

Lecture Notes: Physiology

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Vocabulary:

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

Control of Blood Flow/Pressure:

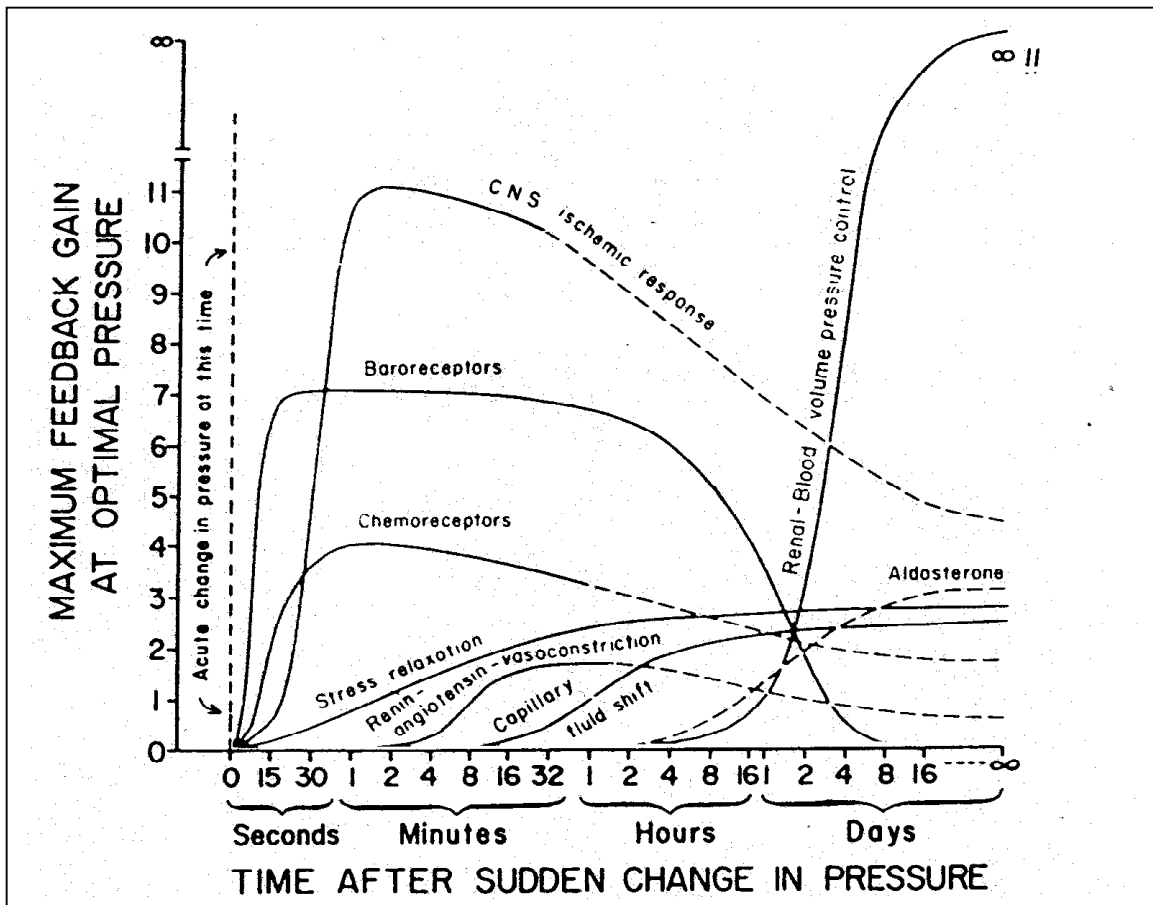
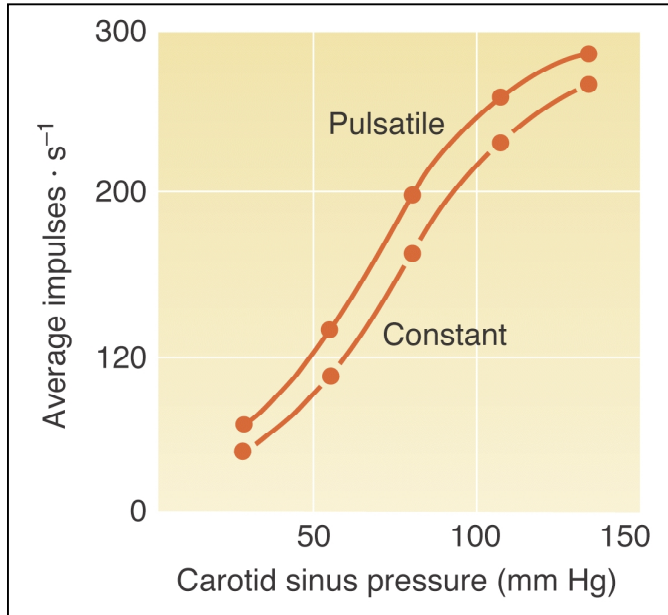


Figure above shows a set of the control mechanisms for regulating blood pressure. Note that each has different power (feedback gain) and a different time course. Some respond quickly but fade while others are slow but very powerful.

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 O₂)
 - Anaerobic metabolism
 - ↓ pH ↑ 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
 - Tachycardia (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)