

## **Inflammation** (*inflamm* ~ to set fire)

Anytime there is damage to any cells of the body, inflammation will happen. It is the body's response to all injury, and in its acute state, it is healthy. It is a process with a purpose, a cascade of reactions set into motion to bring in nutrients and helper and repair cells. Inflammation also allows the body to cordon off toxins that may have come in with the wound. A final characteristic of acute inflammation is its self-regulating ability to shut down after 1-7 days by chemical messengers released to stop the inflammatory cascade. The official definition of **inflammation** is "a tissue reaction to irritation, infection or injury".

Inflammation is characterized by the following signs and symptoms:

1. pain
2. heat
3. redness
4. swelling
5. and sometimes loss of function or reduced range of motion

When cells are damaged they dump their contents into the environment around them. Some chemicals, called cytokines, are; **histamine, bradykinin, prostaglandins** and others that signal to the rest of the body something has gone wrong. These chemicals can get many processes in motion that are important to wound healing and repair. Specialized white blood cells (**Neutrophils** and **Macrophages**) also have the ability to migrate to an injured area and release the same chemicals.

Some of the cytokines cause the blood vessels in the area to **vasodilate**. Vasodilation is an increase in blood vessel diameter. Vasodilation increases the amount of blood flowing into the area. The increased blood flow to the area brings in more help. The helpful cells are **thrombocytes** (platelets) to help clot any breaks in blood vessels, **Neutrophils** and **monocytes** (both types of white blood cells) to help phagocytize (*eat*) any invaders, dead cells, or debris. Monocytes are able to leave the blood and enter the tissue fluid (extracellular). When they leave the blood, they are called **macrophages**.

The chemicals released by damaged cells also have the ability to make local blood vessels more **permeable**. This means more fluid and cells than usual can leak out of the capillaries, bathing the area in oxygen, nutrients, cells mentioned above. This fluid dilutes toxins, washes away harmful chemicals and microbial invaders.

Vasodilation and increased permeability cause the heat, swelling and redness associated with inflammation.

Pain can be caused by prostaglandins stimulating pain receptors in the area, toxins released by invading bacteria irritating nerve endings and/or increased fluid in the area stimulating the pain nerve endings. Pain alerts us that we need to take care of something...either by not moving, putting a band-aid on it, or seeking help.

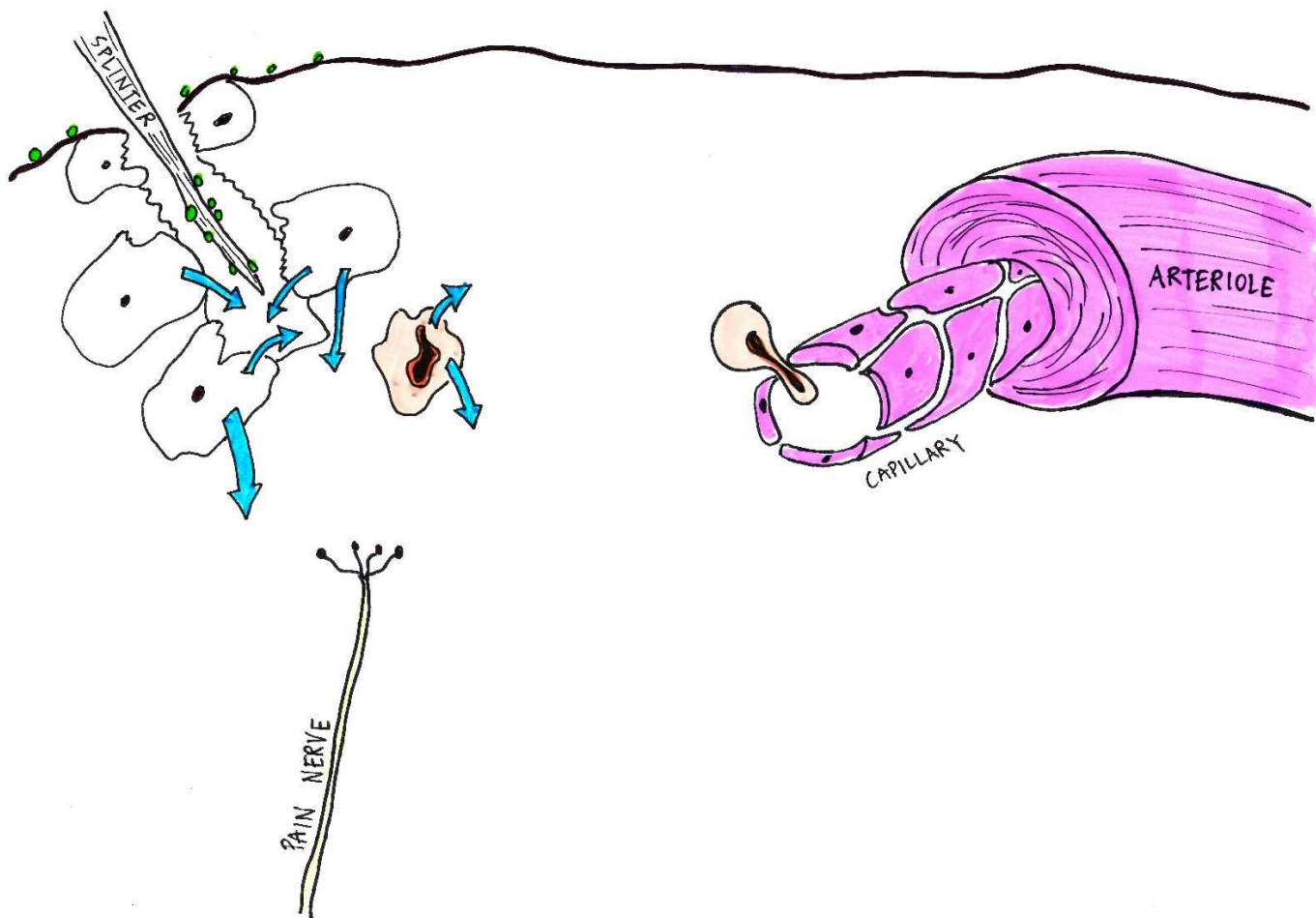
Inflammation is categorized as either acute or chronic.

