

# Case Studies in Cardiovascular and Autoimmune Disorders

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## Disclosure

- No real or potential conflict of interest to disclose.
- No off-label, experimental or investigational use of drugs or devices will be presented.

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## Objectives

- Having completed the learning activities, the participant will be able to:
  1. Analyze symptoms, physical findings, and laboratory analysis of autoimmune disease in a 72-year-old female
  2. Critically analyze acute onset shortness of breath in a 41-year-old female
  3. Synthesize assessment and diagnostic findings to identify atypical cardiovascular conditions in patients with no apparent risk factors

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## Case Study #1

M.J. – A 52-year-old male

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### M.J.

- This 52-year-old male presents for annual physical exam and to discuss new onset sx
- He is a healthy active adult whose medical hx is significant only for testicular cancer 14 years ago, anxiety, and hypertriglyceridemia

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### M.J.

- He has been well without complaint until approximately 3-4 weeks ago
- M.J. was out running with his wife when he needed to stop due to a sense of air hunger
- He describes this as “the worst run of his life”
- This is atypical; he plays soccer and typically does not have any problem running

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M.J.

- Since this run he has become more aware between that first episode and now he describes several episodes of “needing to fill lungs with oxygen”
- This has occurred while climbing stairs at work
- The sensation has also awakened him at night

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M.J.

- M.J. denies chest pain, palpitations, cough, mucus production, wheeze, or chest tightness
- He denies any new medications or allergies
- He had a thorough cardiac workup a few months ago for no reason except “checking up”

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M.J. Review of System

- + fatigue
- + difficulty sleeping
- + reduced exercise tolerance
- + shortness of breath
- + arthralgias, worse in a.m.
- + intermittent numbness left arm
  - This is of years’ duration and unchanged

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### M.J. Physical Exam

- 5'8 1/2" 174 lbs, temp 98.3, pulse 60, RR 16, saO2 98%; BP 102/67 mm Hg
- A complete head to toe examination (absent genitalia) is WNL; chest and heart auscultation WNL, no bruits of major arteries, pulses intact

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### M.J. Plan of Care

- In-office spirometry reveals mild restrictive dysfunction
  - Attributed to general anesthesia this a.m. for colonoscopy
  - 12-lead ECG unchanged from last graph 2 years ago, pr interval 0.22 sec; cardiac eval in the last four months shows no CAD

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### M.J. Plan of Care Laboratory Assessment Ordered

- |              |                            |
|--------------|----------------------------|
| •CBC         | •Free & Total testosterone |
| •Lipid panel | •Sed rate                  |
| •CMP         | •Allergy panel             |
| •TSH         | •CT of the chest and spine |
| •Urinalysis  | •BNP                       |
| •PSA         |                            |

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**LABORATORY**

- 7/10/12: WBC 4.5; HGB 11.6; PLT 256k. Cr 1.21. Calcium 9.7. LFTs normal. AFP 1.3. bHCG 2.0. Iron 41; TIBC 472; iron saturation 8.6; transferrin 351; ferritin 39. Folate 26. Haptoglobin 79. Erythropoietin 18.5. Reticulocyte count 0.22. Immunoglobulins screen all negative. factor antibody pending. Coombs and indirect Coombs negative. Celiac disease antibodies negative. Hemoglobin electrophoresis pending.

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**M.J. Disposition Relevant Labs**

- Hgb/Hct
- MCV/MCH
- RDW
- Serum iron
- Iron saturation (transferrin sat)
- Ferritin
- Transferrin
- Folate
- Haptoglobin
- Erythropoietin
- Reticulocyte count

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**What is M.J.'s Diagnosis??**



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## Case Study #2

J.S. – A 72-year-old female

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### J.S. Initial Visit

- 72-year old female presents with a CC of fever
- Fever is intermittent and began 8 weeks ago; pt reports going to a dentist that was “dirty”
- Since then she has also had fatigue and malaise, decreased appetite, joint pain b/l “to the knees”, and swollen hands

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### J.S. Initial Visit

- ROS is otherwise negative:
  - No n/v/d/c
  - No ENT sx
  - No lymphadenopathy
  - No rash
  - No cardiopulmonary sx
  - No headache, seizures or syncope
  - No extremes of weight
  - No urinary sx
- She has no oral or dental sx.

