Introduction to Sleep lab

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- The term polysomnography was given by Holland, Dement and Raynall in 1974

- It is the technique of recording, analysing and interpreting multiple simultaneous physiologic parameters during sleep

TYPES OF SLEEP STUDY

1. Full night diagnostic sleep study
2. Continuous Positive Airway Pressure (CPAP) titration study
3. Split night study (Diagnostic+Titration on the same night)
4. Multiple Sleep Latency test (MSLT)
5. Maintenance of wakefulness test (MWT)
6. REM behavior disorder study
7. Nocturnal seizure study
8. Ambulatory sleep studies

Level of study	Characteristics	Comments
Level 1	Attended in-laboratory full polysomnography (typically consists of EEG, EOG, chin EMG, airflow, respiratory effort, SaO_2, EKG, leg EMG, and body position)	Gold standard for the diagnosis of OSA
Level 2 (comprehensive portable polysomnography)	Unattended full polysomnography (monitors same parameters as Level 1 study including EEG, EOG, chin EMG, airflow, respiratory effort, SaO_2, EKG, leg EMG, and body position)	Validity of results may be limited by insufficient sleep time, absence of REM sleep, or absence of sleep in the supine position.
Level 3 (cardiorespiratory sleep studies, or modified portable sleep-apnea testing)	Cardiopulmonary studies consisting of 4 or more parameters (eg, airflow, SaO_2, respiratory effort, EKG, or body position)	Useful when there is a high pretest likelihood of OSA, Levels 1 or 2 studies are not readily available, and delay in testing is unacceptable. Might be useful for follow-up evaluation following therapy of patients previously diagnosed with OSA
Level 4 (continuous single or dual bioparameter recording)	Monitoring using only one or two parameters (eg, SaO_2, airflow or snoring)	Poor specificity, and sensitivity Not recommended for diagnosis of OSA

