Pain, Headache & Common Symptomatology

Lecture 10
Pathology and Clinical Science 1 (BIOC211)
Department of Bioscience

Text Reference:
Session Learning Outcomes

This session aims to understand:

- The causes and types of pain
- The pain pathway and gate control theory
- The factors that alter pain perception
- Types of pain associated with headaches
- Pain management
Session Learning Outcomes

- Identify the common symptoms:
  - Nausea and vomiting
  - Coughing
  - Breathlessness
  - Diarrhoea and Constipation
  - Anorexia, weight change
  - Fatigue
  - Fever and Rashes

- Explain how these symptoms develop and the effect they have on the disorder

- Compare various causes for these common symptoms
BE HEARD.

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## Pain

- “Unpleasant sensory or emotional experience associated with actual and potential damage, or described in terms of such damage “

  *Ready L. B 1992 International Association of study of Pain Task Force on Chronic Pain IASP publications*

- Common symptom experienced in all age groups

- Wide variety in perception and effects
Causation of Pain

- Occurs as a result of direct stimulation to pain receptors (nociceptors).
- It is a warning of trauma or damage to body tissues.
- May be sudden (acute), long term (chronic) or be noticed after a reflex action.

- Occurs as a result of
  - inflammation
  - infection
  - ischaemia
  - necrosis
  - stretching of tissues
  - Haemorrhage
# Pain Mechanism

Nociception or “pain sense” word from Greek origin, nocere - to injure

- nociceptors are free nerve endings found in most tissues
- activated by
  - thermal,
  - chemical
  - physical stimuli

## Impulses may activate

- large myelinated **A delta fibers** - rapid transmission
- small unmyelinated **C fibers** - slow transmission
Pain Pathway
## Pain Pathway

- Transmitted to dorsal root of spinal cord
- Reflex action may be initiated
- Decussation occurs
- Impulses carried to brain via lateral spinothalamic tract to thalamus thence to limbic hypothalamus and parietal somatosensory cortex to give location
- Pain threshold is the amount of stimuli required to perceive the pain
### Pain Control Theories

- **Perception of pain is variable, many theories to explain the response**

- **Gate control theory**
  - Gates at entry of impulse at spinal cord can be
    - “open” allowing the impulse to ascent to brain
    - “closed“ modifying the relay of the impulses

- **TENS and ice application** is an application to close the gates and modify the perception of the pain

- **Brain & the Reticular formation** can also modify the stimuli of pain - endogenous opioids
Gate Control Theory

- Gate control theory of pain. Computer artwork of the neural 'circuit diagram' used to represent the gate control theory of pain.

- This theory was introduced by Ronald Melzack and Patrick Wall in 1965 in an attempt to explain why rubbing a smack helps to ease the pain sensation.
# Pain Response & Perception

- Pain threshold point at which stimulus is perceived as painful

- Pain tolerance is the degree of intensity and/or duration endured before seeking intervention

- Amount of endorphin release may influence intensity and duration

- Pain is subjective and influenced by conditioning and:
  - age, culture, prior experience
  - fatigue, hunger,
  - anxiety, fear, stress,
Biopsychosocial Model

## Pain Characteristics

- **Location**
- **Description of sensation**
- **Time**
- **Physical signs**
- **Associated symptoms**
  - vomiting,
  - anxiety
  - muscle spasm
  - guarding
## Acute Pain
- Onset sudden,
- Severe and short term.
- Indicative of tissue damage
- Local or general
- An emotional response.
- Activates the stress response
- May include vomiting

## Chronic Pain
- Long term pain.
- Usually generalised
- Has associated effects - physiological, psychological, family and economic consequences
  - depression
  - insomnia
  - debility - fatigue, irritability, anorexia
# Types of Pain

## Classified by:

- **Location**
  - Cutaneous and deep somatic pain
  - Visceral pain

- **Referral**
  - Referred pain

- **Duration**
  - Acute or chronic
## Location of Pain

- **Cutaneous** from superficial structures and subcutaneous tissues

- **Deep somatic pain** from structures like periosteum, muscles, tendons, joints and blood vessels

- **Visceral pain** in organ such as renal, gall bladder, stomach,
  - travel with axons of ANS
  - impulses to forebrain and reflex circuits resulting in vomiting, sweating and pallor
## Referred Pain

