人體構造與生命徵象

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短期目標

- 通過EMT 1考試

長期目標

- 助人為快樂之本
- 利她（他）之實踐
- 願將來每位學員成就高於老師

方法

- 案例示範講解
- 學員實際操作與討論
- 更正小缺失
- 教師、學員互動
- 全動

- 評分
  - 筆試 40%
  - 操作技術30%
  - 主動學習30%
  - 通過 總分 60分

八大生命徵象

意識、體溫、瞳孔、呼吸、脈搏、血壓、膚色與血氧濃度

統一名詞

名詞解釋--方向

- 上
- 下
- 前
- 後
- 左
- 右

名詞解釋—用字

- 症狀與生命徵象的差異
  - 咳嗽
  - 頭痛
  - 胸痛
  - 瞳孔對光無反應
  - 脈搏無
  - 血壓 60/40mmHg

葛拉斯哥昏迷指數
(GLASGOW COMA SCALE ，GCS)

- 昏迷指數是各醫院用來統一描述創傷病人清醒程度的標準。
- 最先是由位於英國蘇格蘭最大城市 Glasgow ，university of Glasgow 這家大學之醫院，在1974年所發表。所以英文叫做 Glasgow Coma Scale, 簡稱 GCS
- 「昏迷」，「半昏迷」，「會認人」，「知道痛」，「迷迷糊糊」 這些字眼每個醫師的認知不同。所以統一用昏迷指數。

意識 呼叫傷患

1. 清、聲、痛、否
2. 葛拉斯哥(Glasgow)昏迷指數(G.C.S.)
3. E4、V5、M6

*最高為15分、最低為3分
<8分 在急診室中會考慮插管
<13分 送創傷中心
<14分 危急個案

- 判斷頭部創傷嚴重度
- 輕度　13~15分
- 中度　9~12分
- 重度　3~8 分

- GCS剛發展出來是為了用於評估外傷性腦傷（traumatic brain injury）病人的癒後，又因GCS對於評估此類病人意識與癒後的關聯性相當好，所以後來就全面被用來做為臨床評估病人意識的方法

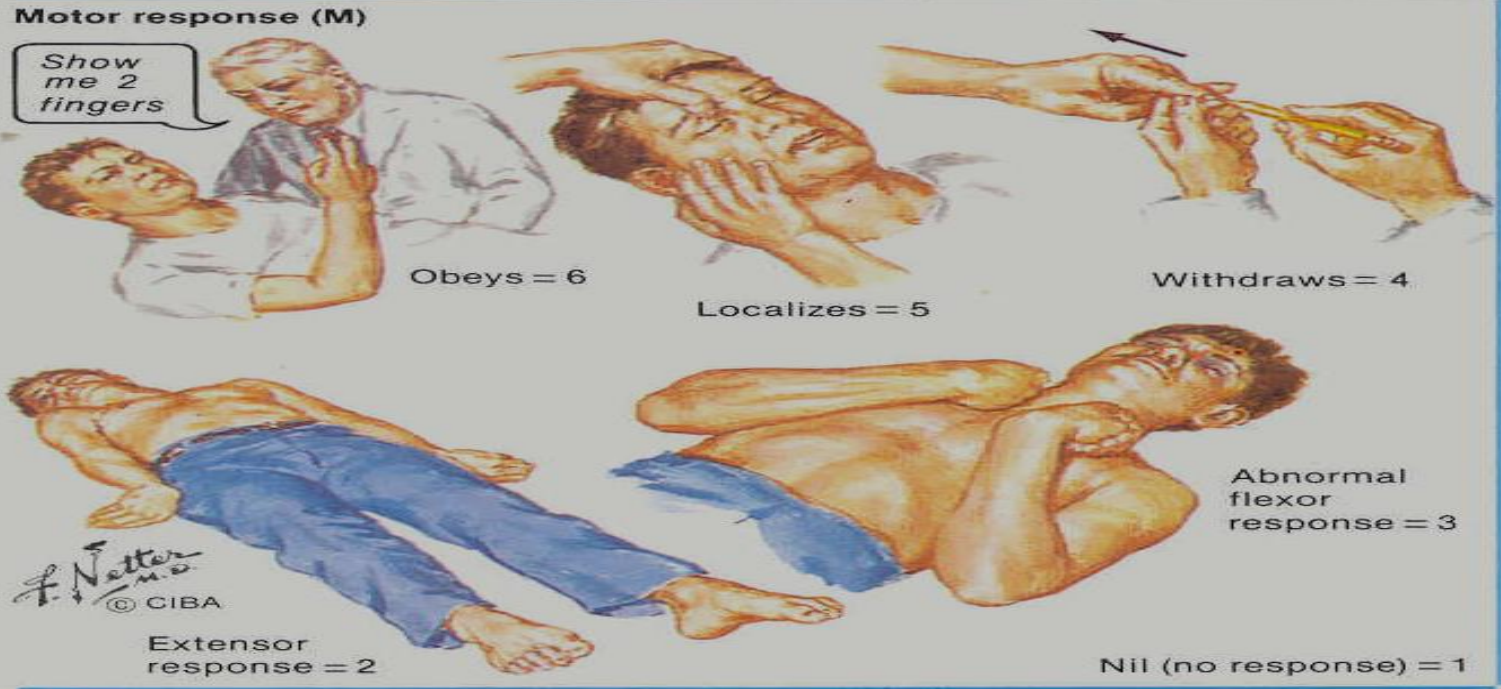
Armadillo building-auditorium

意識　GCS

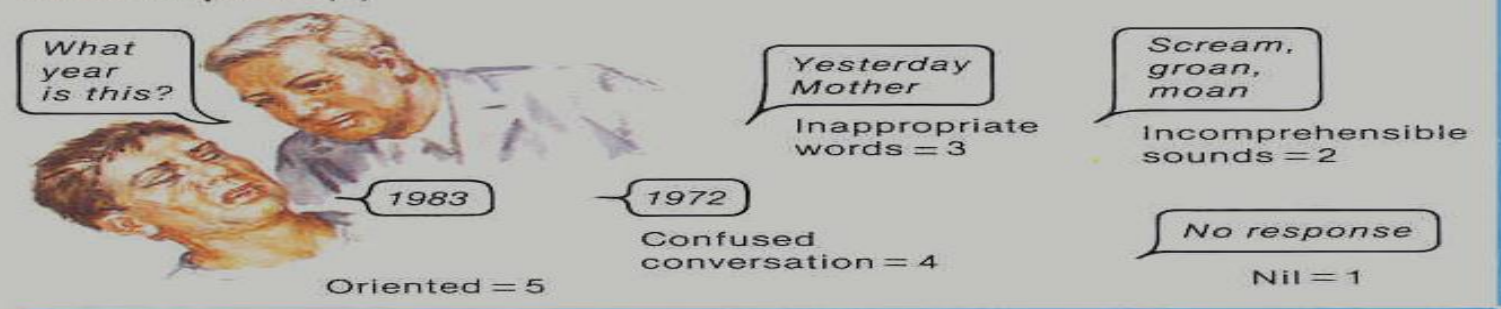
E 眼睛	V 聲音	M 動作（對疼痛刺激）
4 眼神相對	5 有條有理	6 正常
3 對聲音反應	4 語無倫次 答非所問	5 撥手定位
2 對疼痛反應	3 隻字片語	4 揮動 擺動
1 無反應	2 聲音 呻吟	3 回縮
	1 無反應	2 舒張
		1 無反應

