

Lecture 11: Blood Pressure (Part 2)

0. Review

1. Oscillometric Method

2. Extravascular Sensors

3. Cardiac Output

★ Student presentations (Mar 10+12)

→ Teams of 2-3 students

→ 20 min powerpoint

- Disease or medical condition
- Electronic instrumentation

← e.g. ablation catheter

• Fri (2/14): Lab 3 report due

• Mon (2/17): Exam #1 problems

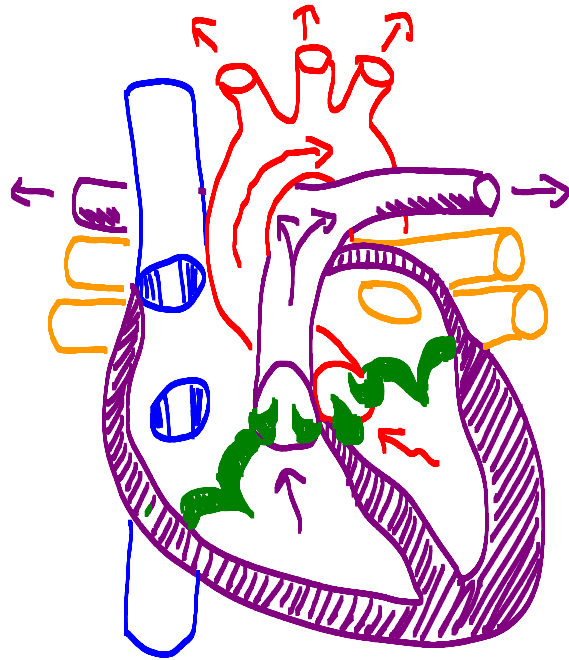
→ Counts as HW

Re-do all 4 problems

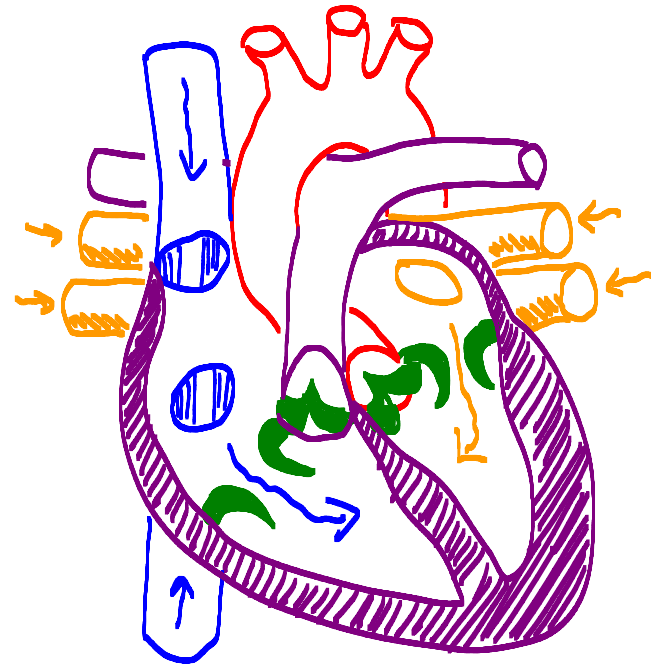
• PreLab 5 due at lab session

• Thu (2/20): HW 5

• Fri (2/21): Lab 4 report due

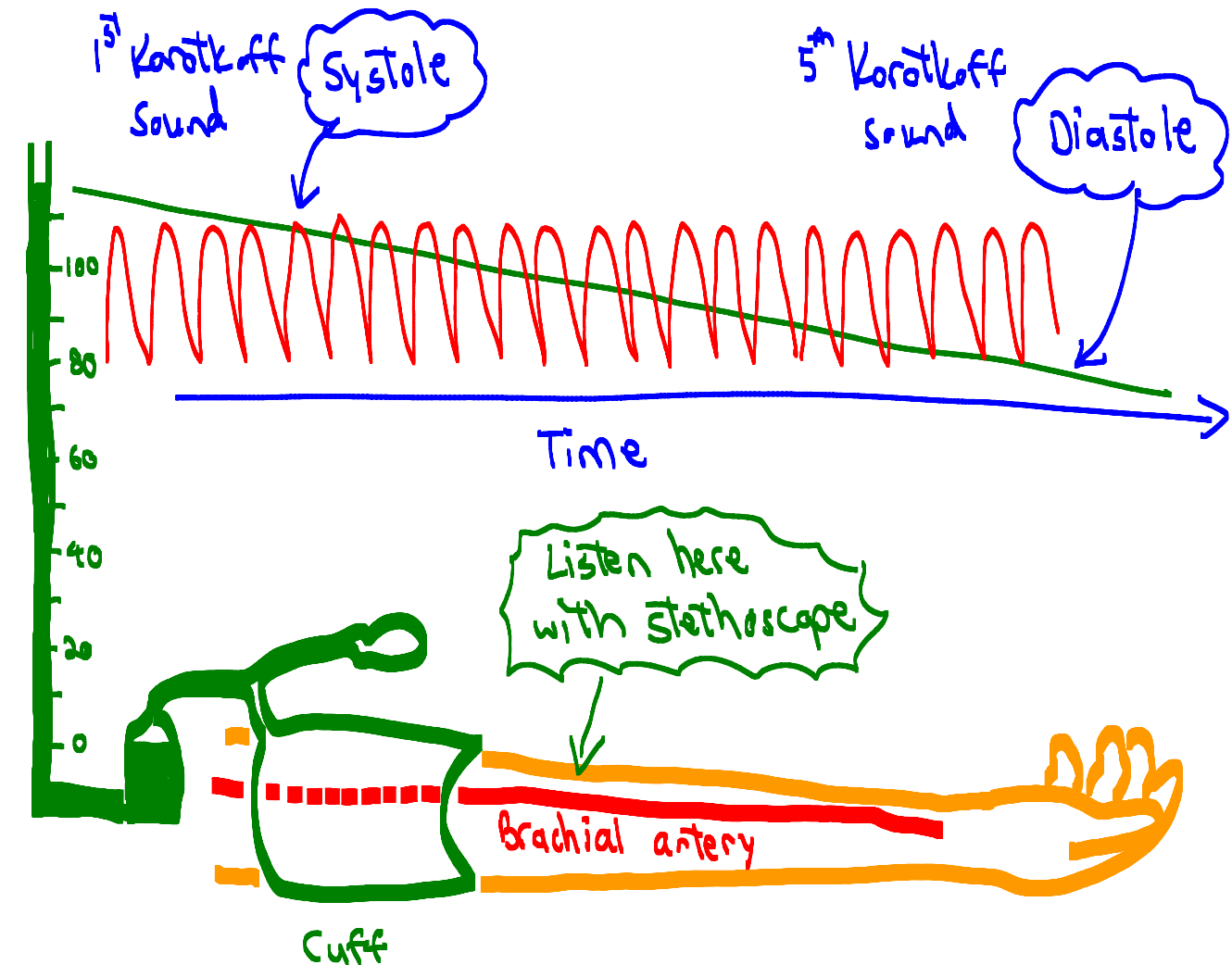
① Physiology**SYSTOLE**"Pumping Phase"
"LUB"

~~Tricuspid Valve~~ Pulmonary Valve Aortic Valve ~~Mitral Valve~~

DIASTOLE"Resting Phase"
"DUB"