- Pain at site other than location of disturbance

- Often organ pain or muscle felt at surface of body
  - left arm pain from Myocardial ischaemia or infarction
  - liver and gall bladder - pain felt at anterior right neck
  - lung and diaphragm - pain felt across anterior and posterior shoulder
  - bladder - down to inner legs
  - kidney - abdominal and outer lower limbs

- Occurs as result of many sensory fibers coming together at the same spinal cord segment

- Areas determined at embryonic development
Phantom Pain

- Occurs in some adults following amputation
- May be temporary or permanent
- Sensations perceived as tingling or itching
- Brain perception is that the limb is present and the brain is receiving impulses from the region

Mirror Treatment for Phantom Pain

# Pain Management & Control

- **Removal of cause**
- **Analgesia**
  - Mild - Paracetamol
  - Mod – Panadeine Forte / Tramadol
  - Strong - Narcotics
- **Sedatives**
- **Patient controlled analgesia - pumps**
- **Other control method**
  - relaxation therapy
  - heat and cold application
- **Surgery**
Headaches

- Pain in head from any cause
- May reflect
  - Local systemic disease reflected in intracranial area
  - Associated with intracranial tumour, haemorrhage, injuries and cerebral hypoxia
  - Migraine, tension, cluster headaches occur and are not from any cerebral pathology

- Headache is one of the most frequent neurological symptoms encountered in primary practice.

Epidemiology – 90% of population will have had a headache within the past year; 20% within the past 2 weeks.
## Headaches - Common Causes

- Benign Paroxysmal (Simple) Headaches eg: due to a “hangover” etc
- Tension Headaches
- Migraine
- Cluster Headaches
- Raised Intracranial Pressure (eg: Brain Tumour)
- Head Injury
- Temporal (Giant Cell) Arteritis
- Trigeminal (Post-Herpetic) Neuralgia
Foods that may trigger headaches.

- MSG
- Red wine
- Nuts
- Cheese
- Salami
- Gerkins
- Coffee
- Artificial sweeteners
Headaches

| Sinus: pain is behind browbone and/or cheekbones | Cluster: pain is in and around one eye | Tension: pain is like a band squeezing the head | Migraine: pain, nausea and visual changes are typical of classic form |

Pathophisiology

The brain parenchyma is insensitive to pain

• Rather, pain receptors are located:
  – at the base of the brain in arteries and veins as they enter brain
  – throughout the meninges
  – extracranial blood vessels
  – dural sinuses
  – muscles of the scalp, neck and face
  – paranasal sinuses
  – eyes and teeth

• Most pain fibers are derived from branches of the Trigeminal, Glossopharyngeal & upper cervical nerves.
Tension Headaches

- Most common form is pain felt in head, face and neck associated with stress / worry or cervical dysfunction
  - Occurs daily - lasts hours
  - Goes to bed with one wakes with it
  - Tightness around head, occiput and forehead
  - Depression often present

- **Pathogenesis**
  - Due to prolonged overwork or emotional strain, or both, affecting especially the occipital region.
  - Cause obscure
Tension Headaches

- **Clinical Features** -
  - “tight band” sensations, pressure behind the eyes, and throbbing/bursting sensations are common.
  - No abnormal physical signs.

- **Treatment** involves firm reassurance,
  - avoiding the causes, analgesics, physical treatments like massage, meditation, and relaxation, and antidepressants where indicated.
Migraine Headaches

- Abnormal changes in blood flow and metabolism in brain
  - more common in women,
  - has familial history
  - unilateral pain often accompanied by nausea, visual disturbances, aura may precede, lasts 72 hours, 1-2 per month

- Risk factors - stress, triggers eg foods, weather changes, hormonal changes

- Recurrent Headaches (often unilateral, but can be bilateral) associated with visual, sensory and gastrointestinal disturbances.

- Epidemiology
  - affects up to 10 % of the population (~ 20 % of females and ~ 6 % of males); 90 % have had their first attack before 40 years of age.
Migraines Pathogenesis

- Cause is unclear.
- The headache,
  - Often throbbing, is believed due to vasodilatation or oedema of blood vessels
  - The release of vasoactive substances
  - Often a family history
  - Great female preponderance
  - Some people have identifiable dietary precipitants
  - Psychological stress can be involved
## Migraines - Clinical Features

- **Classic “attack”** starts with a non-specific prodrome of malaise and irritability, followed by the “aura” of a pending focal neurological event.

