

Lecture 9 : EEG + Photoplethysmography

1. EEG

2. Photoplethysmography

- Exam #1 this Thu (Feb 6)

- * Lecture 1-8 material

- See course website for

- HW, PreLab, Quiz solns

- Last year's exam + solns

- Lab3 report due next Fri (Feb 14)

- PreLab 4 due at next week's lab session

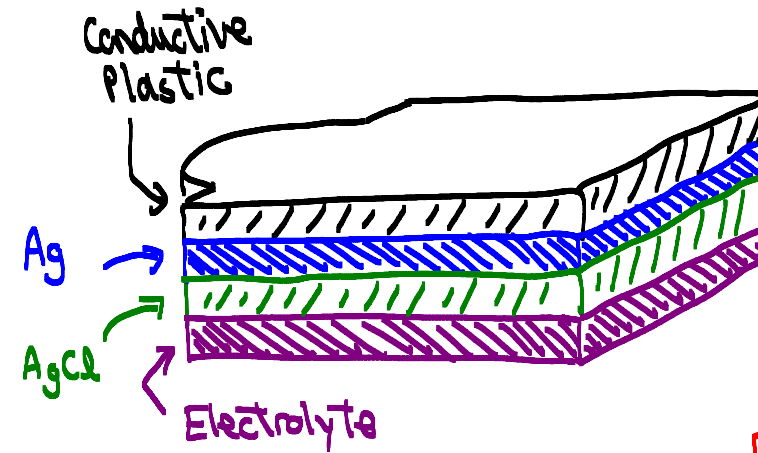
0. Review

① Ag/AgCl Electrodes

~~✗~~ Chemical reactions

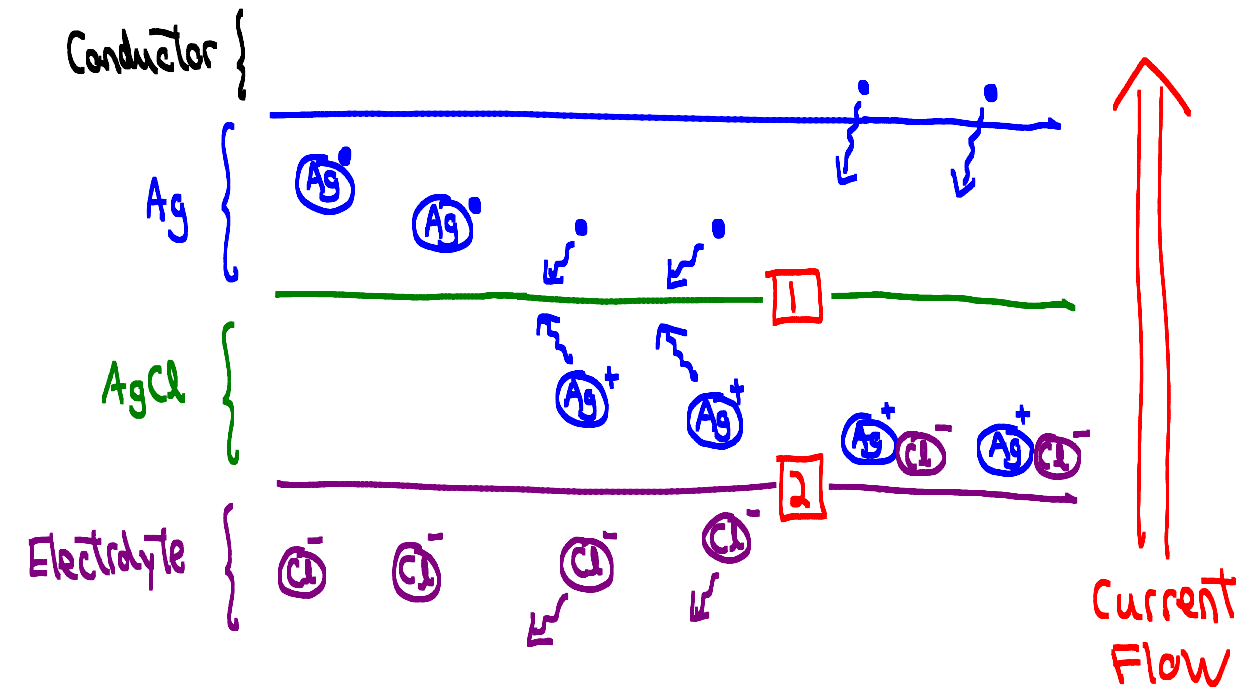
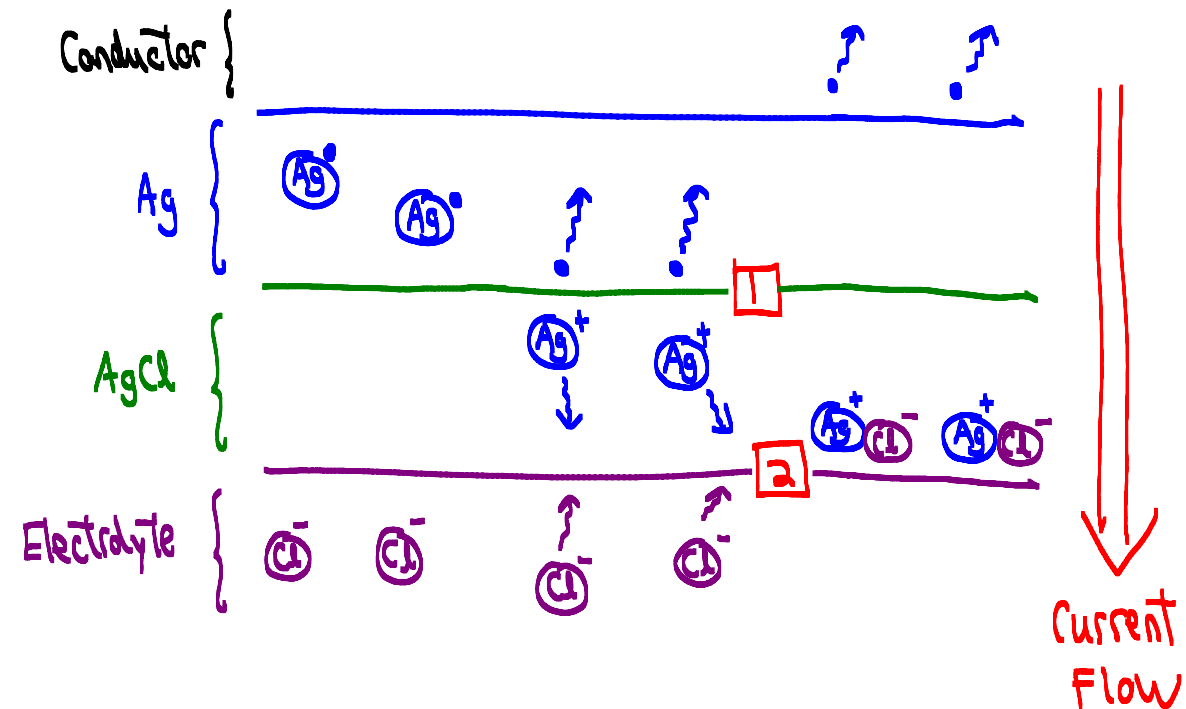
① Oxidation

