# CPC
# 'Waiting for a diagnosis'

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ESIM Riga 2017

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# Introduction

Internal medicine case

Brief introduction to the case

Work through the possible diagnoses

Final discussion

# History

Male, Age 59 , Milkman

Admitted Internal Medicine

Unwell for 2 months

Intermittent fevers

Weight loss of 17kg over 8 weeks

Buttock/back pain-diffuse

# Mr B: Further history

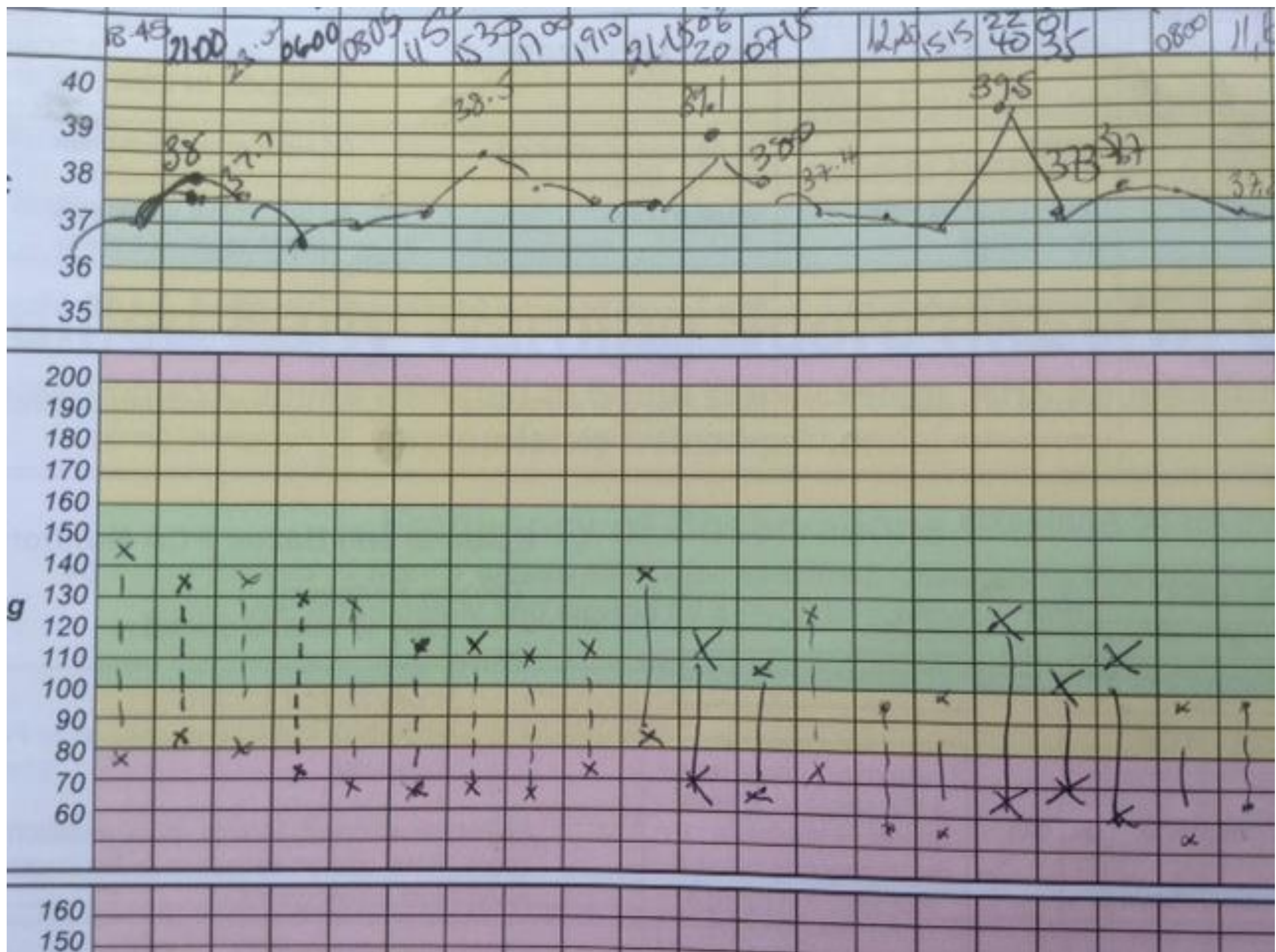
**Past Medical History**:
COPD
Investigated for pulmonary TB in 2008-negative
Recent episode of testicular pain-epididymo-orchitis

