I promised/threatened some Latin so the topic today is in four parts

- Rubor
- Tumor
- Dolor
- Calor
5 cardinal signs of Inflammation

First Century Romans
- Rubor: redness
- Calor: heat
- Dolor: pain
- Tumor: swelling

Second Century Greeks
- Loss of function
Inflammation

Normal
Necessary
Non-specific reaction
Primarily localized
but can be systemic
Combination of cells and chemical mediators
Inflammation

Causes

Mechanical
- Crushing – abrasion – pressure

Chemical
- Alkalai – acids – enzymes

Radiation
- Heat – cold
- Alpha – beta – gamma particles –
- ultraviolet/infra red
Inflammation

Causes

- Infectious
  - Bacteria – fungi – viruses

- Immunologic
  - Allergic – autoimmune

- Ischemia
  - Damage to tissue due to disruption in blood flow or oxygenation
  - Can include inflammation abutting necrosis
Reflex nerve impulses first cause the vessels to contract. Mediators from damaged tissues are released.

**Action**

**Vasodilation**

**Mediators**

charged collagen, prostaglandins $E_2D_2, I_2$
Inflammation: Vascular Response

Action

Permeability

Mediators

histamine, serotonin, $C_{3a}$
leuktriene $C_4$, $D_4$, $E_4$
Increased amounts of red cells collect due to localized vasodilation and distal vasoconstriction.

RUBOR
REDNESS
Inflammation: Vascular Response

Plasma passes through enlarged opening between cells to collect in tissue causing pooling of fluids

TUMOR SWELLING
Blood cells collect in the vessels due to vasoconstriction and pressure builds up causing an increase in temperature.
Inflammation

Monocytes and granulocytes get into the tissue and removed dead and damaged cells, pieces of debris, etc.

The area has to be cleared before healing can start.
Inflammation
If the cause of the damaged is limited, then inflammation is switched off and healing begins.

Type of tissue is important. Some of more willing to replaced themselves than others.
If the cause of the damaged is not limited, then inflammation is never truly switched off and chronic inflammation begins.

Even if the tissue accepts replacement cells, after time it will not and begin to substitute scar tissue.
Inflammation

**Testing**
- Pretty poor

**Erythrocte Sedimentation rate**
- Invented in the early 50s
- The idea – according to the inventor – was if everything else fails and you still got nothing, try this to see if there is some underlying inflammation
- Many use it as a basic “are you sick?”
Inflammation

ESR

- Single result is most meaningless; trend over time is what you are looking for
  - Increases mean that you are not controlling the inflammation
  - Decreases mean that you are controlling it
- Classic procedure takes 1 hour
  - No cheating
  - Automated versions are available
Inflammation

**ESR**

- Single result is most meaningless; trend over time is what you are looking for
  - Increases mean that you are not controlling the inflammation
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  - Automated versions are available
  - No overlap in results from one method to another
Inflammation

Testing

- Pretty poor

- **CRP (Cross reactive protein)**
  - Does well with acute inflammation
  - Not so much for chronic inflammation

- The **HS-CRP** is not the same test.
Inflammation

Fancier testing