

CARDIAC OUTPUT AND ITS REGULATION

- + INTROD. TO C.O.
- + REGULATION OF C.O.
- + METHODS TO MEASURE C.O.
- + FREQ. ASKED SUBJECTIVE Q
- + QNA ON PG ENTR. EXAMS.
- + CLINICAL CHALLENGE Q.

METHODS FOR MEASURING CARDIAC OUTPUT.

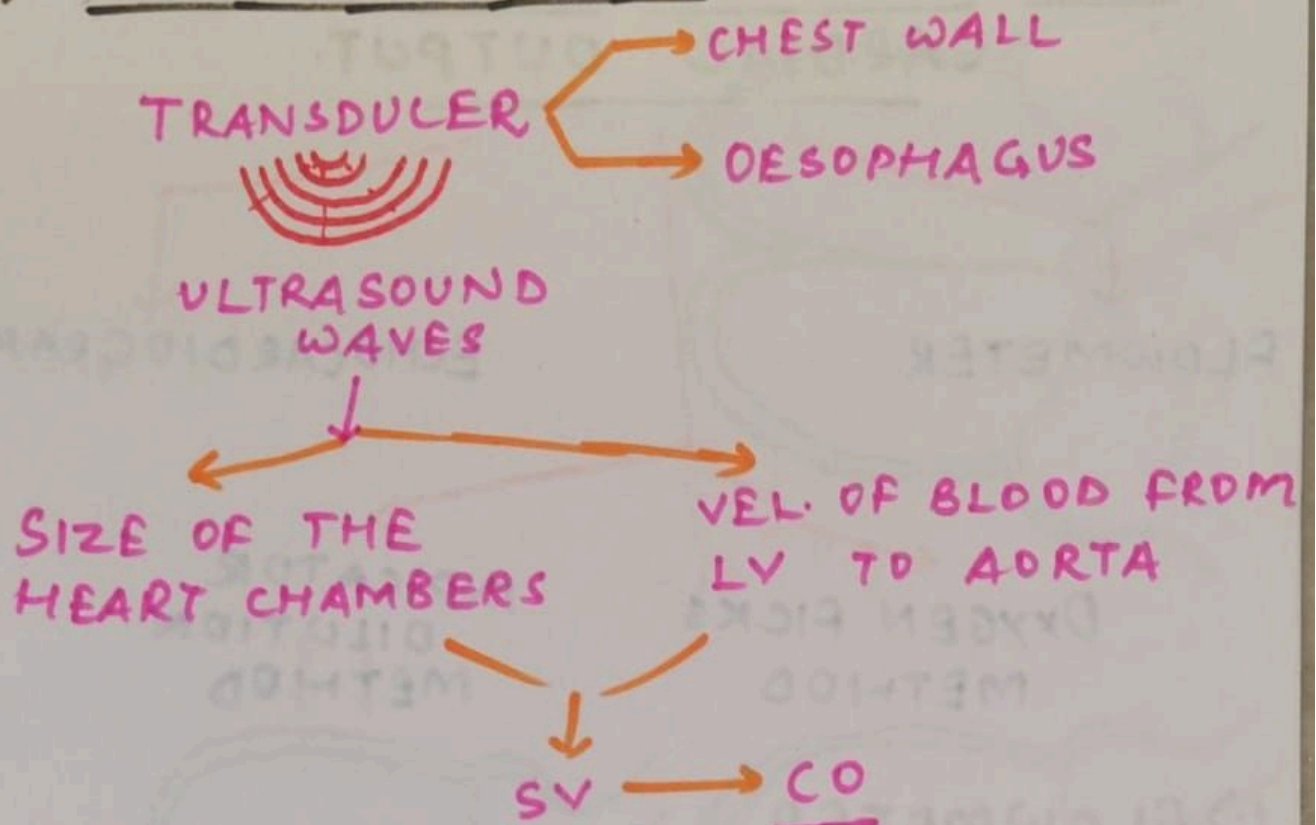


1) FLOWMETER

EM OR ULTRASONIC FLOWMETER
PLACED
BY INSERTING CANNULA

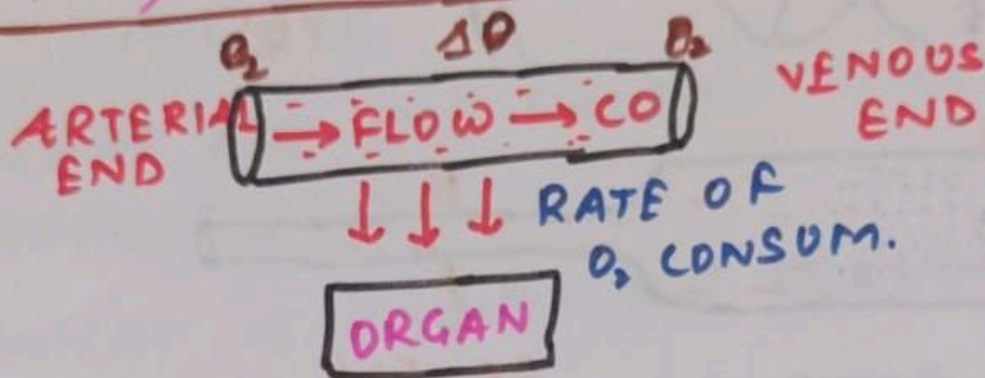
2) ECHOCARDIOGRAPHY

2-) ECHOCARDIOGRAPHY



3) OXYGEN FICK'S METHOD

$$\begin{array}{l} \text{RATE OF } O_2 \\ \text{CONSUMPTION} \\ \text{BY ANY} \\ \text{ORGAN} \\ \text{(mL/min)} \end{array} = \begin{array}{l} \text{ARTERIOVENOUS} \\ O_2 \\ \text{DIFFERENCE} \\ \text{(mL/L)} \end{array} \times \begin{array}{l} \text{C.O.} \\ \text{(L/min)} \end{array}$$