**Drug History:** Salbutamol inhaler, no allergies

**Social History:** White, born UK, lives in a town, with wife
No recent travel outside UK
Ex-smoker, 30/day for 30 years
Alcohol <10u per week

# On examination

White male
Cachectic 46 kg, BMI 17 kg/$m^2$ (<18.5)
Fluctuating pyrexia T 38.5 C
Cardiovascular/Respiratory/Abdominal/
neurological systems all normal
No lymphadenopathy
Joints/spine normal



40
39
38
37
36
35
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
160
150

# Initial Investigations

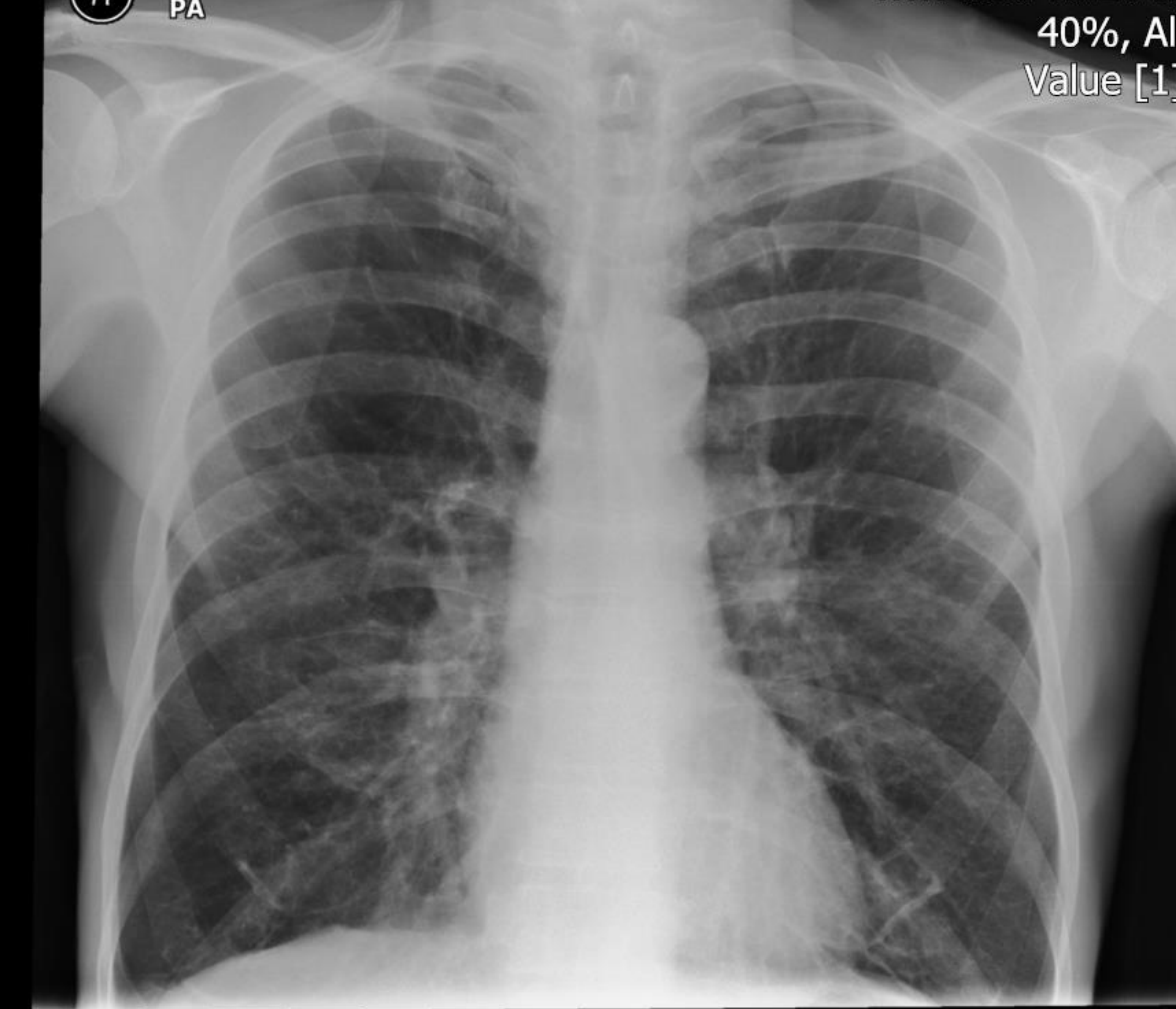
| | | | | |
|---|---|---|---|---|
| Hb | 106 | g/L | (130-170) | ↓ |
| MCV | 80 | fl | (80-100) | |
| wbc | 29 | x $10^9$/L | (4-11) | ↑ |
| Neut | 26.8 | x $10^9$/L | (2-7) | ↑ |
| Plt | 912 | x $10^9$/L | (140-400) | ↑ |
| CRP | 260 | mg/L | (<11) | ↑ |
| PV | 2.22 | mPa.s | (1.5-1,72) | ↑ |