② Association

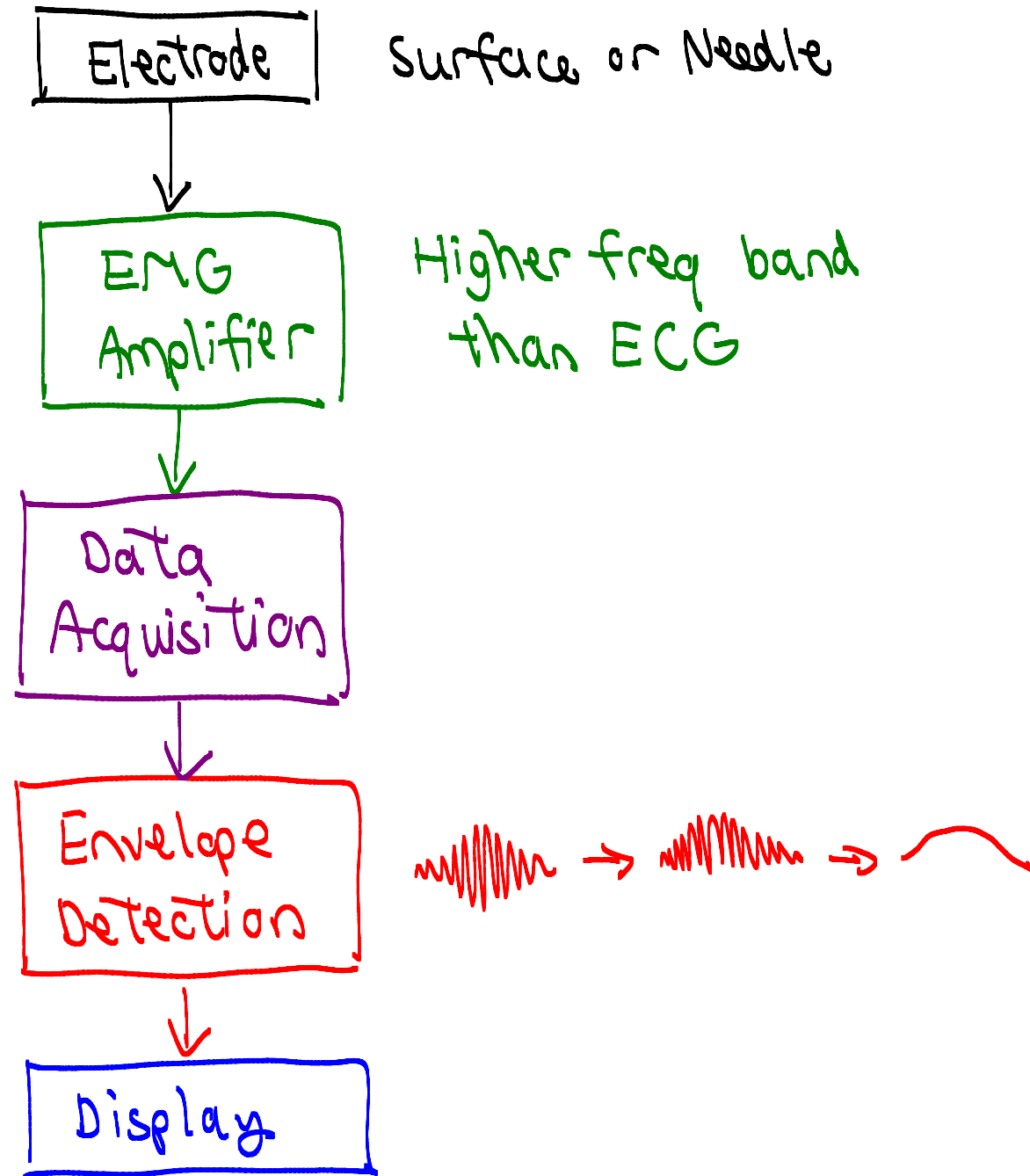
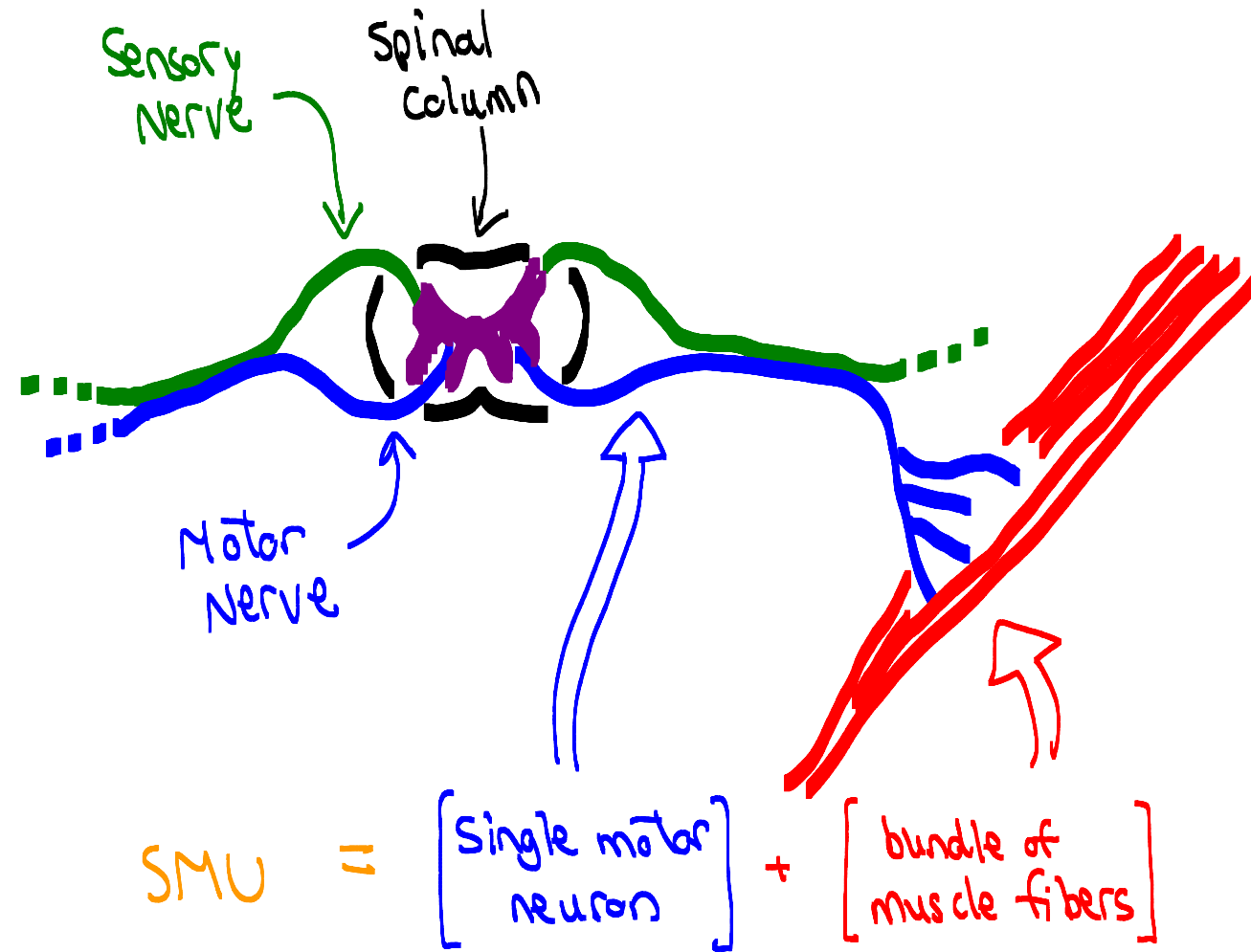


① Reduction

② Dissociation



② EMG (Electromyography)