Glasgow Coma Scale

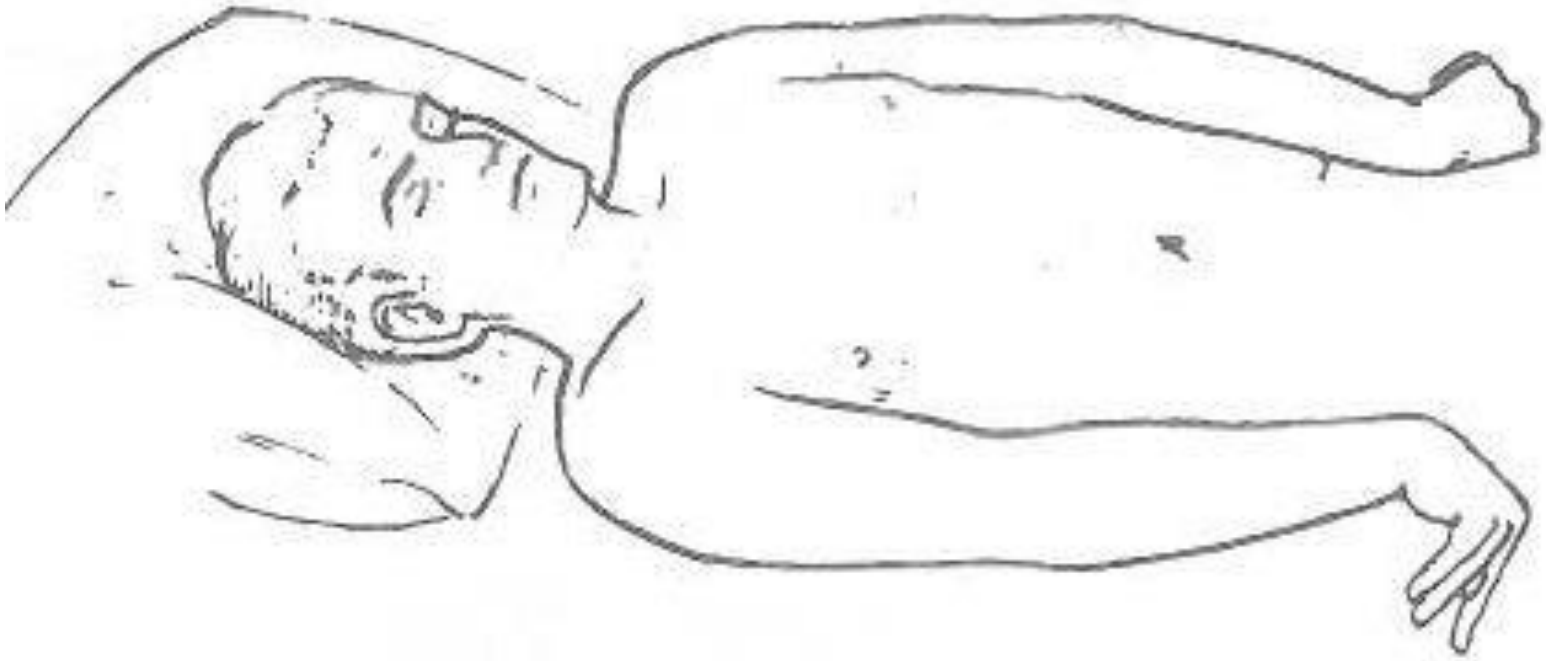
E	
Spontaneous	4
To speech	3
To pain	2
Nil	1



M	
Obeys	6
Localizes	5
Withdraws	4
Abnormal flexion	3
Extensor response	2
Nil	1



V	
Oriented	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
Nil	1

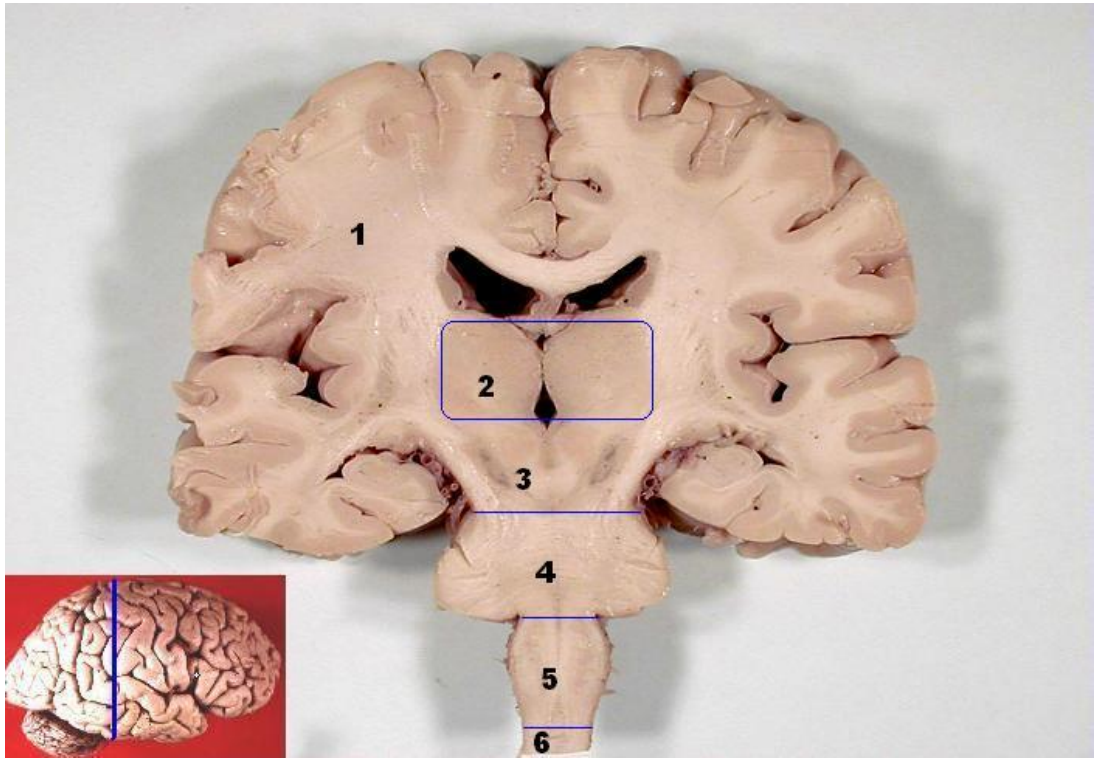


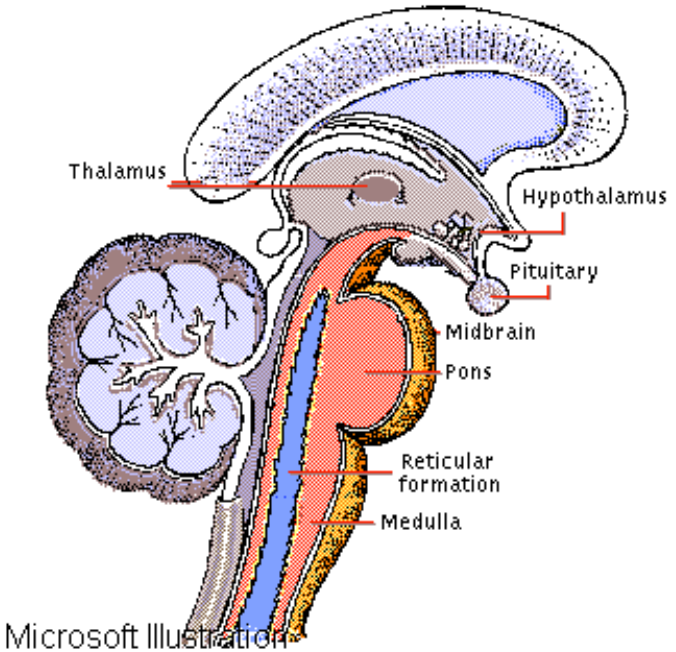

PROTEUS

意識的維持

兩側大腦　腦幹網狀活化系統

RAS AND COMA





Human brain (coronal section). The divisions of the brain include the (1) cerebrum, (2) thalamus, (3) midbrain, (4) pons, and (5) medulla oblongata. (6) is the top of the spinal cord