# Initial Investigations

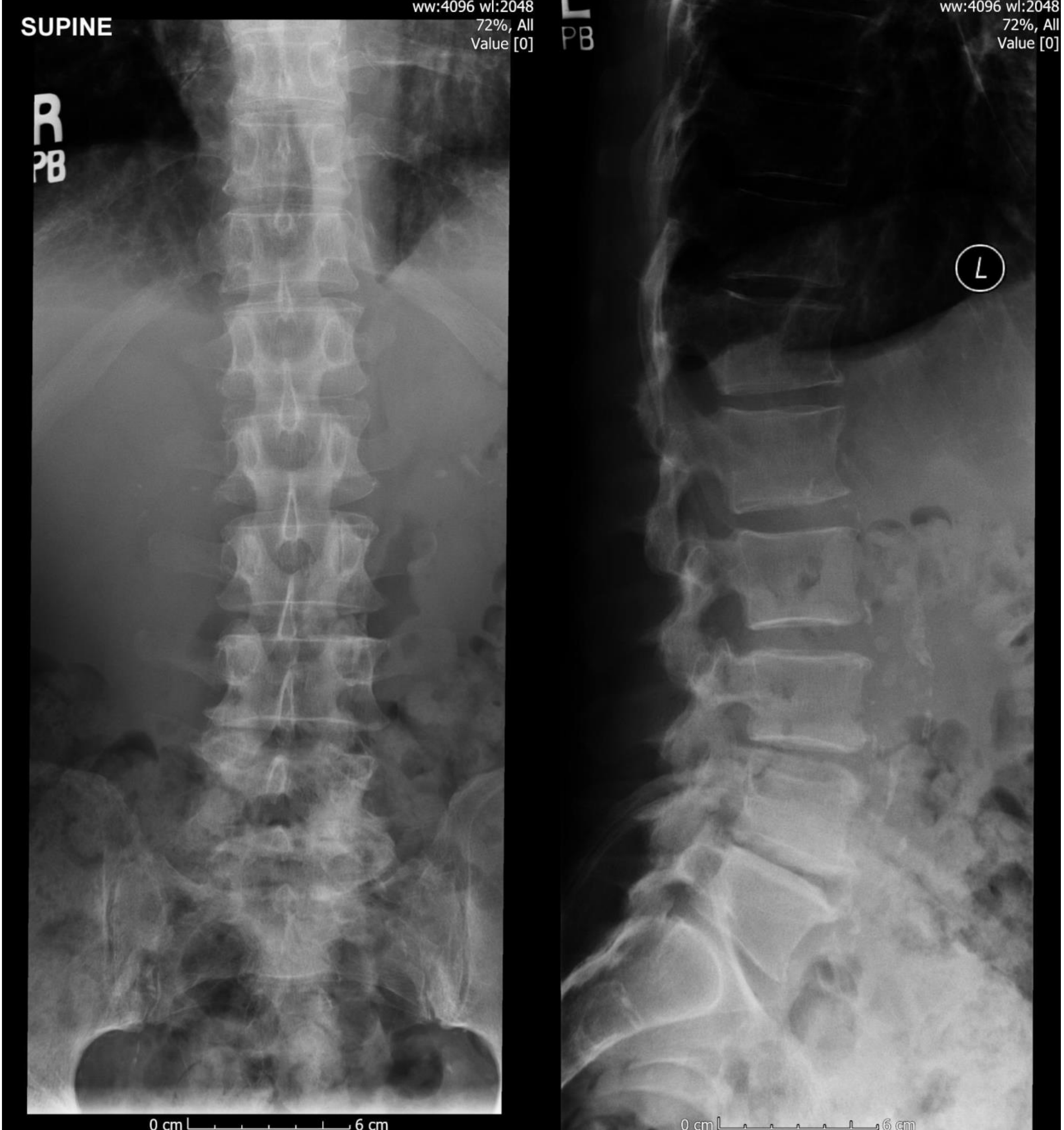
| | | | |
|---|---|---|---|
| Sodium | 133 | mmol/L | (133-146) |
| Potassium | 4.3 | mmol/L | (3.5-5.5) |
| Creatinine | 54 | umol/L | (65-105) |
| | | | |
| Albumin | 23 | g/L | (35-50) |
| Bilirubin | 7 | umol/L | (4-25) |
| Alk Phos | 167 | U/L | (40-130) |
| ALT | 40 | U/L | (10-50) |
| Calcium | 2.37 | mmol/L | (2.2-2.6) |

