Vocabulary:
Baroreceptor
Atherosclerosis
Coronary Arteries
Accommodation – output varies with respect to time
Ischemia
Arrhythmias
Tachycardia/bradycardia
Aerobic/Aerobic

Control of Blood Flow/Pressure:

Figure above shows a set of the control mechanisms for regulating blood pressure. Note that each has different power (feedback gain) and a different time course. Some respond quickly but fade while others are slow but very powerful.
1. Local Control
   a. Goal – adequate blood supply in response to varying requirements
   b. See previous day’s notes for this

2. Central control
   a. Baroreceptor reflex

b. Figure above shows response of baroreceptors to changes in pressure. Note that it is sensitive to change in pressure, i.e., it responds quickly to a change in pressure and then fades fairly soon (within minutes to hours).

c. Control system
   i. sensor: baroreceptor (pressure sensor)
      1. pressure → action potential (frequency)
      2. stretch activated channels
      3. accommodation/fast onset (~seconds); diminish over minutes.
   ii. Feedback: to brain → sympathetic arm of ANS
   iii. Effector: Vasoconstriction, heart rate, stroke volume.
   iv. Set point: system responds to change. So other systems are responsible for maintaining long term control of blood pressure.

Summary:
- Many systems require blood pressure
- Each has its own mechanism
  - Time course
  - Duration
  - Strength
- All work together to maintain blood pressure
- Blood Pressure is important
**Diseased States of Cardiovascular System:**

Ischemia – Imbalance between supply and demand (teeter tauter)

- Supply is not adequate.
  - Hypoxia (low $O_2$)
  - Anaerobic metabolism
  - $\downarrow$ pH $\uparrow$ lactate
  - Pain
  - Muscle fatigue/failure.

- Causes
  - Blocked arteries
  - Blood loss
  - Increased demand

- Cardiac Ischemia
  - Causes
    - Blocked coronary arteries
    - Increased demand
      - “Angina”
  - Complete block
    - “Infarction” (MI) – heart attack
    - Diagnosis is tricky
      - ECG
      - Enzymes in blood
      - Ultrasound
      - MRI

**Plumbing Problem**

**Arrhythmia**

- Abnormal heart rhythm
  - Taclycardia (faster)
    - Atrial (AT)
    - Ventricular (VT)
      - Abnormal sequence of activation
      - Ventricular Fibrillation
      - Shock is the intervention for this
        - Diagnosis is ECG based (rate and morphology)
  - Bradycardia (slower)