- 網狀活化系統有部份纖維會直接投射到大腦皮質，有些則經由視丘再傳到整個大腦皮質。網狀活化系統主要控制警覺及醒覺。
- 因此不難想像，腦幹若出了問題，將引起不同程度的意識缺失及昏迷。

- 造成昏迷的原因有很多，但大致上都與腦幹的醒覺中樞有關。
- 不論是大腦皮質或腦幹的功能喪失、兩者間的連繫出現問題、兩側大腦半球和腦幹或兩者同時合併功能障礙、代謝功能的障礙，或是藥物等因素，都可能造成昏迷。

- 網狀活化系統在腦幹網狀結構內存在具有**上行喚醒作用**的功能系統，它通過丘腦非特異性投射系統發揮作用，維持和改變大腦皮層的興奮狀態。控制覺醒、注意、睡眠等不同層次的意識狀態。

- 昏迷則是深度的意識喪失，昏迷中的人即使面對強烈的刺激也常無反應。兩側大腦半球和腦幹或兩者同時合併功能障礙。

- 意識是由大腦皮質調控, 而覺醒則是由腦幹內的**網狀活化系統**
- 意識是代表一個人對自我與環境的認知狀態(地點與時間)。
- 覺醒代表啟動意識的系統。意識是由大腦皮質調控，而覺醒則是由腦幹內的網狀活化系統所調控。
- 整個網狀活化系統因為廣泛地投射至大腦皮質也因此能提供維持清醒(開關)的功能

- 昏迷：是最嚴重的狀態，無論任何刺激眼睛均無法睜開，也無語言和動作
- 閉鎖症候群（ locked-in syndrome, LIS ）：大部分見於橋腦底部病症，造成延腦麻痺（無法說話及吞嚥）及四肢癱瘓，但意識清楚，可藉眼球轉動、眨眼來表達意思。嚴格說來不屬於意識障礙，但是重要的鑑別診斷。

- 造成意識障礙的原因以頭部外傷最多，非外傷性則以心肺停止最常見，而後者及各種慢性神經系統疾患所占的比例逐年上升。
- 意識的產生是靠著兩大腦半球及上腦幹之上行網狀活化系統（ ascending reticular activating system, ARAS）的相互作用，當有任何因素干擾此相互作用則會減低清醒的程度。

- 腦幹還是呼吸、心跳與血壓的調控中樞。

昏迷與休克的差異

糖尿病低血糖

昏迷或休克?

體溫 量測傷患體溫

- 測量方式：
  1. 儀器：體溫器
  2. 手摸：以手背試溫較準確

  *危急體溫：>=40 中暑、安非他命中毒
  < 30 失溫、鎮定劑過量、休克、溺水

  *局部異常高溫：發炎
  局部異常低溫：循環不好

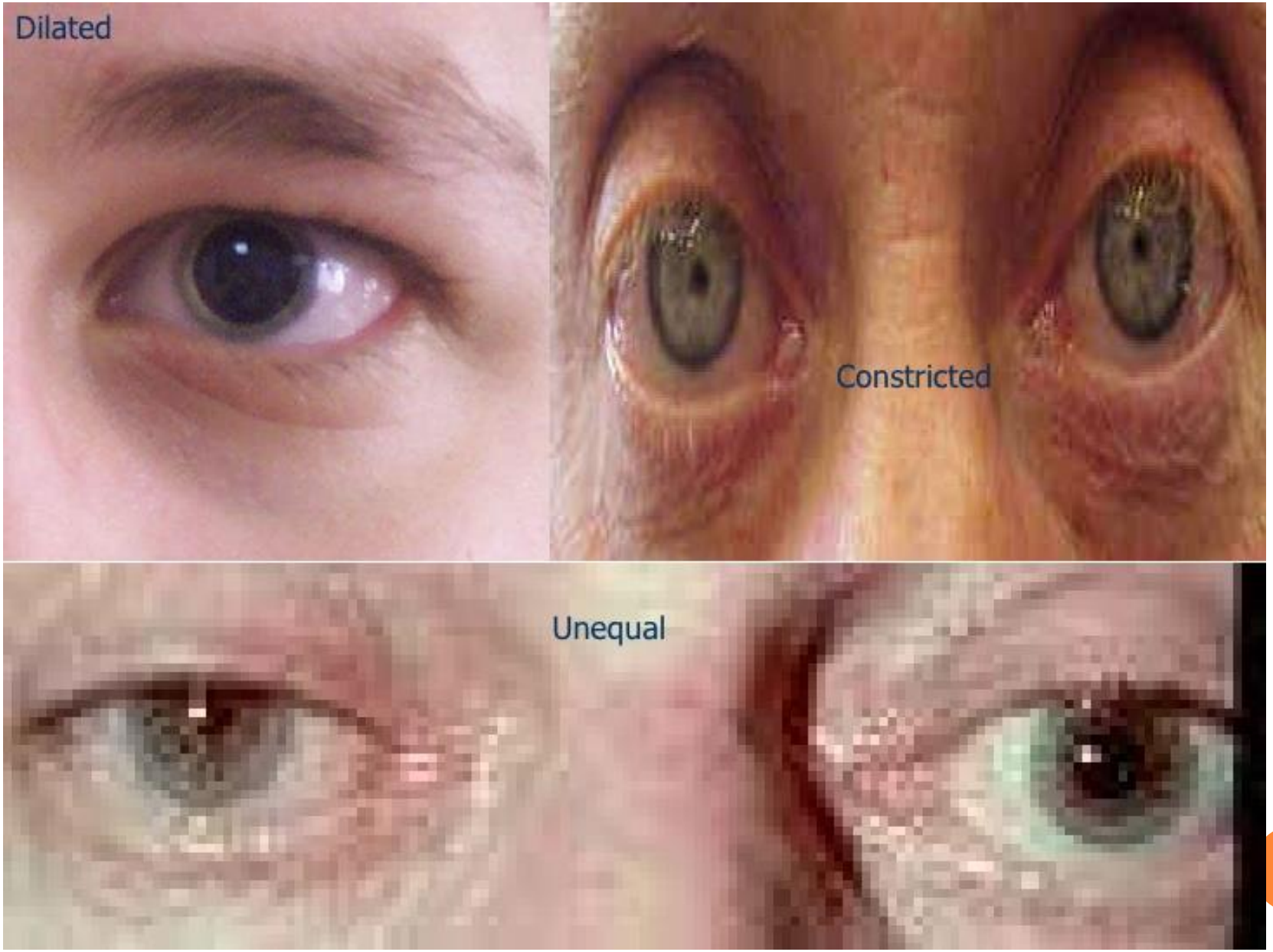
- 生物體內產生的熱量及散失的熱量維持在一平衡狀態

瞳孔

檢查眼睛瞳孔大小對稱及是否對光有反應

- 1.瞳孔放大：安非他命中毒
  2.一邊大一邊小：中風
  3.兩邊都小：機(有機磷中毒)、幹(腦幹出血)、鴉(鴉片中毒)

