



A 20 Year old male with  
cerebral palsy, tachycardia,  
and fevers

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# History of the Present Illness

- 20 yo male w spastic quadriparetic cerebral palsy, meningitis at age 6, congenital hydrocephalus s/p VP shunt, frequent respiratory infections presents with tachycardia, fevers, and seizures
- Admission to Comer in 7/2013 for similar complaints
  - Found to have pneumonia → rhinovirus/enterovirus, treated also for HCAP and with respiratory support
- Recent evaluation (5/2) by outpatient cardiology for isolated episode of 2<sup>nd</sup> degree AV block – pacemaker deferred due to risks
  - No mention of tachycardia
  - Pulse rate at visit - 67
- Marked tachycardia despite aggressive IVF resuscitation and antibiotic therapy; work-up reveals abnormal thyroid function tests (TSH 0.03, FT4 > 7.77) for which the endocrine service is been consulted

# Past Medical History

- Meningitis – age 6
- Cerebral Palsy - non-verbal at baseline, does not follow commands:  
baclofen, glycopyrrolate, diazepam
- Congenital hydrocephalus s/p VP shunt
- Epilepsy – baseline has 3 seizures per day: phenobarbital,  
levetiracetam
- Absent corpus callosum
- Hearing loss in left ear
- Recurrent respiratory tract infections requiring multiple ICU stays:  
albuterol nebulizer
- Idiopathic thrombocytopenic purpura
- Nephrolithiasis

# Family & Social History



- Patient has two siblings who are healthy
- Mother with thyroid disease where she “lost weight,” resolved spontaneously
- Patient resides at Miserocordia
  - Home for children and adults with physical and developmental disabilities

# Review of Systems

Limited by patient's baseline status

**Constitutional:** +fevers x few days, intermittent diaphoresis. No weight changes per mother – objective weight gain of 6 kg in last two months.

**HEENT:** No obvious change in the thyroid size, neck swelling or redness

**Cardiovascular:** Tachycardia is present. Edema is absent.

**Respiratory:** Tachypnea is present, intermittent respiratory distress, frequent secretions.

**Gastrointestinal:** No vomiting, diarrhea. Patient chronically on enteral nutrition.

**Genitourinary:** Denies urinary frequency or urgency.

**Skin:** No excessive moisture, dryness to skin. No rashes.

**Musculoskeletal:** Chronic contractures, no joint swelling.

**Neurological:** No new tremors.

**Psychiatric:** Non-communicative.

# Physical Examination

BP 122/94 P 141 T 37.8 (100.0) R 34 O2 99% 2L NC

**General:** Patient is in mild acute distress, alert, oriented.

**HEENT:** EOMI. Mild scleral icterus. No peri-orbital edema, chemosis, periorbital edema, stare, or injections noted.

**Neck:** Supple, thyroid is symmetric, Normal in size with no palpable nodules. No thyroid bruit is present. Texture is not firm. No grimacing on palpation. No surrounding erythema, neck swelling. No cervical lymphadenopathy.

**Cardiovascular:** Regular rhythm, **tachycardic**, without murmurs or gallops

**Pulmonary:** **Tachypneic, appearing in mild respiratory distress, using accessory muscles, coarse breath sounds.**

**Abdomen:** Abdomen is soft, non-tender. No hepatomegaly. G-tube is clean, dry, intake.

**Musculoskeletal:** Extremities are contracted. No edema.

**Neurological:** Non-verbal. A/O x 0. Does not respond to commands. No tremors.

**Skin:** Warm, diaphoretic. **Very warm to touch.**

**TABLE 5. POINT SCALE FOR THE DIAGNOSIS OF THYROID STORM**

<i>Criteria</i>	<i>Points</i>	<i>Criteria</i>	<i>Points</i>
<b>Thermoregulatory dysfunction</b>		<b>Gastrointestinal-hepatic dysfunction</b>	
Temperature (°F)		Manifestation	
99.0–99.9	5	Absent	0
100.0–100.9	10	Moderate (diarrhea, abdominal pain, nausea/vomiting)	10
101.0–101.9	15	Severe (jaundice)	20
102.0–102.9	20		
103.0–103.9	25		
≥104.0	30		
<b>Cardiovascular</b>		<b>Central nervous system disturbance</b>	
Tachycardia (beats per minute)		Manifestation	
100–109	5	Absent	0
110–119	10	Mild (agitation)	10
120–129	15	Moderate (delirium, psychosis, extreme lethargy)	20
130–139	20	Severe (seizure, coma)	30
≥140	25		
Atrial fibrillation			
Absent	0		
Present	10		
<b>Congestive heart failure</b>		<b>Precipitant history</b>	
Absent	0	Status	
Mild	5	Positive	0
Moderate	10	Negative	10
Severe	20		
<b>Scores totaled</b>			
>45	Thyroid storm		
25–44	Impending storm		
<25	Storm unlikely		

Source: Burch and Wartofsky, 1993 (21). Printed with permission.



