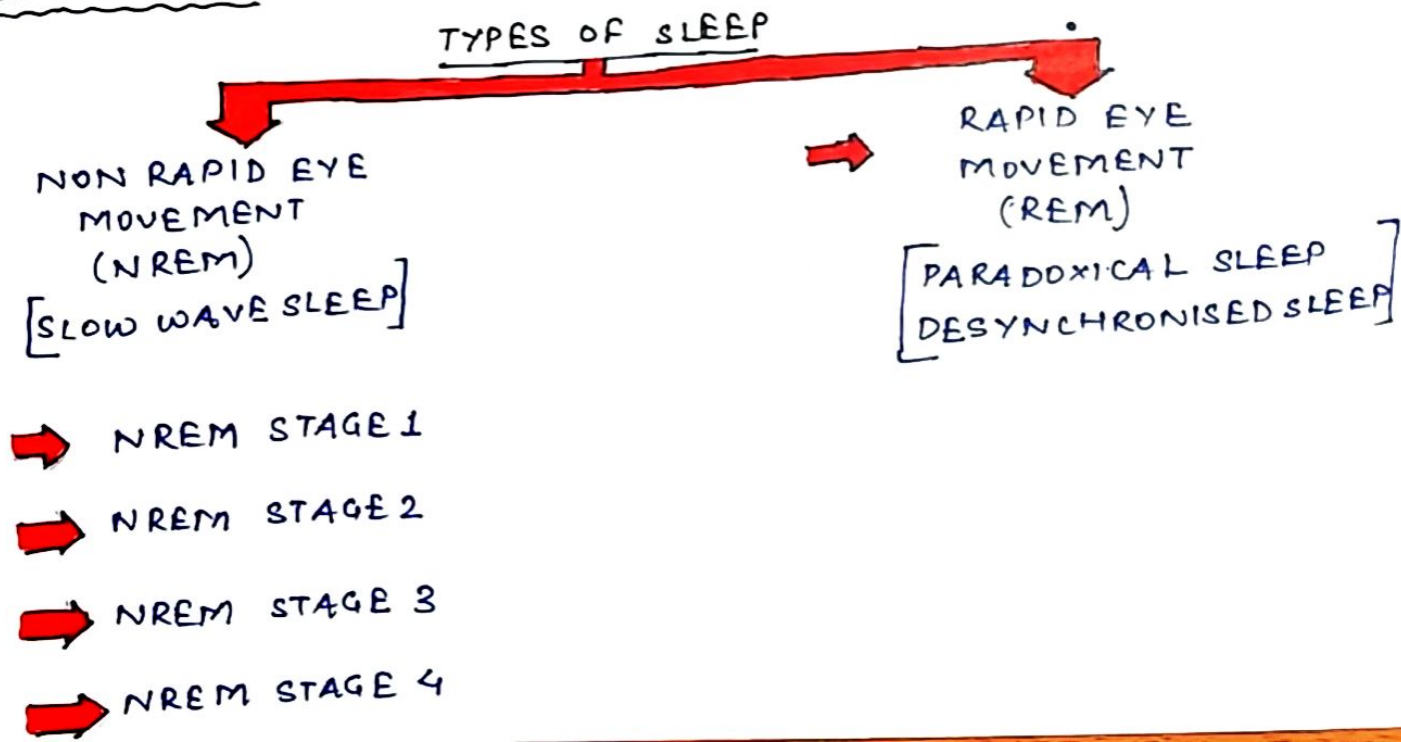


⇒ DEFINATION [SLEEP v/s COMA] :-

SLEEP :- UNCONSCIOUSNESS FROM WHICH PERSON CAN BE AROUSED BY SENSORY OR OTHER STIMULI

COMA :- UNCONSCIOUSNESS FROM WHICH A PERSON CANNOT BE AROUSED.

⇒ SLEEP STAGES



ALERT WAKEFULNESS :- BETA WAVES ARE SEEN.