m

cm



X ray Lumbar spine



# Imagine you are the resident looking after this patient…

1. What is the differential diagnosis?
2. What further investigations would you arrange?
3. What treatment would you start?

# Initial Diagnosis

1. Sepsis-unknown origin

-Bacterial: Pneumonia, Bacterial endocarditis,
-Viral: HIV or other viral infection
-Septic discitis lumbar spine

2. Malignancy-bronchial carcinoma, other malignancy

3. Haematological malignancy. Eg lymphoma

# Initial treatment

IV broad spectrum antibiotics

Co-amoxiclav 1.2g 3x daily

# Further Investigations

| **Infection screen** | |
|---|---|
| Blood cultures x 3 | negative |
| Urine dip/culture | negative |
| Hepatitis B/C | negative |
| HIV 1 and 2 | negative |
| | |
| Echocardiogram | normal |
| | |
| **Malignancy** | |
| US Abdo , testes | normal |
| Prostate specific antigen | normal |
| CT Thorax/Abdomen/Pelvis | Emphysema |
| Immunoglobulins | normal |
| Serum Electrophoresis /light chains | normal |

# Further investigations

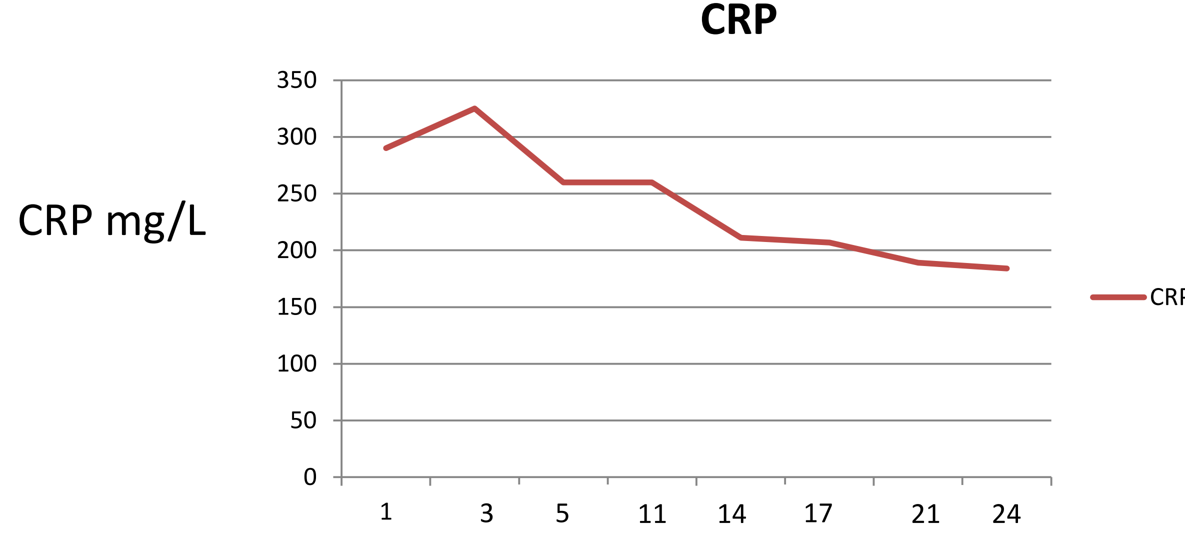
- **Infection screen**
- Blood cultures x 3 negative
- Urine dip/culture negative
- Hepatitis B/C negative
- HIV 1 and 2 negative

