

# APPROACH TO THE FEBRILE PATIENT

Dr. Awadh Al-Anazi, M.D  
College of Medicine  
KING SAUD UNINERSITY

1440-1441/2019-2020

# FEVER

Is an elevation of body temperature above the normal circadian range as the result of a change in the thermoregulatory center located in the anterior hypothalamus and pre-optic area.



# THERMOREGULATION

Body heat is generated by:

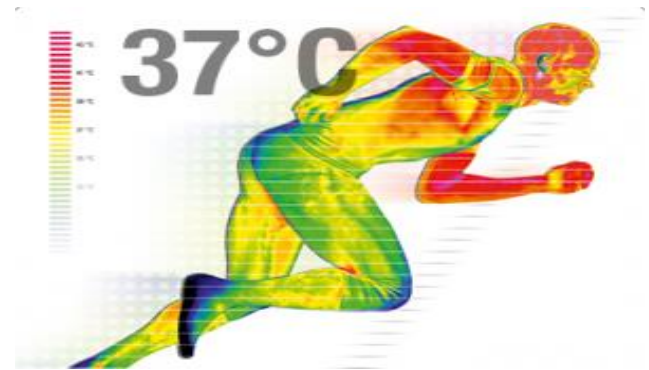
- Basal metabolic activity.
- Muscle movement.

And is lost by:

- Conduction.
- Convection (which is increased by wind or fanning).
- Evaporation which is increased by sweating. or sometimes by breathing

Body temperature is controlled in the hypothalamus, which is directly sensitive to changes in core temperature.

The normal '**set-point**' of core temperature is tightly regulated within  $37 \pm 0.5^{\circ}\text{C}$ , as required to preserve normal function of many enzymes and other metabolic processes.



In a hot environment, Sweating is the main mechanism for increasing heat loss.

This usually occurs when the ambient temperature rises above 32.5°C or during exercise.

as a mechanism of compensation in hot and cold environment the thermoregulatory center in hypothalamus will play an extreme important role.

if you was in a hot environment, sweating is the mechanism to decrease body temperature by loss of heat, the opposite mechanism in the cold weather, shivering and twitching of the muscles will rise the body temperature.



# FEBRILE RESPONSE

The initiation of fever begins when exogenous or endogenous stimuli are presented to specialized host cells, principally monocytes and macrophages.

They will stimulates the synthesis and release of various *pyrogenic cytokines* including:

- interleukin-1, interleukin-6
- TNF- $\alpha$ , and
- IFN- $\gamma$ .

# EXOGENOUS

Stimuli from outside the host like:  
microorganism, their products, or toxins which are called **Endotoxin** (lipopolysaccharide).

Lipopolysaccharide (LPS): are found in the outer membrane of all gram negative organisms.

Action :

- Through stimulation of monocytes and macrophages.
- Direct on endothelial cell of the brain to produce fever.

# ENDOGENOUS PYROGENS

Polypeptides that are produced by the body (by monocytes and macrophages) in response to stimuli that is usually triggered by infection or inflammation stimuli.



- Pyrogens: substances that cause fever.

What pyrogens are there?

Cytokines: regulatory polypeptides that are produced by:

- Monocytes / macrophages.
- Lymphocytes.
- Endothelial and epithelial cell and hepatocytes.

The most important ones are :

- Interleukin  $1\alpha$  and  $1\beta$  (the most pyrogenic). In Labs when they inject this substance to animals the temperature will rise immediately
- Tumor necrosis factor  $\alpha$ .
- Interferon.
- Interleukin 6 (the least pyrogenic).

↑cytokines → fever develop within 1h of injection.

# MECHANISM OF ACTION

Cytokine-receptor interactions in the pre-optic region of the anterior hypothalamus activate phospholipase A.

This enzyme liberates plasma membrane arachidonic acid as substrate for the cyclo-oxygenase pathway.

The resulting mediator, *prostaglandin E<sub>2</sub>*, then modifies the responsiveness of thermosensitive neurons in the thermoregulatory center.

- Diurnal variation:

6 am : 37.2 °C

4 pm : 37.7 °C

- Rectal temperature  $>0.6^{\circ}\text{C}$  oral temperature

Fever: Morning : AM  $>37.2^{\circ}\text{C}$

Evening : PM  $>37.7^{\circ}\text{C}$

# PRESENTATION OF FEVER

## **Feeling hot:**

A feeling of heat does not necessarily imply fever.