PHILIPS

Sleep Diagnostic Product Line

Lab Diagnostic

Outcomes

Portable Diag

screening

referral

Berlin Questionnaire

RU Sleeping

Stardust 2

Alice PDx

Alice 5

Technology

PHILIPS

The Alice 6 family

PHILIPS

Alice 6 Family

LDE Base

LDE head box

LDx Base

LDxS head box

LDxN head box

Alice 6 LDE

- Essentials for customers focused on OSA diagnosis

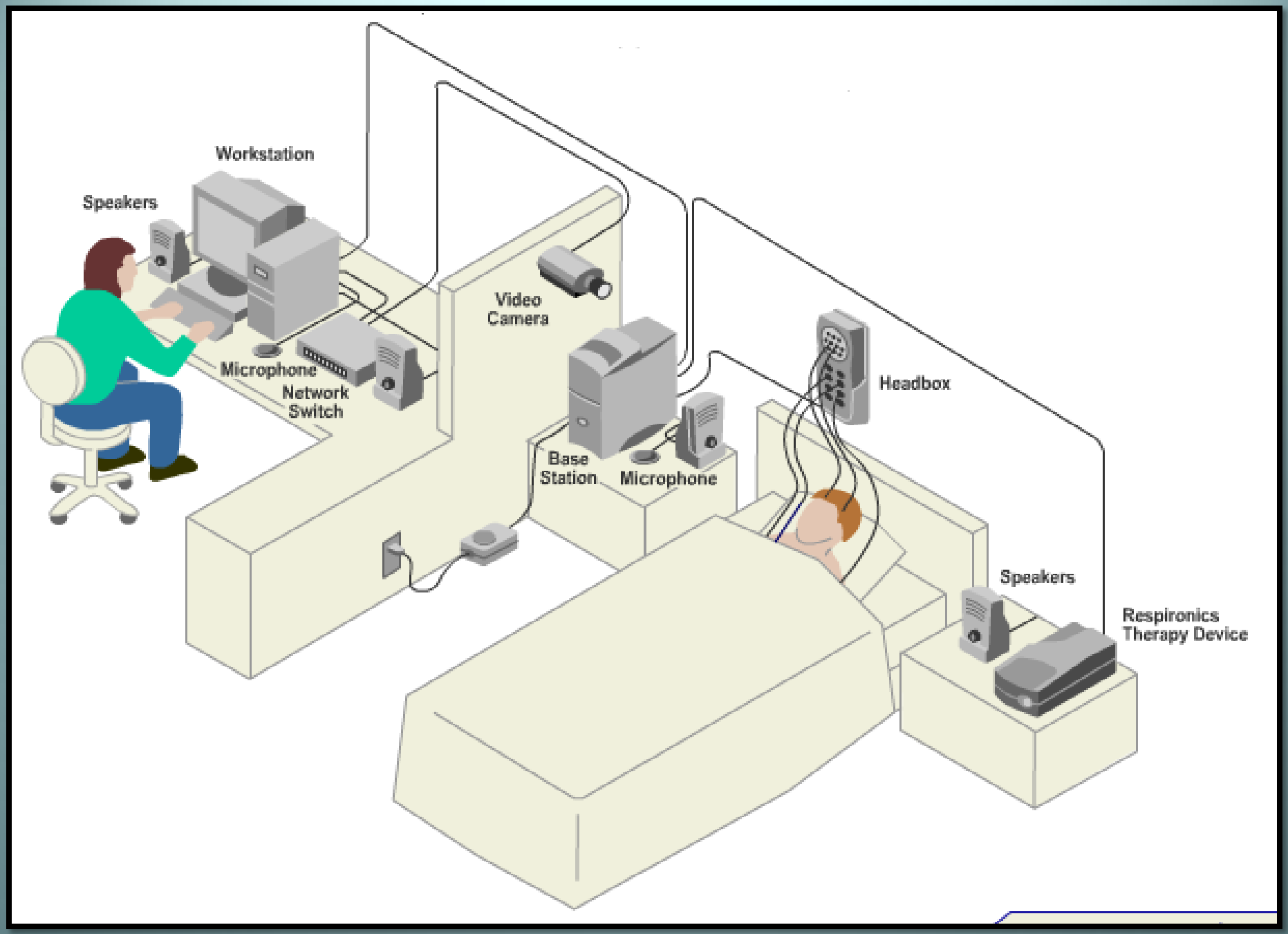
