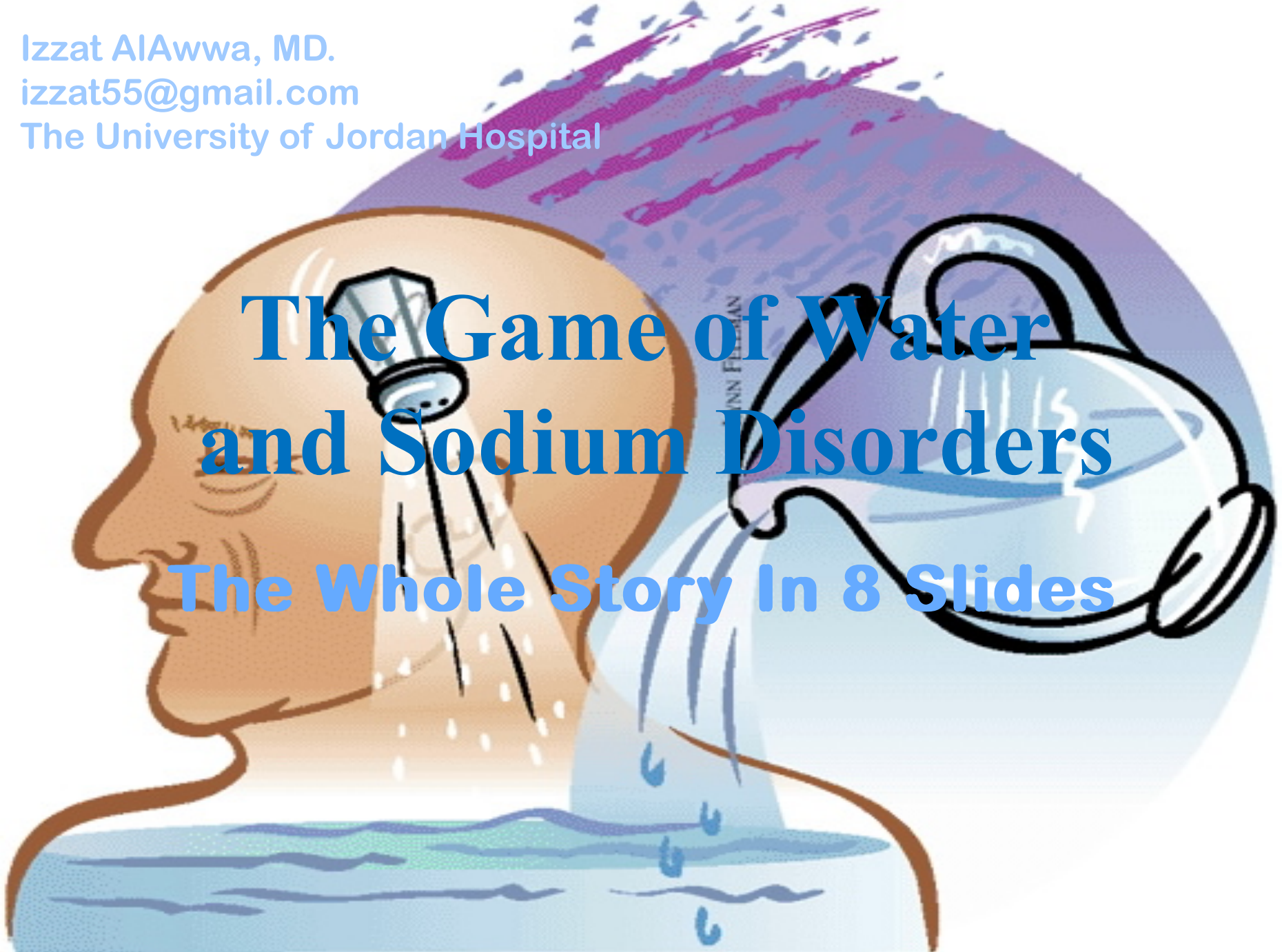


Izzat AlAwwa, MD.  
izzat55@gmail.com  
The University of Jordan Hospital



**The Game of Water  
and Sodium Disorders**  
**The Whole Story In 8 Slides**

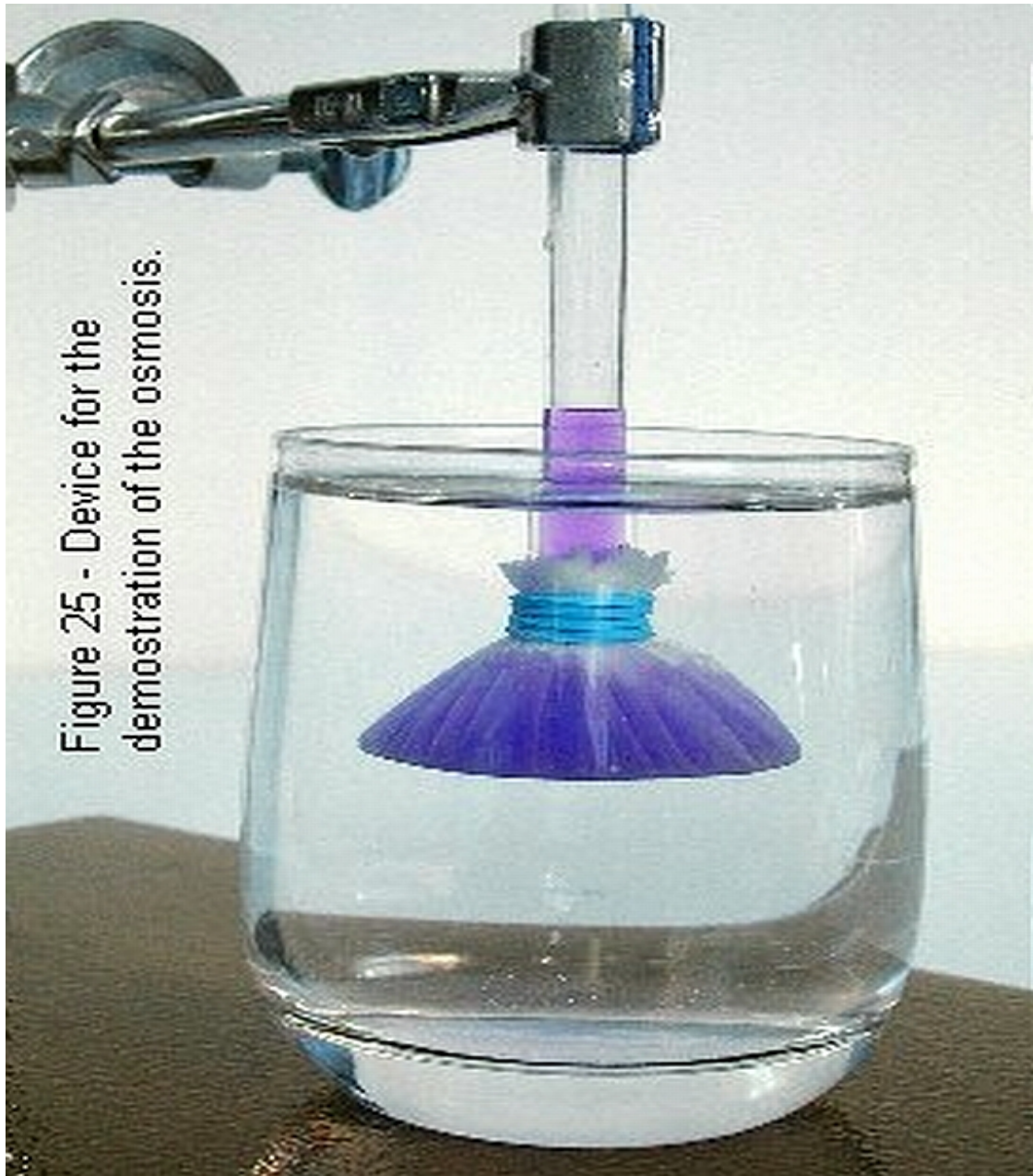
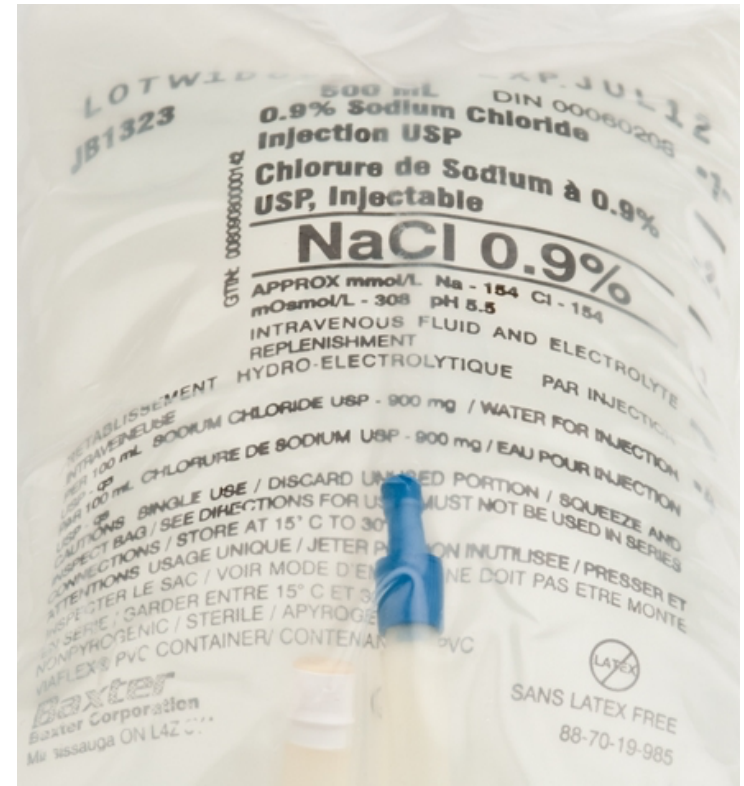
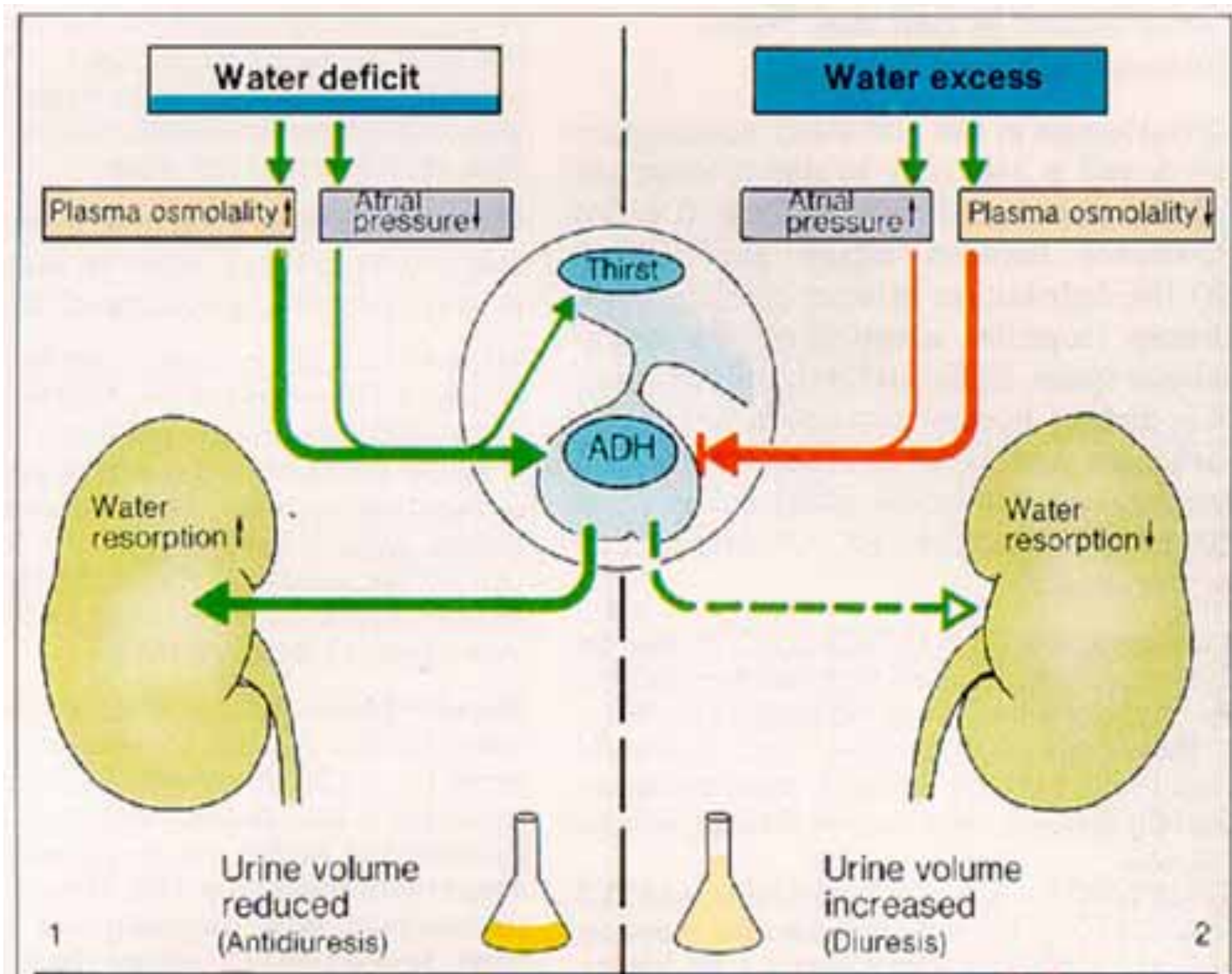
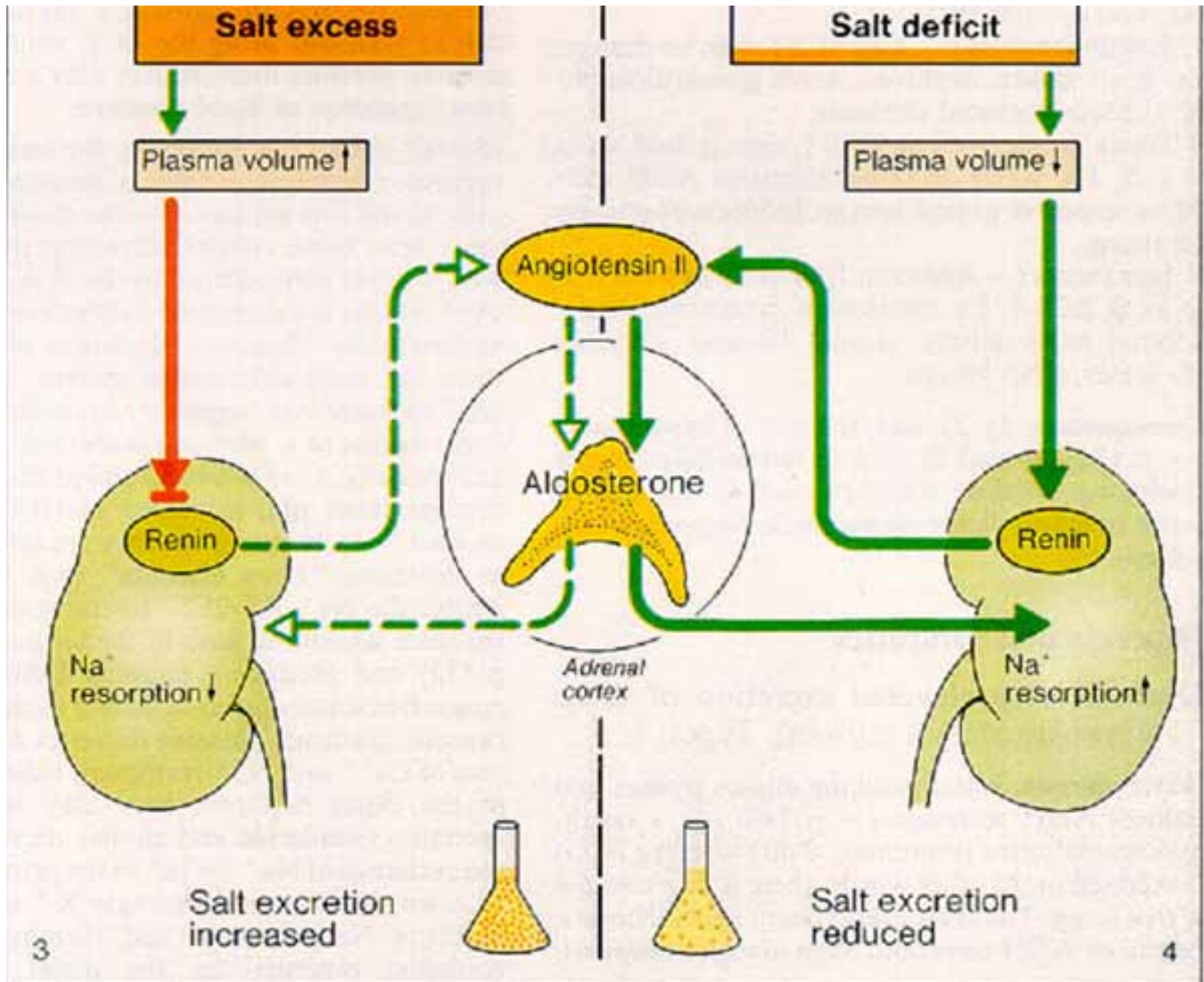