## **Rigors:**

Profound chills accompanied by chattering of the teeth and severe shivering and implies a rapid rise in body temperature. Can be produced by :

- Brucellosis and malaria.
- Sepsis with abscess.
- Lymphoma. and autoimmune diseases

## **Excessive sweating:**

Night sweats are characteristic of tuberculosis, but sweating from any cause is usually worse at night.

When the patient wake up with all his clothing wet this is consider pathologic sweating

# PRESENTATION OF FEVER

## **Headache:**

Fever from any cause may provoke headaches.

Severe headache and photophobia, may suggests  
**meningitis**.or sinusitis

## **Delirium:**

Mental confusion during fever is well described and relatively more common in extreme of age.

Because with aging the blood vessels become sclerotic and the elasticity decrease, so when there is fever the oxygen demand of the brain will increase and its need to be compensated by increase blood flow but with the sclerosis and reduced elasticity the blood flow remains the same, this leads to decrease level of consciousness and confusion.

## **Muscle pain:**

Myalgia is characteristic of viral infections(influenza), and other infections( malaria and brucellosis etc.)

# HYPERTHERMIA

There is a difference between hyperthermia and fever which is secondary to stimuli

Is an elevation of core temperature without elevation of the hypothalamic set point.

**Cause:** inadequate heat loss, such as:

- Heat stroke. تكثر في موسم الحج
- Drug induced such as: tricyclic antidepressant.
- Malignant hyperthermia associated with psychiatric drugs. and anesthesia

# FEVER: BENEFICIAL/DANGEROUS?

Elevation of body temperature increases chance for survival.

Temperatures appear to increase the phagocytic and bactericidal activity of neutrophils, and the cytotoxic effects of lymphocytes. **So it has some benefit but not enough to control the infection**

Thus the growth and virulence of several bacterial species are impaired at high temperature.



# FEVER PATTERNS

Fever patterns Important when we take history

- Intermittent fever.
- Remittent fever.
- Hectic fever.
- Sustained fever.
- Relapsing fever.

## **Intermittent fever:**

Exaggeration of the normal circadian rhythm and temperature.  
falls daily to normal.

when the variation is large it is called hectic.

## **Causes:**

- Deep seated infection.
- Malignancy.
- Drug fever.

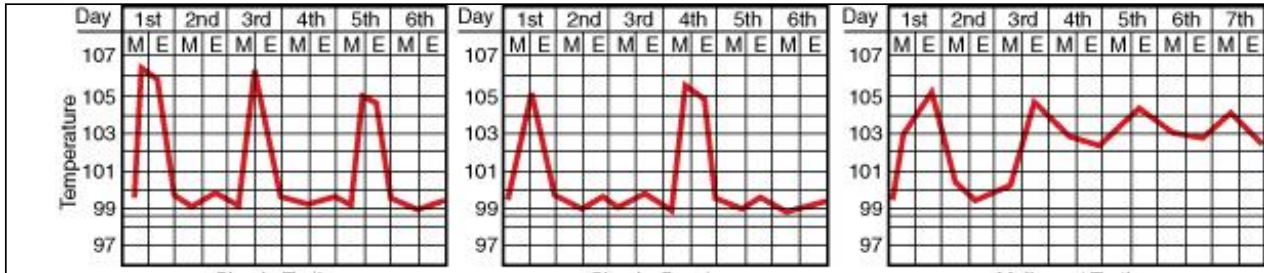
Quotidian fever: hectic fever that occur daily.

## **Remittent fever:**

Temperature falls daily but not to normal.

## **Causes:**

- Tuberculosis.
- Viral infection.
- Many bacterial infections.



## Relapsing fever:

Febrile episodes are separated by intervals of normal temperature. Such as:

- **Malaria:** fever every 3 days (tertian) caused by (plasm. Falciparum). Or every 4 days (quartan) caused by (plasm. Vivax).
- **Borrelia:** Days of fever followed by days of no fever.