  *正常人的瞳孔：2.5~3.5mm


Dilated
Constricted
Unequal

呼吸 打開呼吸道，看、聽、感覺方式評估傷患有無適當呼吸

- 技巧：看(胸部起伏)、聽(呼吸聲)、感覺(熱氣)
  重點：深、淺、快、慢(有、無)

  如何判斷呼吸好壞：
  1. 次數：ALS>30 OR <10次
  2. 儀器：血氧機(測血氧濃度) *血氧濃度：正常人95~100%, <95% 考慮給氧
  3. 外觀：呼吸輔助肌

呼吸

- *呼吸評估：外觀(小孩子特別明顯)
  1. 張口呼吸
  2. 鼻口撐大
  3. 反向呼吸
  4. 胸索乳突肌
  5. 肋肩肌

下呼吸道解剖圖

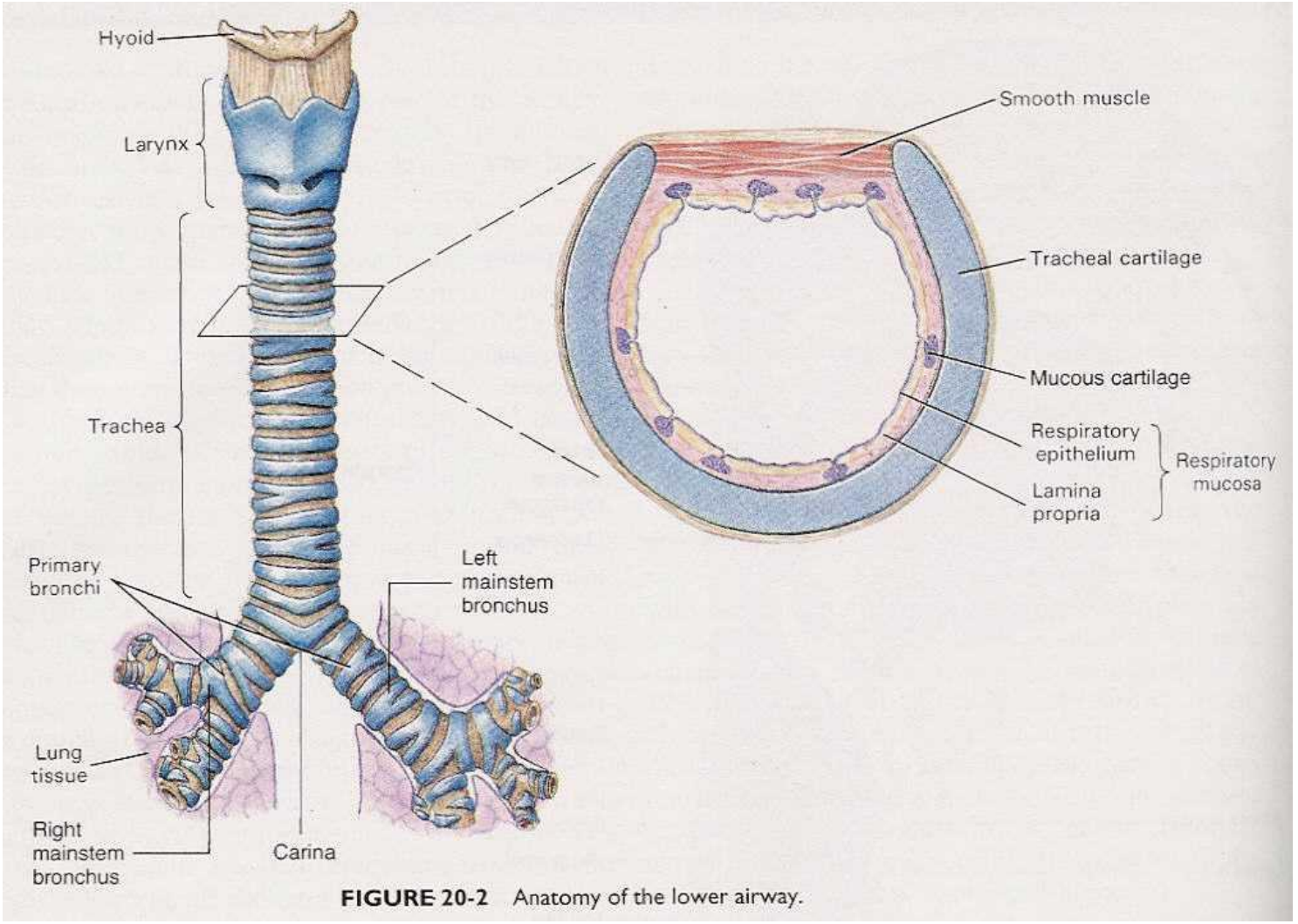
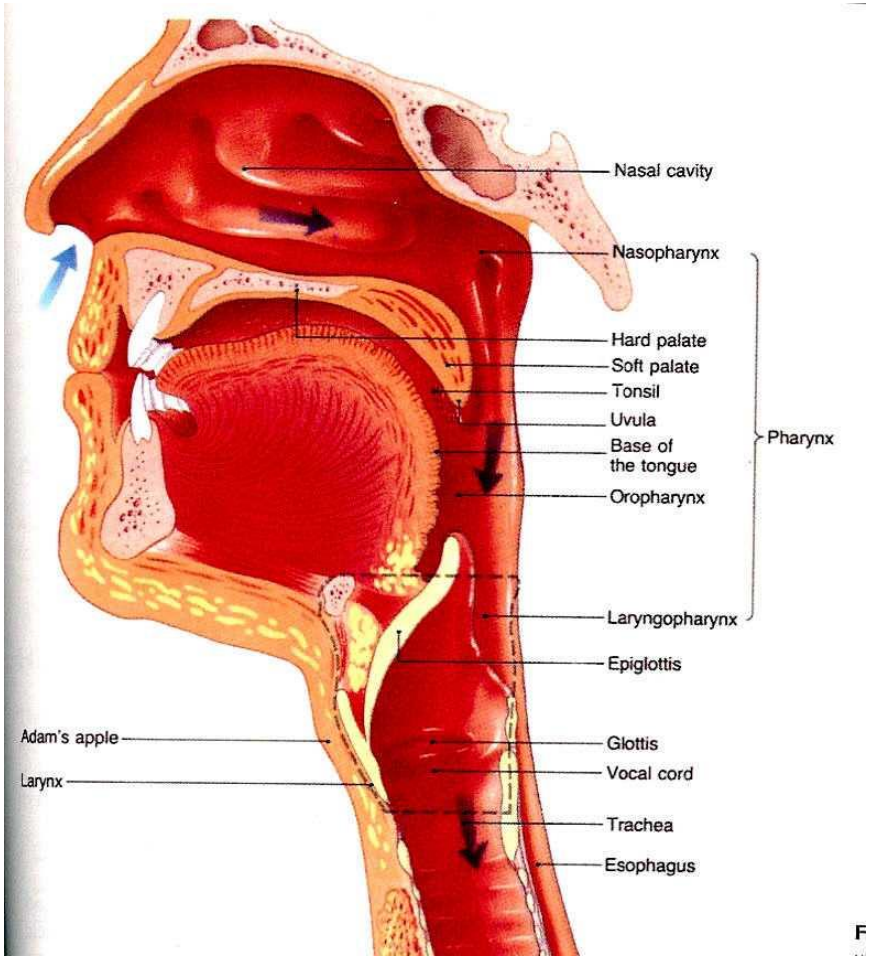
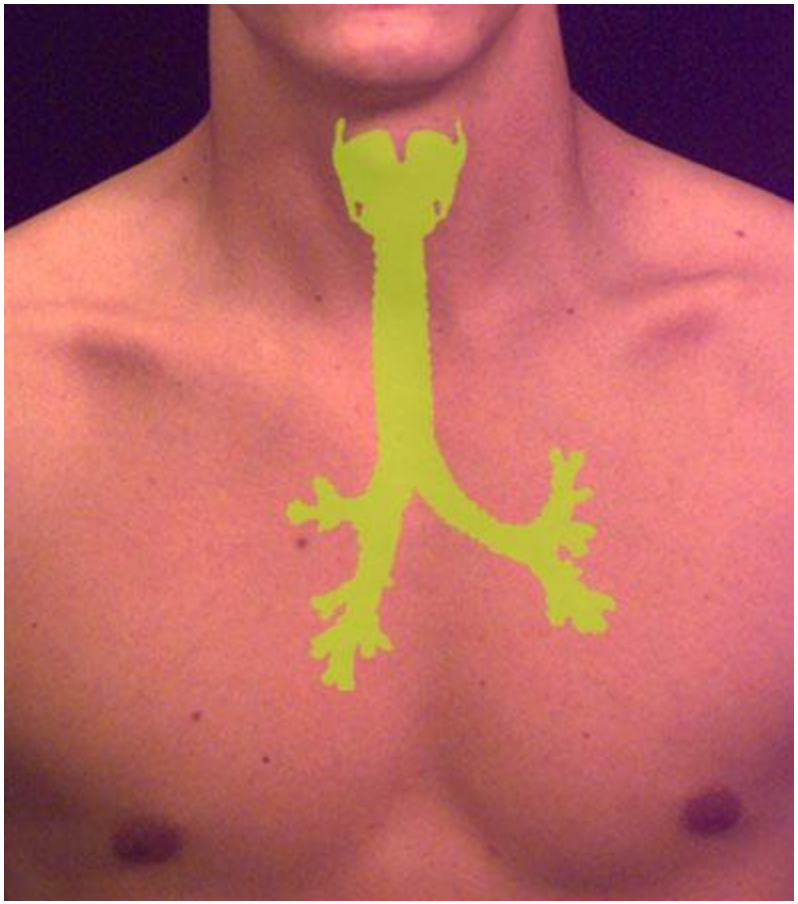
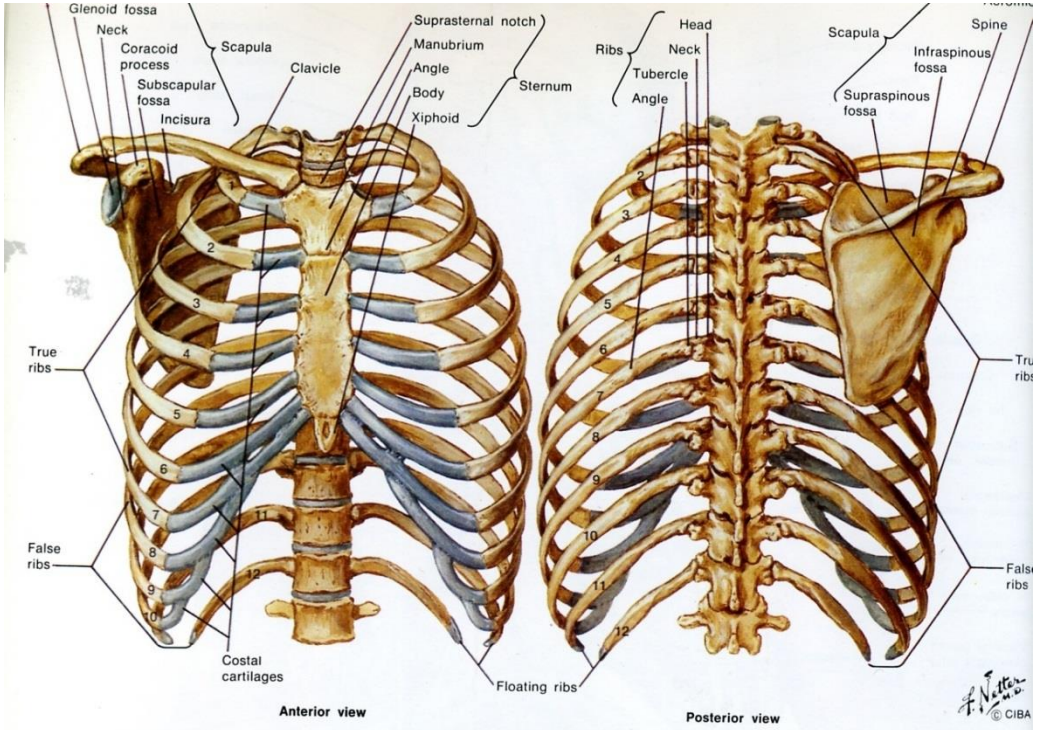