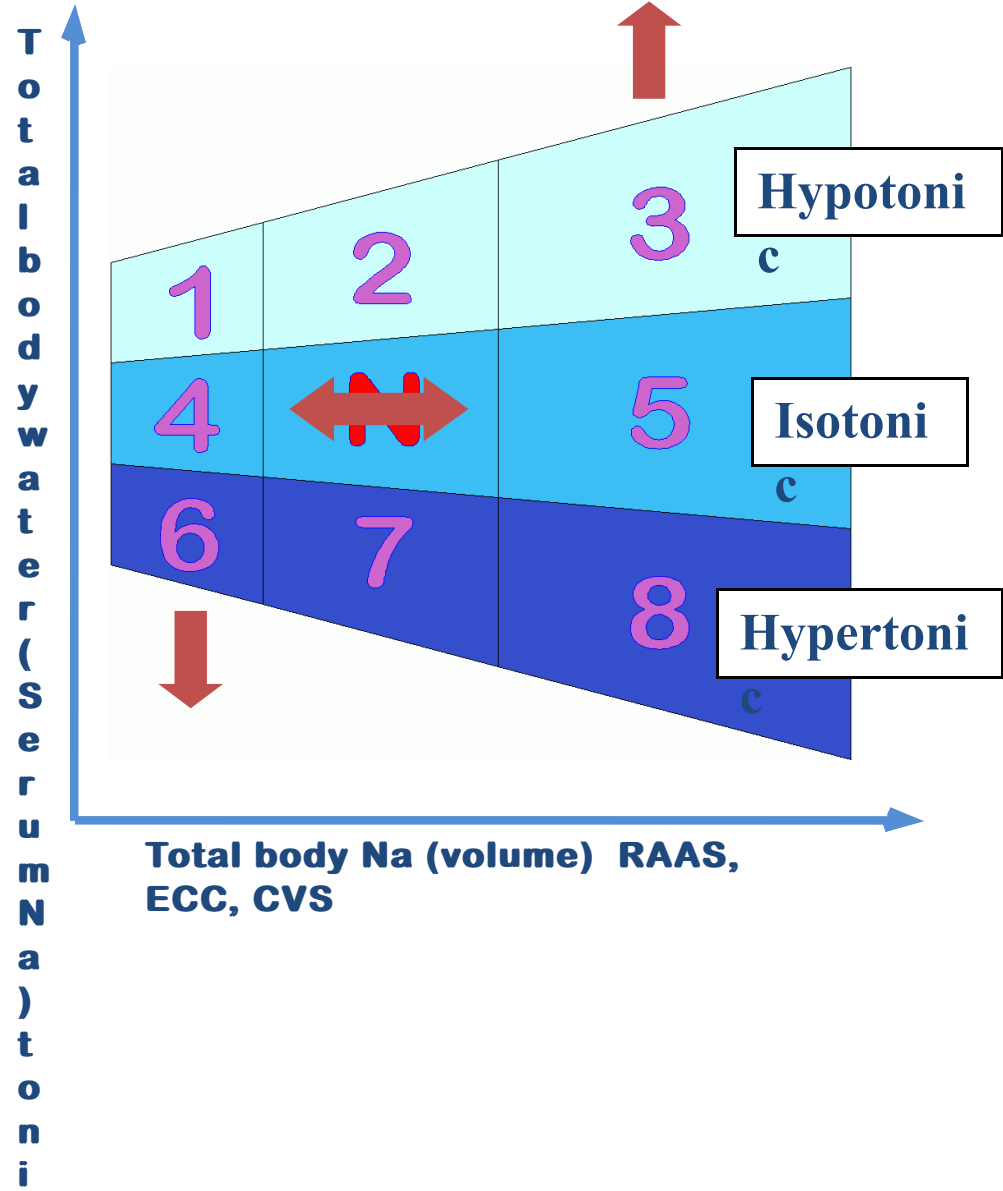
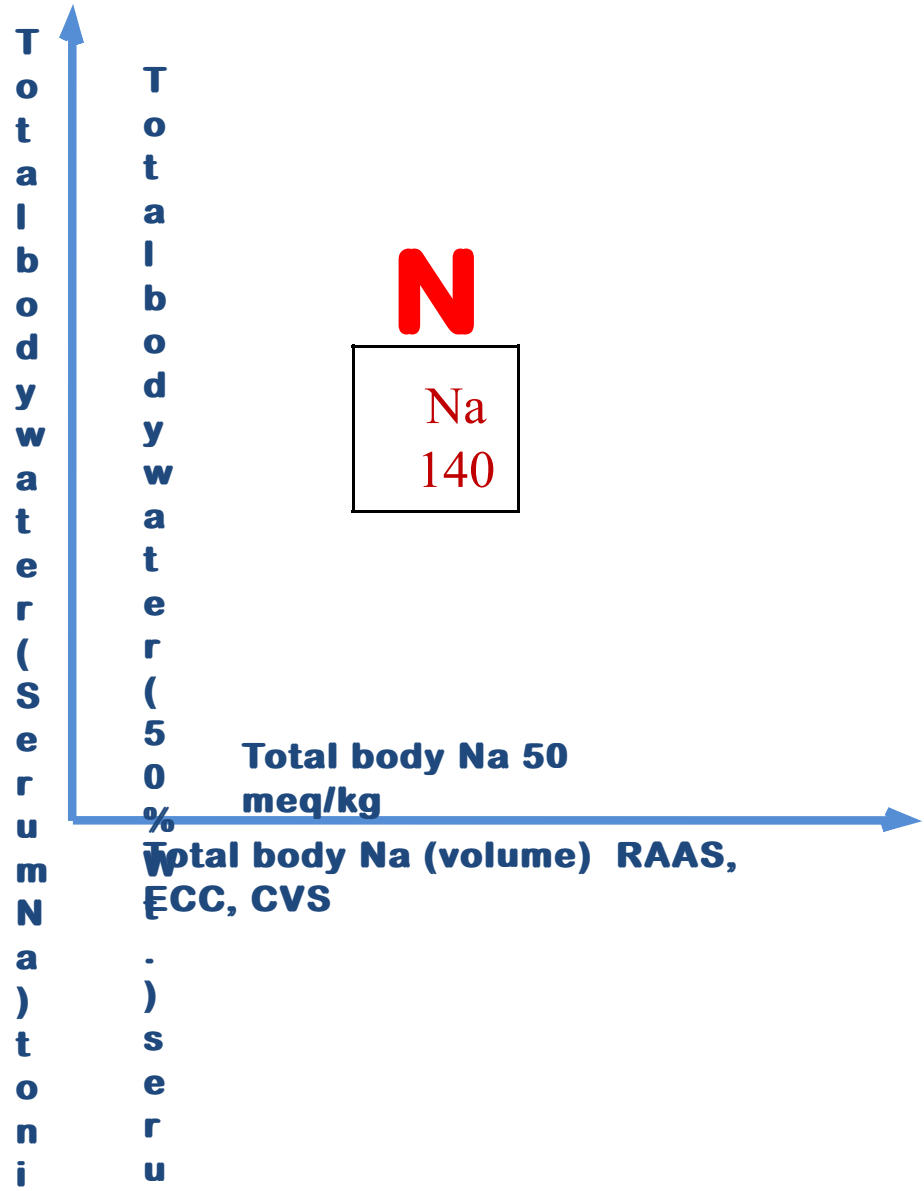
Figure 25 - Device for the demonstration of the osmosis.