# FEVER PATTERN

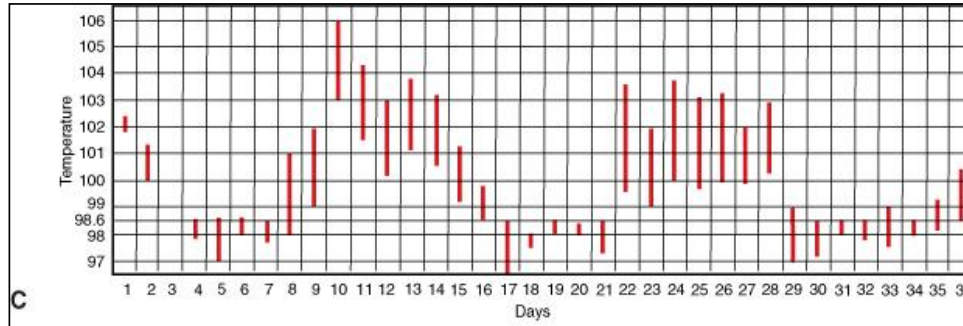
Fever pattern cannot be considered diagnostic for a particular infection or disease and the typical pattern is not usually seen because of use of :

- Antipyretics.
- Steroids.
- Antibiotics.

**factors determine the clinical improvement:**

- 1- follow patient daily with T- max which is the maximum temperature per day.
- 2- duration between fever spikes.

# FEVER PATTERN

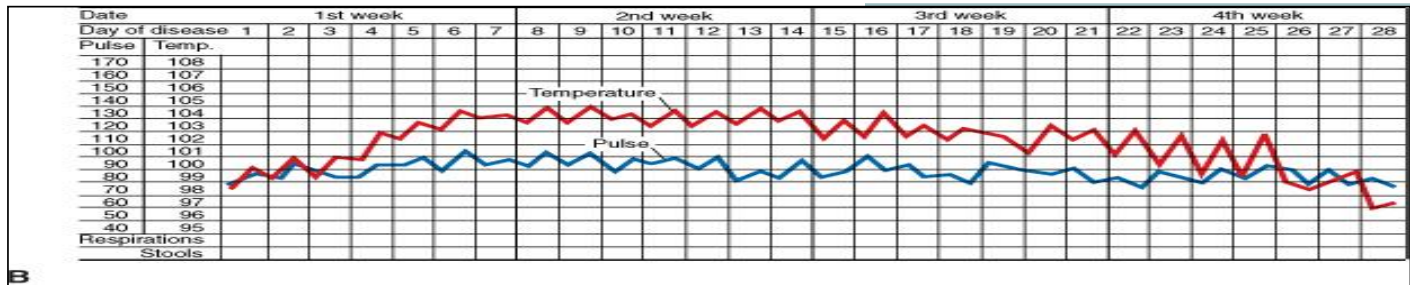


## **Pel-Ebstein fever:**

Fever for 3 to 10 days followed by no fever for 3 to 10 days.

## **Causes:**

- Hodgkin lymphoma.
- Tuberculosis.



## Temperature-pulse dissociation (Relative bradycardia)

is seen in: The normal body reaction to fever is tachycardia .. 1 degree increase in temperature will rise the heart rate by 10 to 15 beats

- Typhoid fever.
- Brucellosis.
- Leptospirosis.
- Factitious fever.
- Acute rheumatic fever with cardiac conduction abnormality.
- Viral myocarditis.
- Endocarditis with valve ring abscess affecting conduction.

It's a wrong reading fever, for example if the nurse measures the temperature orally when the patient is drinking coffee or tea.  
sometimes patient do rubbing to the thermometer to increase the temperature.

Beta blockers

# FEVER PATTERNS..DEGREE

Fever with extreme degree:

- Gram-negative bacteremia.
- Legionnaires' disease.
- Bacteremic pyelonephritis.

Noninfectious cause of extreme pyrexia:

- Heat stroke.
- Intracerebral hemorrhage. Called central fever

# APPROACH TO THE FEBRILE PATIENT

What is the easiest and most cost effective way of reaching a diagnosis and thus offering the right treatment for a febrile patient?



**METICULOUS DETAILED  
HISTORY.**

# APPROACH TO FEVER

Rule out common infection.

Remember:

**UNCOMMON MANIFESTATIONS OF COMMON  
DISEASES ARE COMMONER THAN COMMON  
MANIFESTATIONS OF UNCOMMON ONES.**

## Careful history:

## Chronology of symptoms:

Detailed complain of the patient with the symptoms arranged chronologically.