No known

# Diagnostic Evaluation



Glucose	88
Sodium	139
Potassium	3.8
Chloride	99
Carbon Dioxide	32
BUN	7
Creatinine	0.5
GFR	120
Calcium	9.6
Phosphate, I	2.8
Magnesium	1.5

Total Protein	7.0
Albumin	3.8
Total bilirubin	0.4
Conjugated bili	0.1
Unconjugated bili	0.3
Alk phosphatase	129
AST (SGOT)	56
ALT (SGPT)	74

WBC	4.1
Neutrophils 67 Granulocytes 83 (h)	
Hemoglobin	12.4
Hematocrit	37.0
Platelets	50



# Diagnostic Evaluation – Thyroid Studies

Thyroid Evaluation	
TSH (0.3-4.0 mcU/mL)	0.04
Free T4 (0.9-1.7 ng/dL)	> 7.77
T4 (5.0-11.6 mcg/dL)	> 24.0
T3 (80-195 ng/dL)	380
T3:T4	15.8

Peripheral/Other Markers	
Ferritin (20-300 ng/mL)	743
Creatine Kinase (9-185 U/L)	36
Total Cholesterol (120-199 mg/dL)	81 (2/2013: 130)
LDL (60-129 mg/dL)	51
ESR (0-15 MM/HR)	57

Infectious Work-Up
H1N1 Positive
Sputum culture – Serratia marcescens, Pseudomonas aeruginosa

# DIFFERENTIAL DIAGNOSIS

## Causes of hyperthyroidism

Hyperthyroidism with a normal or high radioiodine uptake
<b>Autoimmune thyroid disease</b>
Graves' disease
Hashitoxicosis
<b>Autonomous thyroid tissue (uptake may be low if recent iodine load led to iodine-induced hyperthyroidism)</b>
Toxic adenoma
Toxic multinodular goiter
<b>TSH-mediated hyperthyroidism</b>
TSH-producing pituitary adenoma
Non-neoplastic TSH-mediated hyperthyroidism
<b>Human chorionic gonadotropin-mediated hyperthyroidism</b>
Hyperemesis gravidarum
Trophoblastic disease
Hyperthyroidism with a near absent radioiodine uptake
<b>Thyroiditis</b>
Subacute granulomatous (de Quervain's) thyroiditis
Painless thyroiditis (silent thyroiditis, lymphocytic thyroiditis)
Postpartum thyroiditis
Amiodarone (also may cause iodine-induced hyperthyroidism)
Radiation thyroiditis
Palpation thyroiditis
<b>Exogenous thyroid hormone intake</b>
Excessive replacement therapy
Intentional suppressive therapy
Factitious hyperthyroidism
<b>Ectopic hyperthyroidism</b>
Struma ovarii
Metastatic follicular thyroid cancer

Major causes of hyperthyroidism according to the presence of a high or low radioiodine uptake. High uptake indicates increased new hormone synthesis by the thyroid whereas low uptake indicates release of preformed hormone, exogenous ingestion, or extrathyroidal hormone synthesis.