- **“Aura”** is most often in the form of “fortification spectra”
  - Some patients have a spreading front of tingling, followed by numbness which moves, over 20-30 mins, from one part of the body to another in a wave like manner
  - **Aphasia** (inability to speak) can occur in some patients
  - **Nausea** is common.
  - The symptoms of the **“aura”** are thought due to ischemia of areas served by affected blood vessels, or represent a spreading front of excitation followed by depression of cortical cells.
Migraines - Clinical Features

- The headache phase then follows, sometimes one-sided, but can become generalized, throbbing, severe, often accompanied by nausea, vomiting & photophobia.

- The headache can last for several hours
  - Migraine (so called “common migraine”) can also occur without the prodromal aura
  - Other unusual prodromes can accompany the headache
# Migraines - Treatment & Management

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>o</td>
<td>Identify &amp; avoid precipitants.</td>
</tr>
<tr>
<td>o</td>
<td>Simple analgesia &amp; antiemetic for the acute attack.</td>
</tr>
<tr>
<td>o</td>
<td>Severe attacks can be treated with Sumitriptan a potent vasoconstrictor of extracranial arteries.</td>
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<tr>
<td>o</td>
<td>Differential Diagnosis</td>
</tr>
<tr>
<td>o</td>
<td>Sudden headache may be similar to Meningitis or Subarachnoid Hemorrhage.</td>
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<tr>
<td>o</td>
<td>Thromboembolic TIA’s</td>
</tr>
<tr>
<td>o</td>
<td>Unilateral tingling or numbness must be distinguished from Sensory Epilepsy</td>
</tr>
</tbody>
</table>
Cluster Headaches -
(Migrainous Neuralgia)

- A migraine variant characterised by attacks of unilateral excruciating pain over the eye and forehead, with fever and other flu-like symptoms; attacks last 2-3 hours, and tend to occur in clusters.

- Epidemiology
  - 10-50 times less common than migraine; a 5:1 male predominance, with onset usually in their 20’s.

- Pathogenesis
  - Little genetic predisposition; no provoking dietary factors; a male predominance – pts are usually heavy smokers and above average alcohol consumers.
Cluster Headaches
(Migrainous Neuralgia)

Clinical Features

- Consists of periodic, severe, unilateral periorbital pain;
  - Often accompanied by a Horner’s Syndrome + conjunctival injection + unilateral lacrimation + nasal congestion + nausea / vomiting.
- pain lasts about 2-3 hours.
- symptoms often develop at a particular time of day.
- typically occurs repeatedly for a number of weeks, followed by respite for a number of months before another cluster occurs.
- attacks tend to disappear by ~ age 55yo.
Cluster Headaches (Migrainous Neuralgia)

Treatment/Management

• Analgesics unhelpful; inhalation of Oxygen can abort an attack; acute attacks can be halted with s/c injections of Sumitriptan, while other migraine medications are ineffective.

• Prophylaxis also difficult
  – Pts with severe and debilitating clusters can be helped with Lithium therapy.
Pressure Headaches

<table>
<thead>
<tr>
<th>Headache of Raised Intracranial Pressure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>o <strong>Pathogenesis</strong> –</td>
</tr>
<tr>
<td>• Intracranial mass/lesions displace &amp; stretch the meninges &amp; basal vessels – pain provoked when these structures are shifted by mass or cerebral oedema; headache made worse by bending forward.</td>
</tr>
<tr>
<td>o <strong>Pathogenesis</strong> –</td>
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</tr>
<tr>
<td>o <strong>Treatment/Management</strong> -</td>
</tr>
<tr>
<td>• headache can be relieved by analgesia usually.</td>
</tr>
</tbody>
</table>
Temporal (giant cell) Arteritis

- A chronic vascular disease of unknown origin,
  - Most common in the carotid arterial system but also occurring in other large and small systemic arteries
  - Characterized by proliferative inflammation, often with giant cells and granulomas, and by headache, difficulty chewing, weakness, weight loss, fever, and symptoms of sepsis with a raised WCC; diplopia or complete blindness in half the subjects; strongly associated with the condition polymyalgia rheumatica (PMR).

- **Epidemiology –**
  - Exclusively a disease of the elderly, chiefly over age 60.
## Temporal (giant cell) Arteritis

### Pathogenesis –
- A granulomatous arteritis of unknown etiology; affects extradural arteries.

### Clinical features –
- Headache is invariable, with pain felt over inflamed superficial temporal or occipital arteries.
- Pain in face, jaw and mouth is caused by inflammation of facial, maxillary and lingual branches of external carotid artery;
- Pain worse on eating (jaw claudication).
- Visual loss occurs in 25% cases if left untreated due to central retinal artery occlusion.
Temporal (giant cell) Arteritis

**Treatment** –

- Immediate high doses of steroids (Prednisolone 60-100 mg daily) – headache subsides within hours.
- Longterm steroid therapy remains controversial, but there is a persistent risk of blindness in these Pts over the ensuing years.