FIGURE 20-2 Anatomy of the lower airway.


Nasal cavity
Nasopharynx
Hard palate
Soft palate
Tonsil
Uvula
Base of the tongue
Oropharynx
Pharynx
Laryngopharynx
Epiglottis
Adam's apple
Larynx
Glottis
Vocal cord
Trachea
Esophagus



- 頸靜脈怒張如何觀察（分組討論）
- 氣管偏移如何觀察（分組討論）
- 第二肋間如何迅速探知（分組討論）
- 急性肺水腫之可能原理（分組討論）
- 張力性氣胸之可能原理（分組討論）
- 正壓呼吸與負壓呼吸可能原理（分組討論）



Bony Thorax

The skeletal framework of the thorax—the bony thorax—consists of 12 pairs of ribs and their cartilages, 12 thoracic vertebrae and intervertebral discs, and the sternum. The illustration also includes one clavicle and scapula, since these bones serve as important attachments for some of the muscles involved in respiration.

The sternum is made up of three parts—the manubrium, body and xiphoid process. The manubrium and body are not in quite the same plane and thus form the *sternal angle* at their junction, a significant landmark at which the costal cartilage of the second rib articulates with the sternum. The superior border of the manubrium is slightly concave, forming what is called the *suprasternal notch*.

The costal cartilages of the first through seventh ribs ordinarily articulate with the sternum, and are called *true ribs*. The costal cartilages of the eighth through tenth ribs (*false ribs*) are usually attached to the cartilage of the rib above, while the ventral ends of the cartilages of the eleventh and twelfth ribs (*floating ribs*) have no direct skeletal attachment.

All the ribs articulate dorsally with the vertebral column in such a way that their ventral end (together with the sternum) can be raised slightly, as occurs in inspiration. The articulations of the costal cartilages with the sternum, except for the first rib, are true or synovial joints, which allow more freedom of movement than there would be without this type of articulation.