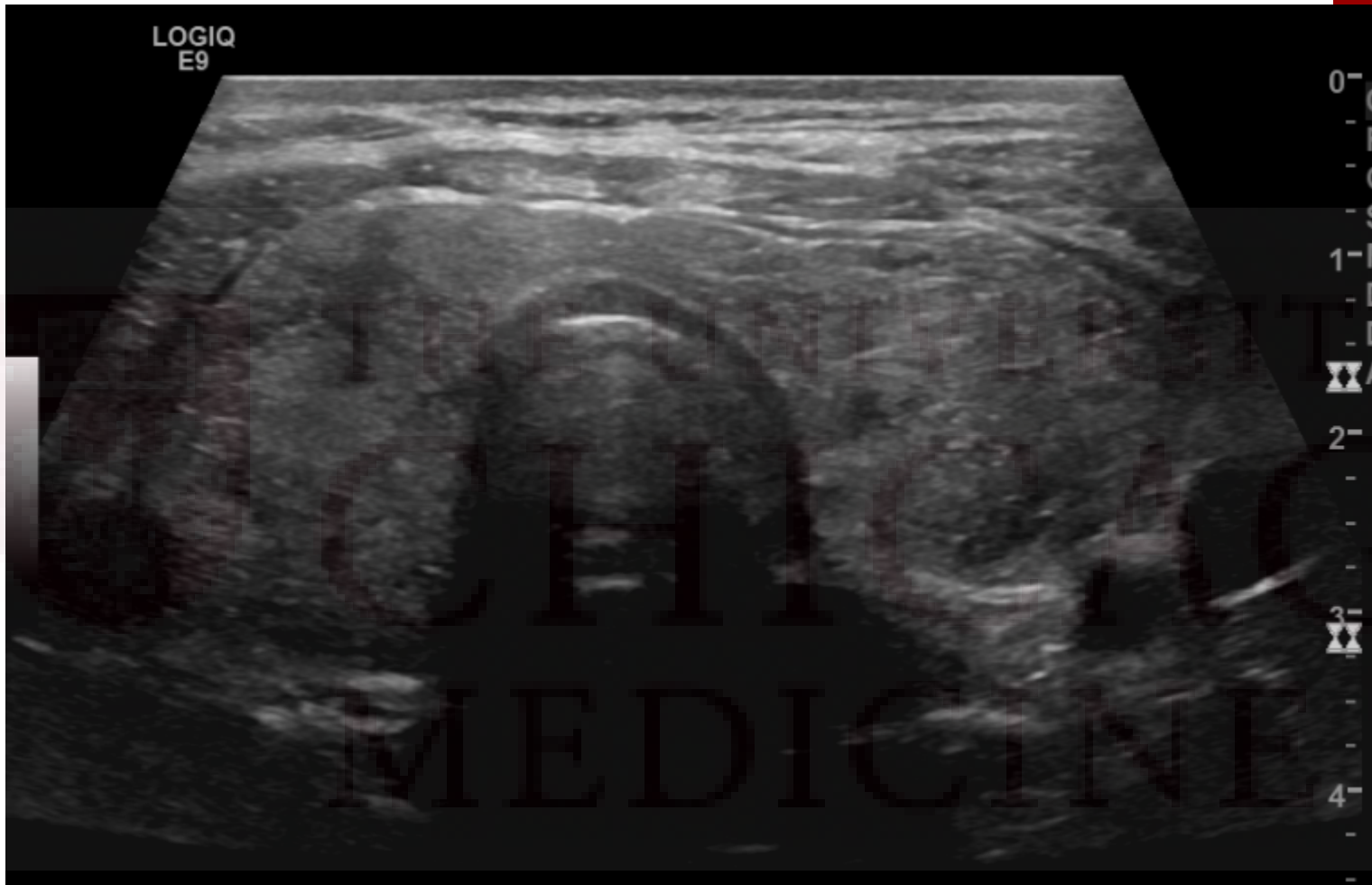
## Thyroid Antibodies

Thyroglobulin Ab (< 0.4 KU/ml Ab Tgn)	< 0.04
TPO Ab (< 0.4 KU/ml Ab TPO)	< 0.04
Thyroid stimulating immunoglobulin (< 1.3 TSI index)	< 1.0
TSH-receptor antibody	

## Thyroid Evaluation

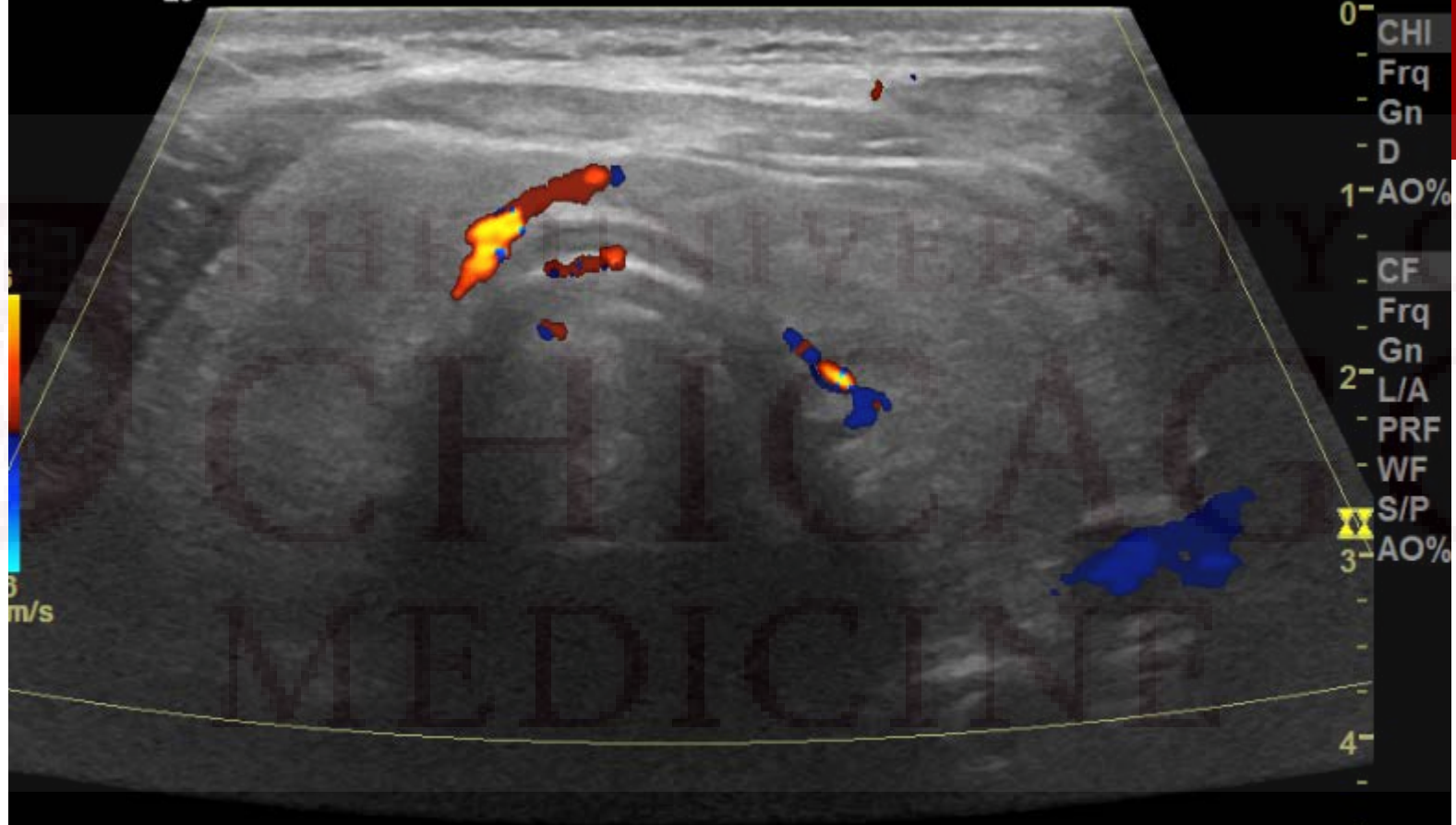
Thyroglobulin	>400 (Ref < 29 ng/mL) "Value too high for reliable direct measurement, test will be repeated with diluted serum."
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No known exposure to:  
Iodine (recent)  
Amiodarone  
Radiation  
Interferon therapy



