Inflammation, oedema and wound healing

Session Objectives.

What you will cover

• Inflammatory response
• Acute and chronic inflammation
• Oedema
• Wound Healing

Your objectives are

• Identify the signs of the acute inflammatory response
• Describe the events of the acute inflammatory response
• Identify the role of neutrophils and inflammatory mediators in the acute inflammatory response
• Describe the aetiology of chronic inflammation
• Identify the cell types and inflammatory mediators associated with chronic inflammation
• Describe the signs of oedema
• Describe the physiology of oedema
• Describe the stages of wound healing

Suggested reading: Tortora & Grabowski, 10th Edition Ch 5, Ch 21, Ch 22; Marieb 6th Edition. Ch 4, Ch 21, Ch 26  Gould Ch 2, Ch 6

NB Note that in American English, oedema is spelled EDEMA.
Inflammation, oedema and wound healing

Inflammation.

**TASK**
Complete the text using the words provided.

Inflammation or the __________ response, is a ________________ tissue response to injury. Inflammation produces local sensations of ____________, ____________, ____________ and ________.

Many stimuli can produce inflammation, including impact, ____________, distortion, ____________ ____________, infection with ____________, or extreme hot or cold. An example of extreme cold inflammation would be _____________. These damaging stimuli kill cells, and can lead to loss of ____________ of the tissue involved.

<table>
<thead>
<tr>
<th>Localized</th>
<th>abrasion</th>
<th>swelling</th>
<th>pathogens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammatory</td>
<td>chemical irritation</td>
<td>frostbite</td>
<td>function</td>
</tr>
<tr>
<td>Heat</td>
<td>pain</td>
<td>redness</td>
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Acute inflammation proceeds through a vascular then a cellular phase.

**Task**
What is the main aim of the vascular phase of inflammation

What is the main aim of the cellular phase of inflammation?

What is the main cell type involved in the cellular phase and what is the function of this particular cell type?

What is the ultimate purpose of acute inflammation?

Identify one inflammatory mediator and it’s function.
Chronic Inflammation

Chronic inflammation arises if the stimulus for acute inflammation persists, e.g. if a person continues to smoke cigarettes, or if a foreign object [dirt] is not removed from a wound.

**Task**
What happens to the role of neutrophils in chronic inflammation?

What happens in terms of tissue repair in chronic inflammation. How might this be problematic for lung tissue?

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Wound Healing/Tissue repair

**Task**
Why is regional inflammation of the skin painful?

Why is the formation of granulation tissue important to skin repair?

Why is the formation of a scab important in wound healing?

Explain why scar tissue is not as strong as the original tissue.
Task.

Under what circumstances does healing by primary intention occur?

What is the difference between healing by secondary intention and healing by tertiary intention?
Oedema
The images show normal tissues, and tissues that have been affected by oedema. Oedema is a swelling of a limb or organ that is brought about by an imbalance in the distribution of body fluids.

Essentially, fluid remains where it should not be i.e. fluid leaks from the tissues into the spaces between the cells of the tissues.

http://www.meddean.luc.edu/lumen/meded/medicine/pulmonar/cxr/diffuse/alveolar.htm
http://www.netmedicine.com/cyberpt/c1/c1-cxr.htm

NORMAL LUNG

PULMONARY OEDEMA


LYMPHOEDEMA

BEFORE TREATMENT

AFTER TREATMENT

**TASK**
What is the name of the fluid found between cells of a tissue?
**Physiological Basis of Oedema**

Whilst the causes of oedema are many, the basis of oedema relates to the movement of water and solutes in and out of the blood and tissue fluids. In particular it concerns the movement of fluids and solutes from capillary networks, the tissues and the lymphatic system.

<table>
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<th>Task</th>
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<tbody>
<tr>
<td>What is net hydrostatic pressure</td>
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<tr>
<td>What is net osmotic pressure</td>
</tr>
<tr>
<td>What is the relationship between net hydrostatic pressure and net osmotic pressure.</td>
</tr>
</tbody>
</table>

After a severe burn, the blood colloid osmotic pressure may fall quite dramatically. What happens to body fluids in this instance? What would the risk be to a patient in this situation?

At high altitude, generally above 8000 ft (2500 m) high-altitude pulmonary oedema may occur. Why might this be a risk for a climber or skier?

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**Web pages [Accessed August 2004]**

http://www-biol.paisley.ac.uk/courses/human_physiol/CVS3_stud.doc