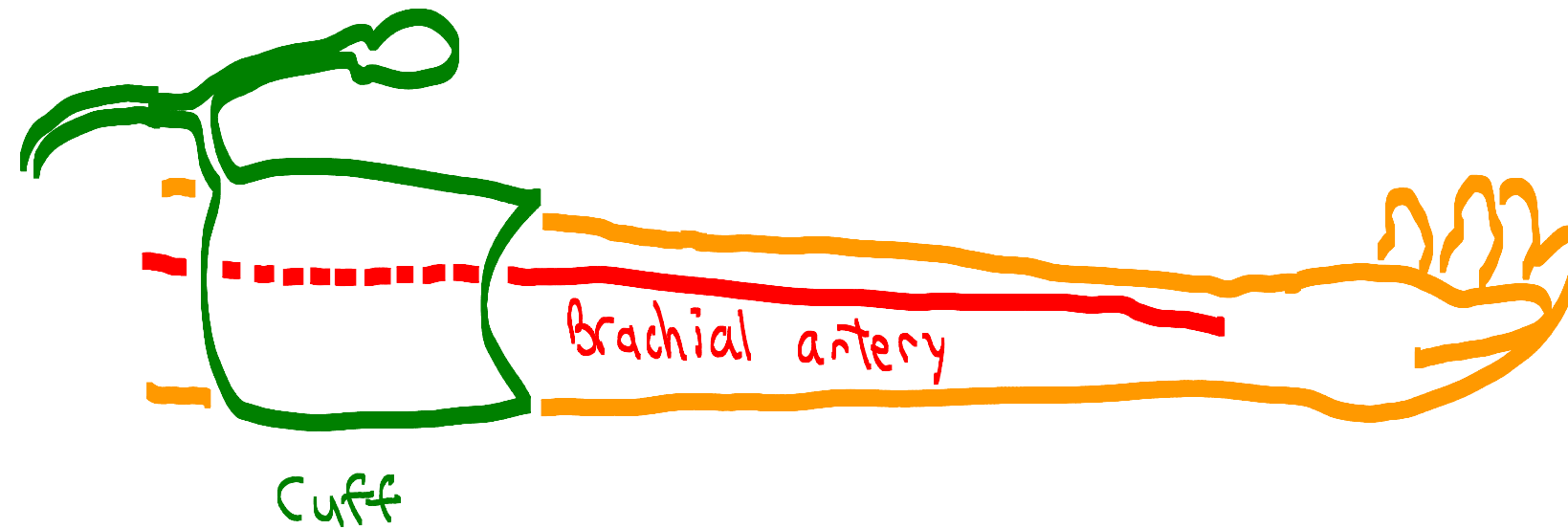
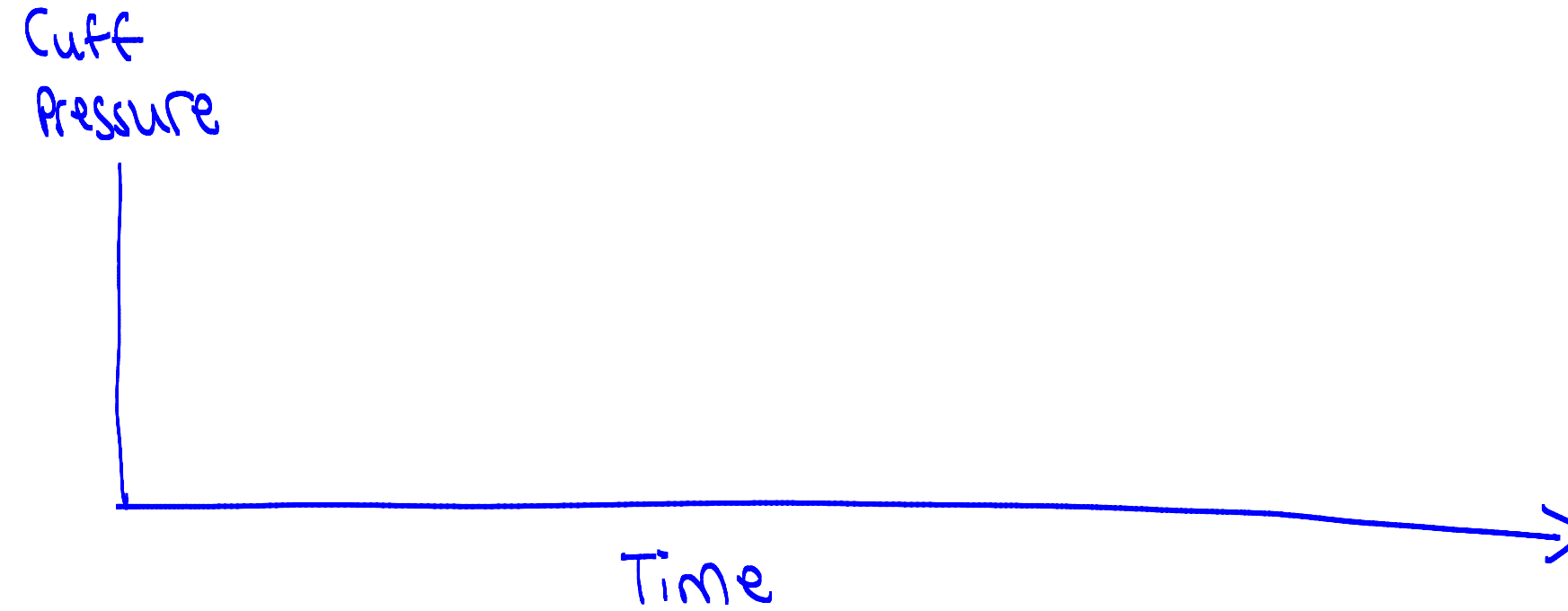
Tricuspid Valve ~~Pulmonary Valve~~ ~~Aortic Valve~~ Mitral Valve