RIGHT LOBE : 2.2 x 2.5 x 4.7 cm; Markedly heterogeneous with convex margins. No focal mass or nodule is identified.  
LEFT LOBE: 2.6 x 2.2 x 5.7 cm; Markedly heterogeneous with convex margins. No focal mass or nodule is identified.  
ISTHMUS : 0.4-cm in AP dimension; Markedly heterogeneous with convex margins. No focal mass or nodule is identified.  
PARATHYROID GLANDS: No significant abnormality noted.  
LYMPH NODES: No significant abnormality noted.  
**IMPRESSION: Enlarged, heterogeneous thyroid gland without focal mass or nodule**

LOGIQ  
E9



**TRANS THYROID**

- 0- CHI
- Frq
- Gn
- D
- 1- AO%
- CF
- Frq
- Gn
- 2- L/A
- PRF
- WF
- S/P
- 3- AO%
- 
- 4-
- 

Image Tr  
Zc

# Serial thyroid evaluation

Thyroid Evaluation	4/30	4/30	5/2	5/4	5/5	5/6	5/7
TSH (0.3-4.0 mcU/mL)	0.04	0.03	0.02	0.01		0.01	
Free T4 (0.9-1.7 ng/dL)	> 7.77	> 7.77	> 7.77	> 7.77	> 7.77	> 7.77	> 7.77
T4 (5.0-11.6 mcg/dL)	> 24.0		> 24.0		> 24.0	> 24.0	> 24.0
T3 (80-195 ng/dL)	380	348	356		279		286

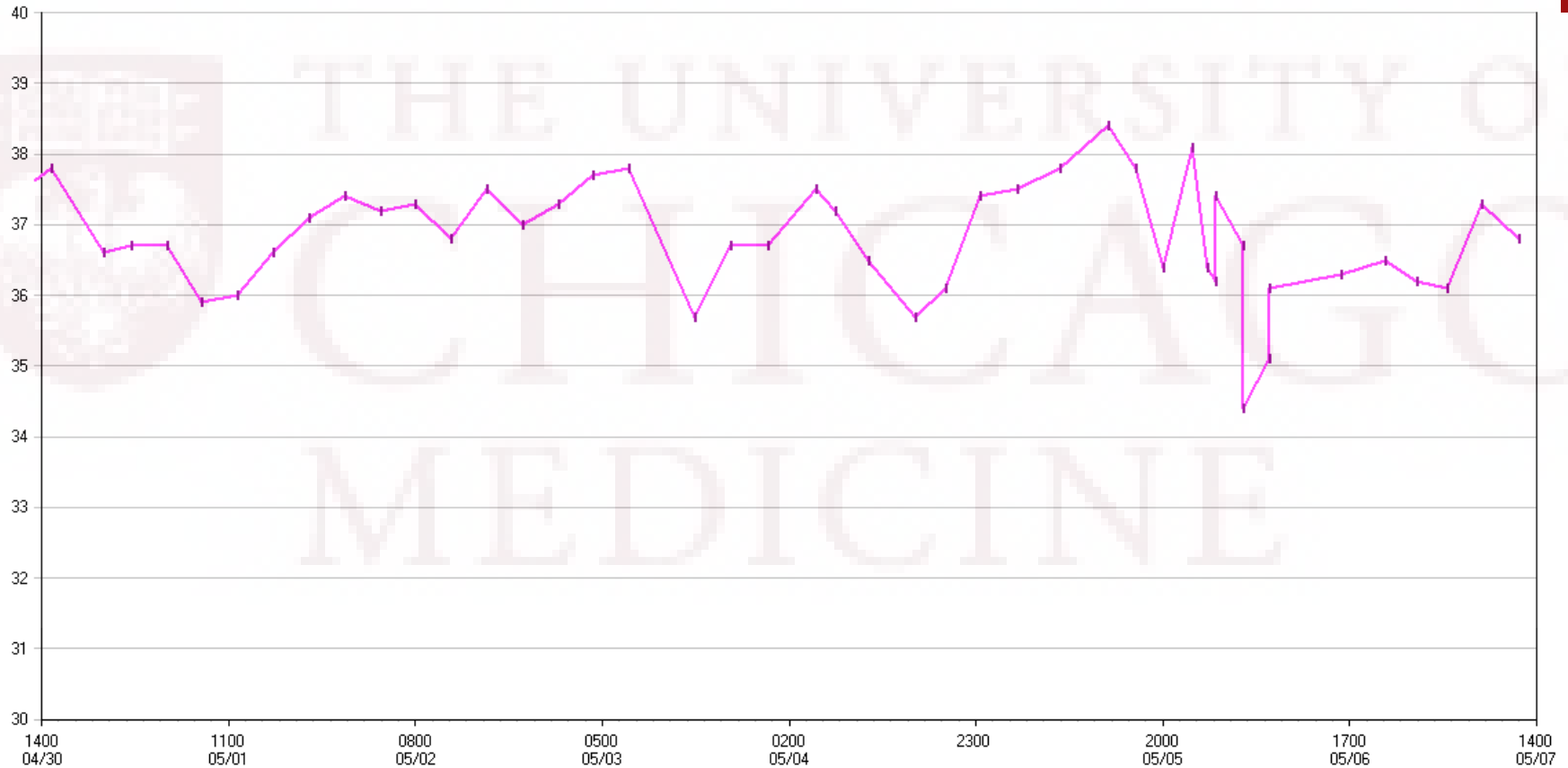
MMI 20 mg qid  
Hydrocortisone 50 mg IV x 1  
Propranolol 80 mg qid