Alice 6 LDxS

- Full-feature model for most sleep customers

Alice 6 LDxN

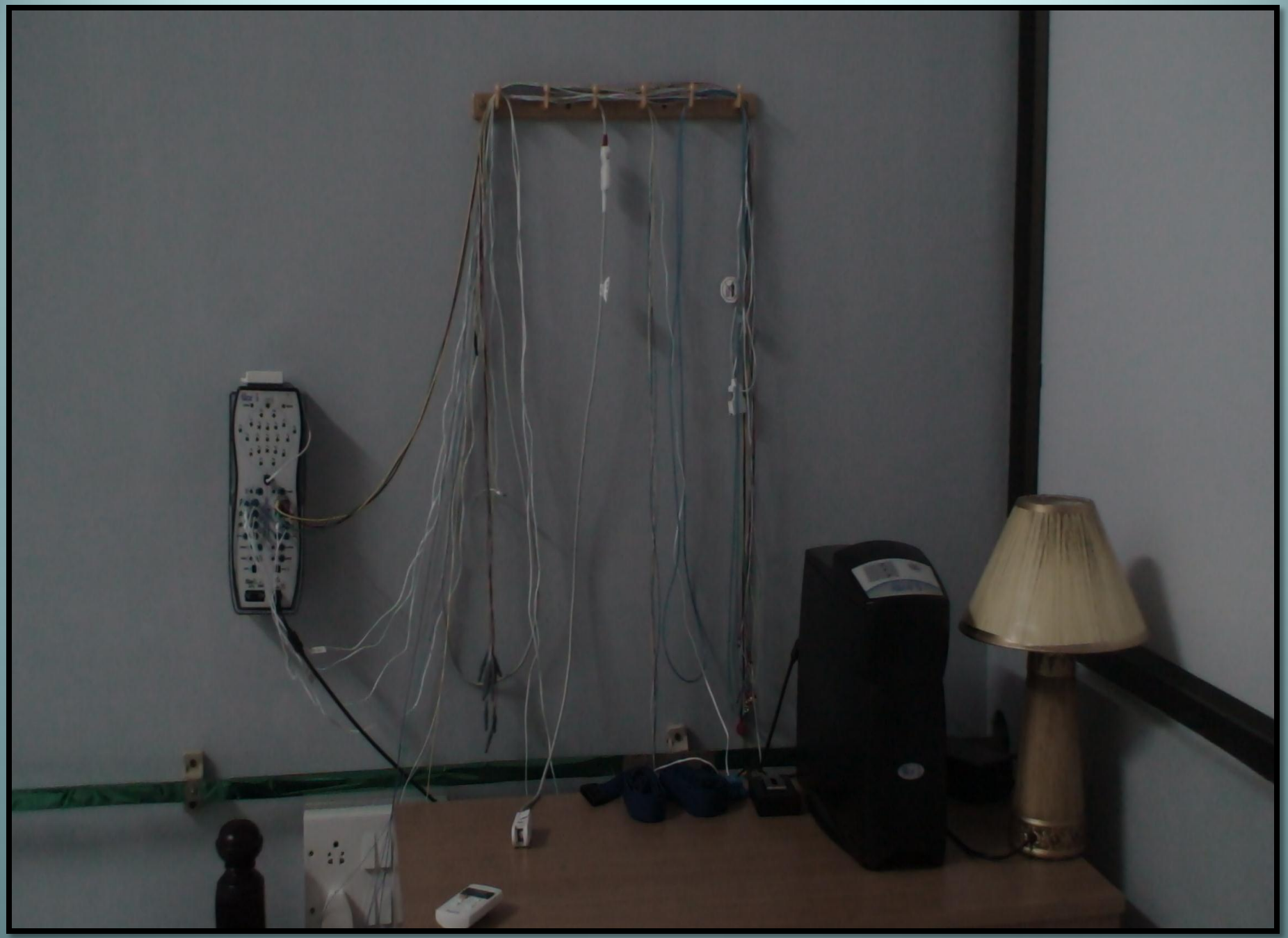
- Advanced model with “Power” for research interests

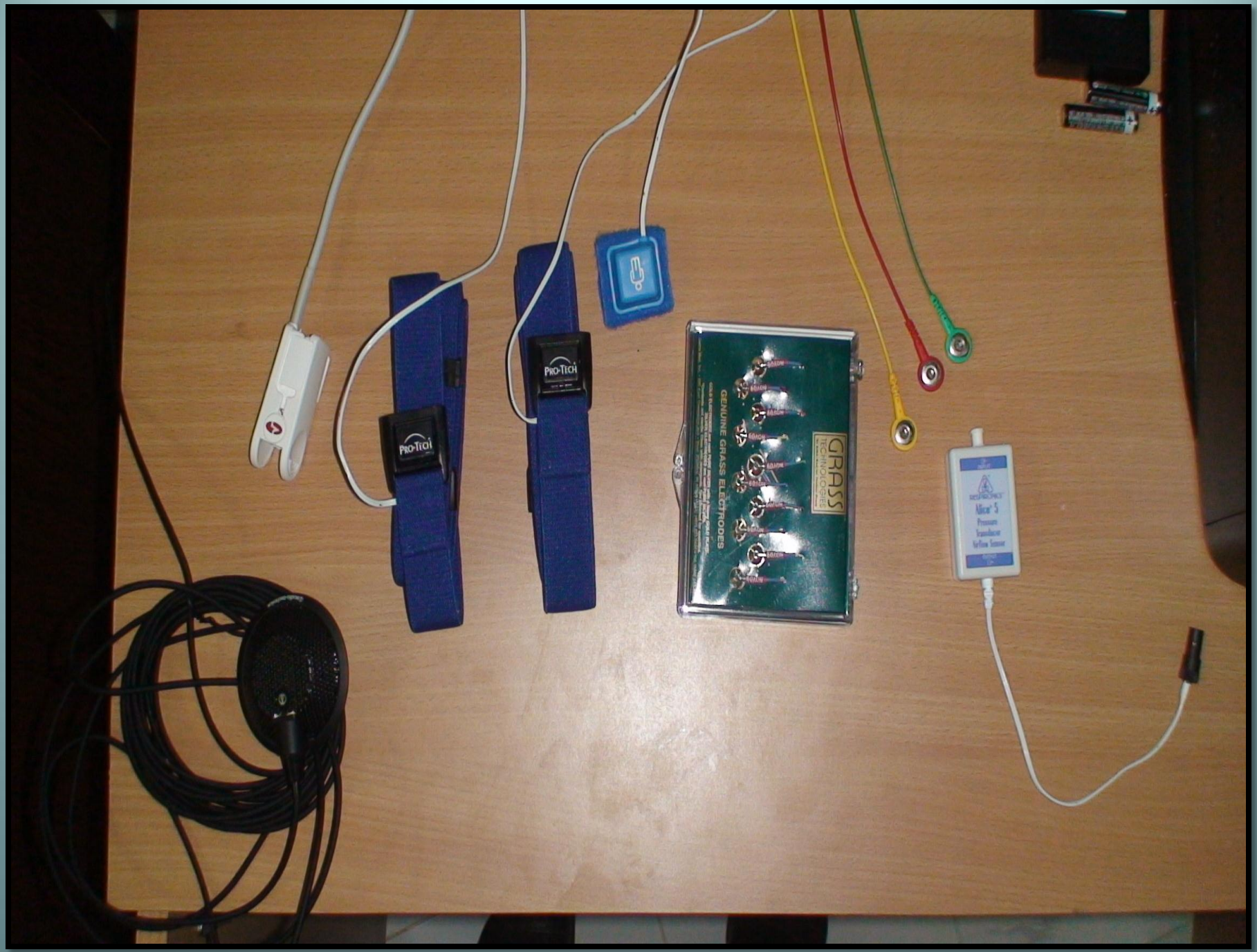
FULL NIGHT DIAGNOSTIC SLEEP STUDY – LEVEL 1


Workstation
Speakers
Video
Camera
Microphone
Network
Switch
Base
Station
Microphone
Headbox
Speakers
Respironics
Therapy Device