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### J.S. Histories

- Denies any significant PMH
- Surgical hx significant for hysterectomy and arthroscopy many years ago
- Social hx significant for 4 cups of coffee daily; quit smoking years ago; 2 beers daily at night, not sexually active
- Meds: Nasacort (triamcinolone acetonide) rx 3 years ago; not taking it

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### J.S. Physical Exam

- 63" 145 lbs (BMI 25.86)
- 98.2° F, 108 bpm, 16 bpm, 135/72 mm Hg, saO2 RA 97%
- Well developed, well groomed
- HEENT all WNL – ears and mouth were inspected; tonsils absent
- No ant/post cervical, submental, submandibular, occipital or pre/post auricular nodes noted

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### J.S. Physical Exam

- Chest is clear to auscultation
- Cardiac exam reg rate, tachycardic, no murmurs or other adventitious sounds
- Exam of the LE was normal, no edema, ulcers, pedal pulses palpable
- Abd normal: no bruits, organomegaly, tenderness

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### J.S. Physical Exam

- Musculoskeletal exam was normal
  - No edema, crepitus, ecchymoses
  - PROM and AROM all normal
  - No joint tenderness
- Skin without rashes or ulceration
- Neuro grossly normal
- CN II-XII intact

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### J.S. Assessment

- Fever
  - UA, CBC with WBC diff, CRP, Sed rate
  - Pt to start recording temps at home
- Weakness
  - Iron/TIBC and B12
- Joint pain
  - Parvo B19 IgM/IgG, CCP Ab IgG/IgA

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Absolute Neutrophils	86	%	6-200
Absolute Eosinophils	178	/µL	15-500
Absolute Lymphocytes	1000	/µL	800-2000
Absolute Monocytes	461	/µL	200-800
Absolute Platelets	7179	/µL	1500-4000
RDWCV	14.4	%	

DIFFERENTIAL	2.0	%	
NEUTROPHILS	33.0	%	L 31.0-45.0
LYMPHOCYTES	25.0	%	L 17.0-35.0
MONOCYTES	12.0	%	
PLATELETS	31.8	10 <sup>9</sup> /L	L 27.0-39.0
RDW	14.4	%	L 12.0-16.0
RDWCV	14.4	%	L 12.0-16.0
PLATELET CRISP	120	µg/L	L 100-300
PLATELET COUNT	318	10 <sup>9</sup> /L	L 150-400
PLATELET DISTRIBUTION WIDTH	18.0	%	L 18.0-23.0
PLATELET TO RBC RATIO	8.9	10 <sup>9</sup> /L	L 8.0-18.0

TEST PERFORMED AT:  
 St. Joseph Diagnostic  
 4100 BRIDGEWAY AVE.  
 LOS VEGAS, NV 89119  
 ESTABLISHED IN 1978, P.C.D.

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COMPONENT	RESULT	UNIT	REFERENCE RANGE
A/G Ratio	1.2		1.0-2.5
Albumin	3.6	g/dL	3.5-5.5
Albumin Fractionation	84	%	79-130
ALT (SGPT)	10	U/L	0-25
AST (SGOT)	17	U/L	10-35
BILIRUBIN, TOTAL	0.2	mg/dL	0.1-1.2
BUN	17	mg/dL	7-20
BUN/Creatinine Ratio	24.4		8-20.0
Calcium	9.3	mg/dL	8.8-10.4
Chloride	100	mEq/L	98-110
CO2	24	mEq/L	23-30
Creatinine	0.69	mg/dL	0.6-1.2
Glucose	100	mg/dL	70-100
Hemoglobin	15.0	g/dL	12-16
Hemoglobin A1c	5.7	%	4.6-5.6

The upper reference limit for Creatinine is approximately 1.19 higher for people living in an altitude location. Glucose reference range reflects a fasting state. If you currently tolerate glucose reference range is 65 - 100 mg/dL.

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J.S. Labs – What is Abnormal?  
What Were We Looking For?

- Do we see infection?
  - WBC differential
  - Urinalysis
- Do we see inflammation?
  - Sed rate
  - CRP

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J.S. – More Labs

- Joint pain – what about rheumatic factors?
  - ANA
  - CCP IgA

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J.S. – More Labs!

- The CBC does not suggest infection but...
  - H/H are low
  - Iron sat
  - Iron
  - MCHC
  - RBC

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J.S. – More Labs

- How do we evaluate anemias?
  - H&H first
  - MCV
  - RDW
- What kind of anemia does J.S. most likely have?

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J.S. -- Disposition

- Given the collection of her history, physical exam, and laboratory assessment, J.S. has a classic presentation of .....
- What is the appropriate management of her anemia?