MMI 20 mg qid  
Hydrocortisone 50 mg tid  
Propranolol 80 mg qid

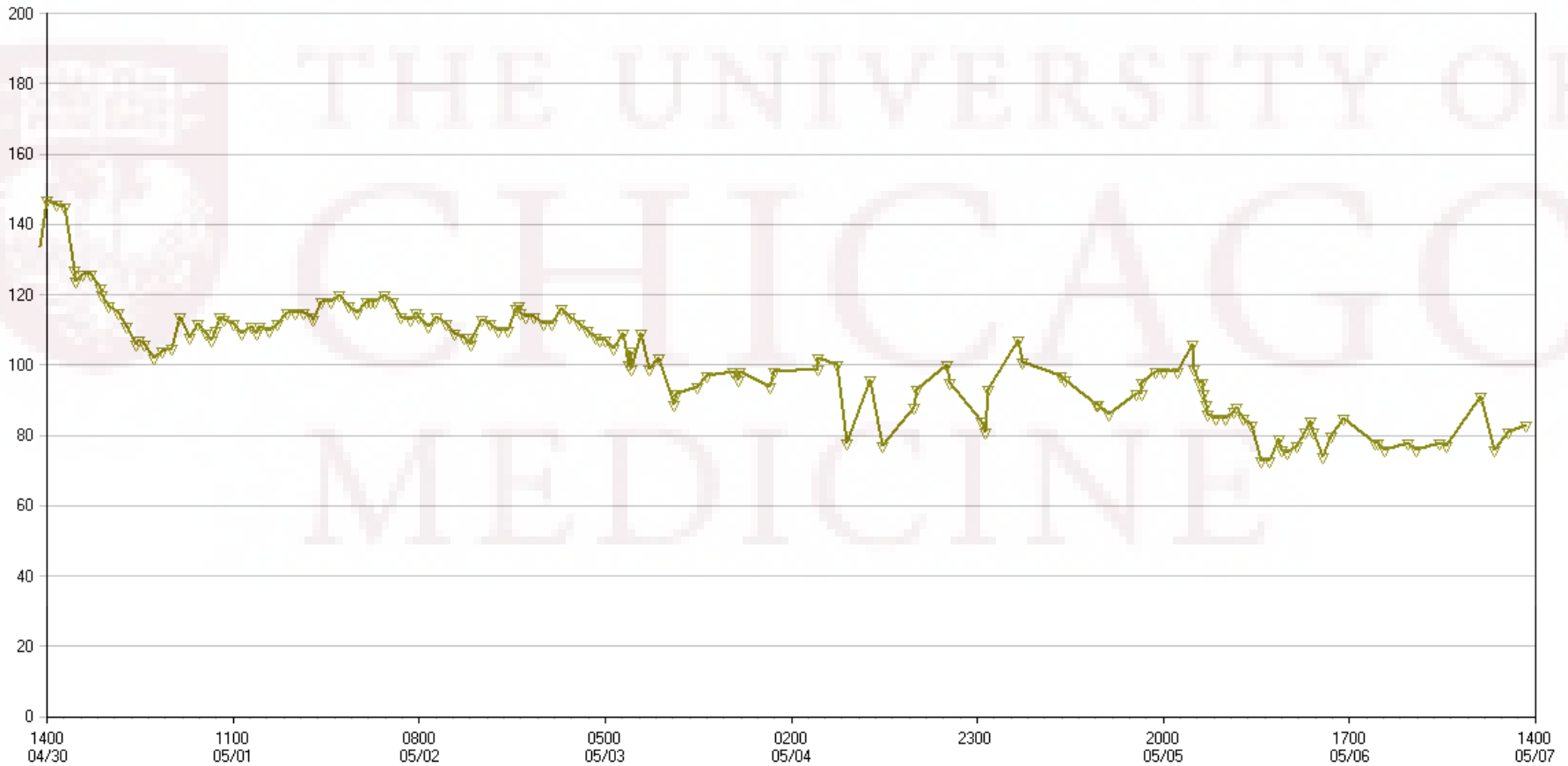
PTU 200 mg qid  
Hydrocortisone 75 mg tid  
Propranolol 80 mg qid