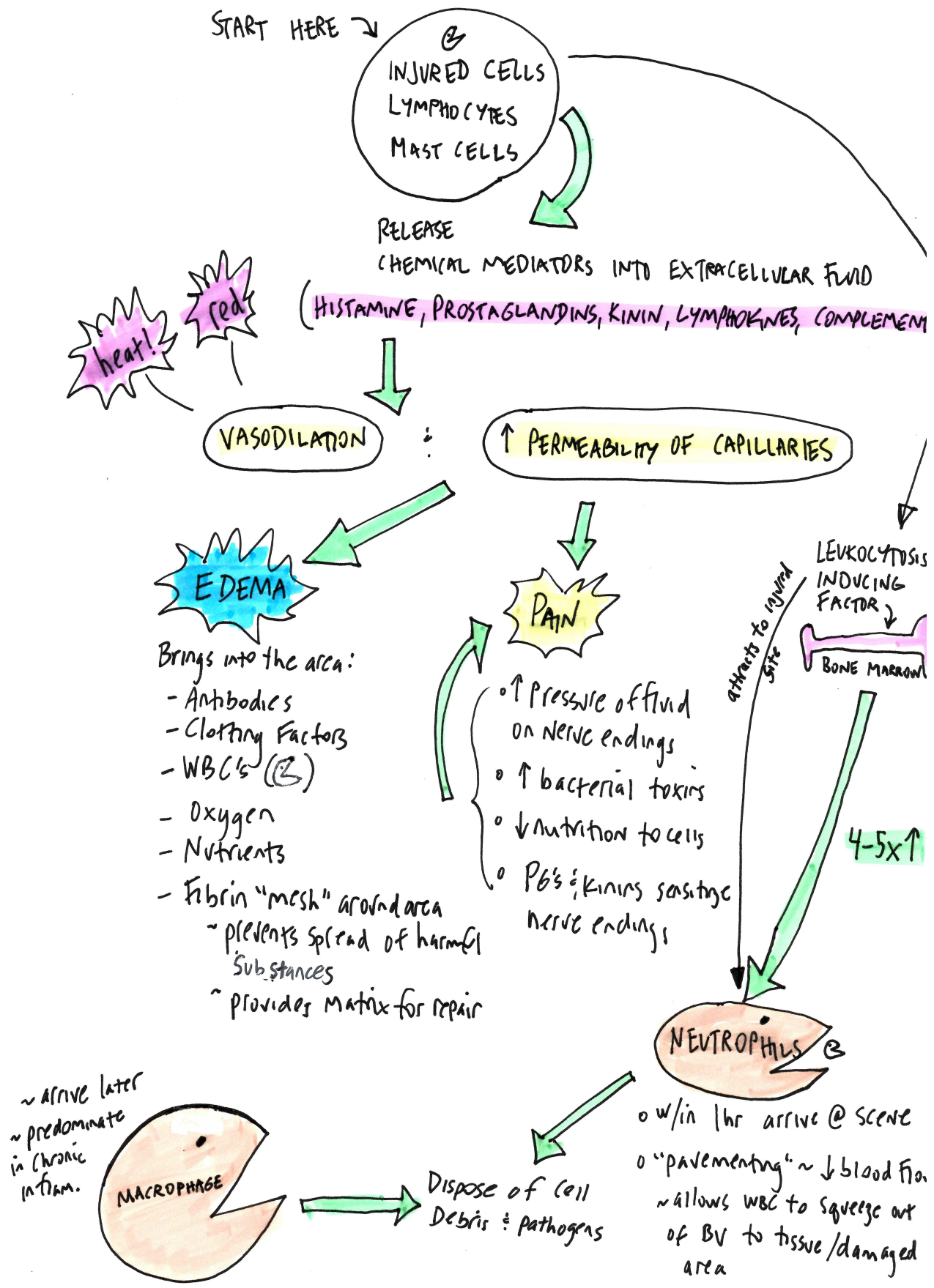
## Acute Inflammation

- Lasts 1-7 days
- Defends and repairs
- Localized
- Beneficial
- Adaptive

## Chronic Inflammation

- Destroys tissue
- Detrimental
- Self-perpetuating
- Disrupts homeostasis
- Maladaptive
- Involved in *all* chronic disease