**H<sub>2</sub>O= 1000 ml**  
**NaCl= 9000 mg**  
**Na= 154 mmol**  
**Cl= 154 mmol**  
**Osm= 308**  
**mOsmol**  
**S. Osm= 2Na+Glu+Urea+X**



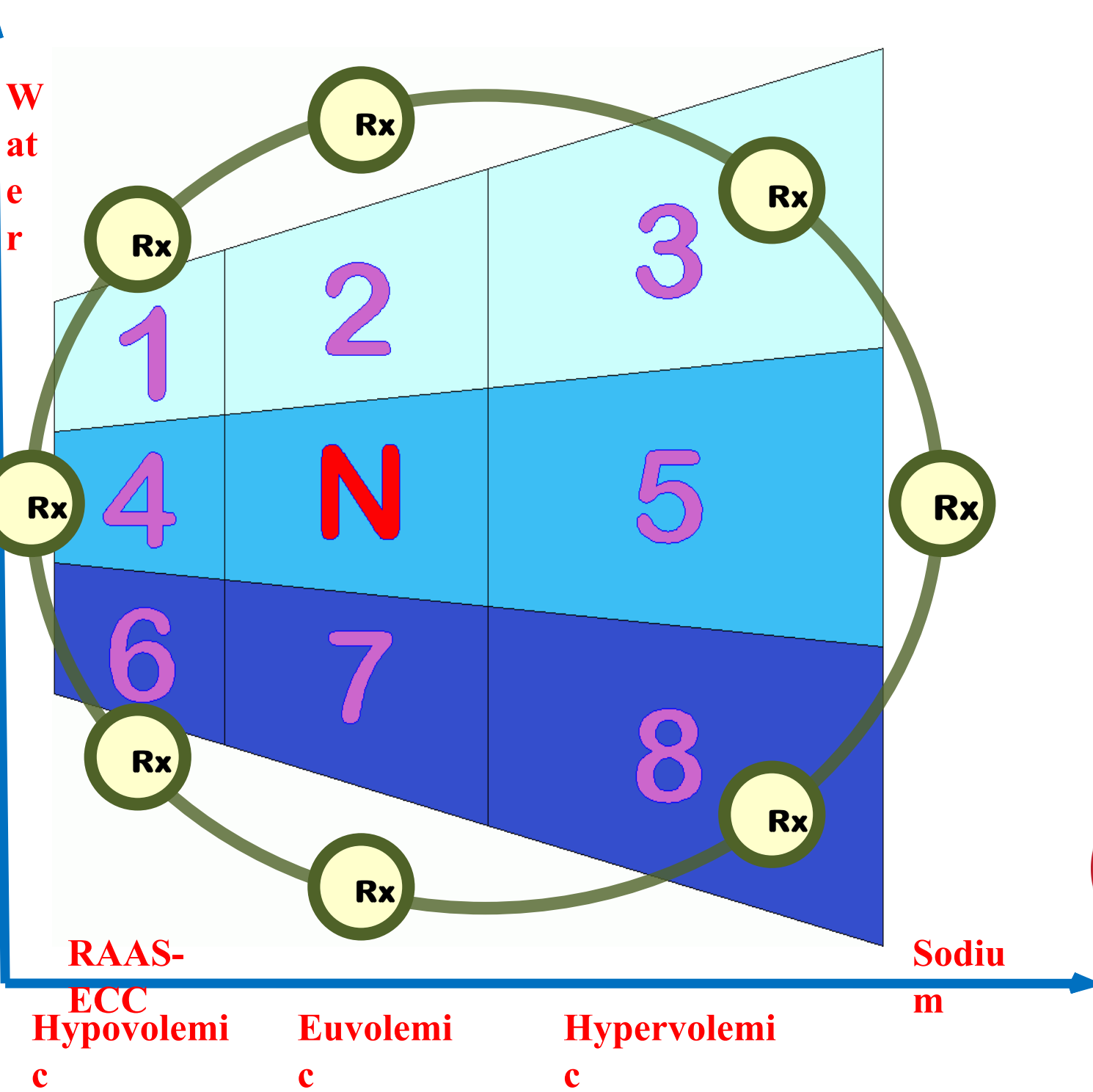




# Two modes of the Game

- **In the next slides:**
- For training mode click on the numbers from 1-8 and the appropriate case will appear.
- For quiz mode click on the letters from A-G and a case will appear. You have to correlate to the appropriate number from 1-8.





A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



**A 45-year-old male with chronic liver disease, presented with abdominal distention and distress for 3 days, preventing him from sleeping at night.**

**On examination: BP: 100/60, PR: 64/min, Wt: 80 kg, abdominal girth: 90 cm**

**Labs: Na: 122, K: 3.8, Albumin: 2.2, INR: 2.1, Hb: 8.2, platelets: 140000.**

**What is your next step in managing this patient?**

**A- Intravenous furosemide**

**B- Oral spironolactone**

**C- Slow intravenous 0.9% NaCl at 60 cc/hour**

**D- A and C**

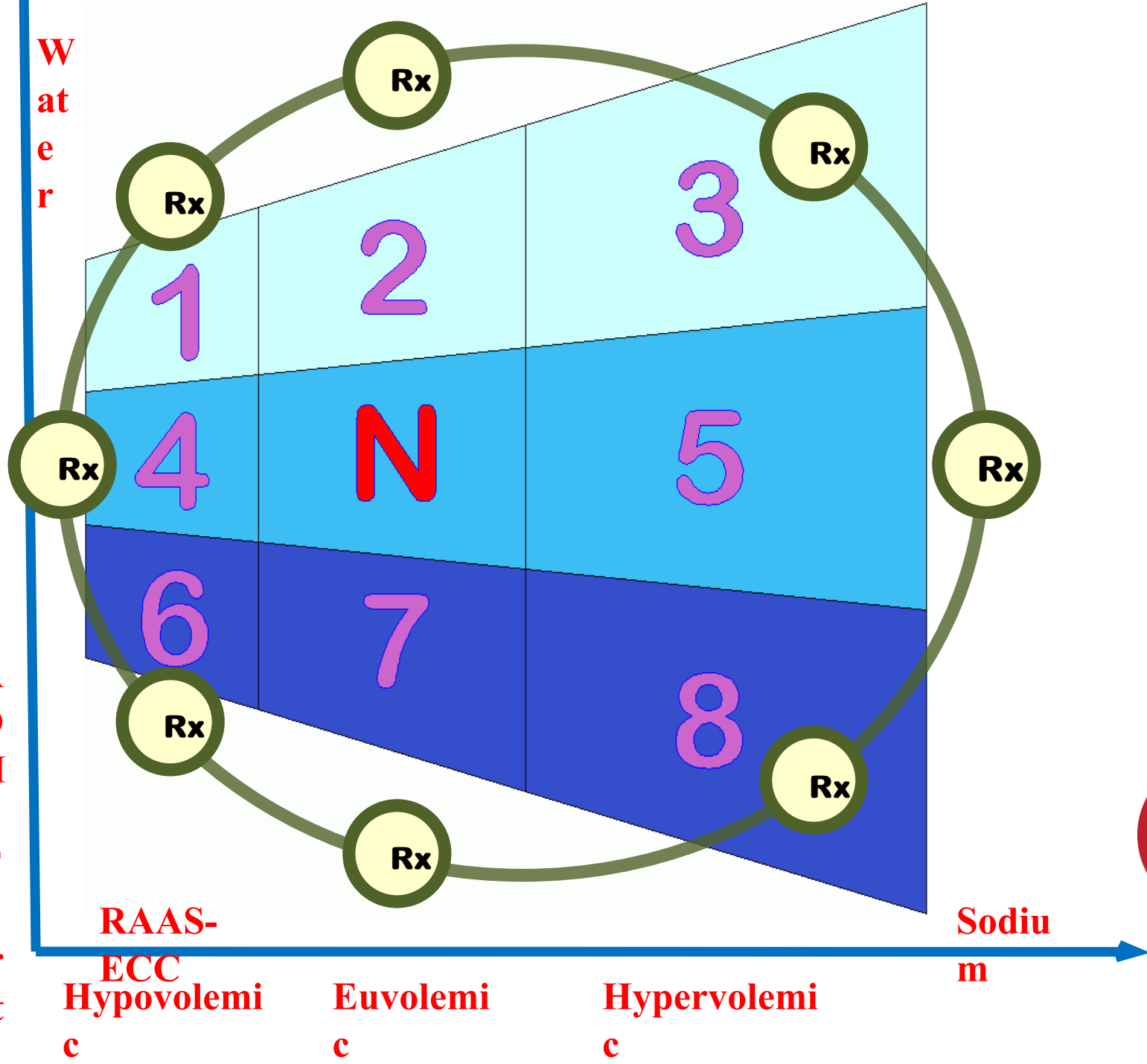
**E- None of the above**



Water

Hypotonic  
Isotonic  
Hypertonic

ADH - Thirst



A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



A 70-year-old female with no previous diseases, presented with gastroenteritis (N&V) of 6 days duration.