# Fluctuating thermoregulation

Left Click to zoom in --- Right Click to zoom Out



# Pulse Rate



# Diagnostic Dilemma

Graves'	Thyroiditis
Severity of thyrotoxicosis	TSH not yet undetectable ( $< 0.01$ ) despite such a high Free T4
Unable to get appropriate history from patient	Onset of presentation concomitant with viral illness
	TG, TPO, TSI all negative
	Low vascular flow on doppler US
	Clinical symptoms: Weight gain (no hyperphagia possible in this patient), no ophthalmologic findings?



# Thyroiditis Syndromes

**Table 2. Characteristics of Thyroiditis Syndromes.\***

Characteristic	Hashimoto's Thyroiditis	Painless Postpartum Thyroiditis	Painless Sporadic Thyroiditis	Painful Subacute Thyroiditis	Suppurative Thyroiditis	Riedel's Thyroiditis
Age at onset (yr)	All ages, peak 30–50	Childbearing age	All ages, peak 30–40	20–60	Children, 20–40	30–60
Sex ratio (F:M)	8–9:1	—	2:1	5:1	1:1	3–4:1
Cause	Autoimmune	Autoimmune	Autoimmune	Unknown	Infectious	Unknown
Pathological findings	Lymphocytic infiltration, germinal centers, fibrosis	Lymphocytic infiltration	Lymphocytic infiltration	Giant cells, granulomas	Abscess formation	Dense fibrosis
Thyroid function	Hypothyroidism	Thyrotoxicosis, hypothyroidism, or both	Thyrotoxicosis, hypothyroidism, or both	Thyrotoxicosis, hypothyroidism, or both	Usually euthyroidism	Usually euthyroidism
TPO antibodies	High titer, persistent	High titer, persistent	High titer, persistent	Low titer, or absent, transient	Absent	Usually present
ESR	Normal	Normal	Normal	High	High	Normal
24-Hour <sup>123</sup> I uptake	Variable	<5%	<5%	<5%	Normal	Low or normal

\* Information is from Farwell and Braverman.<sup>1</sup> TPO denotes thyroid peroxidase, ESR erythrocyte sedimentation rate, and <sup>123</sup>I iodine-123.

## Acute suppurative thyroiditis caused by *Pseudomonas aeruginosa*

SIR,—With reference to the recent report by Drs F Saksouk and I S Salti (2 July, p 23), of a case of acute suppurative thyroiditis caused by *Escherichia coli* we wish to report a case of acute thyroiditis caused by another Gram-negative bacillus—namely, *Pseudomonas aeruginosa*.

A 77-year-old woman with no previous history of thyroid disease was admitted with a 14-day history of sudden painful swelling of the left thyroid lobe associated with redness of the overlying skin, fluctuation, and fever of 39°C. There was a firm, fluctuating, tender mass 6.5 × 6.0 cm in the region of the left thyroid lobe with no lymphadenopathy in the neck. A sodium pertechnetate scan revealed the affected area to be “cold”; the uptake in the right thyroid lobe was normal. The pulse rate of the patient was 80/min, her leucocyte count  $15.1 \times 10^9/l$  ( $15\ 100/mm^3$ ), and her erythrocyte sedimentation rate 119 mm in the first hour. Serum thyroxine, measured by radioimmunoassay, was 70 nmol/l ( $5.4\ \mu g/100\ ml$ ) (normal range 52–181 nmol/l ( $4\text{--}14\ \mu g/100\ ml$ )) and the response (measured by radioimmunoassay) to 200  $\mu g$  of thyrotrophin-releasing hormone intravenously was normal. Urine analysis showed bacteriuria and urine culture yielded a significant bacteriuria with *E coli* and *Proteus vulgaris*. Blood cultures were negative. Radiography of the neck showed the trachea to be shifted to the right but otherwise intact. Incision of the swollen area yielded grey-yellow pus which on culture grew *Pseudomonas aeruginosa*. Cytological examination of a preliminary thin-needle aspirate showed

# Acute infectious thyroiditis?

## Acute Suppurative Thyroiditis Caused by *Serratia marcescens*

Legend. Kirby-Bauer susceptibility pattern of *Serratia marcescens* isolates.

Date	Source	Antibiotic									
		Amp	Crb	Ceph	Gent	Amk	Tob	TSX	Pip	Ctx	Mox
3/17/82	Urine	R	R	R	S	S	R	S	S	ND	S
3/18/82	Thyroid abscess	R	R	R	S	S	R	S	S	S	S

NOTE. Amp = ampicillin; Crb = carbenicillin; Ceph = cephalothin; Gent = gentamicin; Amk = amikacin; Tob = tobramycin; TSX = trimethoprim-sulfamethoxazole; Pip = piperacillin; Ctx = cefotaxime; and Mox = moxalactam. R = resistant; S = sensitive; and ND = not done.