OMEGA


Alice 5

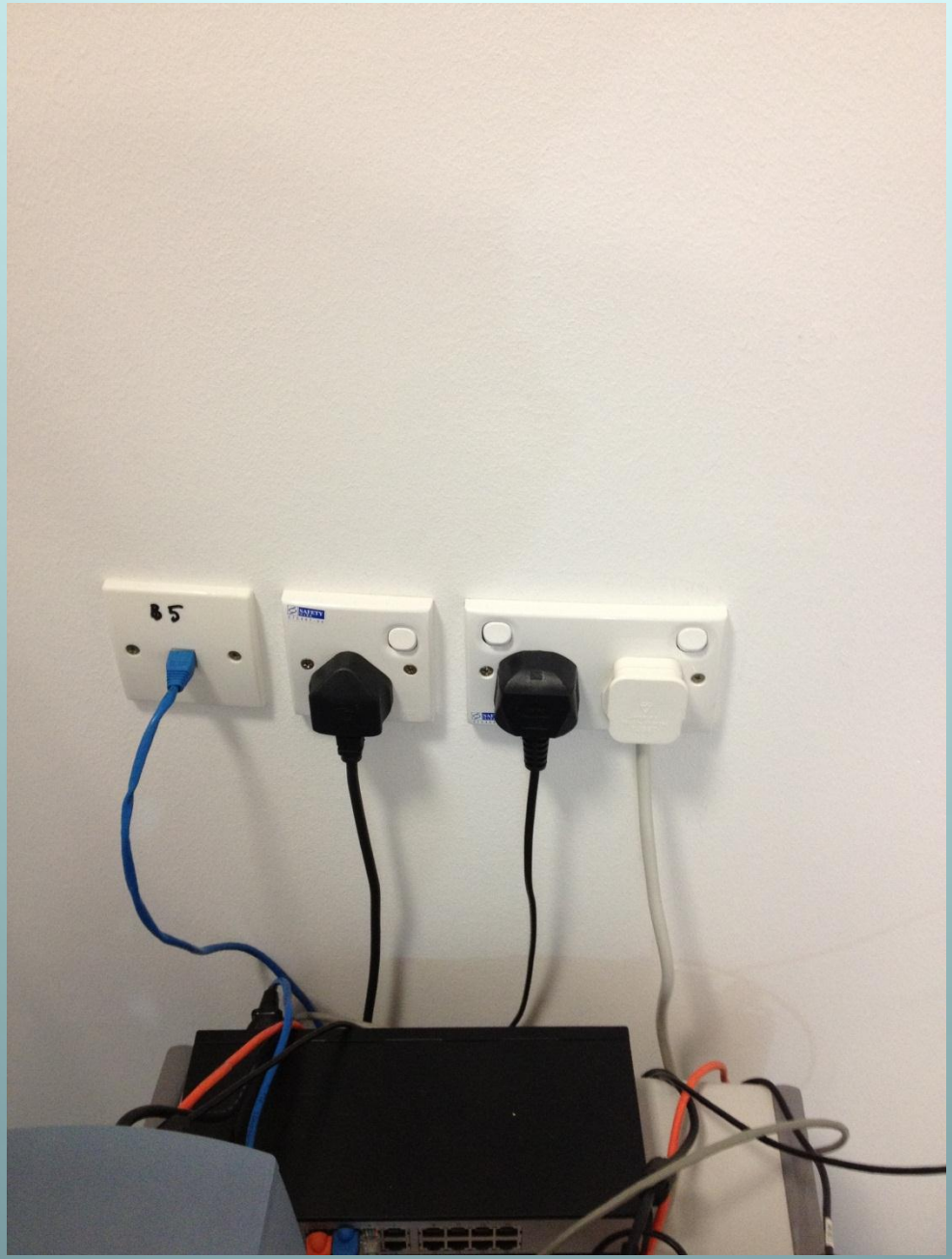



PRO-TECH
PRO-TECH
GENUINE GRASS ELECTRODES
GRASS
TECHNOLOGY
Alice 5


Tanda-tanda


TOILET


PHILIPS
RESPIRONICS

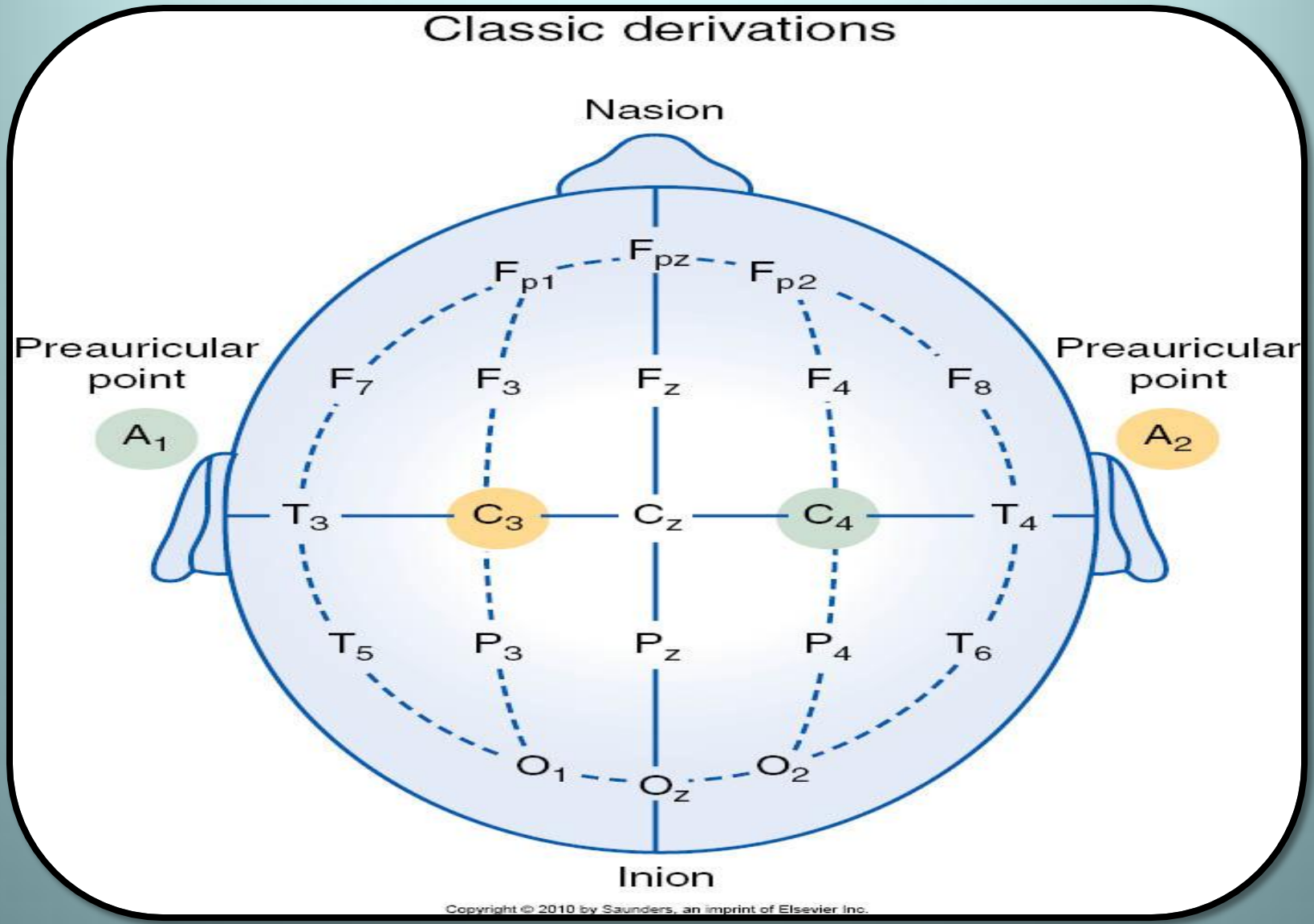

B5

Essential components of a PSG Recording

1. Good quality amplifiers
2. Appropriate filter design
3. Independent filter selection for each channel
4. 50-60 Hz off/on selection for each channel
5. Adequate sampling rates and bit resolution for each parameter
6. Input signal re- referenicng capability
7. Standard calibration procedures and signal verification
8. Appropriate signal display, sleep stage scoring capability of storing all changes to recording made by attending technicians
9. Full disclosure of all options nd features that may potentially affect accuracy or signal resolution