On examination:

BP: 100/60, PR: 102/min, Temp: 37.2

Wt: 56 kg,

Labs:

Na: 122

K: 5.2

BUN: 42

Creatinine: 1.3

1- What type of hyponatremia she has?

2- How you manage this patient?

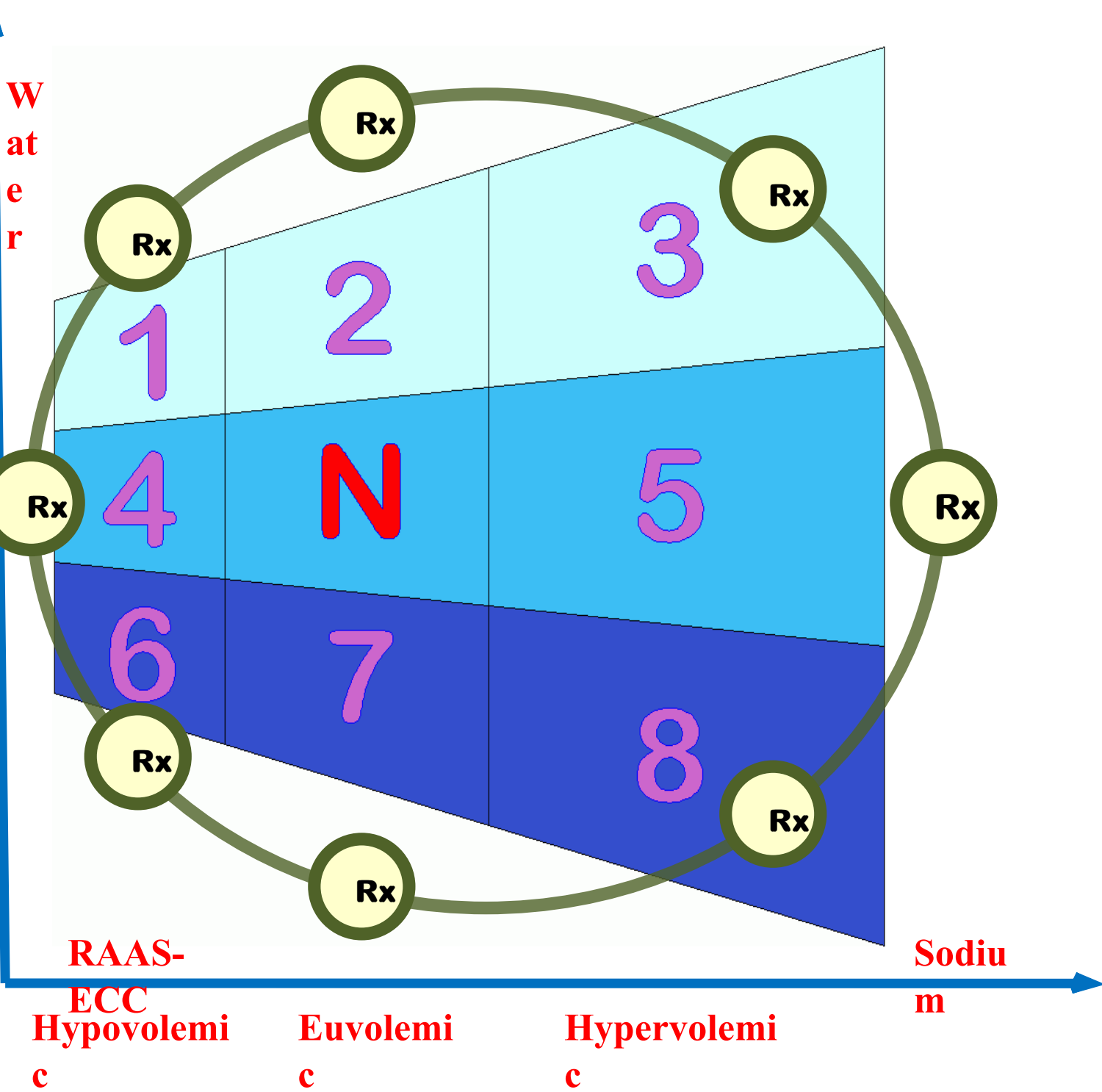
ir  
st

ECC  
Hypovolemi

Euvolemi

Hypervolemi

m



A

B

C

D

E

F

G

O



A 68-year-old male with previous history of heavy smoking, cough and weight loss, brought to the ED by his son because of confusion of 3 days duration.

On examination:

BP: 130/65, PR: 76/min, Wt.: 72 kg,

Labs: Na: 114, K: 4.2, BUN: 6, Creatinine: 0.8,

S. Osm: 237, Urine Na 80, U. Osm Pending.

The patient was given 1000 cc of 0.9% NaCl over the night. The serum Na as a result is expected to:

A- Improve. (118)

B- No change. (114)

C- Decrease. (110)

D- All of the above choices are possible.

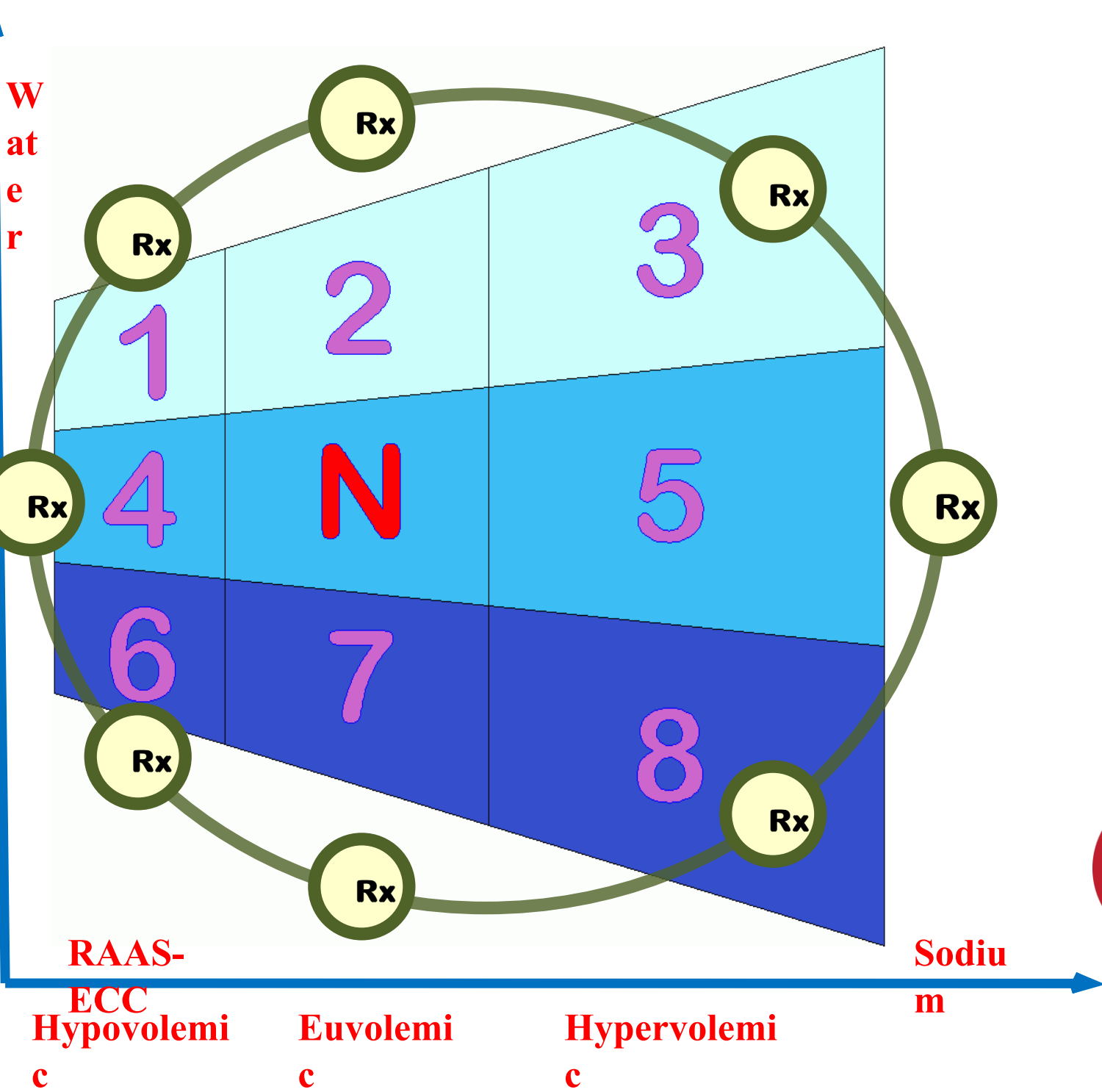
E- Can't predict.

What type of hyponatremia does the patient have?

What is the most likely diagnosis?

st Hypovolemia Euvolemia Hypervolemia

c c c c



A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



**A 58-year-old T2D male presented with dizziness, and confusion of 3 days duration. Patient is known to be non compliant.**

**On examination: BP: 90/56, PR: 122/min, Temp: 37.3, Dry skin and mucus membranes.**

**Labs: Na: 162, K: 4.2, Cl 118, R.B.S: 960 mg, BUN: 26, Creatinine: 1.8**

- 1- What type of hypernatremia the patient has?**
- 2- Is his total body sodium normal? Explain.**
- 3- What is the water deficit in his case?**
- 4- What is the best management?**