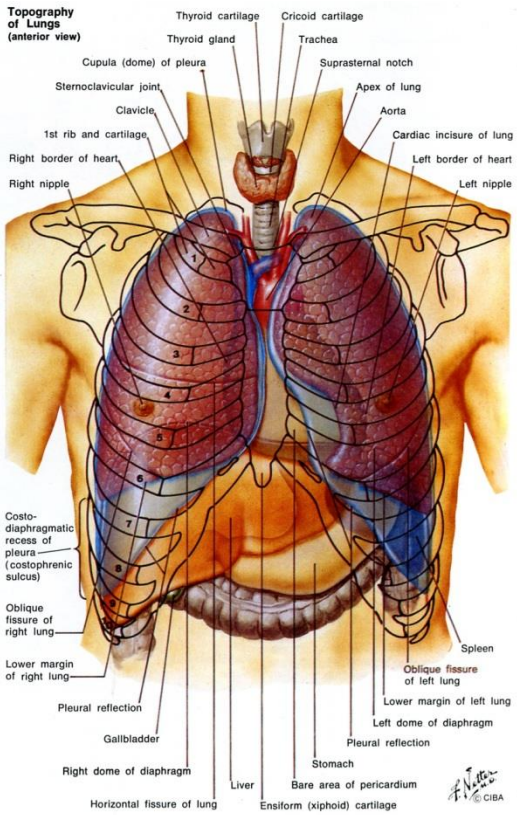
The deep surface of the scapula (the subscapular fossa) fits against the posterolateral aspect of the thorax over the second to seventh ribs, where, to a great extent, it is held by the muscles which are attached to it. The scapula's only bony articulation is between its acromion process and the lateral end of the clavicle; this acts as a strut to hold the lateral angle of the scapula away from the thorax. On the dorsal surface of the scapula a spine protrudes which continues laterally into the acromion process. At its vertebral end the spine flattens into a smooth triangular surface with the base of the triangle at the vertebral border. The spine separates the supraspinous fossa from the infraspinous fossa. Three borders of the scapula are described—superior, lateral, and medial or vertebral. On the superior border is a notch or incisura, and lateral to this the coracoid process protrudes anteriorly.

The lateral angle of the scapula presents a slight concavity, the glenoid fossa, for articulation with the head of the humerus. At the superior end of the glenoid fossa is the supraglenoid tuberosity, and at its inferior margin is the infraglenoid tuberosity.

The clavicle articulates at its medial end with the superolateral aspect of the manubrium of the sternum, and at its lateral end with the medial edge of the acromion process of the scapula. Its medial two-thirds is curved slightly anteriorly, and its lateral third is curved posteriorly. Muscular attachments to the medial and lateral parts of the clavicle leave its middle portion less protected and thus readily subject to fracture.

The vertebral levels of the bony landmarks on the ventral aspect of the thorax are variable, and differ somewhat with the phase of respiration. In general, the upper border of the manubrium is at the level of the second to third thoracic vertebra, the sternal angle opposite the fourth to fifth thoracic vertebra, and the xiphisternal junction at the level of the ninth thoracic vertebra.

Topography of Lungs (Anterior View)



Since the apex of each lung reaches as far superiorly as the vertebral end of the first rib, the lung usually extends about an inch above the medial one-third of the clavicle when viewed from the front. Thus the lung projects into the base of the neck.

The anterior border of the right lung descends behind the sternoclavicular joint and almost reaches the midline at the level of the sternal angle. It continues inferiorly posterior to the sternum to the level of the sixth chondrosternal junction. There the inferior border curves laterally and slightly inferiorly, crossing the sixth rib in the midclavicular line and the eighth rib in the midaxillary line. It then runs posteriorly and medially at the level of the spinous process of the tenth thoracic vertebra. These levels are, of course, variable and apply to the lung in expiration. In inspiration the levels for the inferior border would be roughly two ribs lower.

The anterior border of the left lung is similar in position to that of the right lung. However, at the level of the fourth costal cartilage it deviates laterally because of the heart, causing a cardiac notch in this border of the lung. The inferior border of the left lung is similar in position to that of the right lung except that it extends farther inferiorly, since the right lung is pushed up by the liver below the diaphragm on the right side.

The oblique fissure of the right lung, separating the lower lobe from the upper and middle lobes, ends at the lower border of the lung near the midclavicular line. The horizontal fissure separating the middle from the upper lobe begins at the oblique fissure and runs horizontally forward to the lung's anterior border, which it reaches at about the level of the fourth costal cartilage.

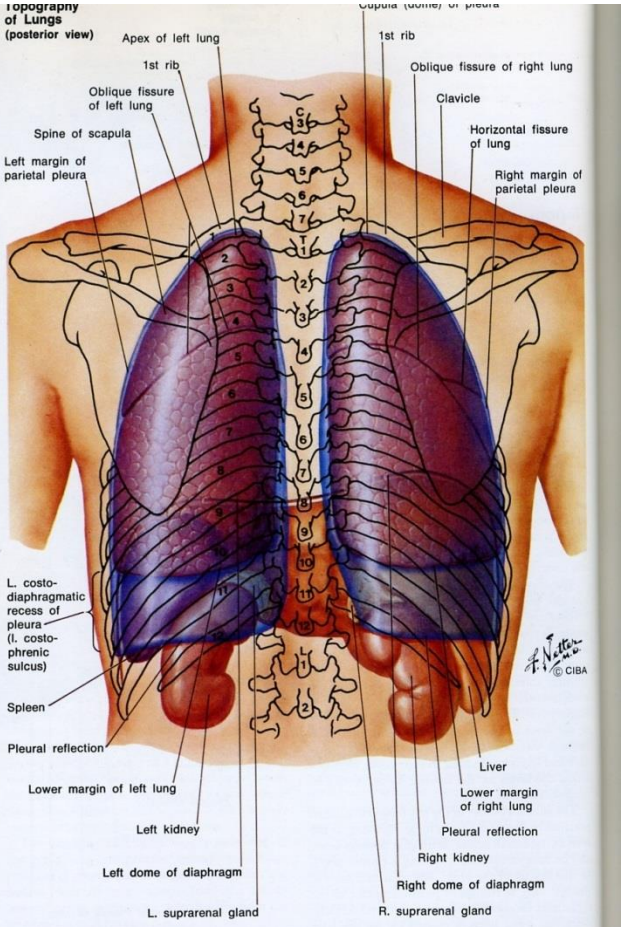
Since the left lung ordinarily has only two lobes, there is usually no horizontal fissure in this lung. The oblique fissure of the left lung is similar in its location to the corresponding fissure of the right side.

It should be remembered that extra fissures may occur in either lung. When such fissures do occur, they are likely to be found between bronchopulmonary segments and, in the left lung, between the superior and inferior divisions of the upper lobe, giving rise to a "three-lobed" left lung.

The lungs seldom extend as far inferiorly as the parietal pleura, so some of the diaphragmatic parietal pleura is usually in contact with costal parietal pleura. This area—which, of course, varies in size with the phase of respiration—is called the costodiaphragmatic recess of the pleura or the costophrenic sulcus. A similar but much less extensive area is present where the anterior border of the lung does not extend to its limits medially—especially in expiration—and the costal and mediastinal parietal pleurae are in contact. This area is called the costomediastinal recess.

The diaphragm separates the liver from the right lung and, depending on the size of the liver, from the left lung. The left lung is also separated by the diaphragm from the stomach and the spleen.

The nipple in the male and in the female (depending on the size and functional state of the breast) usually overlies the fourth intercostal space in approximately the midclavicular line.