② Auscultatory Method = Sphygmomanometer + Stethoscope



1. Oscillometric Method

A. Intro



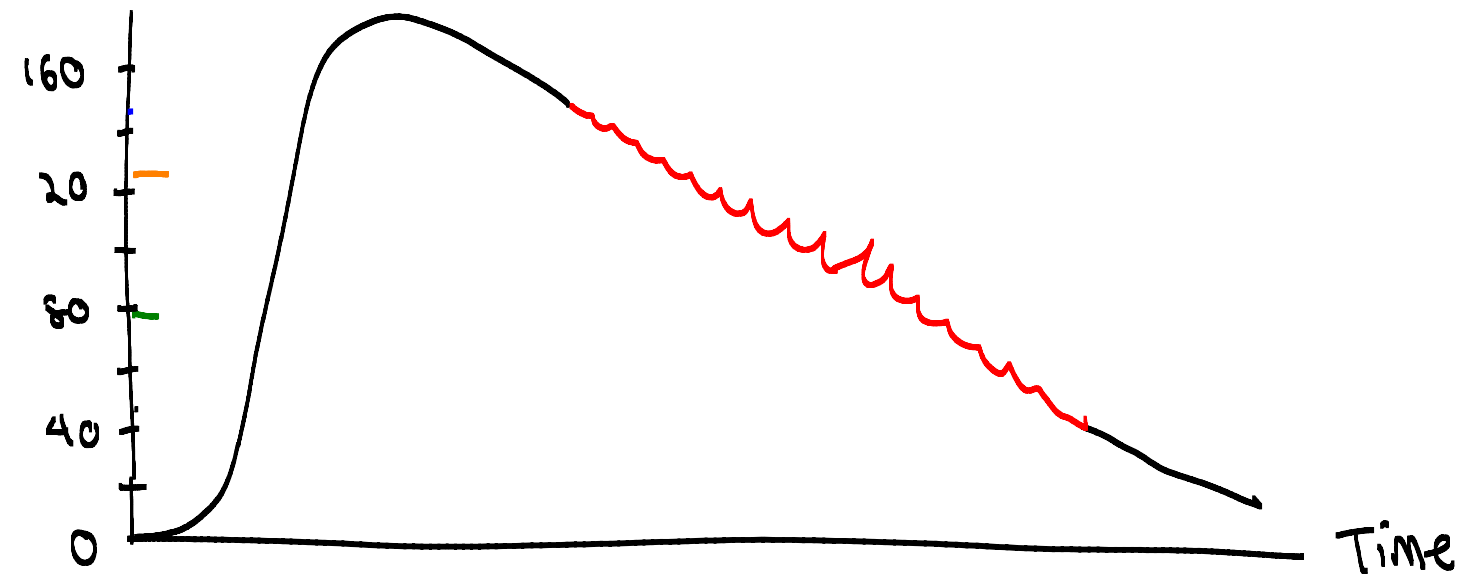
B. Mean Arterial Pressure (MAP)