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Case Study #3

K.T. – A 41-year-old female

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Chief Complaint

- A 41-year-old female presents with a chief complaint of chest pain and getting out of breath too easily
- She power walks/jogs each day and actually had to stop because she was so out of breath

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History of Present Illness

- The patient reports that she is generally in good health. She has just noticed that in the last few weeks or so she gets tired easily
- She was finally prompted to seek care when she had to stop her job for SOB

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History of Present Illness

- She admits to a kind of “dull” chest discomfort that is hard to describe; she is aware of it, it comes and goes but it doesn’t really stop her from doing anything
- It is not sharp or easy to localize

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History of Present Illness

- She specifically denies
  - Radiation of the discomfort
  - Pain or discomfort to neck, arm, jaw
  - No associated sx, e.g., diaphoresis, n/v
  - Association with rest or activity

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Review of Systems

- Otherwise non-contributory
- She was queried specifically regarding history of
  - Constitutional sx
  - Other cardiopulmonary sx
  - Hemoptysis
  - Bleeding (skin, GI, gyn)

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PMH/PSH

- Dyslipidemia
- Hypertension
- Gastric bypass procedure 2 years ago
  - Her two previous medical problems resolved entirely with wt loss

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Medications

- Vitamin B12 500 mcg SL daily
- Vitamin D and calcium combination supplement daily
- MVI daily

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Family Hx

- Mother aged 70
  - Obesity
  - Dyslipidemia
  - T2DM
  - HTN
- Father died age 52 of MI

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Family Hx

- Brother aged 48
  - Obesity
  - HTN
  - T2DM

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Social Hx

- Pt lives with her husband – she has no children
- Works as a telephone tech support person
- Denies tobacco or recreational drug use
- Rare ETOH < 6 x year
- Monogamous with husband

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Physical Examination

- 41-year old female 5'3" 164 lbs
- 97.5° F, P=60, RR=16, BP = 134/82 mm Hg
- Well groomed
- In NAD
- Skin color normal, warm/dry

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Physical Examination

- CN II-XII grossly normal
- HEENT WNL
- Neck without nodes, bruit, thyromegaly but + minimal JVD
- Lung sounds are clear

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Physical Examination

- Cardiac exam reveals
  - A grade II/VI systolic murmur at 4ICS LSB
  - Very loud S<sub>2</sub>

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Physical Examination

- Peripheral pulses are normal
- Examination of the extremities reveals 1+ pitting edema from mid-calf down; there is no hyperpigmentation

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Physical Examination

- The abdomen is basically normal – organ palpation is limited due to large amount of excess skin
  - Large well-healed scar is apparent
  - No bruit
  - No organomegaly
  - No pulsations

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### Office Diagnostics

- Routine labs are drawn
- 12-lead ECG
  - Right atrial abnormality
  - Right bundle branch block
  - Right axis deviation

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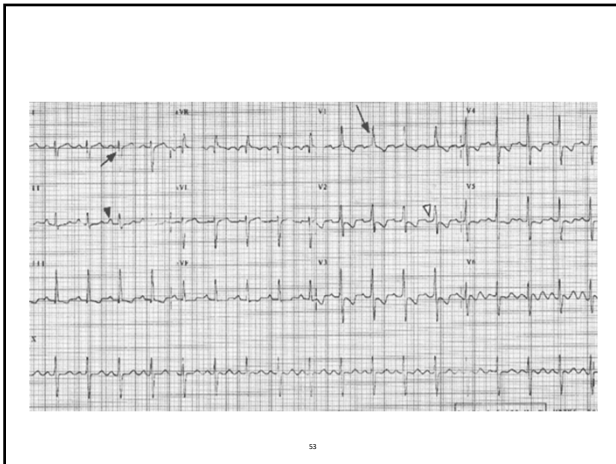
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### Office Spirometry

- Essentially WNL
- No obstructive dysfunction
- Total lung capacity (TLC) 72% predicted

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### Laboratory Results

- CMP was WNL
- CBC
  - Significant for Hgb/HCT of 17.8 g/dL/53%
  - WBC differential was normal

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### Implications

- What would you do?
  - Workup revealed pulmonary HTN
  - More detailed history revealed a long hx of anorexiant use prior to her gastric bypass
  - Murmur was tricuspid regurgitation
  - That "loud S<sub>2</sub>" was a classic wide-split S<sub>2</sub>

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## Case Study #4

M.R. – A 66-year-old female

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### M.R. Presents for Annual Labs

- This 66-year-old female presents for routine labs
- She is not seen by the nurse practitioner
- “Annual labs” included CMP, CBC, lipid panel, TSH

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### Results as follows:

- |            |           |
|------------|-----------|
| •Hgb 12.3  | •Neut 76% |
| •HCT 34.9  | •Lymp 15% |
| •Plt 290   | •Mono 7%  |
| •RDW 14.3% | •Eos 1%   |
| •TSH 2.64  | •Baso 1%  |

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### Results as Follows:

- |            |           |
|------------|-----------|
| •Hgb 12.3  | •Neut 76% |
| •HCT 34.9  | •Lymp 15% |
| •Plt 290   | •Mono 7%  |
| •RDW 14.3% | •Eos 1%   |
|            | •Baso 1%  |