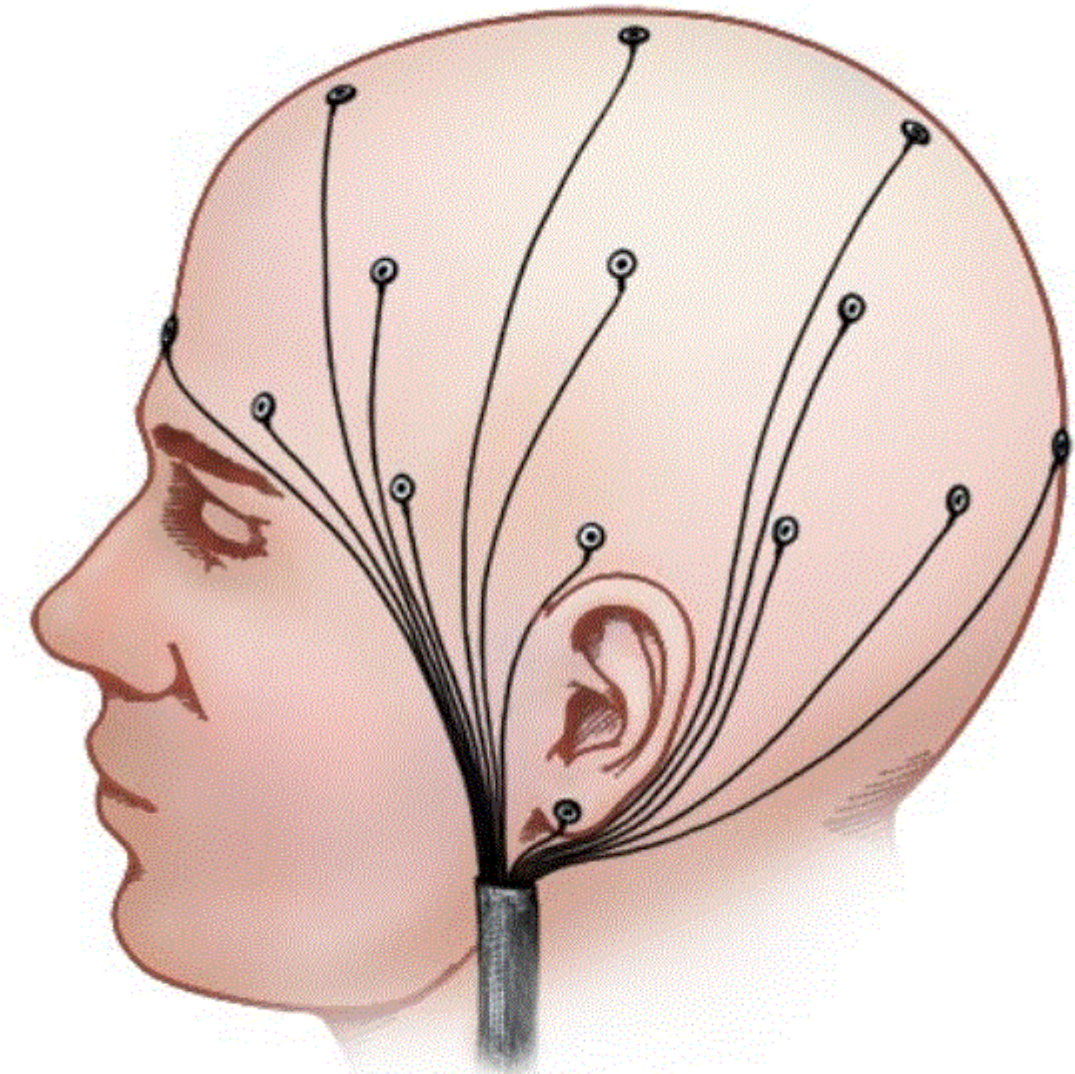


I. EEG Electroencephalography

A. Significance

- Measure electrical activity

(9.1)



© Mayo Foundation for Medical Education and Research. All rights reserved.