**Differential Dx** –

- other forms of Arteritis, such as SLE and Microscopic Polyangiitis, can occasionally present with similar features.
Single Acute Episode Of Severe Headache

- This common emergency is caused by one of the following:
  - Subarachnoid hemorrhage
  - Migraine, or other benign headaches
  - Meningitis (occasionally)

- Particular attention is paid to suddenness of onset (SAH), neck stiffness & vomiting (meningeal irritation), or rash & fever (bacterial meningitis).
Common Symptomatology
## Common Symptomatology

<table>
<thead>
<tr>
<th>There are many symptoms that are present in conditions across systems that are non-specific for a particular disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>They include:</td>
</tr>
<tr>
<td>- Nausea</td>
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<tr>
<td>- Vomiting</td>
</tr>
<tr>
<td>- Cough</td>
</tr>
<tr>
<td>- Breathless etc</td>
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</tbody>
</table>
# Nausea

- Subjective symptom
  - a complex reflex action from a complex mechanisms

- Occurs with
  - Pain
  - Labyrinthine stimulation
  - Intestinal disorders
  - Brain disorder
  - Metabolic effects
  - Medication effects
### Vomiting

- Associated with nausea and retching
- Differentiate between dyspepsia and vomiting
- Associated symptoms may help to differentiate cause
  - Fever, abdominal pain, diarrhea, foods, drugs, vertigo, headache, weight loss
- A reflex integrated by neurons of lower brain stem
- **Sympathetic** accompanying action of tachycardia, sweating
- **Parasympathetic** adds salivation, increases motility and creates relaxation of upper and lower oesophageal sphincters
# Causes of Vomiting

<table>
<thead>
<tr>
<th>Abdominal</th>
<th>Metabolic</th>
<th>Toxic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gastritis and Peptic Ulcer</td>
<td>• Diabetes, Alcohol, Pregnancy, Hypercalcemia, Addison’s Disease</td>
<td>• Febrile illnesses (viral hepatitis), Drugs (Salicylates), Corrosive poisons</td>
</tr>
<tr>
<td>• Colic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Acute Abdominal emergencies</td>
<td></td>
<td></td>
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<tr>
<td>like Appendicitis, Cholecystitis, Peritonitis, Pancreatitis, intestinal Obstruction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td></td>
<td></td>
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<tr>
<td>• MI and Cardiac Failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increased Intracranial pressure, Meniere’s Disease, Motion Sickness and Radiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Complication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mallory-Weiss Syndrome</td>
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</tbody>
</table>
# Cough

- Can originate in pharynx, larynx, trachea bronchi and lung parenchyma resulting from stimulation of sensory nerves in mucosa with differing conditions often inflammations or drug induced e.g. ace inhibitor

- Less receptors in distal area of lung so products can accumulate

- Stimulation through vagus nerve can be modulated by opiates and serotonergic compounds

- Sound quality may change and indicates accompanying features e.g. paralysis vocal cord creates hoarseness, stridor indicates obstructions
Causes of Cough

- **Respiratory causes**
  - **Laryngeal and pharyngeal**: infections and neoplasms
  - **Tracheobronchial**: Tracheobronchitis, Bronchial asthma, Bronchiectasis, Bronchogenic carcinoma, pressure over the trachea or bronchus from outside
  - **Lung**: Pneumonia, TB, Lung Abscess, tropical eosinophilia, pulmonary edema and infarction, interstitial fibrosis.
  - **Pleura**: Pleural effusion, pneumothorax

Tonsillitis

[Lung Abscess Image](http://www.ecureme.com/atlas/data/dis_i mages/Lung_Abscess550_ab.jpg)
## Causes of Cough

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiac causes:</strong></td>
<td>• Left ventricular failure</td>
</tr>
<tr>
<td></td>
<td>• Mitral stenosis</td>
</tr>
<tr>
<td></td>
<td>• Aneurysm of Aorta</td>
</tr>
<tr>
<td><strong>Mediastinum causes:</strong></td>
<td>• Enlarged Lymph nodes, mediastinal tumours</td>
</tr>
<tr>
<td><strong>Psychogenic:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reflex cough:</strong></td>
<td>• Wax or foreign body in the ear, sub-phrenic or liver abscess</td>
</tr>
</tbody>
</table>