## Use of drugs:

Don't jump to drug fever until you rule out serious causes like infection

Drug fever is uncommon and therefore easily missed. The culprits include:

- Penicillin.
- Cephalosporin.
- Sulphonamide.
- anti tuberculous agents.
- anticonvulsants particularly phenytoin.

## **Surgical or dental procedure:**

Patient known to have rheumatic heart disease is at risk to develop infective endocarditis if not given prophylaxis.

## **Occupational history:**

- Exposure to animals: brucellosis & Q fever.
- Exposure to infected person tuberculosis or influenza.

**Brucellosis and Q fever zoonotic diseases share the same risk factors:  
Unpasteurized milk + eat raw liver + uncooked meat.**

## **Symptoms of common respiratory infections:**

- Sore throat, nasal discharge, sneezing ...?URTI (VIRAL).
- Sinus pain and headache.....? Suggesting sinusitis.
- Elicit symptoms of lower respiratory tract infection cough, sputum, wheeze or breathlessness.

Frontal and maxillary Sinus pain increase with praying.

## **Genitourinary symptoms:**

Ask specifically about:

frequency of micturition, dysuria, loin pain, and vaginal or urethral discharge, suggesting:

- Urinary tract infection.
- Pelvic inflammatory disease.
- Sexually transmitted infection (STI).

## Abdominal symptoms:

Diarrhea + nausea + vomiting most likely food poisoning or viral/ bacterial infection.

Ask about diarrhea, with or without blood, weight loss and abdominal pain, suggesting:

- Gastroenteritis.
- Intra-abdominal sepsis. **Post op or trauma**
- Inflammatory bowel disease.
- Malignancy.

**Lymphoproliferative like lymphoma and leukemia.**

**Hepatoma**

**Renal cell carcinoma**

## Joint symptoms:

Joint pain, swelling or limitation of movement . If present ask about:

- Distribution: mono, oligo or poly arthritis.
- Appearance: fleeting or additive.

It suggests:

- Infective arthritis...oligo.
- Collagen vascular disease.....Fleeting.
- Reactive arthritis.

-Mono most likely septic arthritis.

-Brucellosis most commonly affects sacroiliac joint.

-infections that can cause poly arthritis:

Rheumatic fever, disseminated gonorrhoea and reiter syndrome which is triggered by certain infection like chlamydia and other genitourinary infections.



## **Family history of:**

- Tuberculosis.
- Arthritis.
- Other infectious diseases.
- Any one with symptoms of Polyserositis or bone pain.

## **Ethnic origin of the patient:**

Turks, Arabs, Armenians likely to have Familial Mediterranean fever (FMF).

## Geographic area of living:

Very important in history taking.

If the patient has been in an endemic area common diagnoses include:

- **Malaria.** تكون في المناطق الساحلية المنخفضة مثل جازان ... أبها والباحة تعتبر مناطق جبلية ماتعيش فيها الباعوضة التي تنقل الملاريا لكن بعض السكان ينتقلون للمناطق المنخفضة خلال فصل الشتاء ويمكن يصابون في المرض
- **Typhoid fever.** منتشر في جنوب آسيا < باكستان و بنغلادش
- **Viral hepatitis.**

Dengue fever & other viral diseases:

حمى الضنك توجد في المناطق الغربية مثل جدة وايضاً في جازان ونجران

- Hemorrhagic fevers (eg: Rift valley)
- Ebola أفريقيا
- CORONA(MERS-COV)
- Zika virus أمريكا الجنوبية
- Nipah virus

Fever + picture of hemolysis + low platelet + prolonged PTT + liver impairment + hx of traveling to these area > I should put in mind hemorrhagic viruses which is endemic at these areas.

*Malaria* must be excluded whatever the presenting symptoms.

# FURTHER POINTS IN HISTORY

- Household pets.
- Ingestion of unpasteurized milk or cheeses.
- Sexual practice.
- Iv drug abuse.
- Alcohol intake.
- Prior transfusion or immunization.
- Drug allergy.

# PHYSICAL EXAMINATION

## **Approach considerations:**

Fever may sometimes be absent in some cases, such as:

Patient might be septic but because he is under one of these categories you will not find fever so in SIRS (systemic inflammatory response syndrome) we are looking for high temperature or hypothermia both can be signs of infection.