- Echocardiogram normal

- **Malignancy**
- US Abdo , testes normal
- Prostate specific antigen normal

- CT Thorax/Abdomen/Pelvis
  Emphysema

- Immunoglobulins normal
- Serum Electrophoresis normal
- Light chains normal




Day

# What would you do next?

# What happened next? Week 1

Ward 1: Consultant 1, Acute medicine

Broad spectrum antibiotics started . Refer gastroenterology weight loss.

Ward 2: Consultant 2, Gastroenterology

No obvious gastroenterology cause.

Anti TTG antibodies negative.

Refer haematology

# Week 1 continued

| | |
|---|---|
| Consultant 3, Haematology | |
| Check Lactate dehydrogenase | Normal |
| Bone marrow aspirate | Reactive, no evidence TB |
| JAK mutation | Negative |

# Week 2

Consultant 4, Respiratory-emphysema

Hb falling 86 g/L

platelets rising 1216

Consultant 5, Microbiologist

CRP 183-antibiotics changed Mereponem and rifampicin

# Week 3

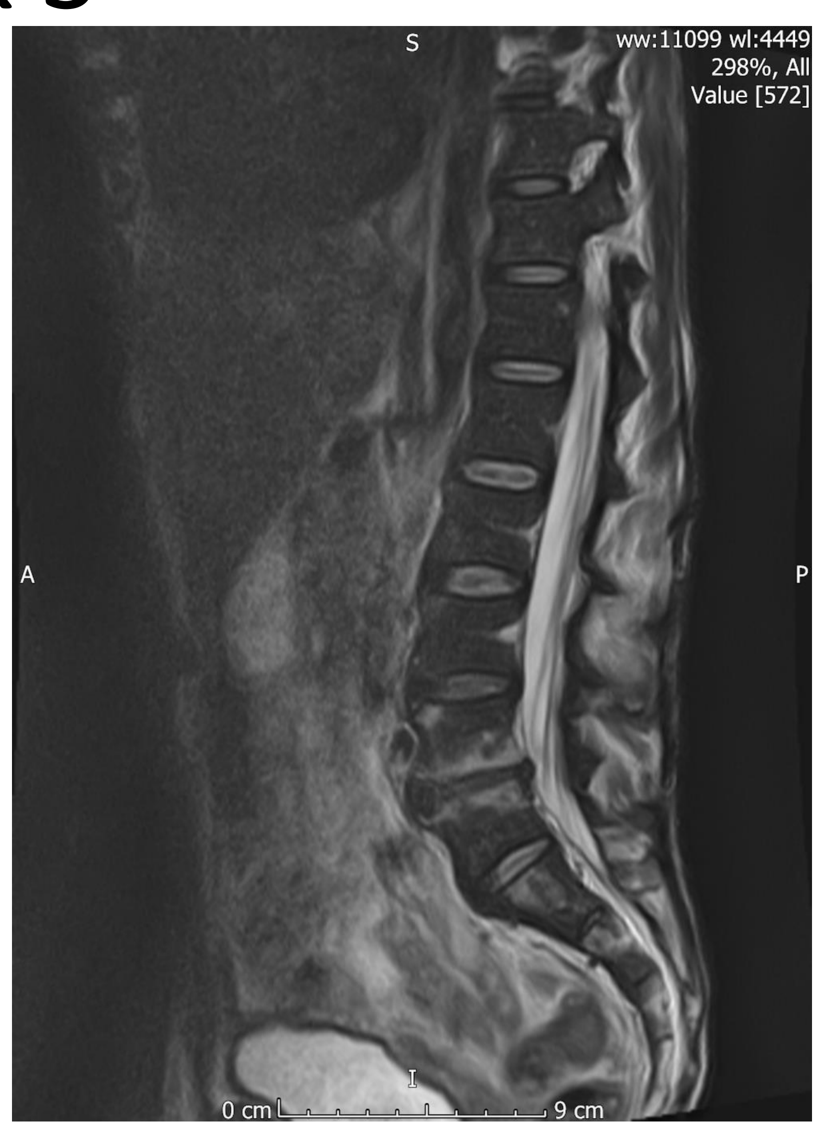
## Weight falling BMI 15

## MR spine

Diffuse oedema vertebrae

Degenerative changes, no discitis,

no abscess, no evidence of malignancy



# Week 3 continued

PET scan

Increased bone marrow uptake-diffuse

Consultant 6, Infectious diseases

About to go on holiday for 2 weeks, waiting for a bed at teaching hospital

# Week 3 continued Further infection screen- atypical infections - all negative

- Adenovirus
- Coxiella burneti (Q fever)
- Chlamydia Psittacosis
- Enterovirus
- Influenza A /Influenza B/ Parainfluenzavirus
- Mycoplasma pneumoniae
- Respiratory syncytial virus
- Leptospira
- Legionella
- Brucella
- Borrelia burgdorferi IgG/IgM
- Bartonella

# Week 4

Ward 3: Consultant 7, Respiratory
? TB
Mantoux test, Sputum & early morning urine-negative.
Inf Gamma Release Assay (IGRA)-requested-not done

? Vasculitis
'Vasculitis screen' ANA/ANCA negative

Albumin falling 22 g/L (35-50)