*Images:*

- [Mediastinal Mass](http://www.pedsradiology.com/Uploadimg/79150449745635.jpg)
- [Anthropod](http://www.sciencephoto.com/image/256999/350wm/M157082-Arthropod_inside_an_ear_otoscope_view-SPL.jpg)
Breathlessness

“Subjective feeling of uncomfortable breathing” (McCance 2009)

No single mechanism has been found to be responsible, but many theories are proposed:
- Length tension inappropriateness sensation initiated when there is a disparity between the tension in intercostal muscles and tidal volume

Respiratory, cardiac or metabolic triggers can increase breathing rate:
- hypoxia
- hypercapnia
- acidosis
## Causes of Breathlessness

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physiological</strong></td>
<td>Mountaineers, exercise, hyperpyrexia, anemia</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td>Airway Obstruction, Respiratory diseases</td>
</tr>
<tr>
<td><strong>Cardiac</strong></td>
<td>Acute Myocardial Infarction, Valvular Heart Disease, Left Ventricular failure, Congenital Cyanotic Heart Disease</td>
</tr>
<tr>
<td><strong>Metabolic</strong></td>
<td>Diabetes, Uremia, Hypokalemia</td>
</tr>
<tr>
<td><strong>Neurological</strong></td>
<td>Respiratory centre depression as in Syringobulbia, Motor neuron Disease, Guillain Barre Syndrome, Bulbar polio, Myasthenia Gravis</td>
</tr>
<tr>
<td><strong>Psychogenic</strong></td>
<td>Originates in the mind</td>
</tr>
</tbody>
</table>
## Diarrhoea

**Defined as loose, watery stool, inconsistent with usual bowel movements**

- Symptoms of urgency or incontinence may be present
- May be osmotic, secretory or motile in mechanism

### Acute
- Infective gastro enteritis with or without blood
  - Major cause morbidity and mortality in young
- Non infective
  - Diverticulitis
  - IBD
  - Ketosis
  - Uraemia
  - Drugs
# Causes Diarrhoea

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Osmotic</strong></td>
<td>Laxative abuse, Maldigestion of food</td>
</tr>
<tr>
<td><strong>Infections</strong></td>
<td>Food poisoning, Typhoid, Cholera, Amoebiasis, Giardiasis, Helminthiasis</td>
</tr>
<tr>
<td><strong>Endocrine disease</strong></td>
<td>Thyrotoxicosis, Diabetes, Addison’s disease</td>
</tr>
<tr>
<td><strong>Drugs</strong></td>
<td>Thyroxine, Prostigmin, Ampicillin, Phenolphthalein</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td>Irritable Bowel Syndrome, Inflammatory Bowel Disease</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td>Malignant Carcinoid syndrome</td>
</tr>
</tbody>
</table>
## Constipation

**Defined as a hard, lumpy stool, inconsistent with usual bowel movements**

- Sensation of anorectal obstruction/ blockage
- Straining
- Sensation of incomplete evacuation

### Causes

- **Gastrointestinal**
  - Dietary, motility, structural, defecation

- **Non gastrointestinal**
  - Drugs, neurological, metabolic, endocrine, immobility
## Causes of Constipation

### Acute
- Intestinal obstruction: Volvulus, intussusceptions, Hernia
- Acute abdomen: appendicitis, salpingitis, Perforation, Colic
- General: Septicemia

### Chronic
- Faulty habits:
- Painful Anal conditions: piles, fissures
- Organic obstructions:
- Adynamic Bowel:
- Metabolic:
- Drugs:
### Bristol Stool Scale

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Separate hard lumps, like nuts (hard to pass)</td>
</tr>
<tr>
<td>Type 2</td>
<td>Sausage-shaped but lumpy</td>
</tr>
<tr>
<td>Type 3</td>
<td>Like a sausage but with cracks on its surface</td>
</tr>
<tr>
<td>Type 4</td>
<td>Like a sausage or snake, smooth and soft</td>
</tr>
<tr>
<td>Type 5</td>
<td>Soft blobs with clear-cut edges (passed easily)</td>
</tr>
<tr>
<td>Type 6</td>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
</tr>
<tr>
<td>Type 7</td>
<td>Watery, no solid pieces entirely liquid</td>
</tr>
</tbody>
</table>