QUIET WAKEFULNESS (EYES CLOSED) (RESTING) :- ALPHA WAVES ARE SEEN



NREM STAGE 1

:- THETA WAVES BEGINS



NREM STAGE 2

:- MORE THETA WAVES ARE SEEN

• APPEARANCE OF K-COMPLEXES

• SLEEP SPINDLES ARE SEEN

[UNUSUAL RISE IN FREQ OF ELECTRICAL ACTIVITY]



- A -
HIGH VOLTAGE
BIPHASIC
WAVES

↑
K-COMPLEX

↑
SLEEP SPINDLE

NREM STAGE 3/4

:- • DEEP SLEEP
• THETA WAVES FREQ BECOMES MORE SLOWER
• DELTA WAVES ARE SEEN



REM STAGE :- • ACTIVE FORM OF SLEEP [NOT SO RESTFULL]

- ALSO KNOWN AS PARADOXICAL SLEEP

BECAUSE BRAIN IS HIGHLY ACTIVE
BUT PERSON IS STILL ASLEEP.

- ALSO KNOWN AS DESYNCHRONISED SLEEP.

⇒ SYNCHRONISATION BETWEEN NEURONS ARE P

⇒ INTENSITY ↓ , FREQUENCY ↑

⇒ CORTICAL ACTIVITY $\propto \frac{1}{\text{SYNCH.}}$ $\propto \frac{1}{\text{INTENSITY}}$

⇒ CORTICAL ACTIVITY \propto FREQUENCY

- BETA WAVES ARE SEEN 

[DIFFICULT TO DISTINGUISH FROM ALERT WAKEFULNESS]

- VIVID DREAMING IS EXPERIENCED.

- CHARACTERISTIC PROPERTY OF PGO SPIKES ARE SEEN.


REM STAGE :- • ACTIVE FORM OF SLEEP [NOT SO RESTFULL]

• ALSO KNOWN AS PARADOXICAL SLEEP

BECAUSE BRAIN IS HIGHLY ACTIVE BUT PERSON IS STILL ASLEEP.

• ALSO KNOWN AS DESYNCHRONISED SLEEP.

⇒ SYNCHRONISATION BETWEEN NEURONS ARE POOR
⇒ INTENSITY ↓ , FREQUENCY ↑
⇒ CORTICAL ACTIVITY $\propto \frac{1}{\text{SYNC.}}$ $\propto \frac{1}{\text{INTENSITY}}$
⇒ CORTICAL ACTIVITY \propto FREQUENCY

• BETA WAVES ARE SEEN 
[DIFFICULT TO DISTINGUISH FROM ALERT WAKEFULNESS]

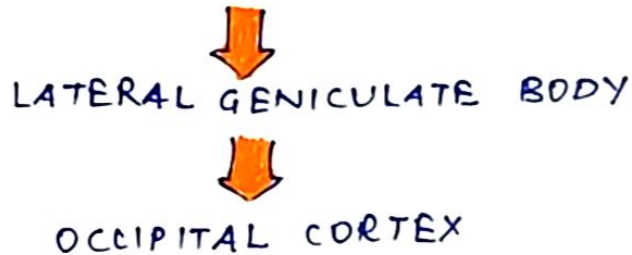
• VIVID DREAMING IS EXPERIENCED.

• CHARACTERSTIC PROPERTY OF PGO SPIKES ARE SEEN.

PGO SPIKES [PONTOGENICULOCCIPITAL SPIKES]

⇒ LARGE PHASIC POTENTIALS

⇒ ORIGINATE IN CHOLINERGIC NEURONS
IN PONS



NREM SLEEP

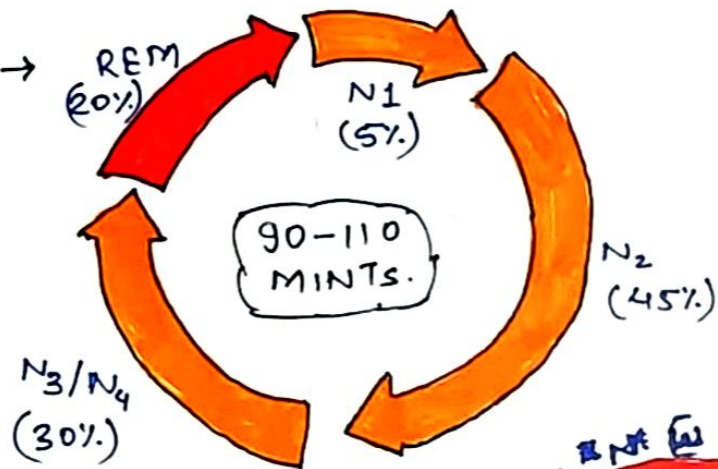
- ⇒ 75-80% OF SLEEP CYCLE
- ⇒ NO EYE MOVEMENT
NO MUSCLE ACTIVITY
- ⇒ DREAM MAY APPEAR BUT
MEMORY OF DREAM
DOES NOT RETAIN.
- ⇒ HEART RATE AND RESPIRATORY
RATE DECREASES THAN FROM
WAKEFULNESS
- ⇒ BLOOD PRESSURE DECREASES
- ⇒ SYMPATHETIC ACTIVITY AND
BMR DECREASES.