Consultant 8, Cardiology no evidence endocarditis

# Week 4 continued

Developed diarrhoea, transferred to isolation ward

IGRA cancelled

Ward 4: Consultant 9,  Care  of Elderly

Diagnosis: ? Inflammatory bowel disease

# Week 5

Consultant 10, Gastroenterology, no evidence of inflammatory bowel disease

Stool sample positive for Clostridium Difficile toxin (CDT)

Oral metronidazole started

Nasogastric  tube inserted for feeding

# Patient

‘ I had given up, I was feeling so weak, I thought I was dying’

# Week 6

Consultant 11, Gastroenterology

Diagnosis not clear

Suggests trial of prednisolone

Rheumatology opinion

# Week 7

No diagnosis but started prednisolone 30 mg daily

Dramatic improvement

CRP 9, Albumin 35

# Week 7

Consultant 12, Rheumatology

Diagnosis made

# Diagnosis?

Polyarteritis nodosa (PAN)

Medium/small vessel vasculitis
ANCA negative

# PAN-Classification Criteria

**at least three** of the following criteria:

- Otherwise unexplained weight loss greater than 4 kg
- Livedo reticularis
- Testicular pain or tenderness
- Myalgias – weakness/tenderness of leg muscles
- Mononeuropathy or polyneuropathy
- New-onset diastolic hypertension
- Elevated levels of or creatinine
- Evidence of hepatitis B virus infection
- Characteristic arteriographic abnormalities
- A biopsy of small- or medium-sized artery containing pmn cells

American College Rheumatology 1990

# Treatment for Vasculitis

3 x IV Methylprednisolone 1g daily

Followed by oral prednisolone 1mg/kg

Pulse IV cyclophosphamide 10mg/kg every 3 weeks for 6 pulses

# Progress

Appetite improved-eating normally
Nasogastric tube removed
Weight improving-1 kg gain in 1 week
Mood improved
Physiotherapy

| | | | |
|---|---|---|---|
| Hb | 119 | g/L | (130-170) |
| CRP | 4 | mg/L | (<11) |
| Albumin | 34 | g/L | (35-50) |