Bristol Stool Chart developed by Dr. Ken Heaton University of Bristol, 1997 Creative Commons license 2.5
Anorexia & Weight Loss

Anorexia is defined as:
- A loss of appetite

May be caused by:
- Psychiatric disorders
  - Eating disorders, depression, sleep deprivation
- Systemic
  - TB, chest infections, HIV/aids, endocrine
- Gastrointestinal
  - Malabsorption, malignancy
- Advanced disease
  - Malignancy
- Drugs
  - Aperients (laxatives), appetite suppressants
Fever

- Release of pyrogenic cytokines interleukin 1, TNF-α, interleukin 6, INF-γ
- Activates receptors of preoptic anterior hypothalamus
- Release of phospholipase A
- This modifies the thermo sensitive neurons
- Epinephrine increases metabolic rate
- Heat production increases and is conserved
- Peripheral vasoconstriction (heat to core)

http://image.made-in-china.com/4f0j00lvHa/fnShHWbR/Medical-Thermometer-Clinical-Thermometer-DT001-.jpg
Fever

- Occurs in
  - Infections
  - Malignancy
  - Connective tissue disorders
  - Inflammatory conditions

- Associated manifestations
  - Rash, change in consciousness level, jaundice lymphadenopathy, breathlessness, joint and muscle symptoms

- Benefits adverse effects on growth and metabolism of organisms

http://image.made-in-china.com/4f0j00leIGKsdZVcY/Clinical-Medical-Thermometer-Electronic-Thermometer-DT001-.jpg
## Skin Changes & Rashes

- **Papule**
  - ![Papule Image](http://www.healthline.com/images/adam/big/1379.jpg)
- **Patch**
  - ![Patch Image](http://media.photobucket.com/image/skin%20patch%20images/littleames/IMAG0078.jpg)
- **Plaque**
- **Wheal**
  - ![Wheal Image](http://www.dermaamin.com/site/images/clinical-pic/u/urticaria_multiforme/urticaria_multiforme2.jpg)
- **Nodule**
  - ![Nodule Image](http://www.skincareguide.ca/images/glossary/nodule.jpg)
- **Wheal**
  - ![Wheal Image](http://www.dermaamin.com/site/images/clinical-pic/u/urticaria_multiforme/urticaria_multiforme2.jpg)
- **Tumour**
  - ![Tumour Image](http://www.surgical-tutor.org.uk/pictures/images/skin/melanoma2.jpg)
- **Bulla**
  - ![Bulla Image](http://people.rit.edu/grhfad/DLP2/DLPdict/bullaDictionary.jpg)
- **Pustule**
  - ![Pustule Image](http://accessmedicine.net/loadBinary.aspx?name=wolf7&filename=wolf7_c0041030t.jpg)
Skin Changes & Rashes

- **Cyst**

- **Scale**
  - [Image](http://www.mayoclinic.com/images/image_popup/sn7_ichthysissscales.jpg)

- **Keloid**
  - [Image](http://wacky5.com/wp-content/uploads/2010/12/keloid-over-hand-at-elbow-joint.jpg)

- **Excoriation**
  - [Image](http://dermatologic.ayuda-por-favor.com.ar/loadbinary_064.jpg)

- **Erosion**

- **Telangietasis**
  - [Image](http://www.dermnetnz.org/site-age-specific/img/telangiectasia.jpg)

- **Lichenification**
  - [Image](http://www.aaaai.org/Aaaai/media/MediaLibrary/Images/excoriation_lichenification.jpeg)

- **Scar**
  - [Image](http://www.bing.com/images/search?q=skin+scar+images&view=detail&id=6667F9BF029E9DB3113DC553A2777D3C61727B0F&first=271&FORM=IDFRIR)

- **Fissure**
  - [Image](http://www.consultantlive.com/image/image_gallery?img_id=1451103&t=125252297323)

- **Ulcer**
  - [Image](http://www.skincareguide.com/images/glossary/venous_ulcer.jpg)

- **Atrophy**
  - [Image](http://0.tqn.com/w/experts/Dermatology-1011/2011/06/x_29.jpg)

- **Steroid induced atrophy**
The Mystery of Chronic Pain – Dr. Elliot Krane - 8.00 minutes
http://www.ted.com/talks/elliot_krane_the_mystery_of_chronic_pain#t-471166

‘Ouch’ – fascinating perspective on pain - 51 minutes
Readings and Resources

Resources:

- **Set Textbooks:**

- **Additional textbooks:**
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