## What happens elsewhere during Acute Inflammation?

Damaged endothelial cells, macrophages and platelets have all been secreting various cytokines. One of them, Interleukin-6, (IL-6), travels to the Limbic brain, causing “brain fogg” and the depressed feeling we feel when sick. All of the inflammatory cytokines travel through the liver and signal it to begin making more inflammatory proteins. Up to 45 grams per day of protein signals are made by the liver every day when this is happening. Some signaling proteins made by the liver and dumped into the blood are:

### Initial:

C-reactive protein  
 Manos binding protein  
 Amyloid A

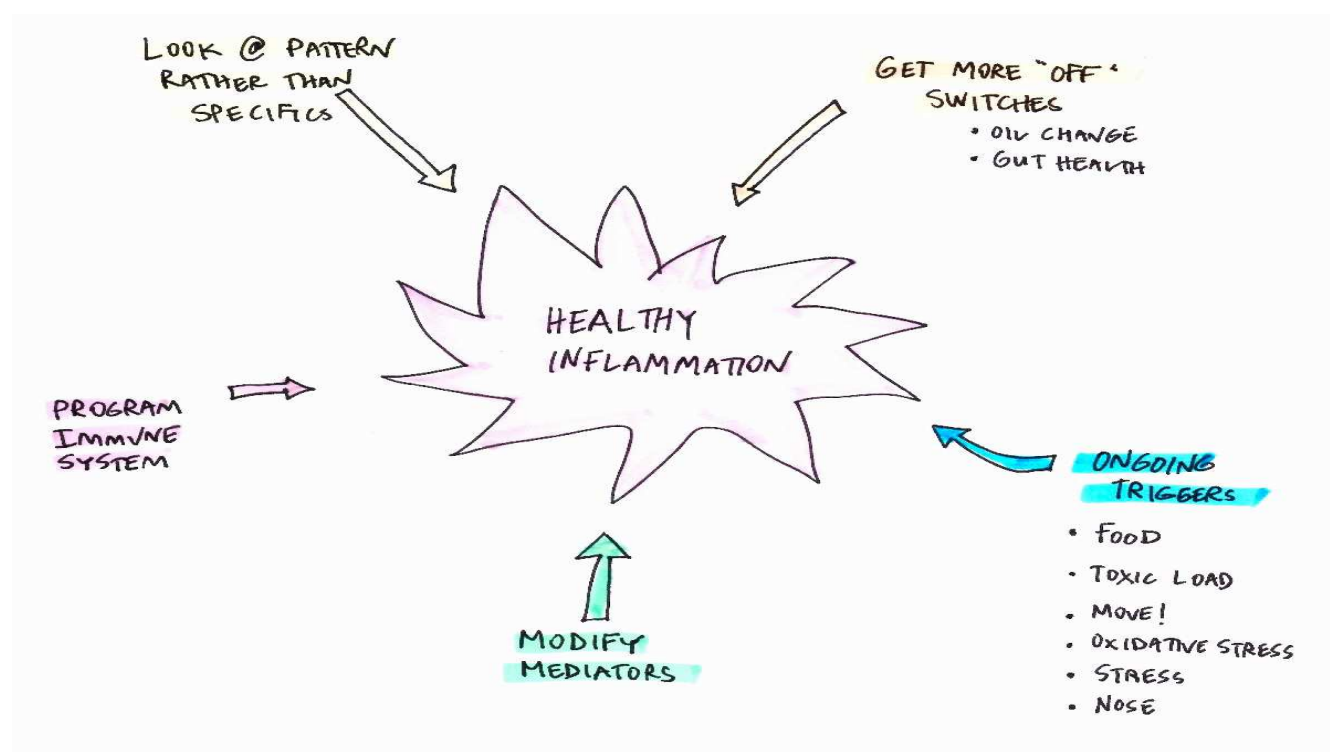
### Later:

Fibrinogen  
 Prothrombin  
 Complement  
 Ferratin

\*After one week all of this signaling should be turned off by our “off-switches”, the anti-inflammatory cytokines.

## Why Do We Have Chronic Inflammation?

1. Not enough “off-switches”.
2. Ongoing triggers
  - a. Lack of movement (*formerly known as exercise*)
  - b. The Gut
  - c. The Nose



## How To Work With Chronic Inflammation

1. Look for pattern rather than diagnosis
2. Help the body make more off switches.
  - a. Oil change
  - b. Support the gut bacteria
3. Check ongoing triggers of inflammation
  - The Gut: gluten, lectins, dairy, glucose, trans fats
  - Toxic load: Heavy metals, phthalates
  - Lack of movement
  - Oxidative stress
  - Stress
  - The Nose
  - NSAIDS
4. Modify Mediators
  - Nutrients
  - Anti-oxidants
  - Phytochemicals in WHOLE PLANTS
  - TGFbeta in gut
5. Program the Immune system

### At the Cellular Level