# Progress

Week 9: Home

Reducing dose of prednisolone

Completed 6 x pulse IV cyclophosphamide

Started azathioprine

# So why did it take so long to reach a diagnosis?

# Multiple errors

1. Failure to broaden diagnoses when initial investigations negative. Vasculitis was only considered as a diagnosis in week 4
2. Diagnosis of vasculitis dismissed because ANCA negative
3. Multiple changes of wards (4)
4. Multiple consultants (11) -silo mentality

# Silo Mentality

Each person sits inside their own silo
Failure to problem solve across broad boundaries

# Patient Harm

1. Multiple unnecessary treatments and investigations
2. Iatrogenic infection-C. Difficile
3. Psychological- patient still has bad dreams, doesn’t want to go back into hospital again

# Systems/Organisational errors

6 weeks of cost of hospital in-patient care

Cost of all investigations

Unnecessary ward moves

This case argues for all patients to be under a supervising physician practising internal medicine

# Diagnostic errors- clinical problem solving

'The most important predictor of successful problem solving is the quality of the hypotheses that are generated early in the process. Once generated, a correct diagnosis is hardly ever rejected, but the case will not be solved if this process fails'

Custers et al, Clinical problem analysis: a systematic approach to teaching complex medical problem solving. Acad Med 2000

# Avoiding diagnostic errors

Pattern recognition vs analytical reasoning

Pattern recognition- take a shortcut, easy, you’ve seen it before, you know what it is

If you are faced with a situation where you don’t know what is going on-slow down, avoid short cuts, switch to analytical reasoning

# Analytical reasoning

‘Thinking slow’