**Syndrome.** A 58-year-old black woman with a history of multinodular goiter, bilateral ureteral obstruction from retroperitoneal fibrosis, and recurrent urinary-

**Unique features.** To our knowledge, this is the first reported case of acute suppurative thyroiditis caused by *S marcescens* species. Thyroid and urine isolates were

Weissel, et al. BMJ.  
1977;2:580

## Case History

### A Rare Case of Subacute Thyroiditis Causing Thyroid Storm

Thyroid storm is a rare but potentially fatal condition that is most frequently associated with Graves' disease. We present the case of a young woman who presented in thyroid storm, later diagnosed as being due to severe subacute thyroiditis. We discuss the diagnostic approach to thyroid storm, the initial management, and eventual treatment and course of subacute thyroiditis. This case illustrates the necessity to include subacute thyroiditis in the differential diagnosis of severe thyrotoxicosis and thyroid storm.

TABLE 1. THYROID FUNCTION TESTS OVER TIME

Day of illness:	1	2	7	14	23	41	55	107	132
TSH (0.27-4.20 $\mu$ U/mL)	< 0.01						6.53	3.31	3.1
FT <sub>4</sub> (12-22 pmol/L)	> 155	73	> 155	57	48	13	10	15	
FT <sub>3</sub> (4.0-6.8 pmol/L)	35.2	13.5		7.6	4.1	3.4			
Tg (<60 $\mu$ g/L)	520				180				
ESR (2-20 mm/h)			78						
WBC (4.5-11 $\times 10^9$ cells/L)	10.0		14.1						

TSH-thyroid stimulating hormone, FT<sub>4</sub>-free thyroxine, FT<sub>3</sub>-free tri-iodothyronine, Tg-thyroglobulin, ESR-erythrocyte sedimentation rate, WBC-white blood cells.



## Case History

### Atypical Subacute Thyroiditis: Preliminary Observations

Nine patients with painless or minimally painful subacute thyroiditis were seen between late June and October 2000. Six had a history of antecedent viral symptoms. Thyroid peroxidase antibodies were negative in eight patients tested; none had a family history of autoimmune thyroid disease. It is possible that these patients represent examples of postviral painless subacute thyroiditis (atypical subacute thyroiditis). In order to establish the nature of the syndrome, cytological examination, HLA typing, and long-term follow-up are necessary.

TABLE 2. CLINICAL CHARACTERISTICS

Age	Gender	Viral illness	Thyroid FH	Hx Thyroid pain	Thyroid palpation	T <sub>4</sub>	FT <sub>4</sub> I	FT <sub>4</sub>	TT <sub>3</sub>	TSH	Ral U or TcU	TPO Ab	ESR	Course	
1	53	M	Yes	No	Slight	10 g	Nontender		2.1	226	0.02	0%	neg	79	Spontaneously Euthyroid
2	48	M	Yes	No	No	Barely palpable		18.4	15.1	322	0.03	0%	neg	69	Spontaneously Hypothyroid
3	45	M	Yes	No	Minimal	25 g SI	Tender	25.8	32		0.01	0.09% <sup>a</sup>	neg		Spontaneously Hypothyroid
4	38	M	Yes	No	Slight	Nontender		12.5	14.3	209	<0.01	ND	neg	4	Spontaneously Hypothyroid
5	31	M	Unknown	M-Nodule	No	35 g SI	Tender	8.7	11.9	175	0.01	0.04%	neg		Spontaneously Hypothyroid
6	31	F	Unknown	M-Nodule	No	Nontender		9.2	8.5	151	0.11 <sup>b</sup>	1.50%	neg		Spontaneously Hypothyroid
7	69	M	No	No	No	Nontender		8.8	9	147	0.05	0.09%	ND		Spontaneously Hypothyroid
8	44	M	Yes	No	Slight	Nontender		14.4	12.8	233	0.04	ND	neg	28	Spontaneously Hypothyroid
9	41	M	Yes	No	No	Nontender		14.9		6.7	<0.03	undetect	neg		Spontaneously Hypothyroid

Normal range, T<sub>4</sub> 4.5–10.9 μg/dL; FT<sub>4</sub> 4.5–10.9; FT<sub>4</sub>, 0.7–1.5 ng/dL; T<sub>3</sub>RIA, 60–180 ng/dL; TSH, 0.5–5.0 μU/ml; 24-hour <sup>123</sup>I uptake, 10%–30%; 20-min <sup>99m</sup>Tc uptake, 0.5%–3.75%; subsequent TSH, 0.01; ND, not done. M, mother

<sup>a</sup>T<sub>4</sub>, thyroxine; FT<sub>4</sub>I, free thyroxine index; FT<sub>4</sub>, free thyroxine; TT<sub>3</sub>, total triiodothyronine; TSH, thyrotropin; TPO Ab, thyroid peroxidase antibodies; SI, slightly; FH, family history; Hx, history; Ral U, radioactive iodine uptake; TcU, Technetium pertechnetate uptake; ESR, erythrocyte sedimentation rate.