Topography of Lungs (Posterior View)

The apex of the lung extends as far superiorly as the vertebral end of the first rib and therefore as high as the first thoracic vertebra. From there, the lung extends inferiorly as far as the diaphragm, with the base of the lung resting on the diaphragm and fitted to its superior surface. Because of the diaphragm's domed shape, the level of the highest point on the base of the right lung is about the eighth to ninth thoracic vertebra. The highest point on the base of the left lung is a fraction of an inch lower. From these high points the bases of the two lungs follow the curves of the diaphragm to reach the levels described on page 13 for the inferior borders of the lungs.

The highest point on the oblique fissure of the two lungs is on their posterior aspects, at about the level of the third to fourth thoracic vertebra, a little over an inch from the midline.

If the arm is raised over the head, the vertebral border of the scapula approximates the position of the oblique fissure of the lung. If the shoulder is brought forward as far as possible, the scapula is carried laterally, so that the area in which auscultation can be satisfactorily carried out on the posterior aspect of the chest is significantly widened.

The parietal pleura is separated from the visceral pleura by a potential space (the pleural cavity), which under normal circumstances contains only a minimal amount of serous fluid. Caudal to the inferior margin of the lung the costal parietal pleura is in contact with the diaphragmatic parietal pleura, forming what is called the costodiaphragmatic recess (costophrenic sulcus). This allows for the caudal movement of the inferior margin of the lung on inspiration.

Under abnormal circumstances the pleural cavity may contain air, increased amounts of serous fluid, blood or pus. The accumulation of a significant amount of any of these in the pleural cavity compresses the lung and causes respiratory difficulties.

The diaphragm separates the base of the left lung from the fundus of the stomach and the spleen. Because of this relationship, if the stomach becomes overfilled with retained food or gas it can push the diaphragm upward and embarrass respiratory activity.

The base of the right lung is separated from the liver by the diaphragm. Because of this relationship, if the liver increases in size it can elevate the diaphragm and push against the lung, possibly limiting its expansion. An abscess on the diaphragmatic surface of the liver can rupture through the diaphragm and involve the related pleural cavity and lung.

It should be remembered that in the illustration the lungs are shown in relation to the bony thorax, scapula and diaphragm, but overlying the structures shown are the deep and superficial muscles of the back, in addition to the superficial fascia and skin.

horacic Cage Injuries

Thoracic cage injuries are treated according to e principles that apply to trauma elsewhere in the ody, with certain modifications for specific natomic features and for disturbed cardiorespira- ry dynamics. Thoracic cage injuries are unique in at mild injuries improperly treated may be fatal, hereas massive trauma can be treated by proper easures with excellent results.

A rib fracture is the result of trauma, but athologic rib fractures may occur in patients with alignant metastases, myeloma and hyper- arathyroidism. Simple rib fractures occur primar- y in adults and usually involve the upper and wer ribs. Ordinarily the first, eleventh and welfth ribs are spared. With severe trauma, frac- ures of any rib, or combination of ribs, with or ithout dislocations, may occur. The posterior ngle is structurally the weakest point, and frac- ures in this area are likely. However, the fracture sually occurs at the point of impact, often later- lly. Such fractures are hard to see on x-ray films.

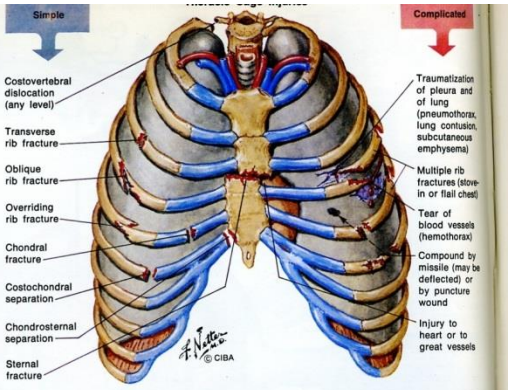
Crushing injuries may produce multiple ggshell fractures, the sites being dependent on the irection of the compressing forces. For example, npaling the anterior chest on a steering wheel, as n an automobile accident, often fractures the ster- um and several ribs anteriorly on both sides. Be- ides rib fractures, costovertebral dislocations may ccur at any level, as may costochondral and chon- rosternal separations. Fractures may be transverse r oblique, and the fragments may override, or a ointed fragment may be pushed inward, tearing he pleura and underlying lung.

Penetrating wounds of the chest (gunshot or stab ound) may cause comminuted fractures of a rib, ith bone fragments driven into the lung sub- tance. In the elderly patient with atrophic, decal- ified ribs, fractures may result from simple rauma, coughing or any severe muscle pull.

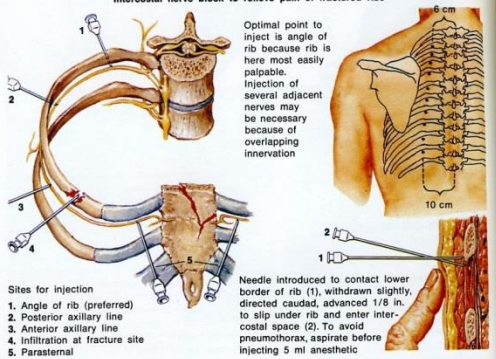
Fractures of the rib or sternum or costovertebral eparations are diagnosed from movement of frag- ents, ecchymosis and crepitus, as well as by x-ray xamination. Since pain characteristically occurs ith inspiration, the patient tends to splint the hest wall and, therefore, hypoventilates. A chest -ray film is always indicated, not only to identify he number and extent of rib fractures but also to etermine whether there is an associated neumothorax, hemothorax or pleural effusion.

Rib fractures usually heal readily if com- lications are handled properly. However, the pain ssociated with the fracture can prevent proper entilation and coughing, leading to atelectasis, etained secretions and pneumonia, especially in he elderly. Damage to the underlying lung may ause pneumothorax or subcutaneous emphysema. aceration of the intercostal vessels sometimes auses hemothorax, which can become severe. Mul- iple rib fractures may produce paradoxical move- ent of the chest wall, with a flail segment.

Pain from a rib fracture is best treated by inter- ostal or paravertebral block; this promptly relieves he pain and quiets the labored respiration which ay be accentuating paradoxical motion of the hest. The major problem with a block is increased iflex bronchial secretions; these must be removed patients are to avoid an obstructive type of



Intercostal nerve block to relieve pain of fractured ribs



Sites for injection

1. Angle of rib (preferred)
2. Posterior axillary line
3. Anterior axillary line
4. Infiltration at fracture site
5. Parasternal

pneumonia, which is particularly dangerous in the elderly. If coughing is inadequate, tracheal aspiration by catheter or by bronchoscopy, and occasionally by endotracheal intubation or tracheostomy, may be necessary. The local anesthetic is injected into the fracture site, if possible, or as a nerve block. The needle is inserted under the rib to inject the anesthetic agent into the intercostal space, as the intercostal nerve runs along the lower border of the rib except posteriorly, where it lies midway between the ribs. Injection of one or two additional nerves above and below the fracture site may be required because of overlapping innervation. Complicating pneumothorax is always of concern.

Adhesive strapping of the chest wall should be avoided because it inhibits deep inspiration and may result in traumatic atelectasis. Medication for pain, however, is essential if the patient is to cough effectively. Drugs that depress the cough reflex must be used with great caution, and avoided altogether if possible. Patients should be encouraged to cough frequently and to breathe deeply, particularly if they receive sedation. The ribs usually become fairly stable within 10 days to two weeks, although some patients require ventilatory support longer, depending on the severity of the rib fractures. Firm healing with callus formation is seen after about six weeks.