- Seriously ill newborns.
- Elderly patients.
- Uremic patient.
- Malnourishment.
- Corticosteroid use.
- Continuous treatment with anti-inflammatory or antipyretic agents.

Repeated meticulous examination on a regular basis  
(better by different colleagues) until diagnosis is reached.

Temperature should be taken

- Orally or,
- Rectally. to measure the core temperature ... used in pediatrics and neonates
- Axillary temperature is notoriously unreliable .

Cautions while taking oral temperature

- Recent consumption of hot or cold drinks.
- Smoking.
- Hyperventilation.

## **Document the presence of fever.**

A careful examination is vital and must be repeated regularly.

Particular attention should be paid to:

- The skin for rash.
- Throat for pharyngitis.
- Eyes for jaundice, scleritis.
- Nail bed for clubbing, splinter hemorrhage.
- lymph nodes for enlargement.
- abdomen for ascites or sign of peritonitis.
- heart for murmurs indicating endocarditis.

**Head:**  
 -tenderness around sinuses  
 -Increase headache when patient moving his head left & right > CNS infections

**Ear:**  
 -cellulitis in external ear.  
 -malignant otitis externa > in DM patients caused by pseudomonas  
 -look for discharge and abscess

-oral thrush > candida

**5 Mouth**  
 -tonsillitis  
 -peri-tonsillar abscess  
 Dental sepsis  
 Signs of HIV infection

**6 Jugular venous pulse**  
 -neck stiffness > meningitis

**7 Changing heart murmurs**  
 Endocarditis

**8 Pleural rub or effusion**  
 Signs of pneumonia or septic emboli

**9 Abdomen**  
 Hepatomegaly  
 Splenomegaly

**10 Groin injection sites**

**11 Femoral stretch test**



▲ Hip flexor spasm in an injection drug-user with psoas abscess

**12 Legs**  
 Thromboses  
 Emboli  
 Compartment syndrome

**13 Joints**  
 Septic or reactive arthritis

**4 Jaundice**  
 Viral hepatitis  
 Bacteraemia  
 Acute endocarditis  
 -pulsing of the eye > cavernous sinus thrombosis  
 -jaundice > hepatitis, malaria  
 Puffiness, swelling > periorbital abscess

**3 Optic fundi**  
 Retinal candidiasis

**2 Skin (any site)**  
 Abscesses  
 Ulcers

-Injection marks in drug abuse  
 -thrombophlebitis signs > tender, redness and feels like a thread on palpation

**1 Hands and nails**  
 Splinter haemorrhages  
 Signs of chronic liver disease

-clubbing > bronchiectasis and lung abscess  
 -pulse > reactive bradycardia

• Neck swelling > Internal jugular venous thrombosis (septic thrombophlebitis) in Lemierre syndrome which is secondary to certain types of bacteria "fusobacterium" affect oral mucosa and teeth

# SKIN

Look for rash.

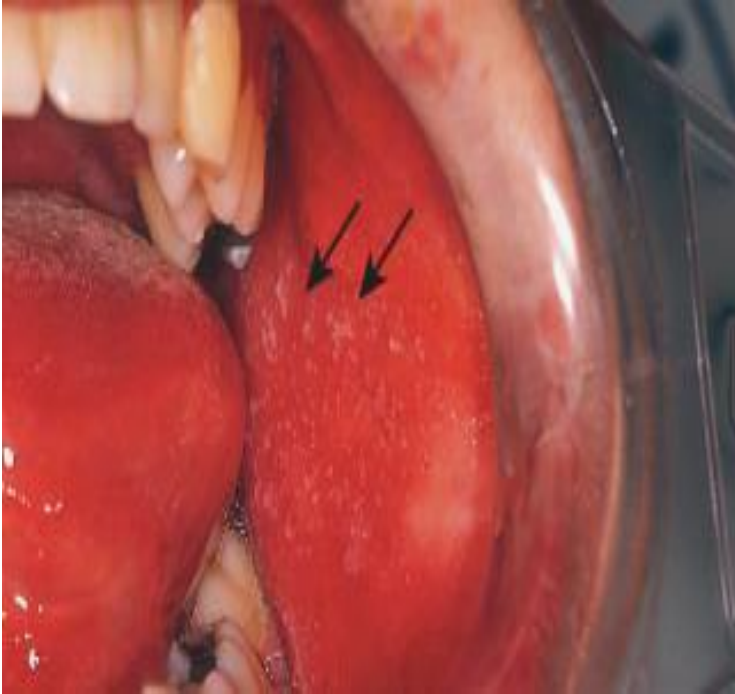
**Erythematous rash (rash that blanch on pressure):**