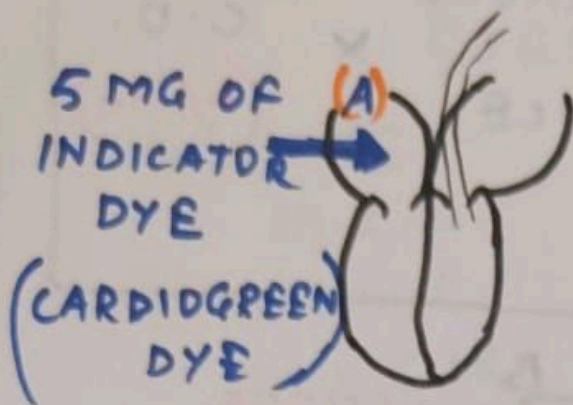


RATE OF O_2 CONSUMP. BY LUNGS $\rightarrow$ BY OXYGEN METER

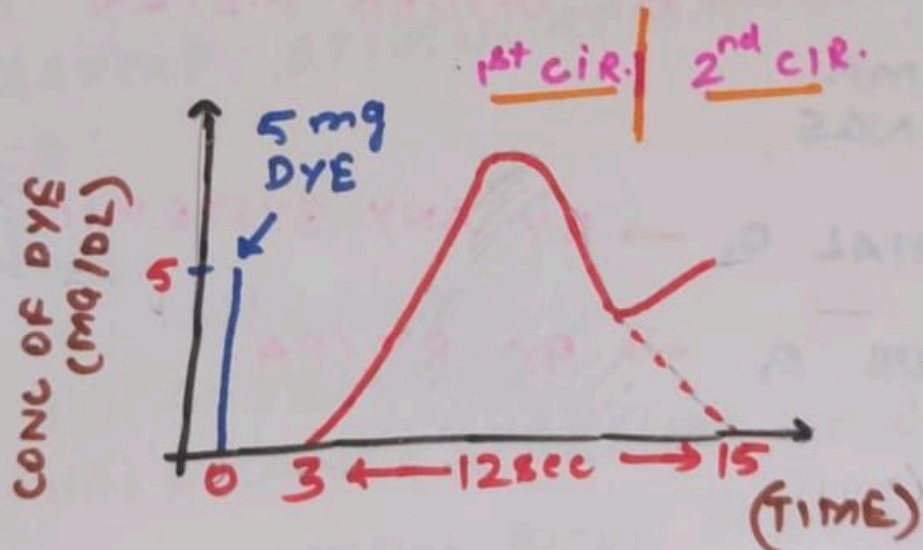
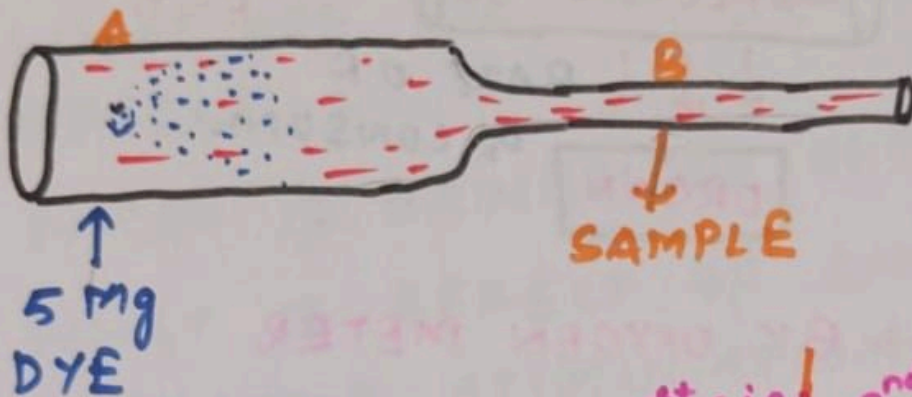
ARTERIAL O_2 $\rightarrow$ BY ANY SYSTEMIC ARTERY

VENOUS O_2 $\rightarrow$ BY RV/PA

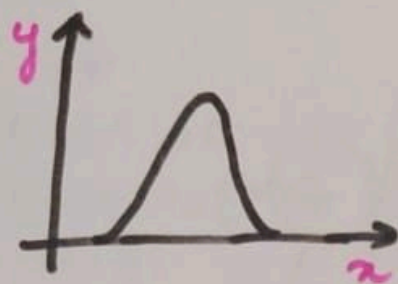
4.) INDICATOR DILUTION METHOD



SAMPLE
(B)



BASICS,



$$AVG = \frac{\int x dx}{\int dx} = \frac{AREA}{\int dx}$$



$$AVG = \frac{AREA OF CURVE}{TIME}$$

Let, Avg Conc = 0.25 mg/dl

$$\left(\text{Avg. conc(A)} = \text{Avg. conc(B)} = \text{Avg. conc of circulation} \right)$$

Point (B)

Avg conc

12 sec $\Rightarrow$ 0.25 mg/dl

MEANS
0.25 mg $\rightarrow$ 100 ml

Circulation

12 sec $\Rightarrow$ "

5 mg $\rightarrow$?

? = $\frac{5 \times 100}{0.25}$

= 2000 ml

OUTPUT OF 2000 mL IN 12 SEC

$$\begin{aligned} CO &= 2000 \times 5 \\ &= 10,000 \text{ mL} \\ &= 10 \text{ L/min} \end{aligned}$$

FORMULA

$$CO \text{ (ml/min)} = \frac{\text{mg OF DYE INJECTED} \times 60}{\left(\begin{array}{c} \text{Avg. CONC OF DYE} \\ \text{IN EACH ML OF} \\ \text{BLOOD (mg/ml)} \end{array} \right) \times \left(\begin{array}{c} \text{DURATION} \\ \text{OF} \\ \text{CURVE} \\ \text{(sec)} \end{array} \right)}$$

$$CO = \frac{5 \text{ mg} \times 60}{\left(\frac{0.25}{100} \right) \text{ mg/ml} \times 12 \text{ min}}$$

$$\begin{aligned} \checkmark \text{AV CONC} &= 0.25 \text{ mg/dl} \\ \checkmark \text{durat}^n &= 12 \text{ sec} \\ \checkmark &5 \text{ mg dye inject} \end{aligned}$$

$$CO = 10,000 \text{ mL/min}$$

$$CO = 10 \text{ L/min}$$