SURGICAL SPIRIT
Nuprep
Ten20
CONDUCTIVE
Fluka
SURGICARE
DISPOSABLE SURGICAL RUBBER GLOVES
SIZE : 7.5
ONE PAIR
SINGLE USE
STERILE

- EEG
- EOG
- EMG (Chin&Leg)
- ECG
- SpO_2
- Respiratory effort
- Nasal flow
- Snore


Classic derivations
Nasion
Preauricular point
Preauricular point
A_1
A_2
F_{pz}
F_{p1}
F_{p2}
F_7
F_3
F_z
F_4
F_8
T_3
C_3
C_z
C_4
T_4
T_5
P_3
P_z
P_4
T_6
O_1
O_z
O_2
Inion
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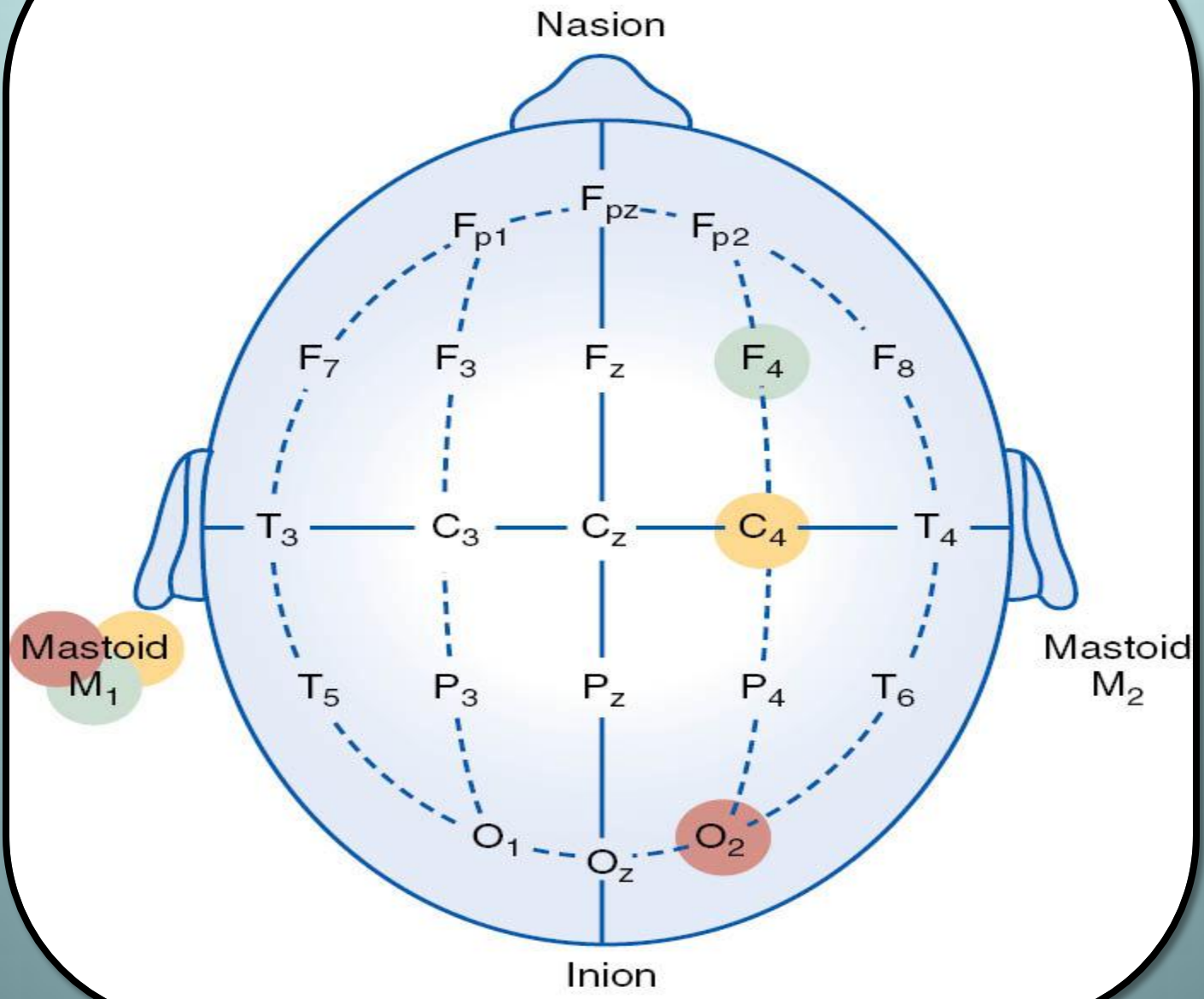
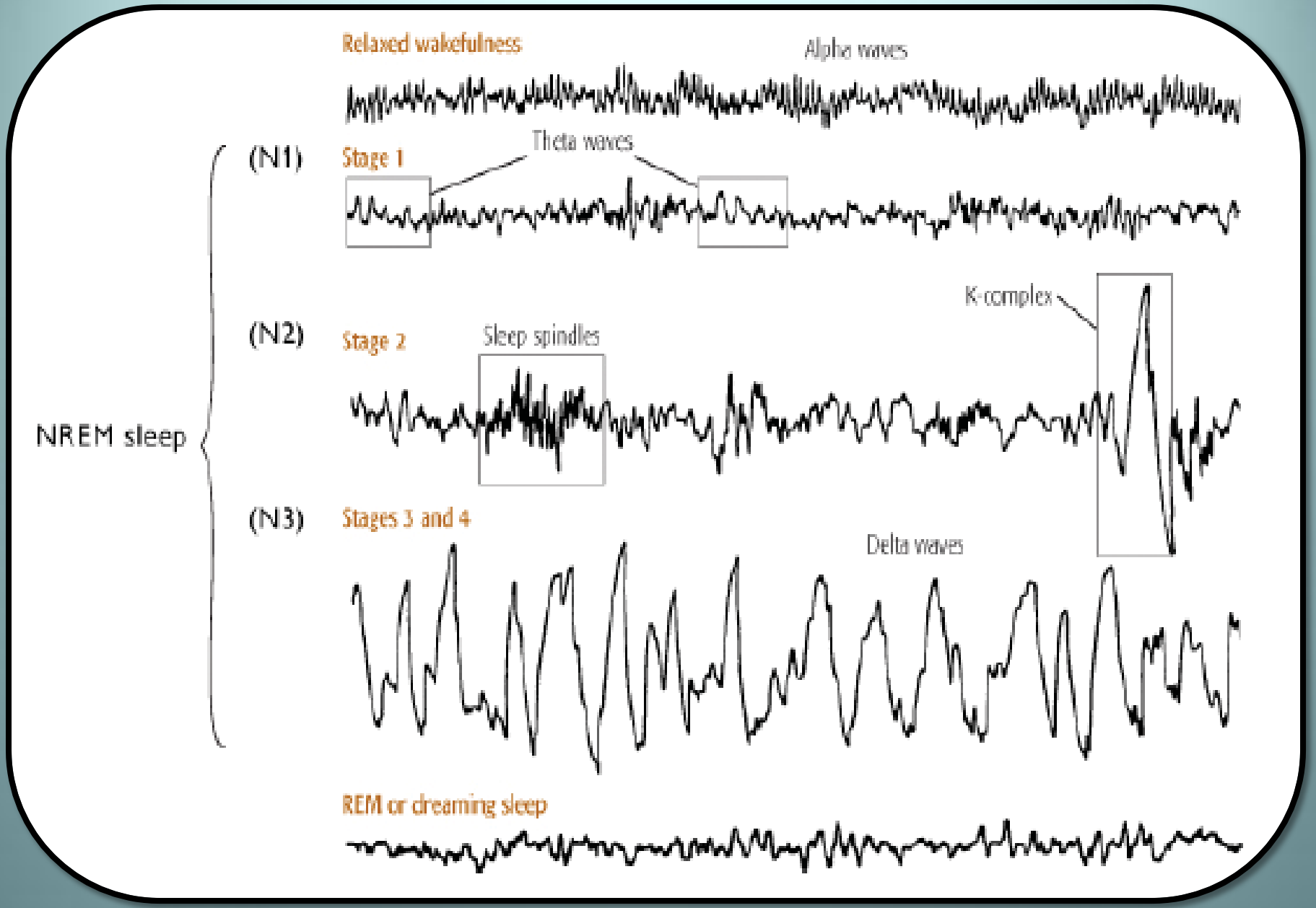
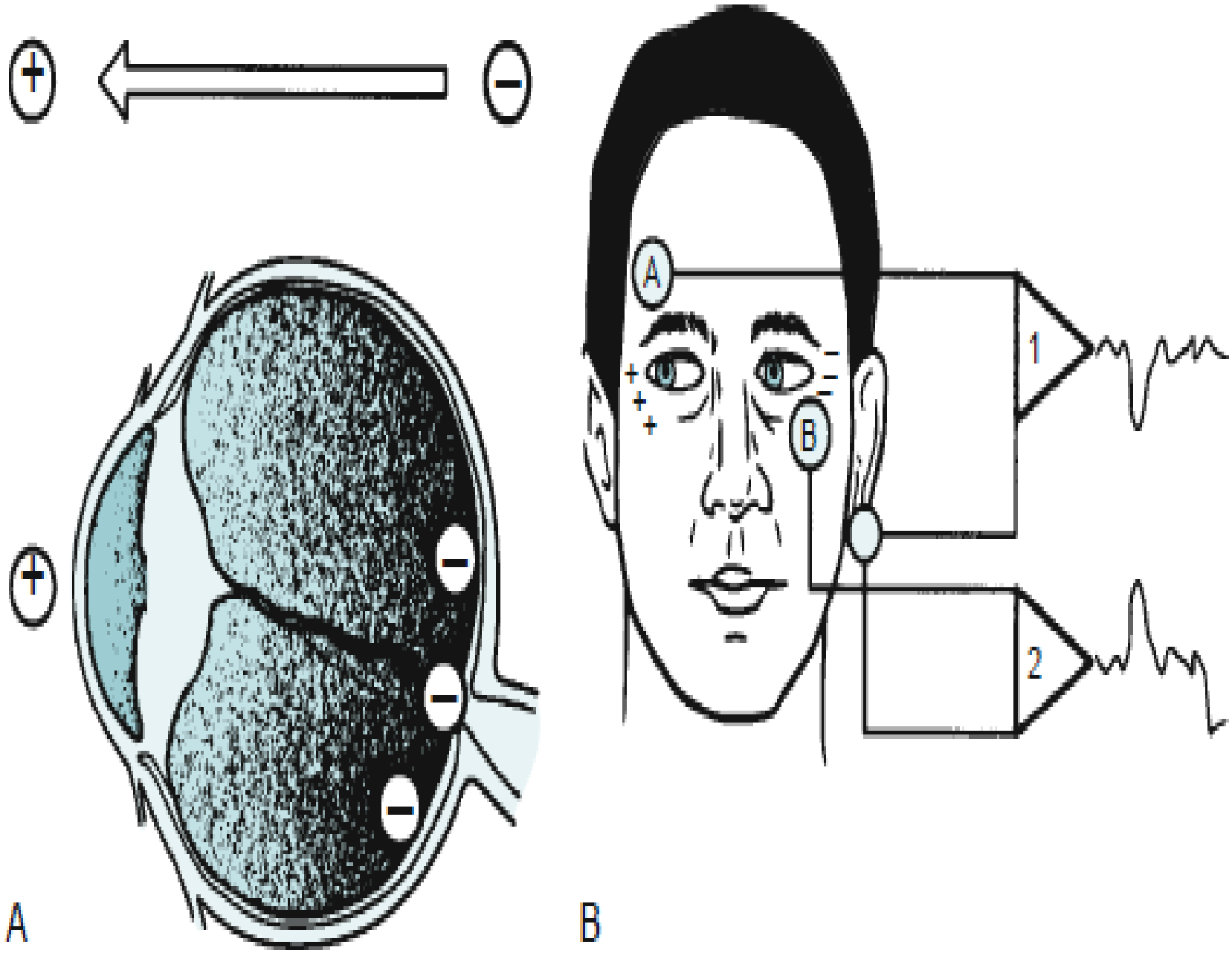
Updated recommended derivations