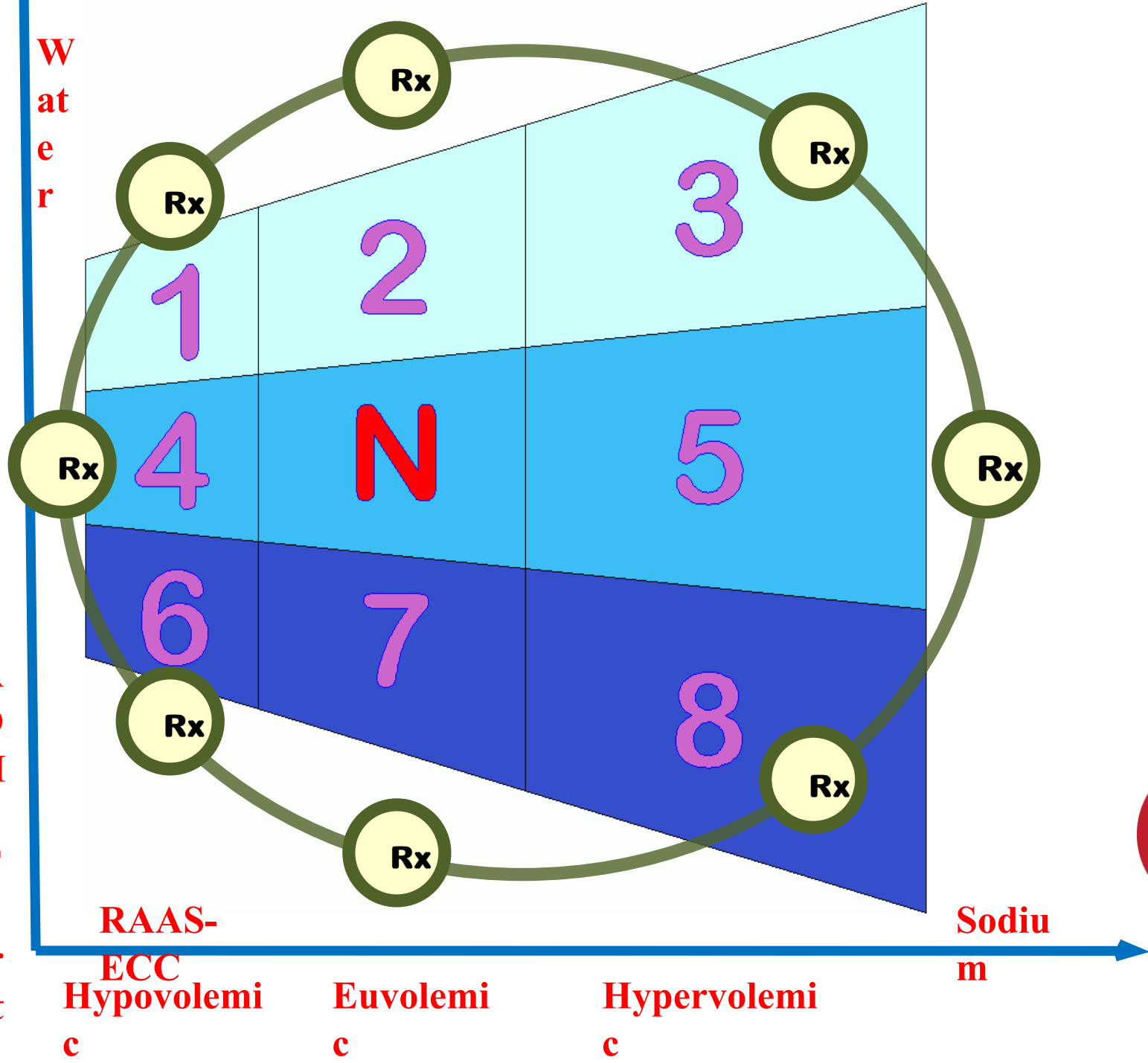




Water

Hypotonic  
Isotonic  
Hypertonic

ADH - Thirst



A

B

C


D

E

F

G



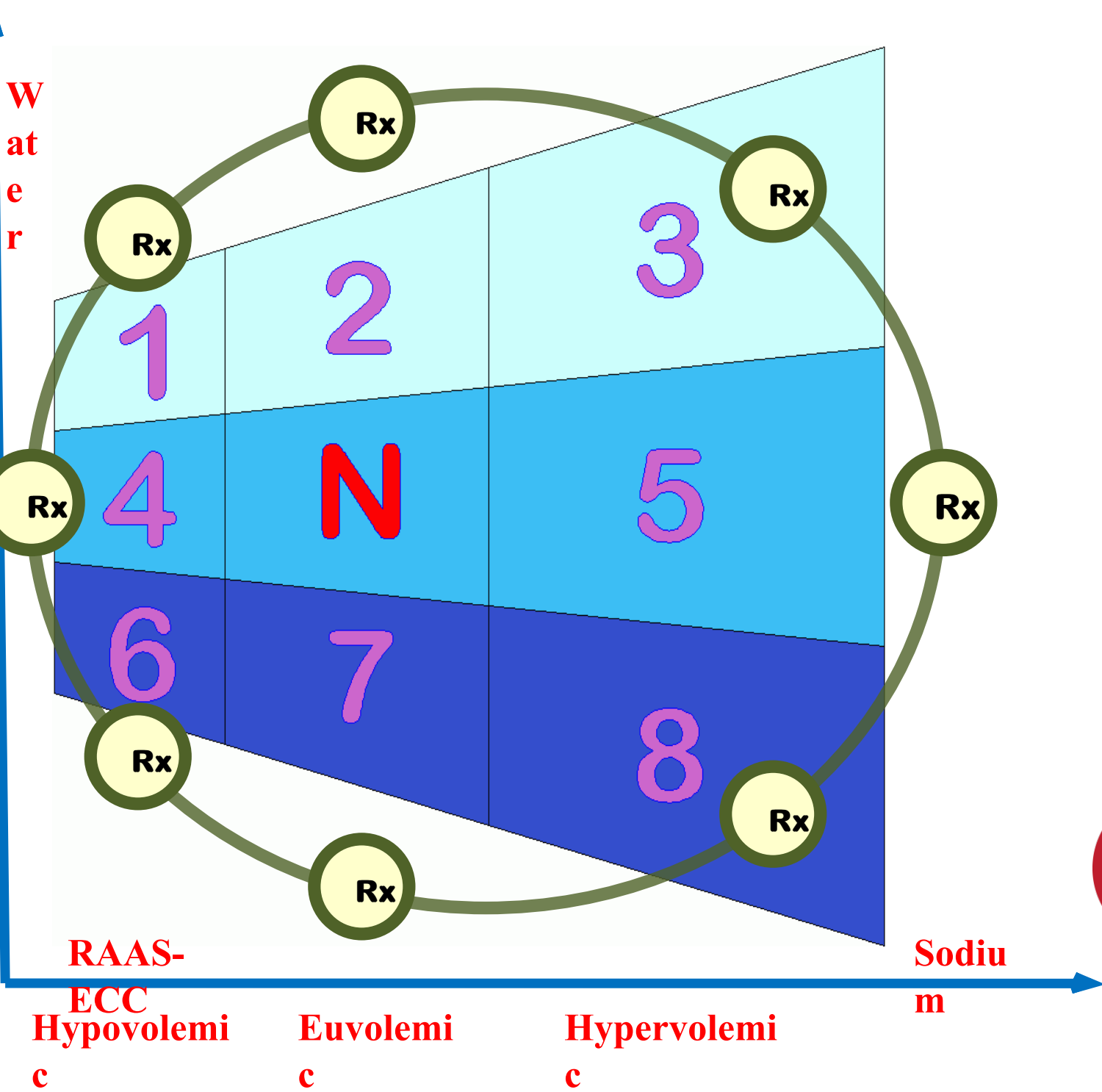


**A 55-year-old man with a history of bipolar disorder, hypertension and osteoarthritis was brought into the ED by his family claiming over the past week the patient was acting more tired and confused than usual and had experienced several episodes of enuresis. He is on lithium carbonate 300mg three times a day and amlodipine 5 mg once daily.**

**On examination: The patient was somnolent yet easily arousable. BP: 128/78, PR 88. Wt.: 74 Kg. He had dry oral mucous membranes, and a largely non-focal CNS exam.**

**Labs: Na: 163, K: 3.8, R.B.S: 134 mg, BUN: 38, Creatinine: 2.2, Lithium level: 3.2 (High).**

- 1- What type of hypernatremia he has?**
- 2- What is the cause of his renal failure?**
- 3- Comment on high lithium level.**
- 4- What is best treatment for this case?**



A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



A 70-year-old male with a history of obstructive uropathy, is being evaluated for polyuria of 3 days post TURP. The patient is on 200 cc/hour 0.9% saline IV infusion. His 24-hour urine output is 5800 cc.

On examination: BP: 164/90, PR 78. He had bilateral leg edema of 2+.

Labs:

Na: 156

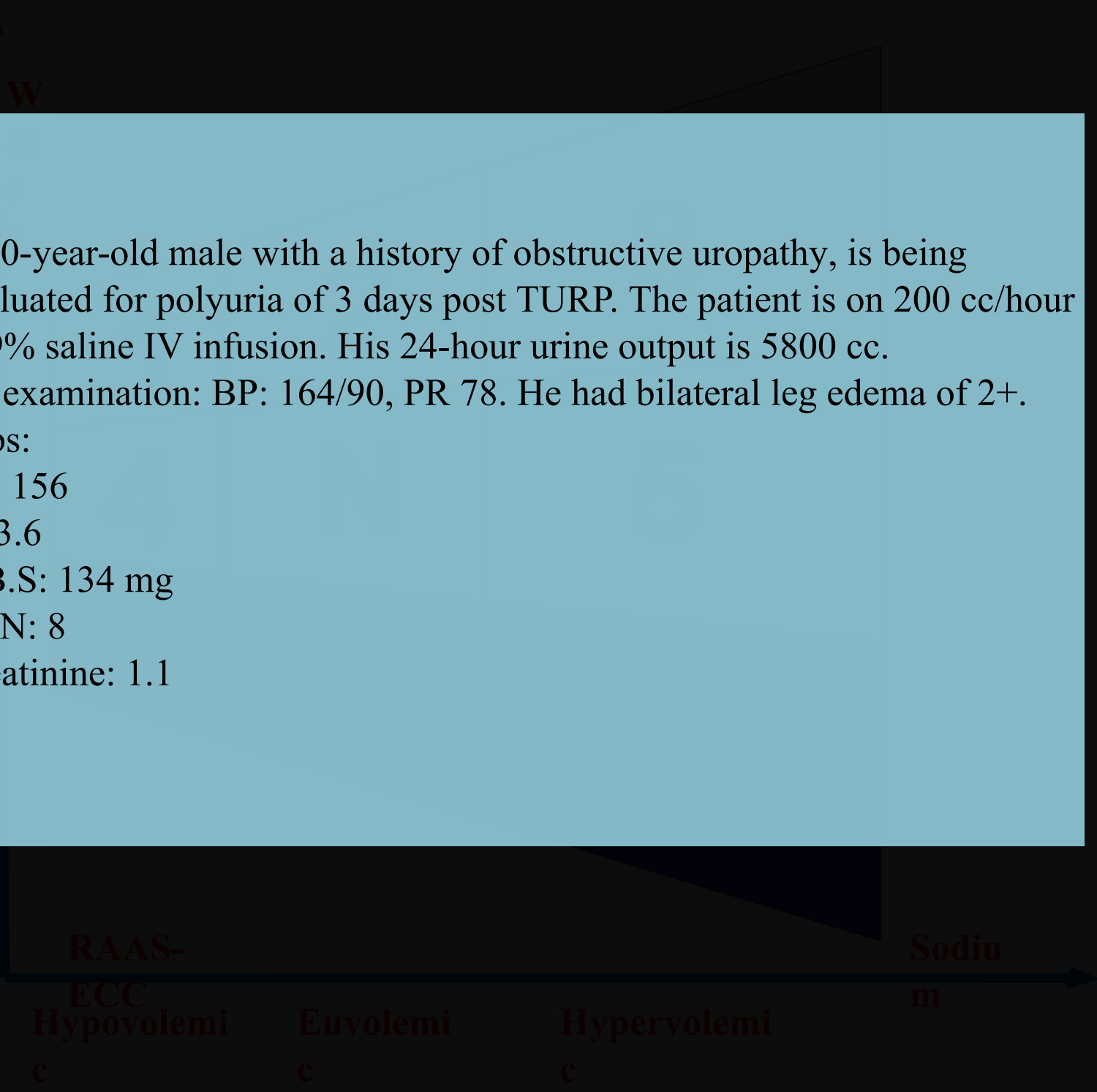
K: 3.6

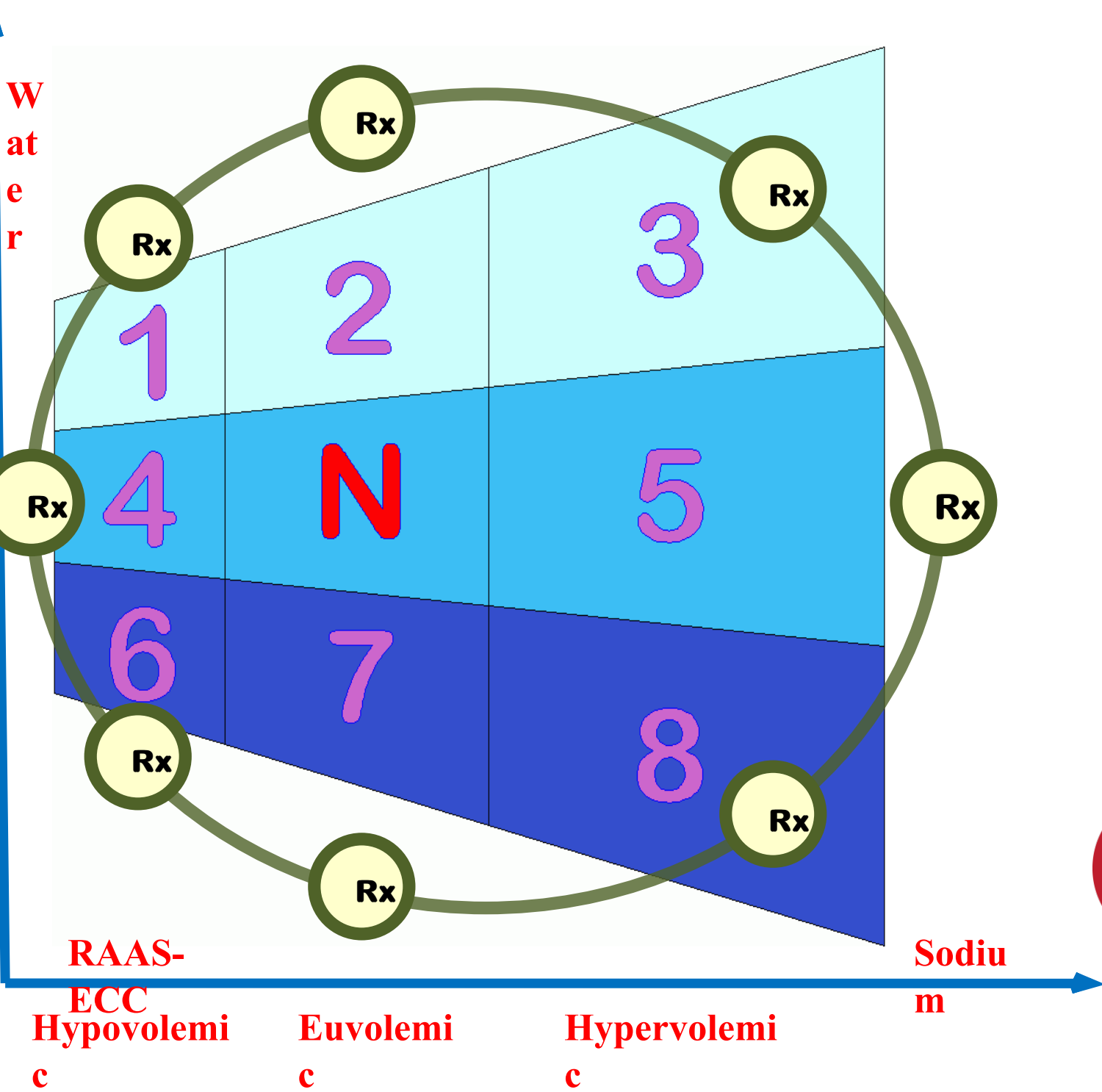
R.B.S: 134 mg

BUN: 8

Creatinine: 1.1

Hypotonic  
Isotonic  
Hypertonic  
Thirst





A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



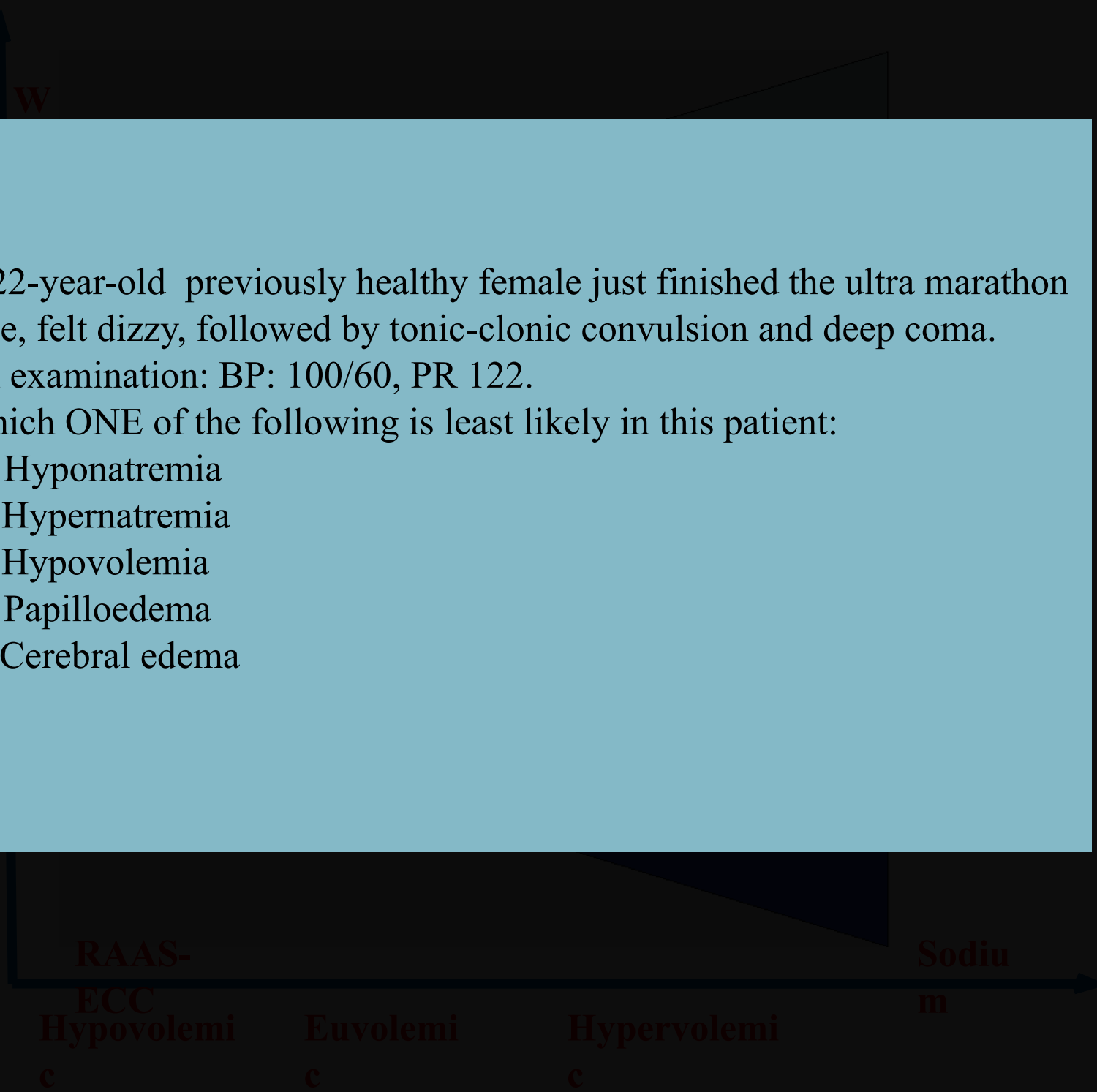
A 22-year-old previously healthy female just finished the ultra marathon race, felt dizzy, followed by tonic-clonic convulsion and deep coma.

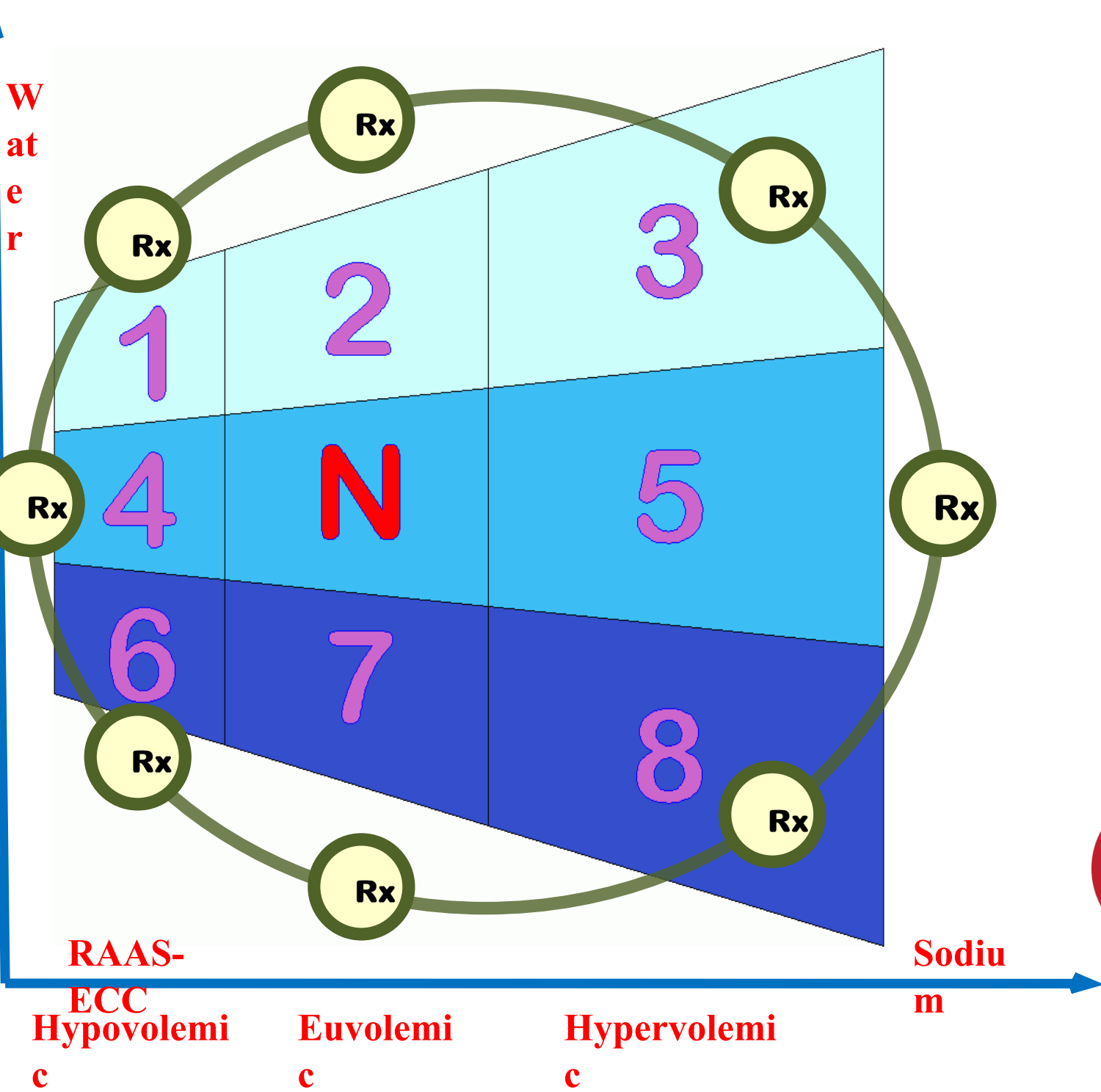
On examination: BP: 100/60, PR 122.