## Subacute thyroiditis in the course of novel H1N1 influenza infection

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Nikolaos Akritidis

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**Abstract** To describe the first documented case of subacute (De Quervain) thyroiditis in the course of novel H1N1 influenza infection. This is a case report of a patient

### Introduction

The pandemic of novel swine-origin H1N1 influenza virus,

T3 310 ng/dL, (normal 58–159 ng/dL)  
FT4 1.55 ng/dL, (normal 0.7–1.48 ng/dL)  
TSH 0.00, (normal 0.35–4.95 mIU/L)  
TG, TPO Antibodies – negative  
ESR 60 mm/h (normal 0–20 mm/h)

Technetium-99 scintigraphy:  
Diffuse and inhomogenous very low  
technetium trapping, c/w subacute  
thyroiditis.

Patient declined FNA.

# Next Steps...

The differential for thyrotoxicosis can seem equivocal without (and perhaps despite) a thorough historical, physical, and diagnostic work-up.

Further work-up is needed in our patient;

Determining etiology is useful – should anti-thyroidal drugs be continued or can they safely be stopped?

If think safe to d/c ATD, can do RAI uptake in a few days

If suspicion is still high for Graves', and shouldn't stop ATD, FNA better

Check HLA-Bw35?

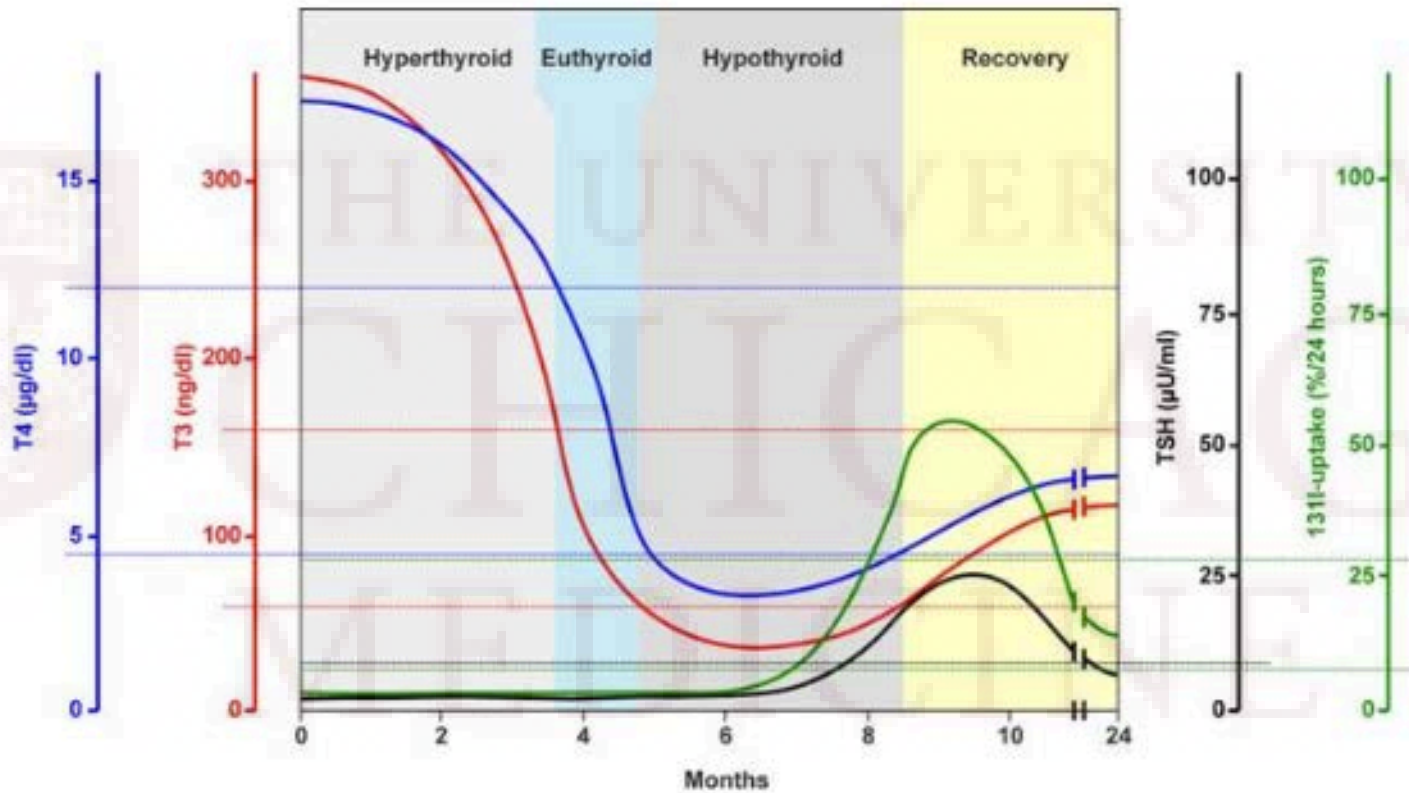


Figure 13-4. Schematic representation of the phases of silent thyroiditis. Modified after Woolf PD, *Endocr Rev* 1:411-420, 1980 (213).