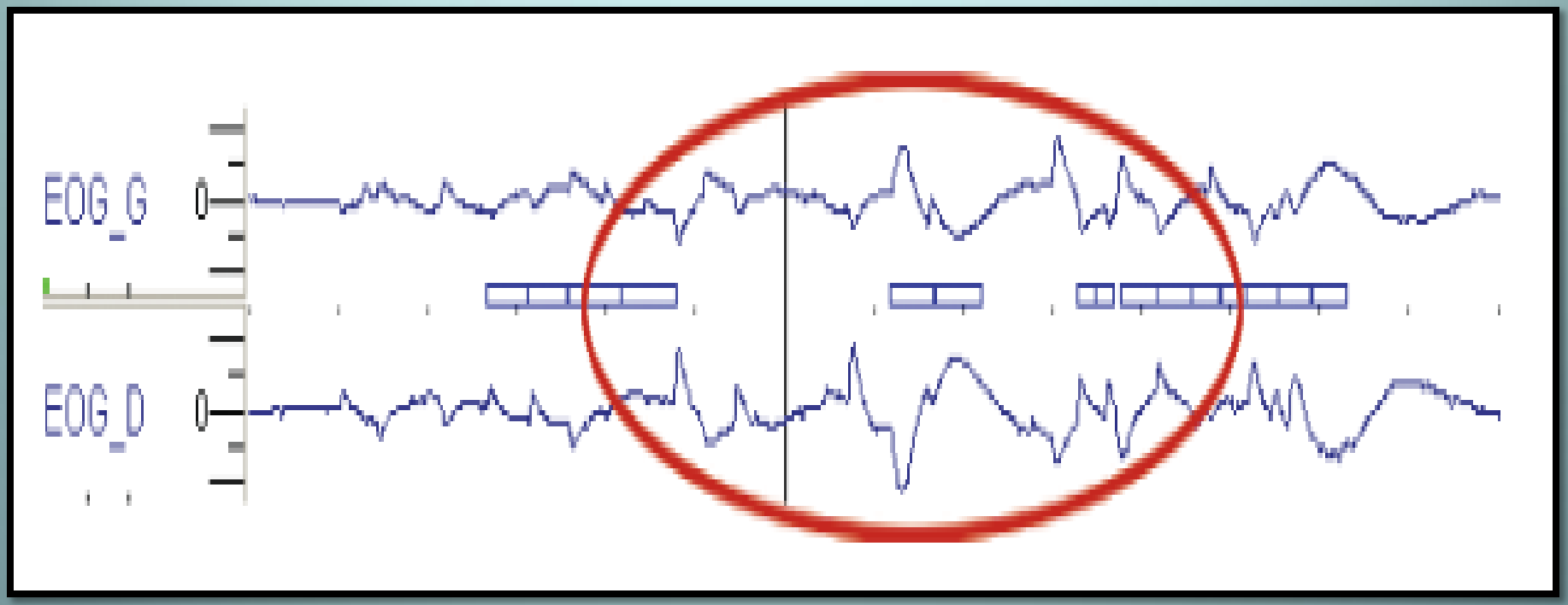



Relaxed wakefulness
Alpha waves
NREM sleep
(N1)
Stage 1
Theta waves
(N2)
Stage 2
Sleep spindles
K-complex
(N3)
Stages 3 and 4
Delta waves
REM or dreaming sleep

- **The recommended EOG derivations and electrode positions are:** (see Figure 2A) RECOMMENDED
  a. Derivations: E1-M2 and E2-M2
  b. Electrode Positions: E1 is placed 1 cm below the left outer canthus and E2 is placed 1 cm above the right outer canthus

- **Acceptable EOG derivations and electrode positions are:**[N1] (see Figure 2B) ACCEPTABLE
  a. Derivations: E1-Fpz and E2-Fpz
  b. Electrode positions: E1 is placed 1 cm below and 1 cm lateral to the outer canthus of the left eye and E2 is placed 1 cm below and 1 cm lateral to the outer canthus of the right eye


+
−
+
−
−
−
−
A
A
B
1
2
B

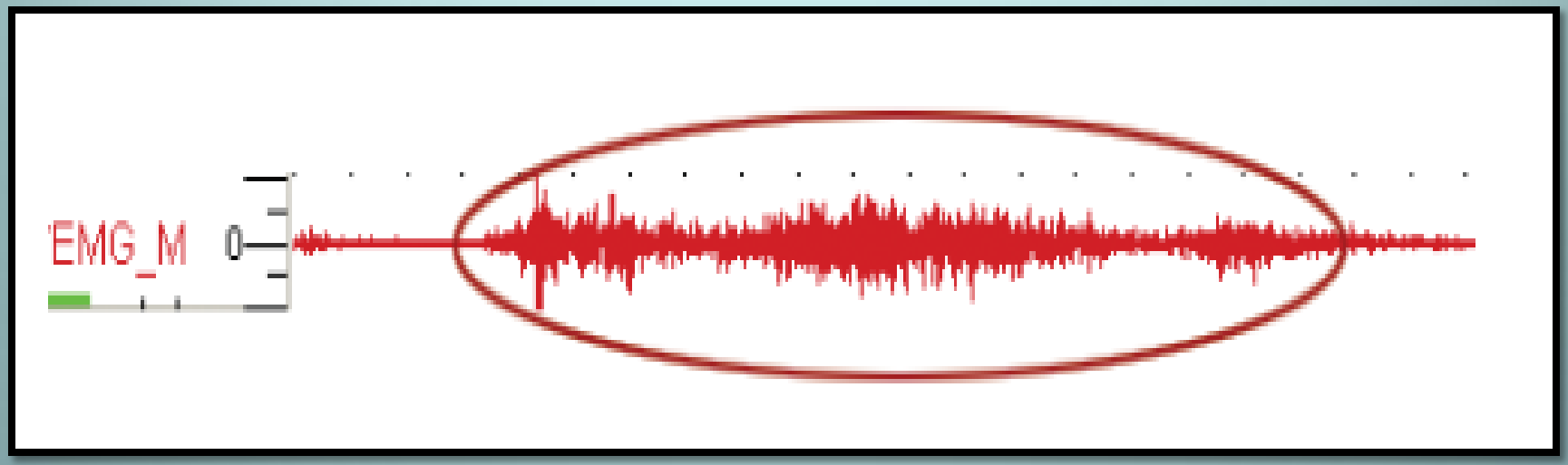

EOG_G
EOG_D

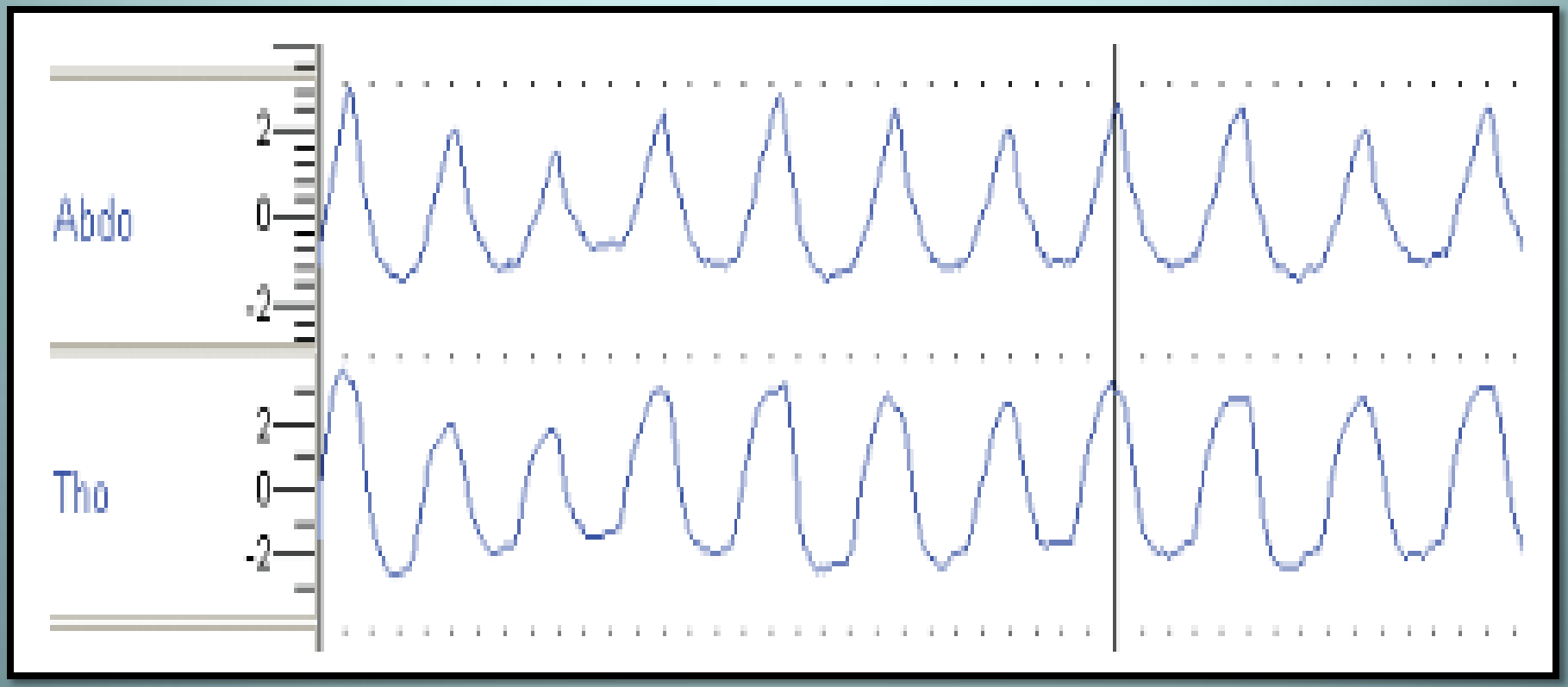
Three electrodes should be placed to record chin EMG: RECOMMENDED