Causes:

- Measles: often accompanied by upper respiratory tract symptoms and conjunctivitis.
- Other viral infection like: rubella, scarlet fever.

-Swelling, redness, hotness > cellulitis ... caused by staph  
if the margins well demarcated > impetigo ... caused by staph and streptococcus





-Whitish spots in front of second molar teeth is pathognomonic feature of measles > called koplik spots, appears early before rash



## **Purpuric or petechial rash (do not blanch on pressure):**

- May suggest meningococcal septicemia.



## **Vesicular rash:**

May be caused by chickenpox or shingles.



# MOUTH AND OROPHARYNX

Vesicular lesions, tonsillar exudate suggest Infectious etiology:

- Streptococcal pharyngitis.
- Coxsackie infection.



Hairy leukoplakia or oropharyngeal candidiasis suggest:

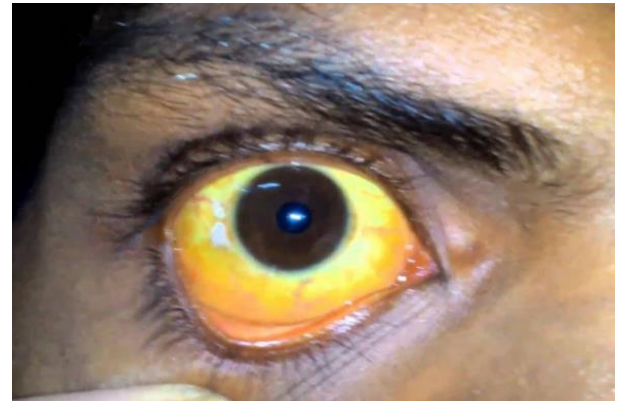
- HIV /AIDS Black patches > kaposi sarcoma



-strawberry tongue > kawasaki disease and scarlet fever

# EYES

- Conjunctival petechiae may suggest meningococcal meningitis.
- Jaundice may suggest acute hepatitis A.



# LYMPH NODES

Cervical lymph node enlargement and tonsillar enlargement suggest:

- Acute pharyngitis or tonsillitis.

Posterior lymphadenopathy suggest:

- Infectious mononucleosis.
- HIV infection.

Axillary lymph node enlargement may suggest:

- Sepsis.
- Leukemia.
- Lymphoma.

# JOINTS

Any joint but commonly the knee and ankle.  
Look for swelling, redness, hotness and effusion  
suggesting active arthritis ..? infective/septic arthritis

If single joint affected its in favor  
of infection always do:  
-fluid analysis to see cell count,  
presence of crystals.  
-gram stain & culture



**Neck:** look for stiffness. may suggest meningitis

## **Chest and heart:**

- Sign of consolidation.
- Pleural effusion. -chest expansion impaired.  
-percussion > dull or stony dullness.  
-increase tactile fremitus.
- Pericardial rub. -auscultation > crepitations & crackles, eegophony and bronchial breathing.
- Cardiac murmur: Endocarditis or acute rheumatic fever.

**Abdomen:** Look for tenderness (especially in the RIF) acute appendicitis and other types of acute abdomen.

## **Rectal examination:** look for

- Perianal abscess.
- Acute prostatitis.

### **Abdomen:**

- organomegaly
- rebound tenderness
- murphy's sign > cholecystitis
- liver bruits > disseminated gonorrheal infection
- ascites
- liver shrinkage + ascites + fever > Spontaneous Bacterial Peritonitis, we should analyze the fluid to see:
  - 1- serum albumin ascites gradient
  - 2- turbid fluid
  - 3- neutrophils > 250



20 years male who is a heroin drug abuser for a long time,  
came to ER c/o left thigh pain and fever.

Look at the picture and guess what is his problem



Hip flexor spasm due to psoas abscess secondary to staphylococcus septicemia with seeding into the muscle.