The maximum oscillation

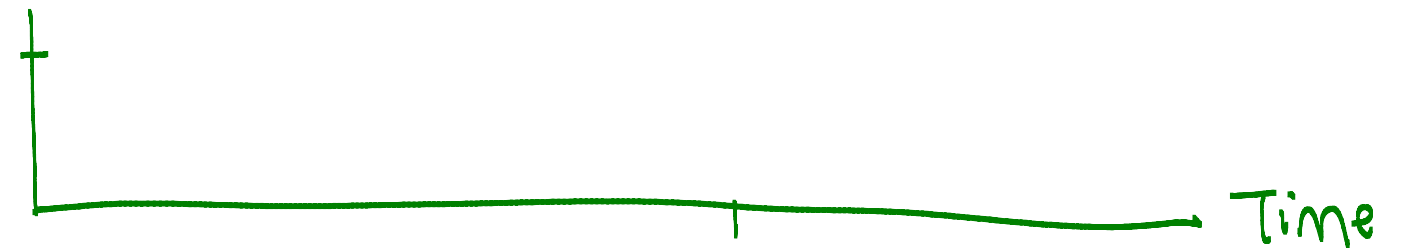
NOTE :

Oscillation
Amplitude

Cuff Pressure
(mmHg)



Oscillation
Amplitude



(11.2)