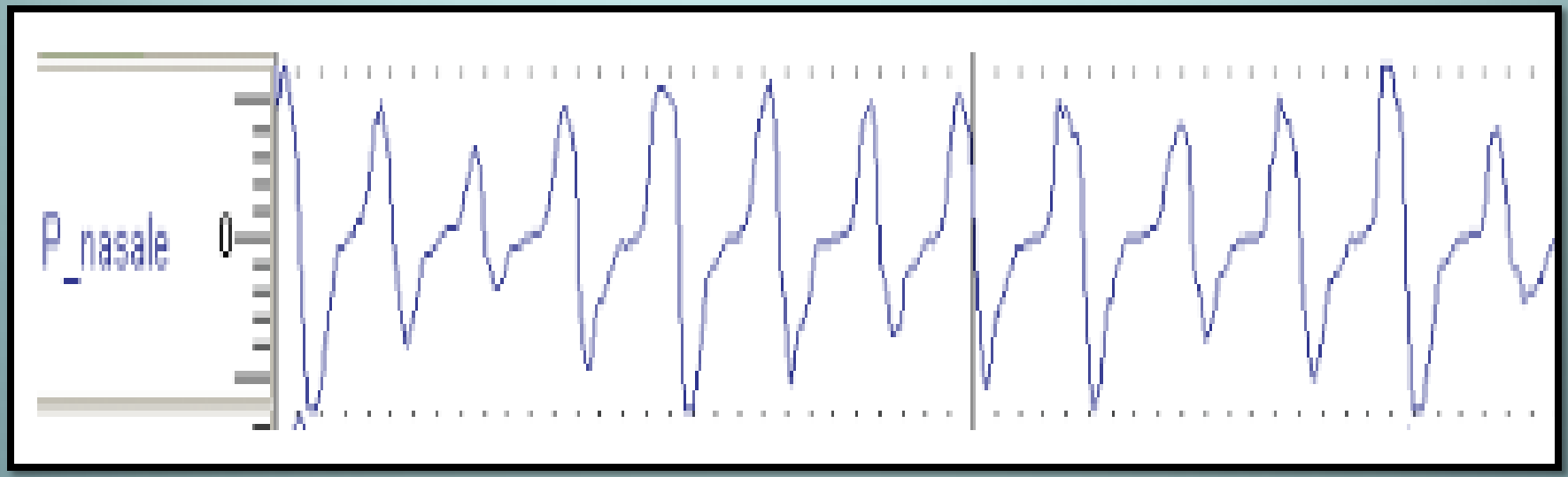
a. One in the midline 1 cm above the inferior edge of the mandible (see a in Figure 3)

b. One 2 cm below the inferior edge of the mandible and 2 cm to the right of the midline (see b in Figure 3)

c. One 2 cm below the inferior edge of the mandible and 2 cm to the left of the midline (see c in Figure 3)