REM SLEEP

- ⇒ 20-25% OF SLEEP CYCLE
- ⇒ RAPID EYE MOVEMENT
IRREGULAR MUSCLE ACTIVITY;
BUT MUSCLES ARE VIRTUALLY
PARALYSED.
- ⇒ VIVID DREAMING
- ⇒ HEART RATE AND RESPIRATORY
RATE INCREASES AND BECOMES
IRREGULAR.
- ⇒ BLOOD PRESSURE INCREASES
AND BECOMES IRREGULAR.
- ⇒ SYMPATHETIC ACTIVITY AND
BMR INCREASES

SLEEP CYCLE

GENERAL TREND OF SLEEP CYCLE :->



N1 \Rightarrow NREM STAGE 1

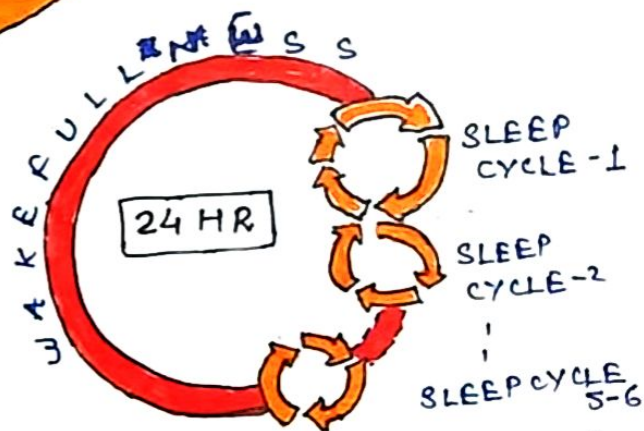
N2 \Rightarrow NREM STAGE 2

N3 \Rightarrow NREM STAGE 3

N4 \Rightarrow NREM STAGE 4

N3 AND N4 DECREASES WITH INCREASE IN SLEEP HOURS.

REM INCREASES WITH INCREASE IN SLEEP HOURS



24-HR SLEEP-WAKE CYCLE
[CIRCADIAN RHYTHM]

THEORIES OF SLEEP :-

EARLIER THEORY ⇒ FATIGUE OF RETICULAR ACTIVATING SYSTEM CAUSES SLEEP.

RECENT THEORY ⇒ IT IS DUE TO STIMULATION OF CERTAIN CENTRES THAT INHIBITS OTHER PART OF BRAIN THROUGH NEUROHORMONAL SUBSTANCES CAUSING SLEEP.

CENTERS

NEUROHORMONES

1) RETICULAR ACTIVATING SYSTEM

- RAPHE NUCLEUS → SEROTONIN (5-HT)
- LOCUS COERULEUS → NOREPINEPHRINE (NE)
- ADJACENT AREAS → ACETYLCHOLINE (ACh)