- Accuracy of oscillometric method

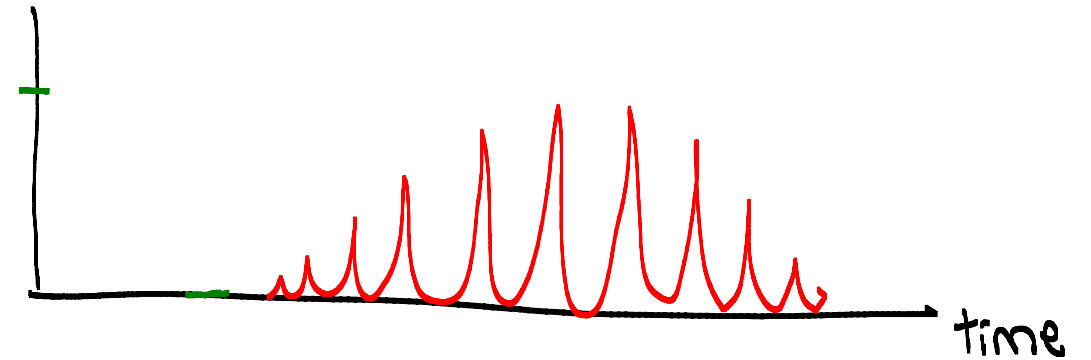
→ Good for

→ Not as good for

Ex: $A_s = 0.7 A_m$

$A_d = 0.6 A_m$

Oscillation
Amplitude



Cuff
Pressure



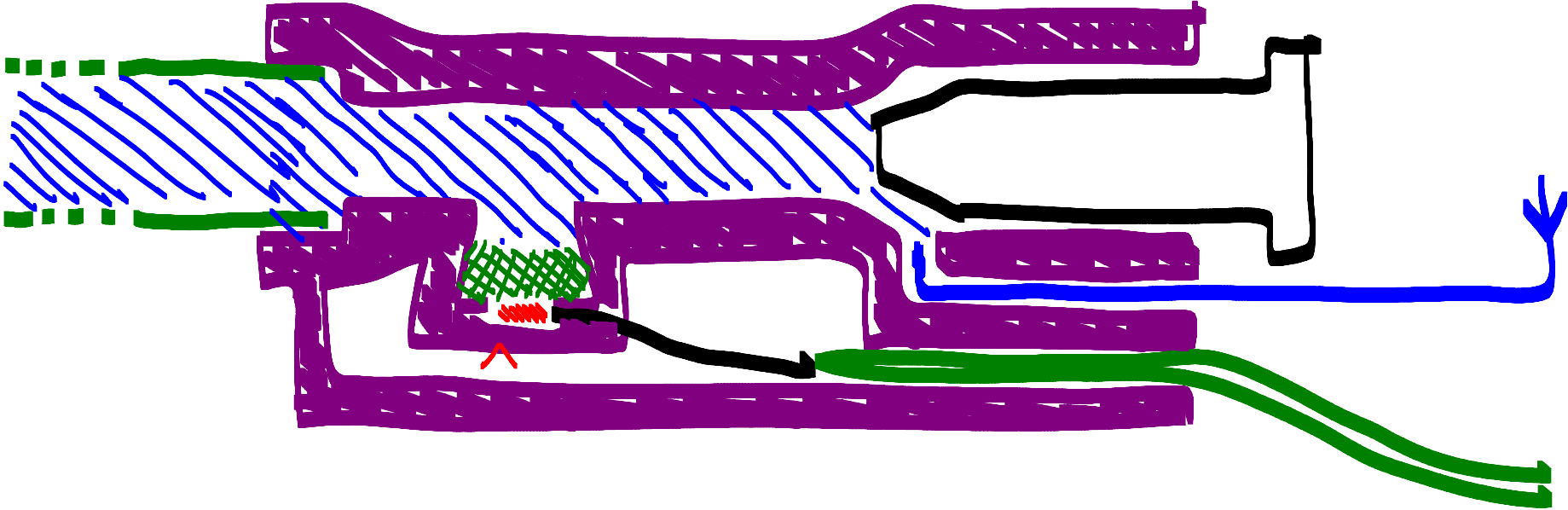
- _____



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• Disposable
Pressure Sensor

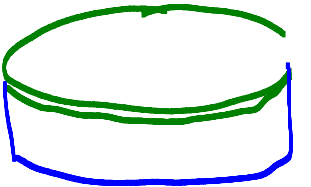
(Wehster Fig 2.5)