Which ONE of the following is least likely in this patient:

- A- Hyponatremia
- B- Hypernatremia
- C- Hypovolemia
- D- Papilloedema
- E- Cerebral edema

Thirst





A

B

C

D

E

F

G

?

- ← A.
- ← B.
- ← C.
- ← D.



A 45-year-old female known case of hypertension and DM, presented with PND's and orthopnea.

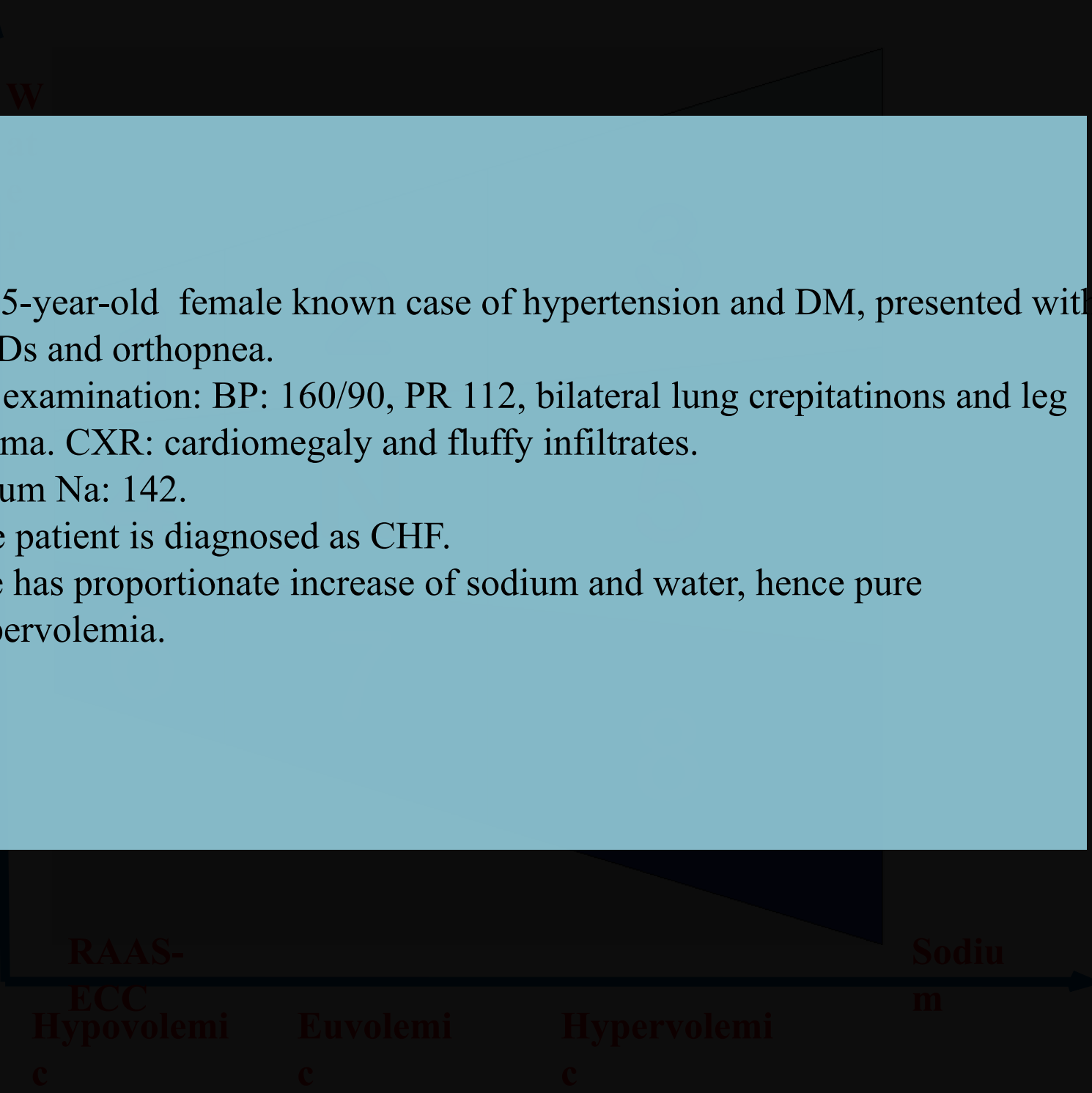
On examination: BP: 160/90, PR 112, bilateral lung crepitations and leg edema. CXR: cardiomegaly and fluffy infiltrates.

Serum Na: 142.

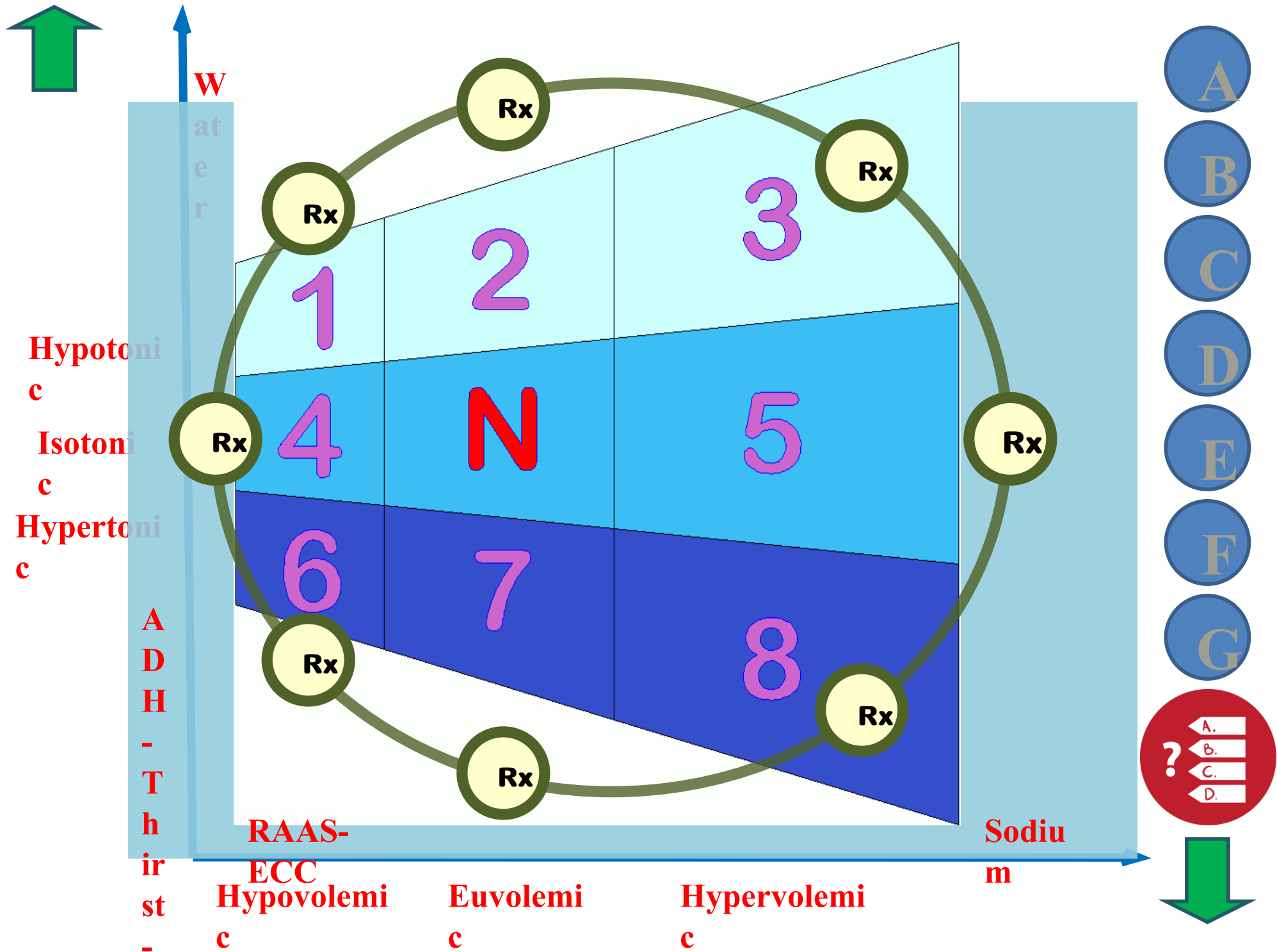
The patient is diagnosed as CHF.

She has proportionate increase of sodium and water, hence pure hypervolemia.

Hypotonic  
Isotonic  
Hypertonic







A 70-year-old female with no previous disease, presented with gastroenteritis (N&V) of 5 days duration.

On examination:

BP: 100/60, PR: 102/min,

Wt: 56 kg, dry mucus membranes and increase skin turgor.

Labs:

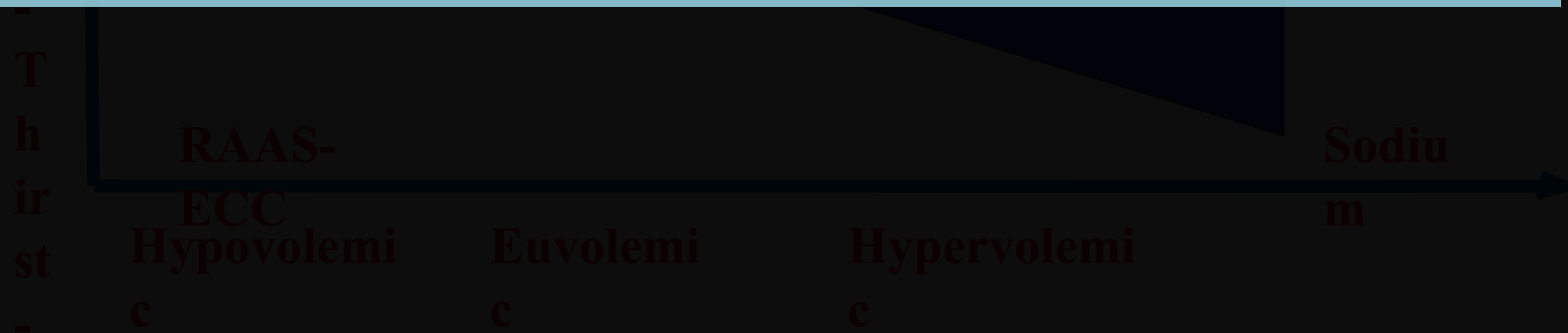
Na: 142

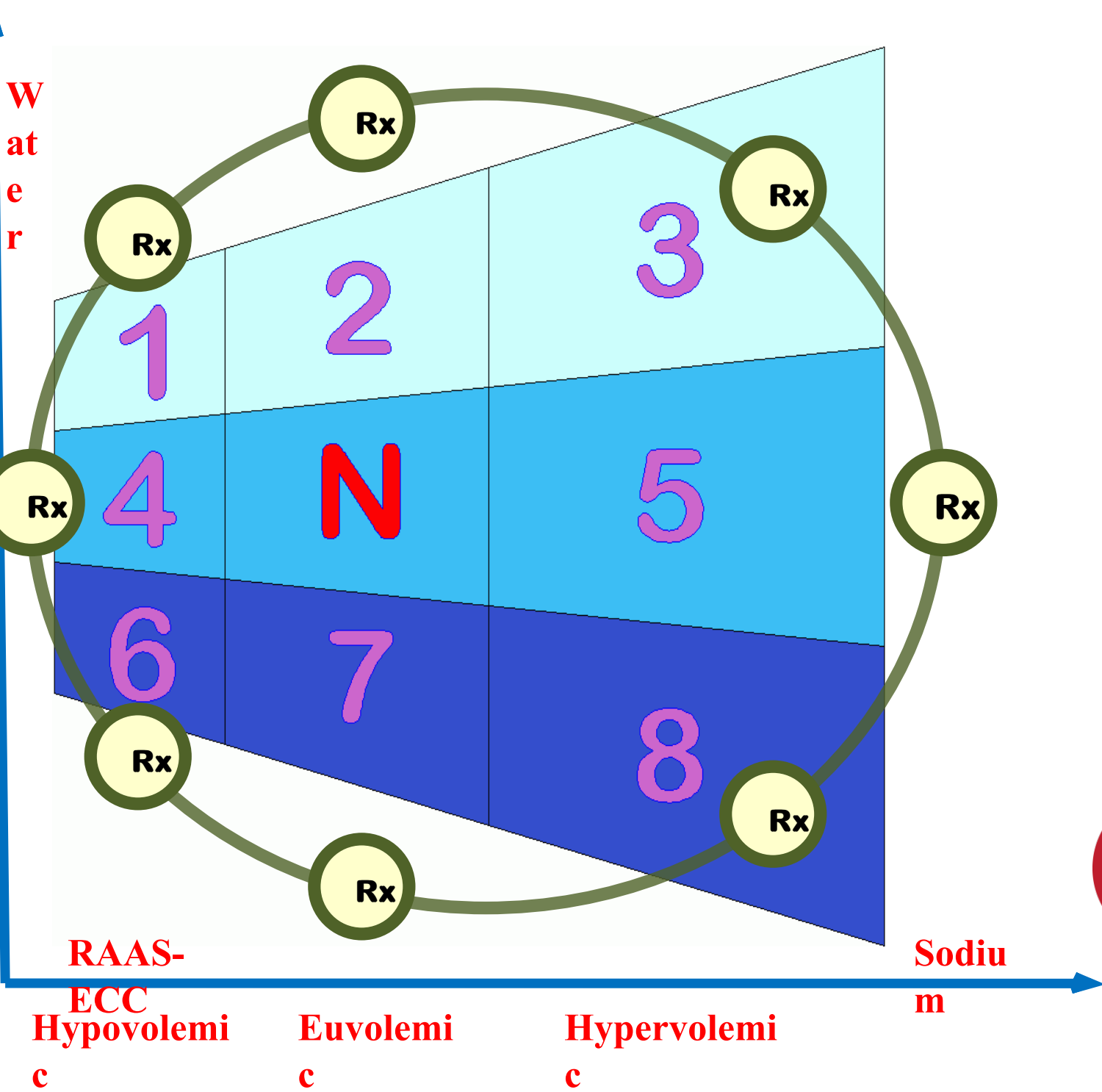
K: 5.2

BUN: 18

Creatinine: 1.3

The patient has proportionate loss of sodium and water hence in pure hypovolemic state.





A

B

C

D

E

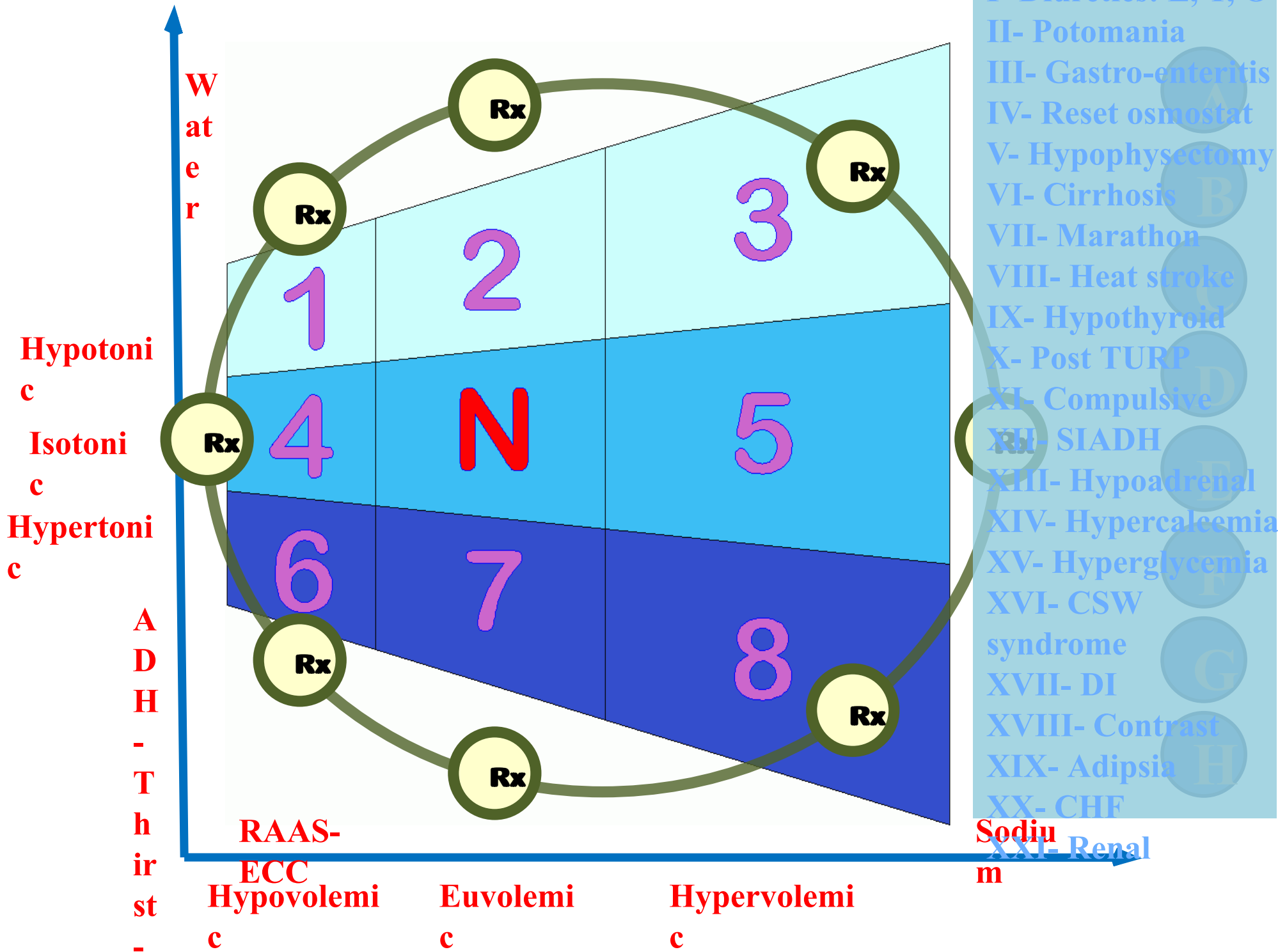
F

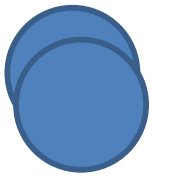
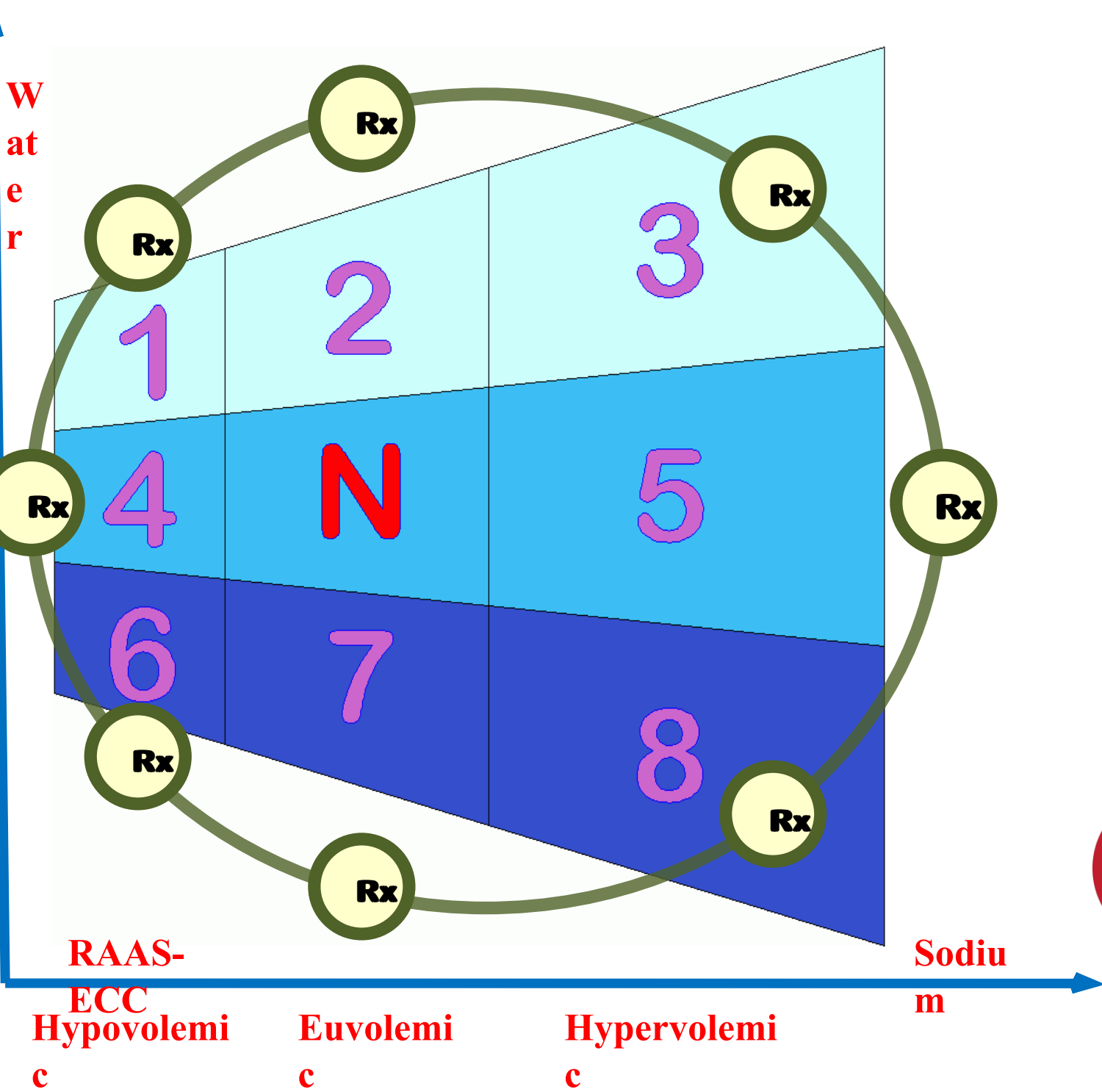
G

?

- ← A.
- ← B.
- ← C.
- ← D.







B



C

D



E



F



G