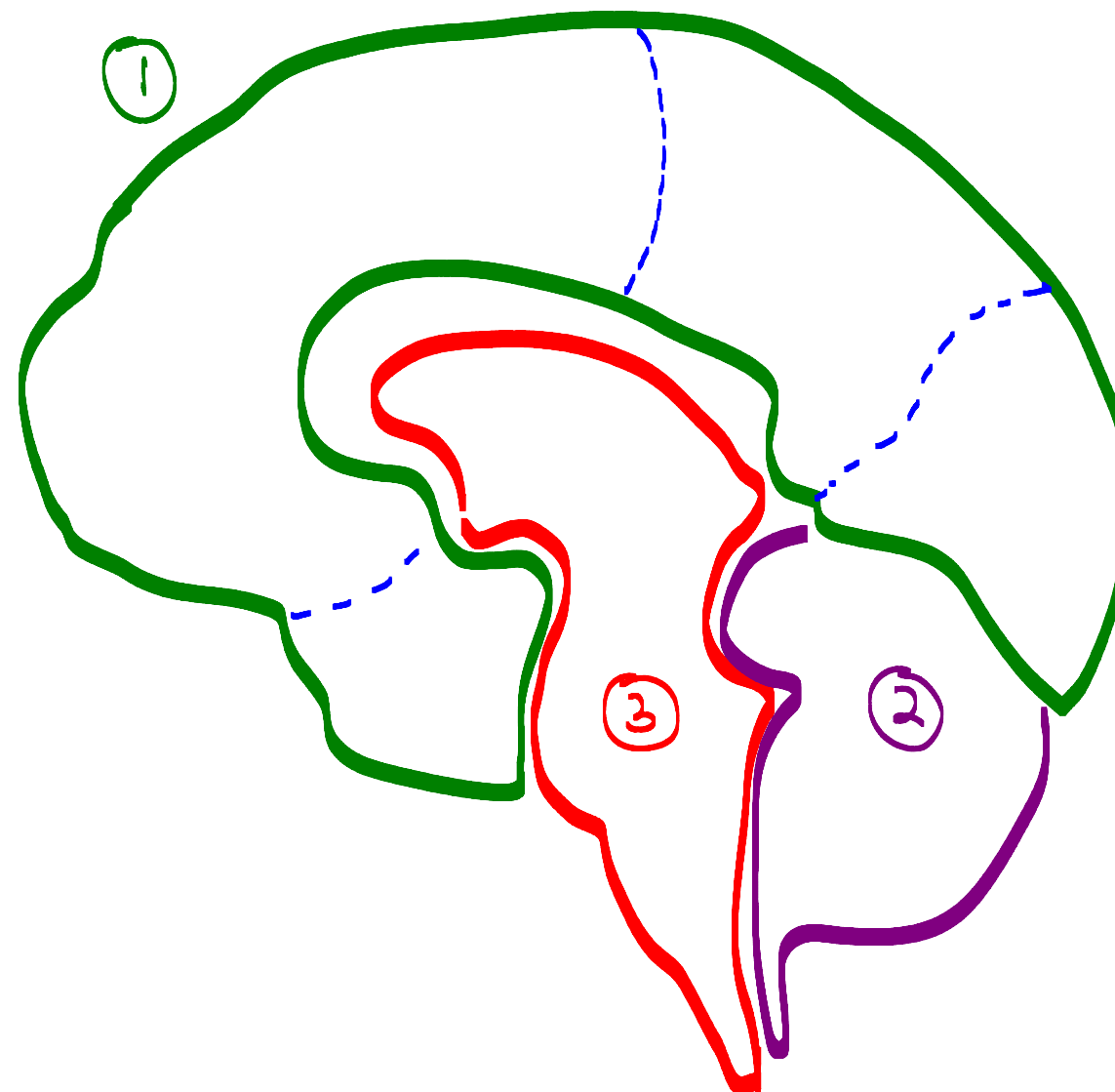
www.riversideonline.com

B. Basic Brain Anatomy

①

②

③



C. Electrode Placement

★ 10-20 Standard

F:

T:

P:

O:

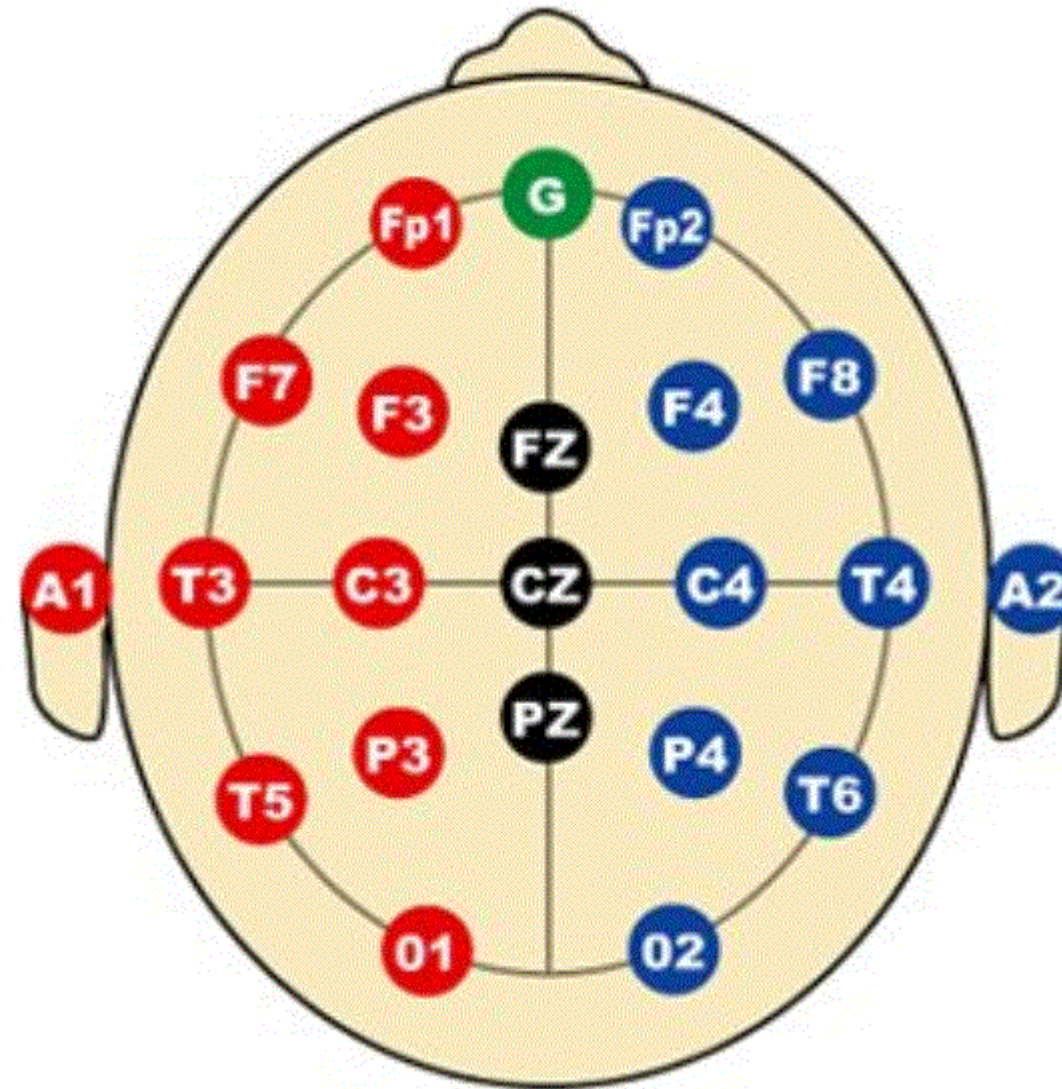
C:

Z:

A:

Pg:

Fp:



Normal EEG Waves

9.4

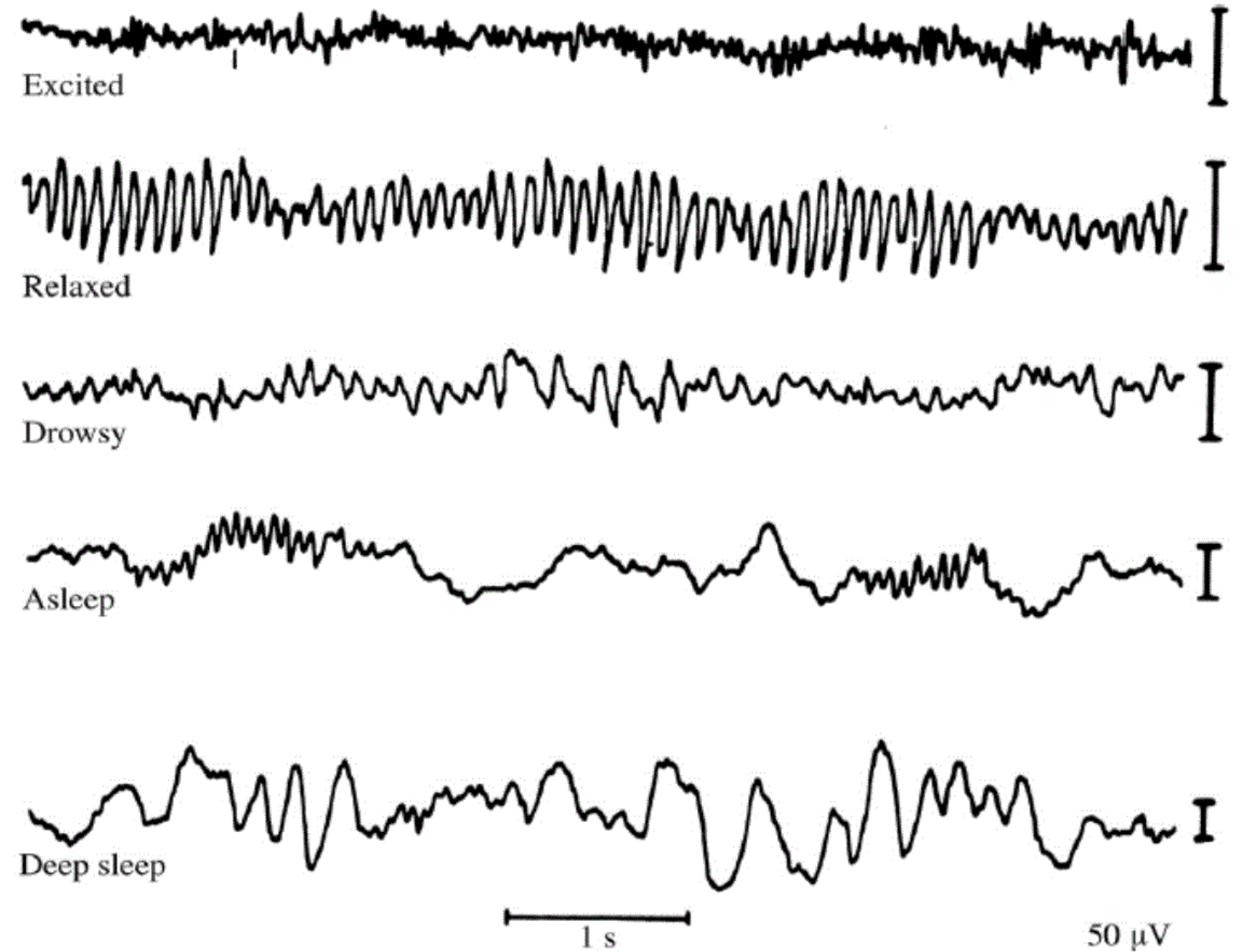
Alpha

Beta

Theta

Delta

- EEG waveforms of a subject falling asleep...

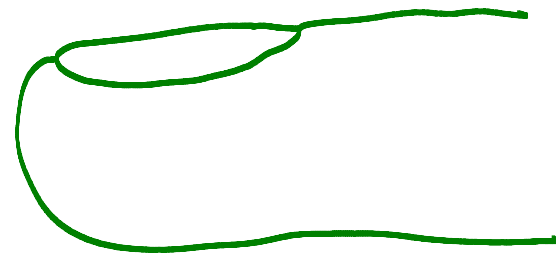


(webster Fig 4.29)