# FACTITIOUS FEVER

This is defined as fever created by the patient by manipulating the thermometer and/or temperature chart apparently to obtain medical care.

uncommon and typically presents in young women who work in paramedical professions.

Examples include the dipping of thermometers into hot drinks to fake a fever.

The factitious disorder is usually medical but may relate to a psychiatric illness with reports of depressive illness.

## Clues to the diagnosis of factitious fever:

- A patient who looks well.
- Absence of temperature-related changes in pulse rate.
- Temperature  $> 41^{\circ}\text{C}$ .
- Absence of sweating.
- Normal ESR and CRP despite high fever.

## Useful methods for the detection of factitious fever include:

- Supervised (observed) temperature measurement.
- Measuring the temperature of freshly voided urine.

# LABORATORY TESTS

Laboratory investigations are indicated if the presentation suggests more than a simple viral infection or acute pharyngitis in children.

Lab test can be focused if the history is suggesting a certain diagnosis.

- Leukopenia > viral infection
- high neutrophils > bacterial infection
- very high leukocytosis > acute leukemia
- low platelet > septic shock, malaria, hemorrhagic viruses, HUS/TTP ( hemolytic uremic syndrome thrombotic thrombocytopenic purpura ) which is fever + renal impairment + low platelet + normal PTT & aPTT + sometimes confusion
- low hemoglobin > malaria, chronic infection like TB & brucellosis.

CBC with differential:

Band forms(%of neutrophils), and toxic granulation(periph.B.F) suggest bacterial infection.

**Neutropenia** may be seen with:

- Infection: Typhoid, brucellosis ,viral infection.
- Vasculitis: systemic lupus erythematosus.

**Lymphocytosis** may be seen in:

Tuberculosis, brucellosis and viral disease.

**Monocytosis** is seen with:

- Tuberculosis, typhoid and brucellosis.
- Lymphoma.

**Eosinophilia** is seen in:

- Hypersensitivity drug syndrome.
- Hodgkin disease.
- Adrenal insufficiency.

Drug induce fever, dress syndrome

Blood films to exclude Malaria. Taken from periphery...best time during spike of fever

Urinalysis.

Sample any fluid and examine: pleural, peritoneal, joint.

Bone marrow aspirate & biopsy for microbiologic& histopathology.

Stool exam for occult blood, O, C & parasites.

**Chemistry:** electrolytes ,glucose, urea , and liver function.

**Microbiology:**

Samples from sputum, urethra, joint aspirates, pleural fluid, ascetic fluid and send for smears and culture.

**Sputum evaluation:**

- Gram staining.
- Z-N staining for acid fast bacilli.

**Cultures for:** blood, abnormal fluid collection and urine.

-Tissue culture if there is wound

**CSF:** if meningitis is suspected do gram stain and culture.

-histopathology and tissue biopsy to rule out malignancy & TB.



## Special blood tests:

HIV screening for patient who has risk factor (high risk behaviors):

- Recent travel with high risk behaviors.
- Injection drug user.
- Sex workers.
- Blood transfusion recipient.

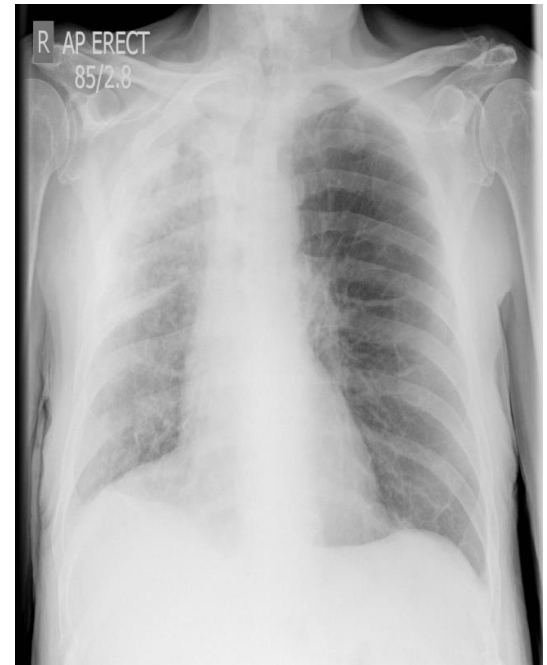
## Radiology:

Chest x ray is indicated for any patient with significant febrile illness.