Use frameworks to explore all avenues

Discuss the case with colleagues/grand rounds

# A framework to prompt analytical problem solving

V

I

T

A

M

I

N

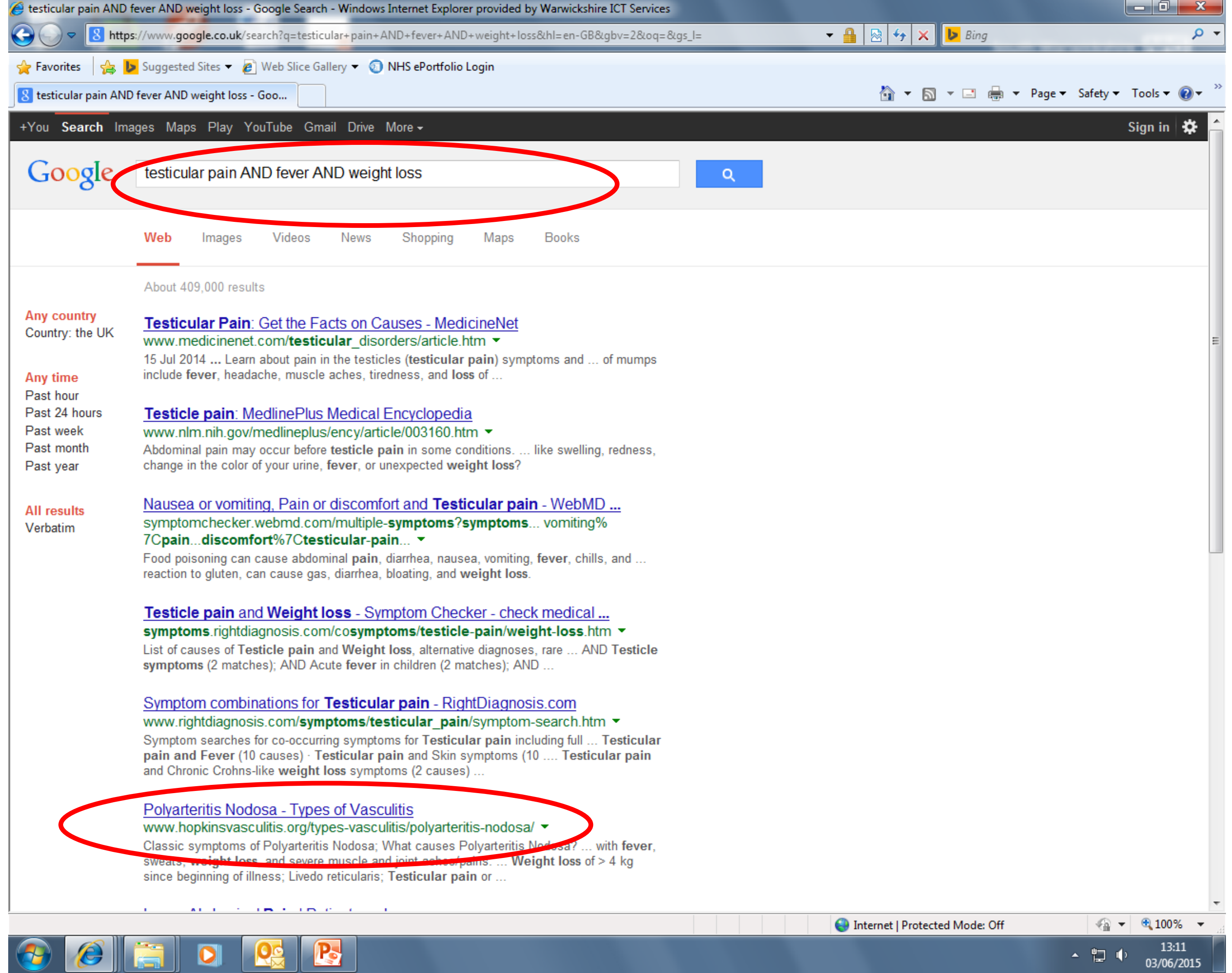
Rigby et al, Student BMJ 2008

# A framework to prompt analytical problem solving

| | |
|---|---|
| V | Vascular |
| I | Infection-bacterial, viral, other |
| T | Trauma/injury |
| A | Autoimmune/inflammatory |
| M | Metabolic/endocrine |
| I | Iatrogenic/Medicines |
| N | Neoplasia-benign, malignant |

- Rigby et al, Student BMJ 2008

# How about using Dr Google?



# Using Google to make a diagnosis

***Googling for a diagnosis—use of Google as a diagnostic aid: internet based study***

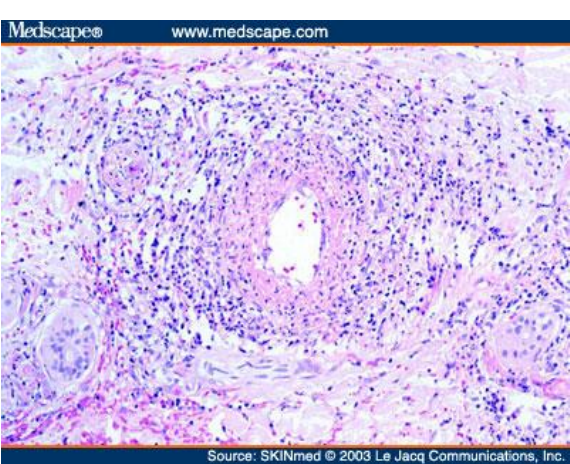
*BMJ 2006;333:1143*

Google correctly identified the diagnosis in 58% of cases

# Why do patients with PAN get testicular pain?

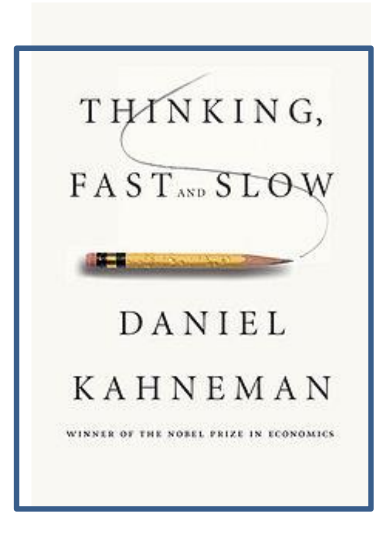
# Why do patients with PAN get testicular pain?






Poiseuille's law
Flow is proportional to $r^4$

# Summary




PAN-rare disease, easy to miss

Use slow thinking when faced with a clinical problem which is difficult to solve

Use a framework to prompt you to think