2. Photoplethysmography

A. Intro

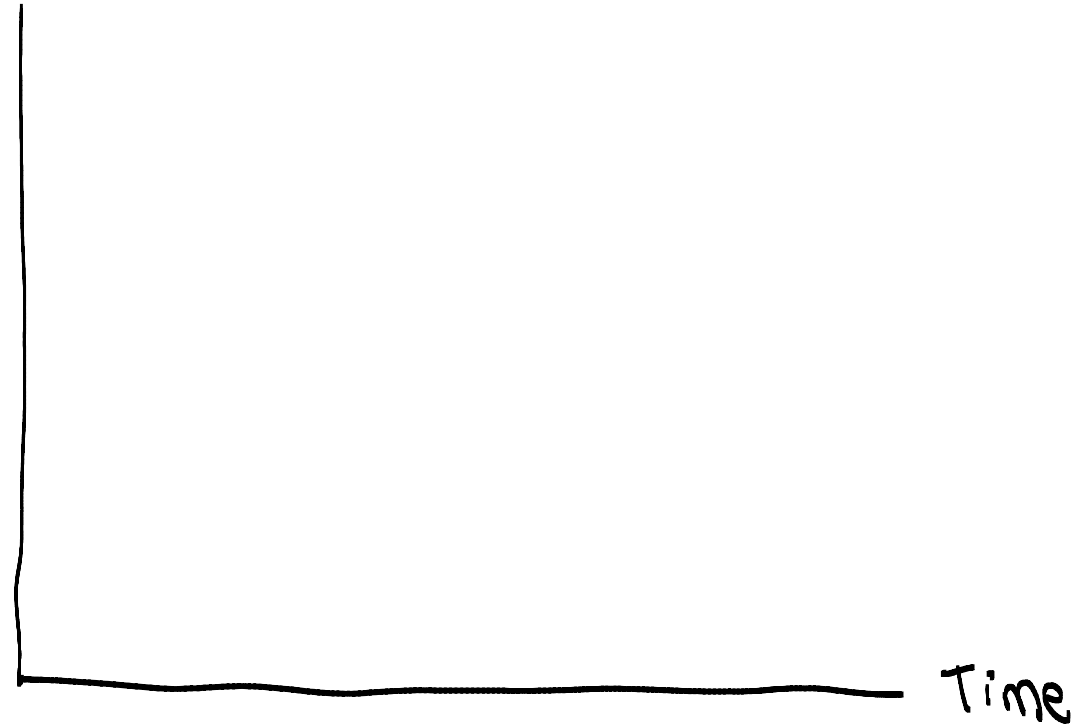
- Plethysmography =
- Photoplethysmography