①

②

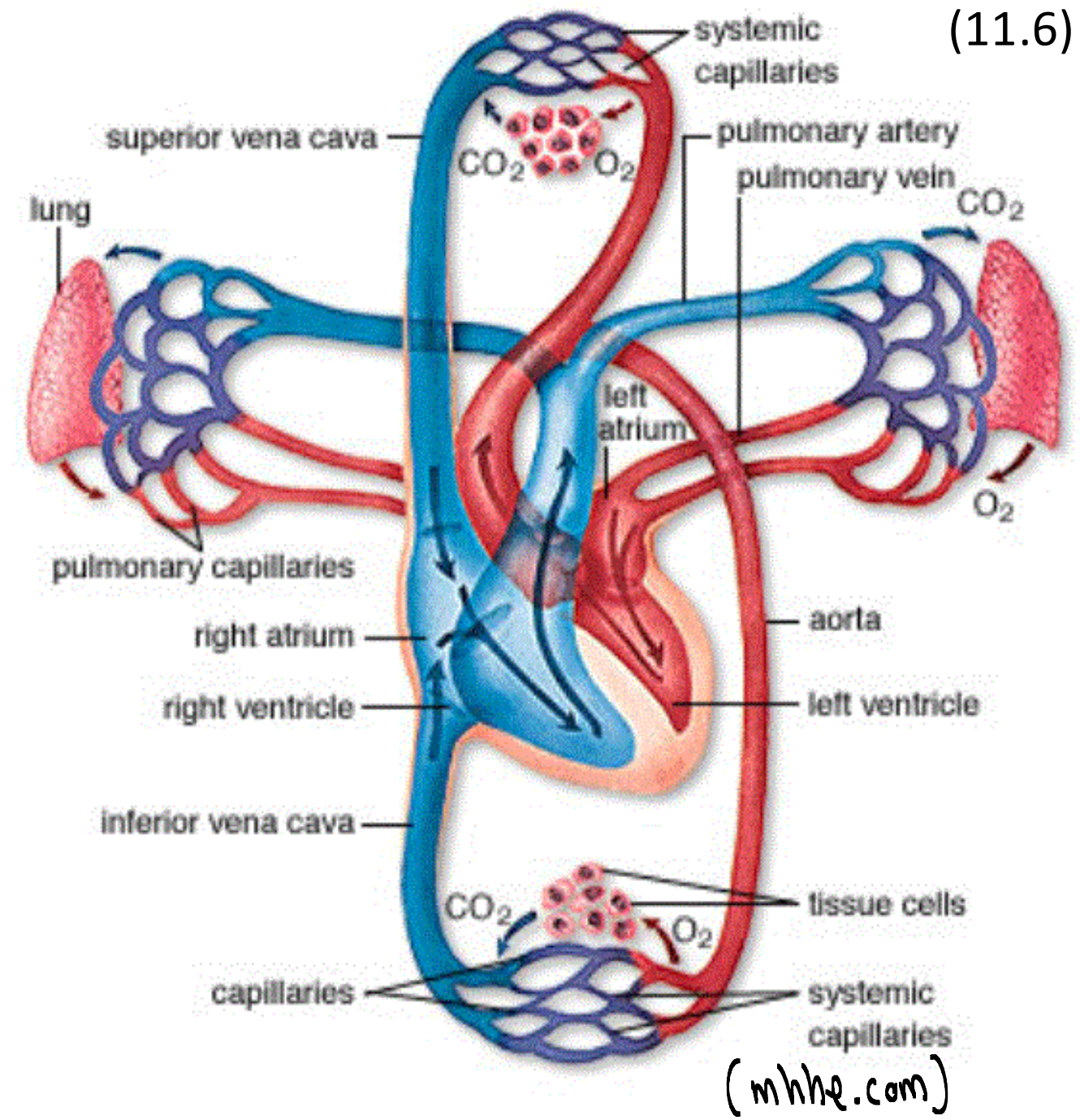
③



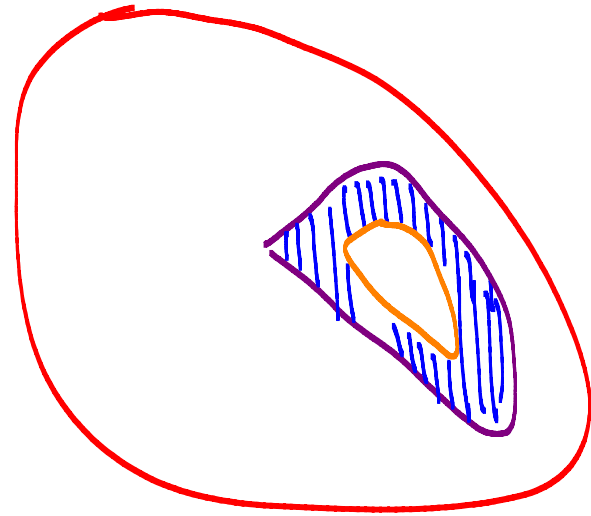
3. Cardiac Output

A. Intro

- Cells need
- The delivery rate
- Cardiac output $\equiv$



- Example values for 70 kg male



SV =

CO =

Typical Value

(EDV)

(ESV)

(SV)

(HR)

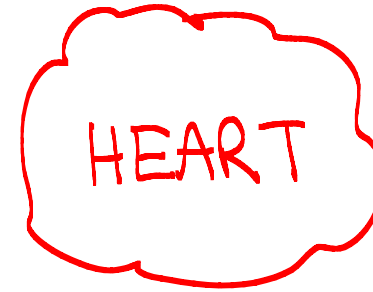
(CO)