CT PET scan > hot spot indicate malignancy or infection

### HIV testing:

- 1- pre-employment
- 2- before donating blood
- 3- pre-marital
- 4- antenatal care
- 5- TB
- 6- clinical picture "opportunistic infections"
- 7- high risk behavior



# OUTCOME OF DIAGNOSTIC EFFORTS

Patient recover spontaneously suggesting:  
viral illness or some of the spontaneously recovering  
bacterial infection (mainly intracellular organism like  
*typhoid or brucellosis*).

If fever persist for more than 2-3 weeks with no diagnosis is  
reached by repeated physical examination and laboratory  
tests then it's:

**PYREXIA OF UNKNOWN ORIGIN(PUO,FUO)**

# TREATMENT OF FEVER

-Central fever caused by stroke with large infarction or hemorrhage > no need for further work up or treatment.

Is it fever or hyperthermia?

Hyperthermia:

1. Heat stroke.
2. Drug-induced hyperthermia.
3. Malignant hyperthermia.

## **Heat stroke:**

Thermoregulatory failure in association with a warm environment.

- **Exertional:** young person exercising at ambient temperature and or humidity that is higher than normal.
- **Non Exertional:** typically occur in the elderly.

**Hyperpyrexia:** more than 40 should be treated with antipyretics and physical cooling.

While resetting the hypothalamic set point with antipyretic will speed the process. Antipyretics also help treating headaches, myalgia and chills.

Low grade or moderate fever is not harmful; so no antipyretics use except for:

- Pregnant women.
- Child with febrile seizures.

Why no antipyretics for mild fever?

- Obscure the natural history of the patient disease or syndrome.
- Gives false feeling of well being. may miss/mask meningitis which may be imminently life-threatening.

# ANTIBIOTICS USE IN ER

Pathogens

Infection focus

host factors (Immune factors)

Common infection in ER:

- UTI
- Respiratory tract infection
- CNS infection
- Cellulitis

-Each patient before we give him antibiotics we need to categorize him as health care associated or community acquired infection because Health care associated infection means patient has risk factor for multi-drug resistant organism and certain type organisms including pseudomonas.

-Antibiogram is a summary of the cultures has been done during the year, for example 1000 culture of urine showed most common organism E.coli and the most pattern of sensitivity is to a specific antibiotic > so I can start that antibiotic empirically with patients present with UTI.

# ANTIBIOTICS USE IN UTI

Upper urinary tract infection

**Symptoms:** Fever, flank pain, dysuria

**lab test:** Pyuria, bacteria

**Treatment:** cotrimoxazole , cephalosporin or aminoglycoside (duration: 7-10 days)



# ANTIBIOTICS USE IN-RESPIRATORY TRACT INFECTION

## **Pneumonia:**

Cough, fever, sputum or not.

**Clinical manifestations:** consolidation.

**CXR:** opacity with air bronchogram interstitial infiltrate.

**Sputum:** gram's stain.

**Treatment:** 3<sup>rd</sup> generation cephalosporins and macrolides.

# ANTIBIOTIC USE IN-RESPIRATORY TRACT INFECTION

## **Nosocomial fever:**

Fever acquired after 48 hours of admission to the hospital.

Maybe:

- Pneumonia.
- Catheter related infection.
- UTI.

Consider hospital pathogen while selecting antibiotics.

# ANTIBIOTICS USE IN-CNS INFECTIONS

## **Bacterial meningitis:**

Use aggressive antibiotics-due to prognosis and sequence.  
cephalosporin ±Vancomycin.

## **Viral meningitis:**

Observation, s/s Tx.

Herpes meningitis: acyclovir.

## **TB meningitis:**

Anti-TB agents.

Prognosis: variation.

**Fungal meningitis:** antifungal agents.

# ANTIBIOTICS USE IN-CELLULITIS

Pathogens: common streptococcus, or staphylococcus.

Antibiotics: PCN G or oxacillin/synthetic penicillin's

# PITFALLS

- Depend on laboratory data.
- Incomplete history and examination.

Atypical presentation:

- Immunocompromised patient.
- Newborn.
- Early sign.
- Dehydration.

**Thank you**