penncare.net

- Basic idea of photoplethysmography

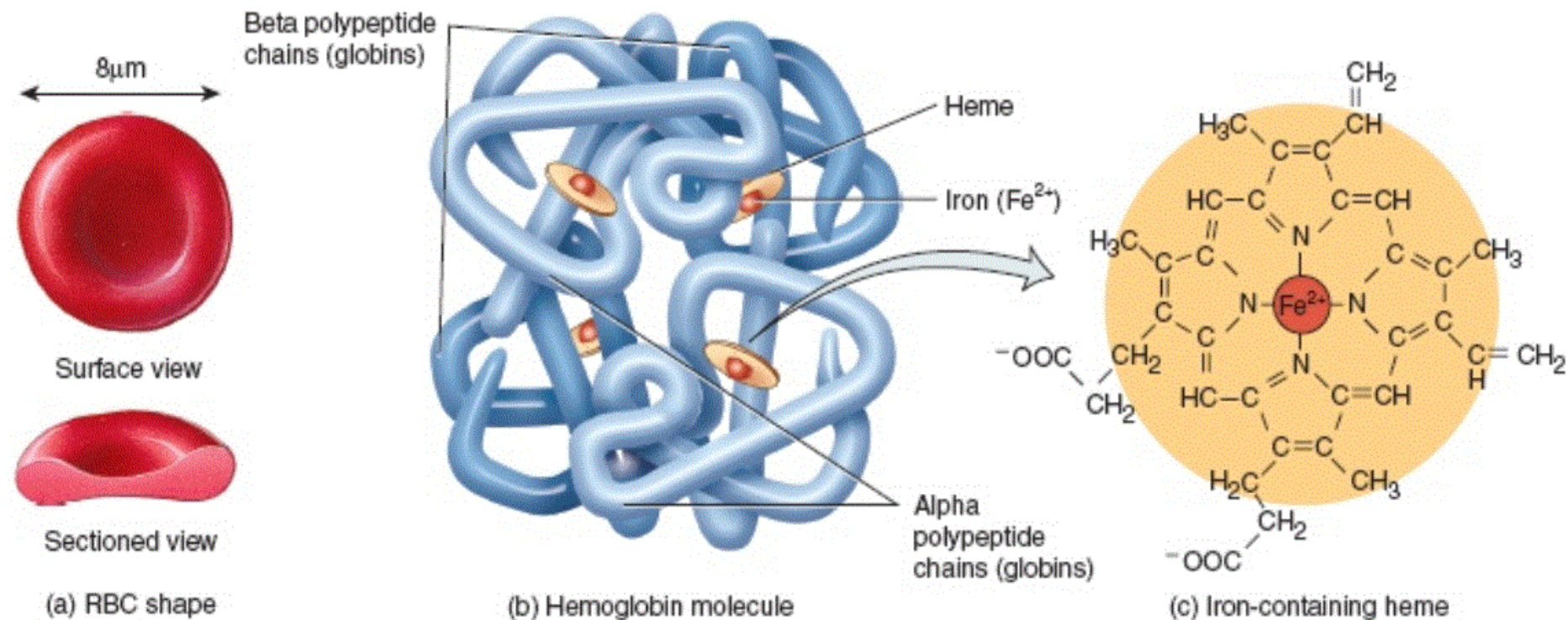
Optical
Absorption



C. Pulse Oximetry

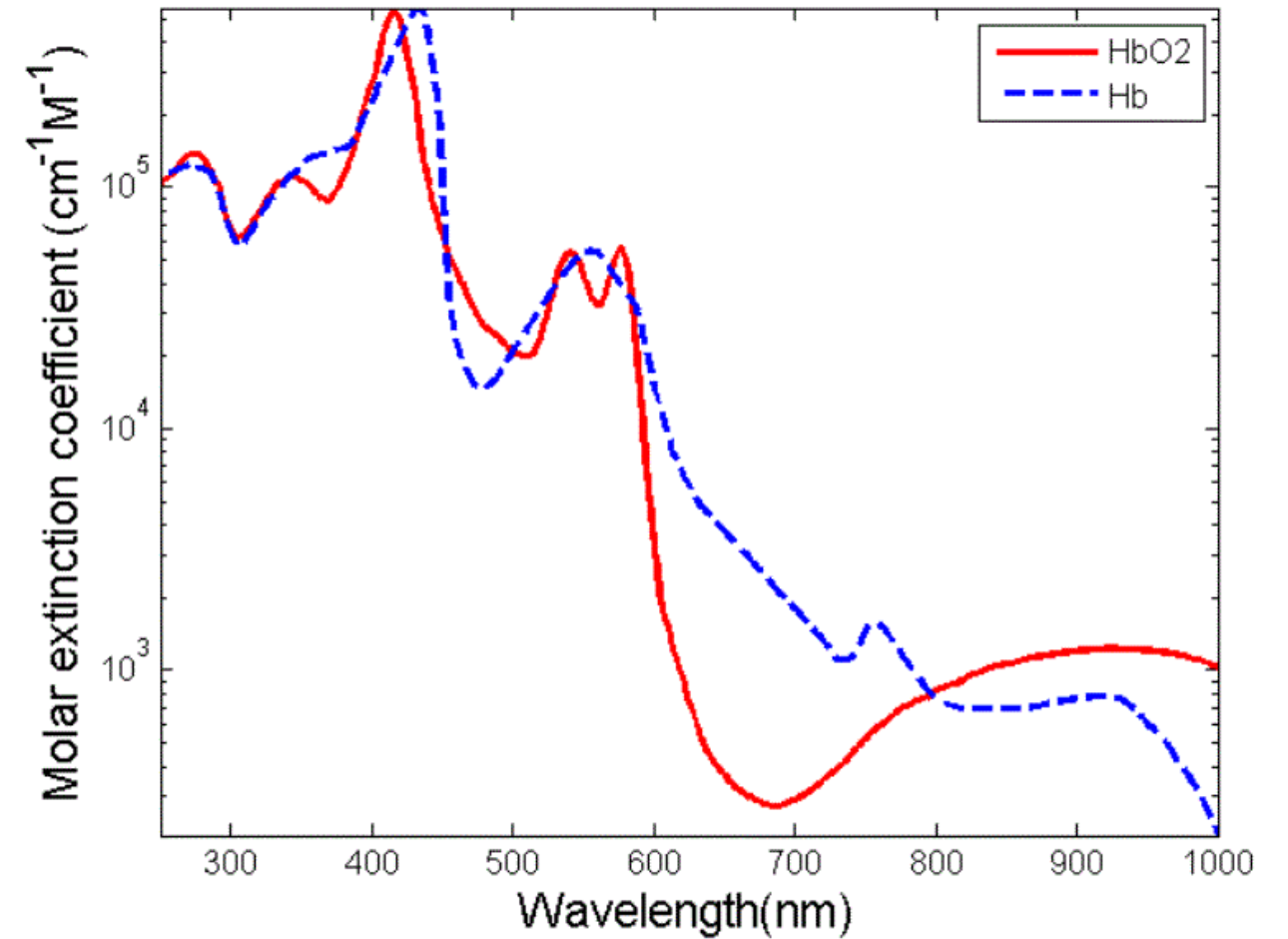
• Measures

(9.8)



(wikipedia)

Molar extinction coefficient vs. wavelength



- Oxygen Saturation

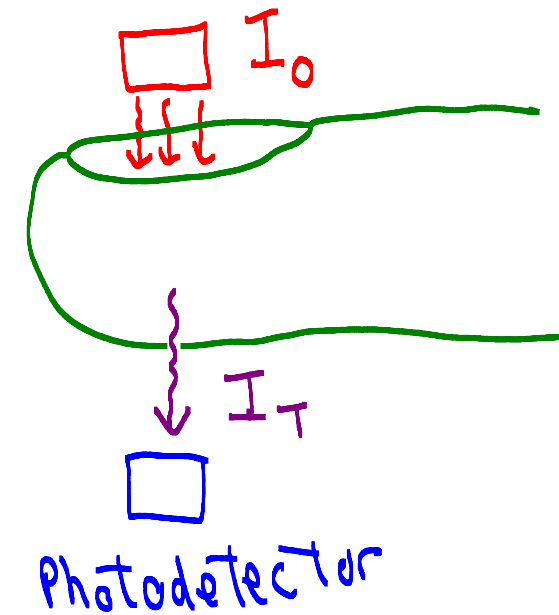
 C_o
 C_d

$$\left. \begin{array}{l} C_o \\ C_d \end{array} \right\} SO_2 =$$

Transmitted light intensity
depends on absorption by

$$I_T(\lambda) =$$

Q: How to get SO_2 from I_T ?



A: use

$$\lambda_1: \quad \frac{I_{T1}}{I_1} =$$

$$\lambda_2: \quad \frac{I_{T2}}{I_2} =$$