6. Indicator-Dilution Method

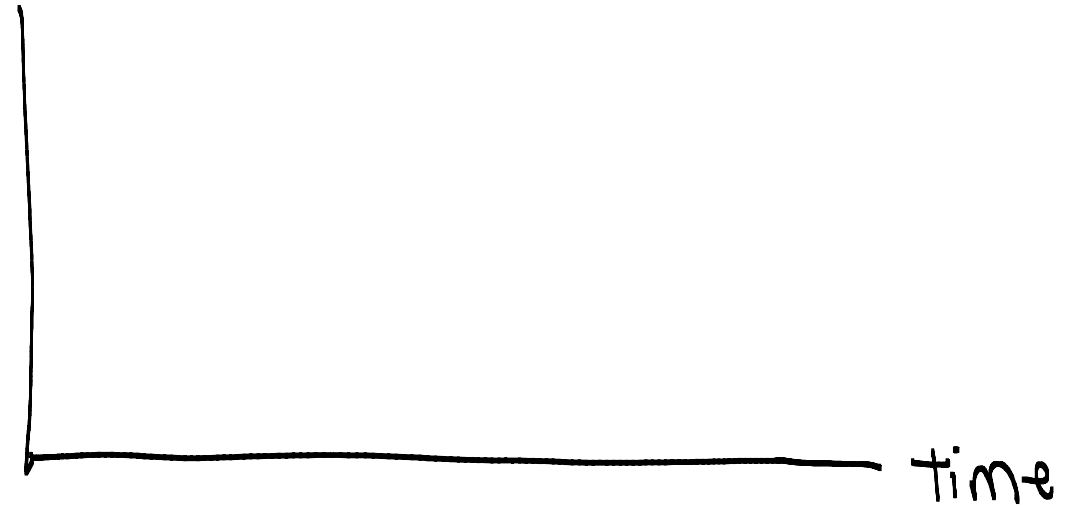
Step 1: Inject

Step 2: Measure

Step 3: Compute



Concentration

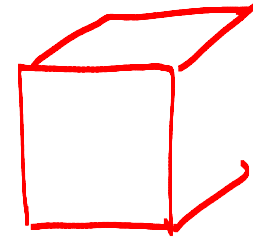


Derivation:

- Consider an increment of blood ΔV passing a sampling site during ΔT
- Amount of indicator is given by:

$$\Delta Q =$$

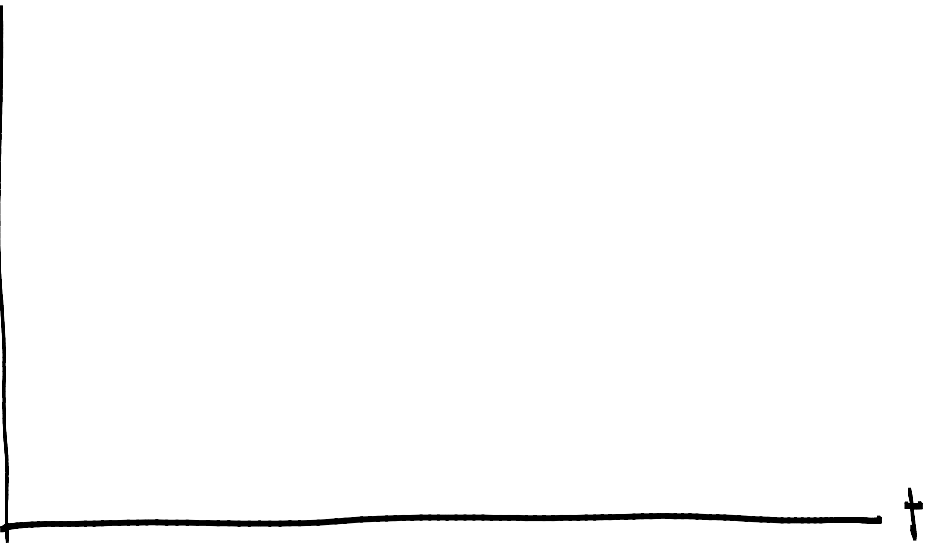
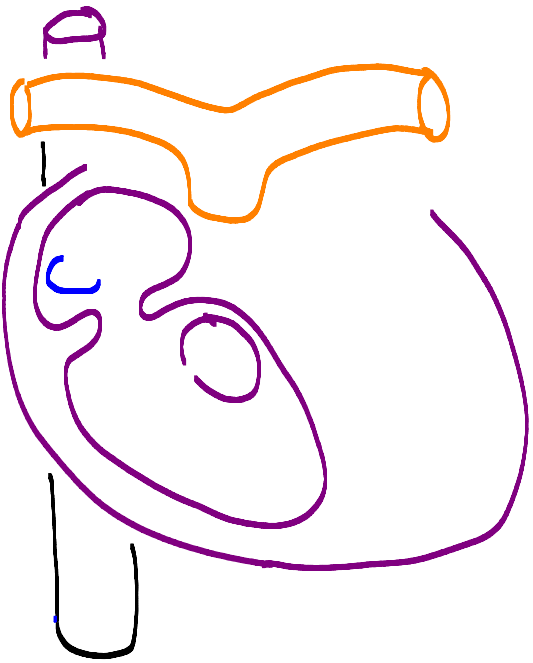
Time = t_0



Thermodilution

Step 1 Rapidly inject

Step 2 Temperature



$$F = \frac{\text{Total injected amount}}{\text{Integrated concentration}}$$