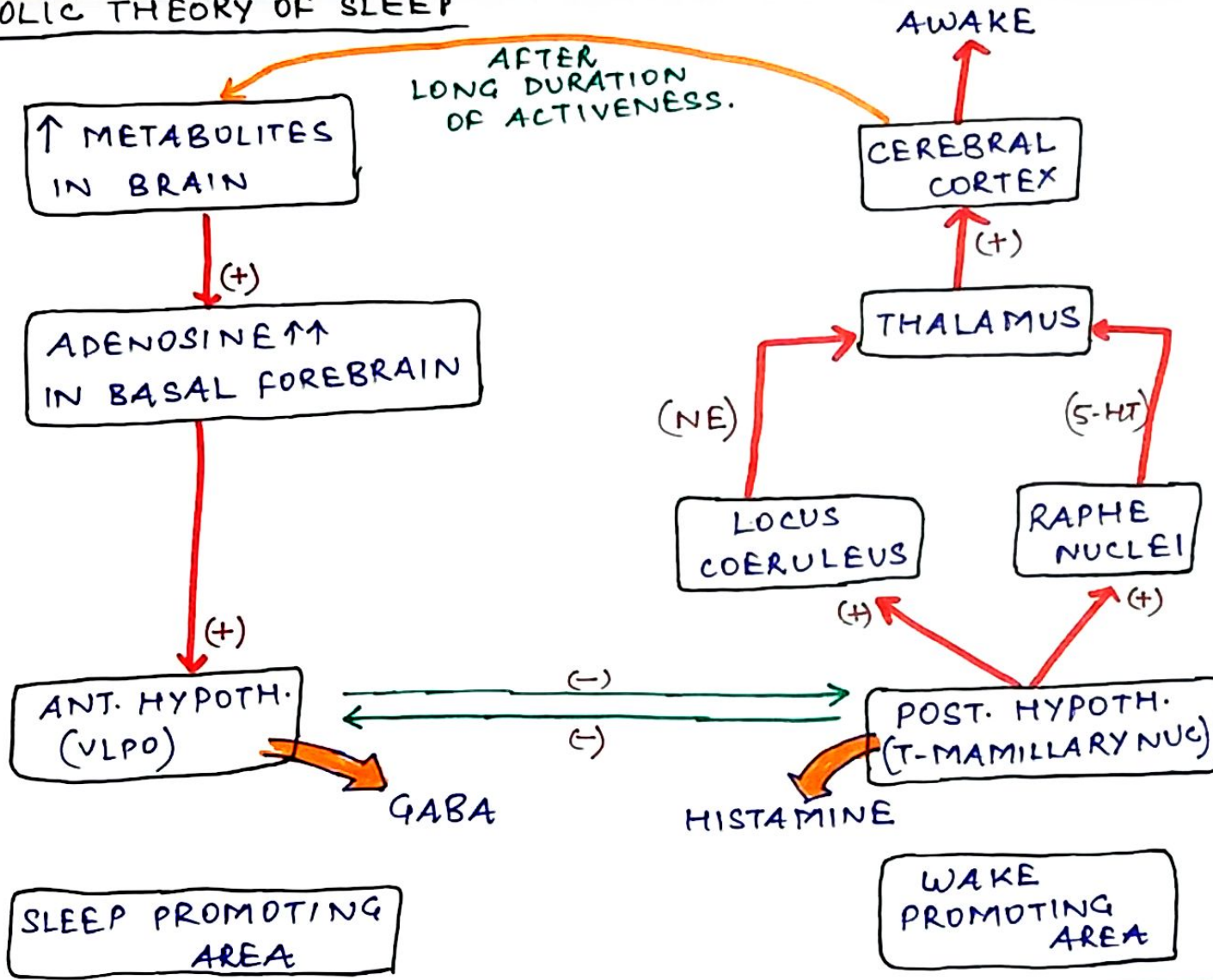
2) HYPOTHALAMUS

- ANTERIOR HYPOTH. (VLPO) → GABA
- POSTERIOR HYPOTH. (TUBEROMAMILLARY NUCLEUS) → HISTAMINE

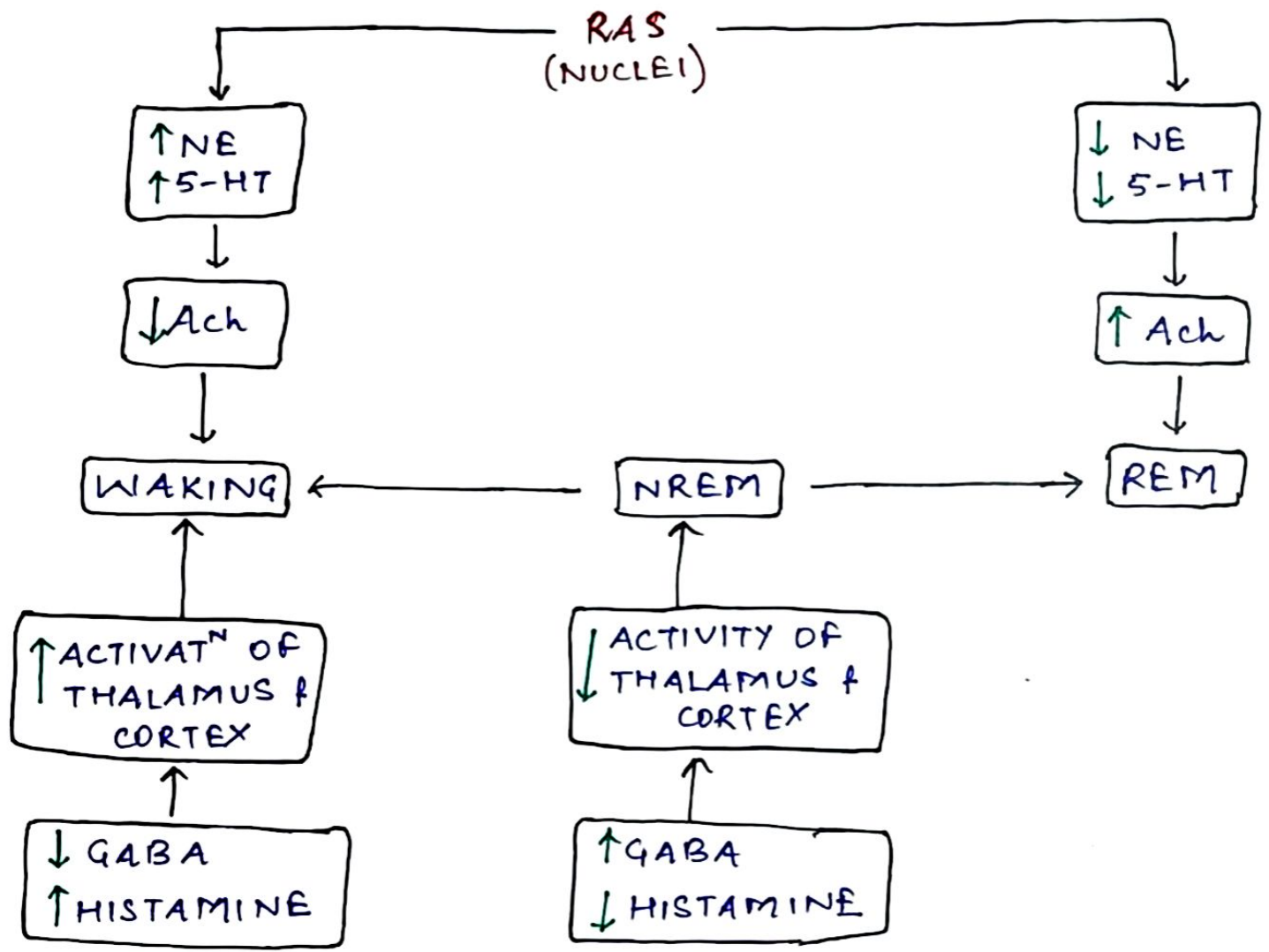
3) OTHERS

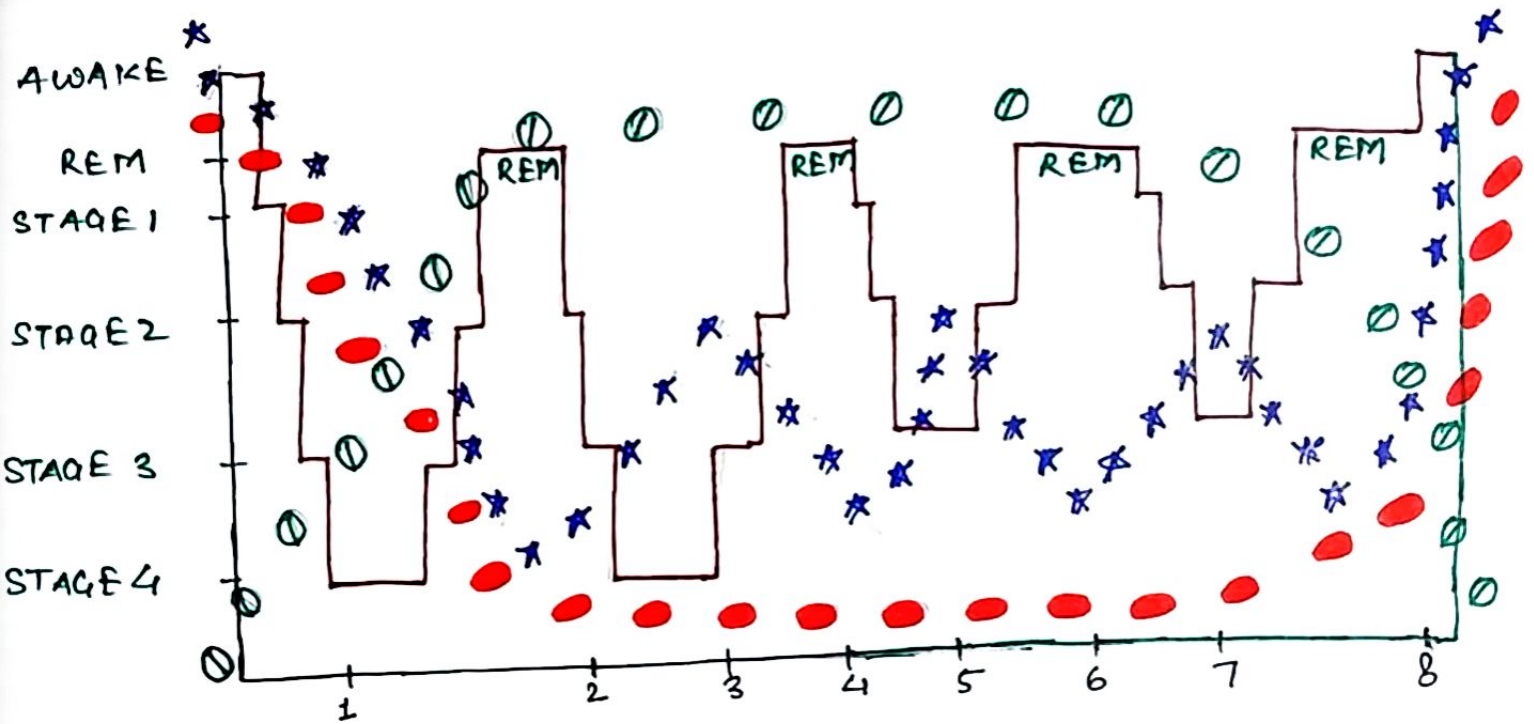
- OREXIN (HYPOCRETIN)
- MURAMYL PEPTIDE
- SOME SLEEP FACTORS

METABOLIC THEORY OF SLEEP



NEUROTRANSMITTER MODEL OF SLEEP





- ⊙ ⇒ GABA
- ⇒ HYPOCRETIN/OREXIN
- ★ ⇒ HISTAMINE, NE, 5-HT

INTEGRATED MODEL
OF FLUCTUATIONS
IN NEUROHORMONES

DISORDERS OF SLEEP

INSOMNIA

- DIFFICULTY IN FALLING AND STAYING ASLEEP.
- DUE TO
 - DEPRESSION
 - ANXIETY
 - MEDICATIONS
 - DRUG USE
 - ALCOHOL USE

HYPERSOMNIA

[EXCESSIVE SLEEP]

⇒ OBSTRUCTIVE SLEEP APNEA

- ↑ DAYTIME SLEEP
- MALES > FEMALES (OBESITY)
- LOUD SNORING AND LOUD OBSTRUCTIVE GAPS
- FALL IN O₂ SATUR.

⇒ NARCOLEPSY

- UNCONTROLLED DAYTIME SLEEPINESS
- FREQ. NAPS OF 10-20 MIN

PARASOMNIA

⇒ SOMNAMBULISM (SLEEP WALKING)

⇒ ENURESIS (BED WETTING)

⇒ NIGHT MARES

⇒ NIGHT TERRORS