EMG_M
0

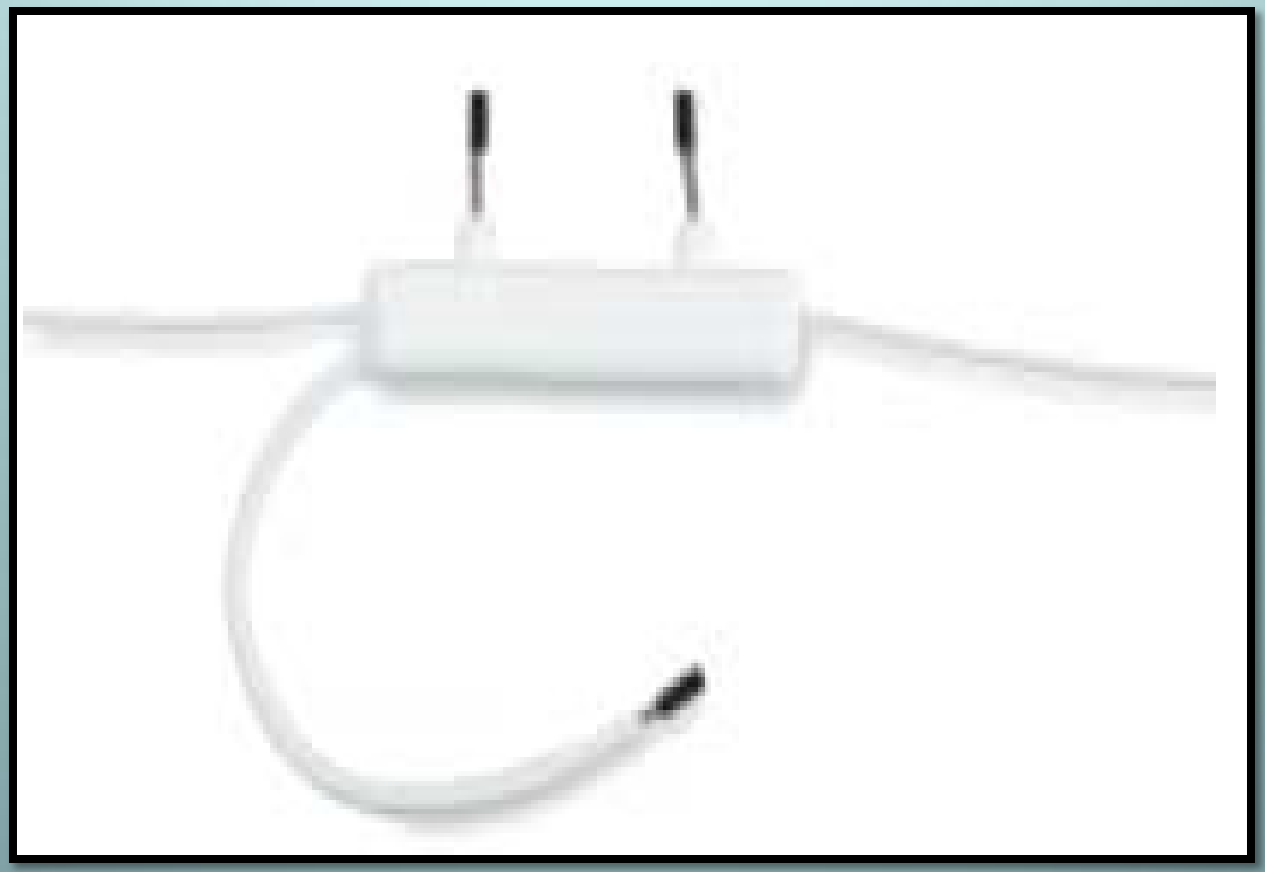

Abdo
2
0
-2
Tho
2
0
-2

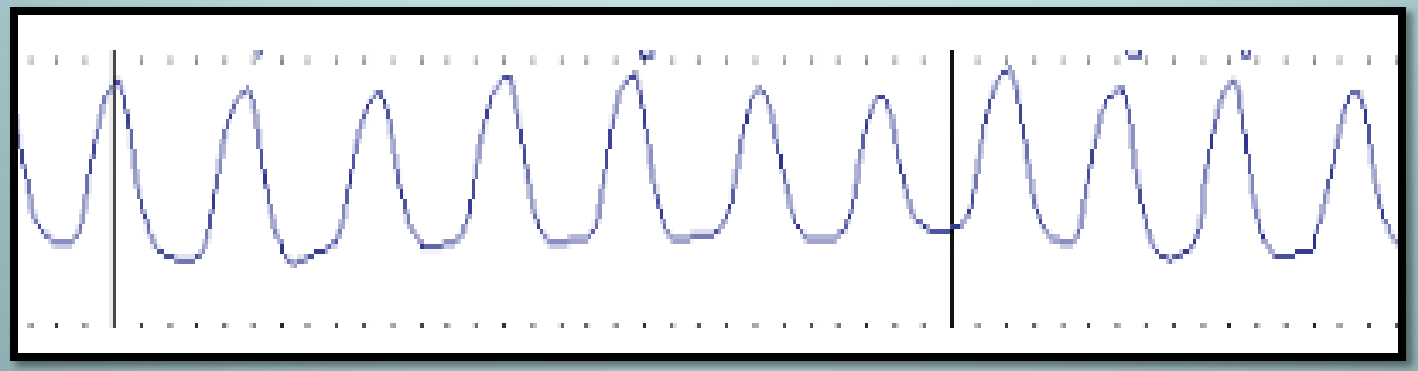

P_nasale
0

- During Inspiration airway pressure is negative relative to atmospheric pressure and during expiration it is relatively positive

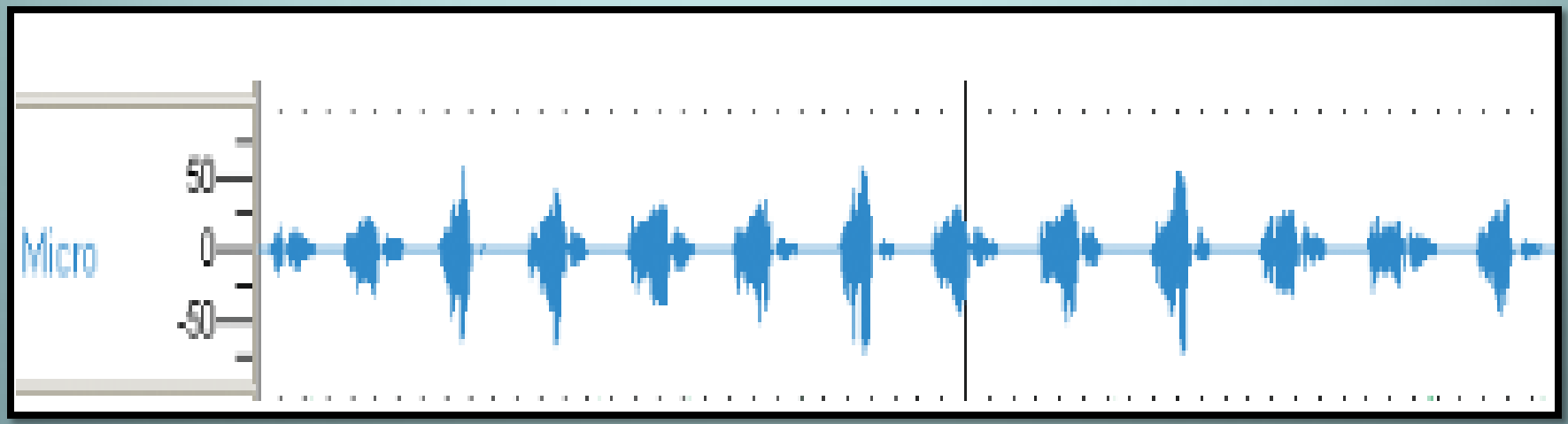
- The resulting alteration in nasal airway pressure can provide a surrogate estimate of airflow

- It is used to define hypopneas





- Exhaled air is warmer than ambient temperature
- Measuring temperature fluctuation in front of nares or mouth provides a simple measure of airflow
- Thermistors are thermally sensitive variable resistors that produce voltage alterations when connected in a low current circuit
  - Advantage- Maximize sensing area while minimizing sensor size and mass
  - Used for defining apneas


Micro
50
0
-50


~EMG_Di
~EMG_G


TCM4 SERIES
tina
RADIOMETER COPENHAGEN
21.18
13/07/2007
Alert
Calibration required
Pulse — bpm
Site time 08.00
Tutorial
Calibrate
Setup
Alarm silence

- Several factors limit the application of $PtcO_2$ monitoring during adult sleep studies-
- The variable relationship between PaO_2 and $PtcO_2$
- Slow response time that fails to mirror rapid changes in PaO_2
- and the need for periodic site changes

Biocalibration

- Close the eyes
- Open the eyes
- Move the eyes left and right
- Move the eyes up and down
- Cough
- Move the feet
- Hold breath
- Respiratory effort

- Time of Sleep study
- Biocalibration
- Technical difficulties and methods of correction
- Patient concerns or complaints
- Anything noteworthy that the patient said during hookup
- CPAP or BI-PAP pressure changes
- Supplemental oxygen flow
- Time and purpose for entering the patient room after the start of the study
- Level of snoring (mild, moderate, severe)
- Leg movements, respiratory events, EEG arousals and other significant events
- Periods of nocturia
- Any other unusual event or observation

- At the end of the study “lights on is marked on the tracing and the patient is awakened and unhooked from the electrodes. The paste off the electrode sites is cleaned after the wires are removed

- Post-test questionnaire- This is given in the morning after the study. Questions that are included in this are-
- How long did it take for you to fall asleep last night?
- How many times do you remember waking up last night?
- How did your sleep during the study compare with your normal night's sleep?
- How many hours do you feel you slept last night?
- The patient is now discharged after the study

Post study Procedures

- Ensure that the study is saved properly
- Save the audio-visual sequence taking care that it is synchronized along with the polysomnographic tracing
- Ensure that the system is shut down properly
- The electrodes and various sensors are cleaned and sterilized

THANK YOU