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Results as Follows

- TC 261
- HDL 70
- LDL 173
- TC/HDL 3.7
- TG 90
- VLDL calc 18

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Results as follows

- TC 261
- HDL 70
- LDL 173
- TC/HDL 3.7
- TG 90
- VLDL calc 18

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Results as follows

- |                |                     |
|----------------|---------------------|
| •A/G ratio 2.4 | •BUN 16             |
| •Albumin 4.1   | •Cr 1.14            |
| •Alk phos 80   | •Ca++ 9.2           |
| •ALT 13        | •CO <sub>2</sub> 22 |
| •AST 19        | •Na+ 121            |
| •Tbili 0.5     | •Cl 84              |
| •eGFR 51       | •K+ 3.6             |
|                | •Glu 95             |

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### Results as follows

- A/G ratio 2.4
- Albumin 4.1
- Alk phos 80
- ALT 13
- AST 19
- Tbili 0.5
- eGFR 51
- BUN 16
- Cr 1.14
- Ca++ 9.2
- CO2 22
- Na+ 121
- Cl 84
- K+ 3.6
- Glu 95

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### Abnormals

- eGFR 51
- Cr 1.14
- Na+ 121
- Cl 84
- TC 261
- LDL 173
- Neuts 76%

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### Over the last 3 years (avg of 8 measures)

- BUN ~ 40 (now NL)
- Cr ~ 1.85 (now 1.14)
- Na+ ~ 136 (now 121)
- Cl ~ 108 (now 84)
- eGFR 35 (now 51)
- TC 230 (now 261)
- LDL 130 (now 173)

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### M.R. Medical Hx

- Anemia
- Benign HTN
- Impaired renal function
- GERD
- Mixed hyperlipidemia
- Hypothyroidism
- VS: 64" 81 lb (BMI 13.9)  
97.9, 59, 16, 136/66, 96%

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### M.R. Medications

- Omeprazole 20 mg q.d.
- Tirosint (levothyroxine) 75 mcg q.d.
- Amlodipine 5 mg q.d.
- ASA 81 mg q.d.
- Lisinopril 10 mg q.d.
- Lovastatin 20 mg q.d.

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### M.R. – Something Clearly Different!

- Called the lab to add serum osmolality -- result 254
- While in office for lab draw she looked clinically volume contracted

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### M.R. – Something Clearly Different!

- Na+ 121
- Serum osmo 254
- Clinically dry
- She has hypovolemic, hypotonic, hyponatremia

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### M.R. Medications

- Omeprazole 20 mg q.d.
- Tirosint (levothyroxine) 75 mcg q.d.
- Amlodipine 5 mg q.d.
- ASA 81 mg q.d.
- Lisinopril 10 mg q.d.
- Lovastatin 20 mg q.d.

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### M.R. Disposition

- Where did the hypotonic, hypovolemic, hyponatremia come from?
- What are the implications?

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### M.R. Hyponatremia

- The primary implication of hyponatremia is whether or not the patient is hypotonic
- If the patient is hypotonic, then the extracellular fluid is more “watery” than the intracellular fluid; the danger is that there will be an intracellular fluid shift
- If fluid shifts into the cell, cellular edema occurs

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### Hyponatremia – Next Question is Osmolality

- Na<sup>+</sup> is the single most abundant extracellular solute – if the patient is hyponatremic, we worry they are hypoosmolar.
- Assess the hyponatremic patient for tonicity
  - Isotonic
  - Hypertonic
  - Hypotonic

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### The Isotonic Patient – Low Sodium but Normal Osmolality

- Serum osmolality 270-290 mOsm/L
- As long as the patient is isoosmolar, there is no concern about intracellular fluid shift
- Most common cause is an extracellular accumulation of an insoluble solute (lipid)

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### The Hypertonic Patient – Low Sodium but High Osmolality

- Serum osmolality is  $> 290$  mOsm/L
- Now the concern is extracellular fluid shifts
- Most common cause is an extracellular accumulation of a solute other than  $\text{Na}^+$  (glucose is most common)

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### The Hypotonic Patient – Low Sodium and Low Osmolality

- Serum osmolality  $< 270$  mOsm/L
- Concern is for intracellular fluid shifts and consequent edema
- Several causes
  - Hypervolemic
  - Hypovolemic
  - Euvolemic

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### Types of Hypotonic Hyponatremia

- Hypervolemic – an accumulation of free water dilutes serum sodium
  - Liver, renal, heart failure
- Hypovolemic – pt loses both water and  $\text{Na}^+$ , but  $\text{Na}^+$  loss is greater
  - Diuresis, vomit/diarrhea
- Euvolemic – usually mild retention of water -- hypothyroidism

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End of Presentation!

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