- 正壓呼吸與負壓呼吸

脈搏

檢查二側橈動脈

- *評估不超過10秒鐘

  評估方式：
  1. 儀器：血壓機　血氧機
  2. 手摸：以食指與中指量測

- *危險心率：　心跳> 140
  < 50

血壓

檢查微血管充填時間是否大於2秒

- 評估方式：
  1. 儀器
  2. 手摸

  *危險血壓：收縮壓 >=220　　<80
  *(收縮壓)120/80(舒張壓)
  *口語：120(收縮壓) OVER 80

血壓：檢查微血管充填時間是否大於2秒

- 手測脈搏：
  頸動脈：摸到即有60 mmHg
  臂動脈：摸到即有70 mmHg
  橈動脈：摸到即有80 mmHg
  股動脈：摸到即有70 mmHg
  足背動脈：摸到即有90 mmHg
- 循環評估：CRT 微血管充血時間(指甲試驗，2秒內回血表正常，指腹亦可)

- 前推現象
- 體循環
- 冠狀動脈
- 主動脈弓

膚色 目視膚色是否蒼白、發紺或異常

- 判別：
  1. 嘴唇：末梢循環處
  2. 小指頭：發乾、發紫

  *白：交感神經啟動
- *紅：血壓高、過敏、中暑、CO中毒(後期才會出現紅色)、
- *紫：中毒、缺氧、異物梗塞

- 非創傷危急個案包括：
  - 意識不清(昏迷指數＜14分，對聲音沒有反應)
  - 呼吸每分鐘≧30或<10次、脈搏每分鐘≧141或<50下、收縮壓≧220或<80~90 mmHg(或摸不到橈動脈)、微血管充填時間＞2秒
  - 體溫≧40或<33℃
  - 急性腦中風或缺血性胸痛發作、突然或近期昏迷、抽搐不止、中毒可能危及生命、急產、情況異常不穩定之嬰兒或兒童、吸入性傷害或發紺。
  - 二、非創傷危急個案，在完成患者初步評估與病史詢問後應立即送醫，不得延誤。

- 創傷危急個案包括：
- 急性意識不清(昏迷指數＜14分，對聲音沒有反應)
- 呼吸每分鐘≧30或<10次、脈搏每分鐘>150或<50下、收縮壓>220或<90 mmHg(或摸不到橈動脈)、微血管充填時間＞2秒
- 二度或三度燒傷體表面積>25%、顏面或會陰燒傷
- 大量皮下氣腫、手腕或腳踝以上截肢、大而深的傷口、頭頸胸腹鼠蹊部之穿刺傷或開放性傷口、連枷胸、腦組織或內臟外露、頭部或脊椎傷害併肢體癱瘓、長骨開放性骨折、兩根以上長骨或骨盆腔骨折、高處墜落(＞ 6公尺或≧兩層樓高)或其他有高能量撞擊可能之創傷機轉、毒蛇咬傷等。

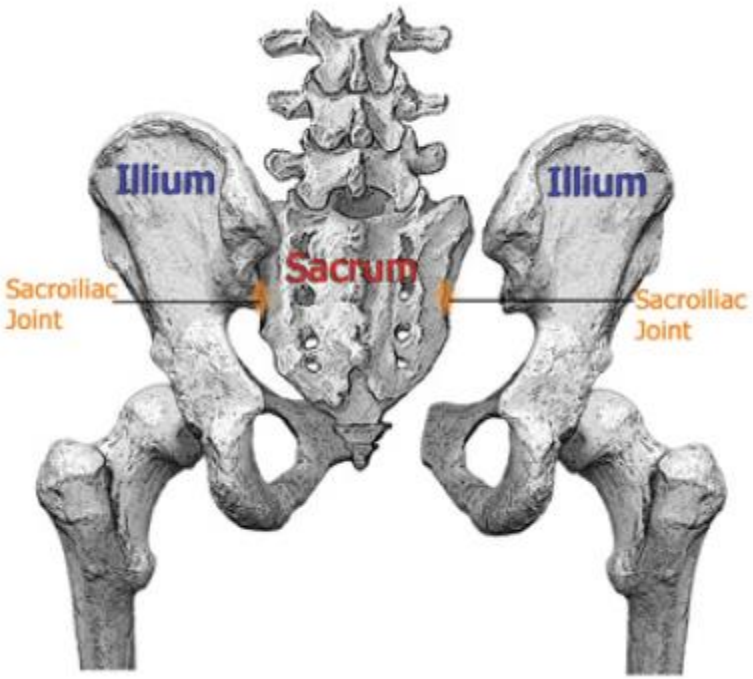
ALS數據(必背!!)

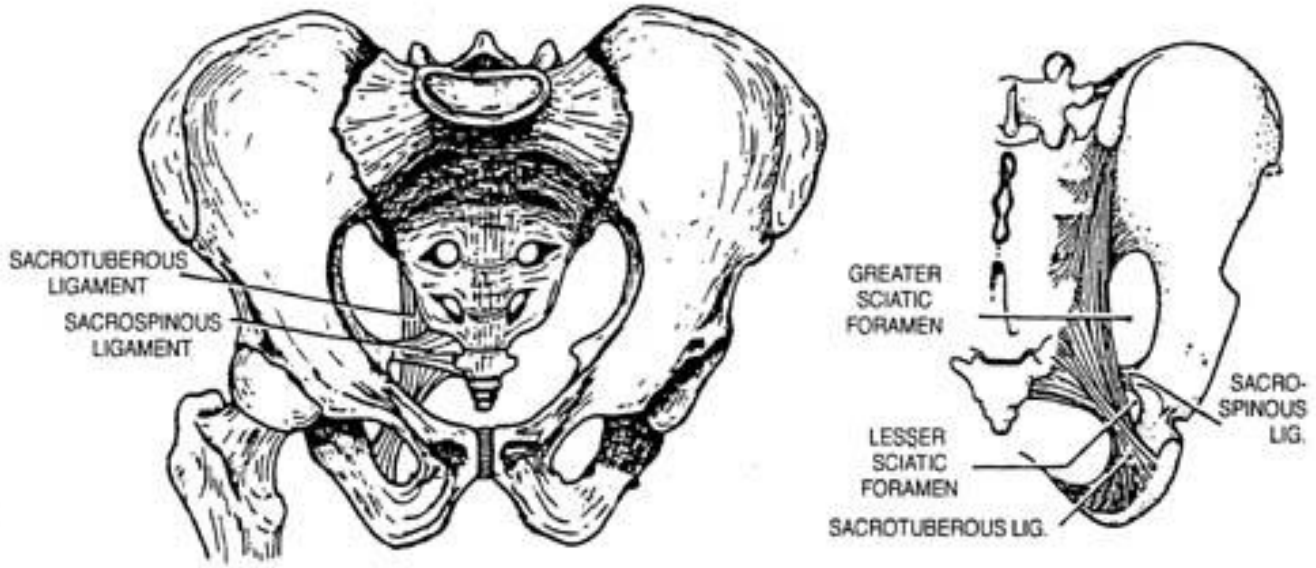
- 1. GCS<13
  2. 呼吸>=30 <10
  3. 脈搏>=140 <50
  4. 血壓>220 <90
  5. 體溫>=40 <32
  6. CRT>=2
  7. SPO2<90
  8. 血糖>=500 <60

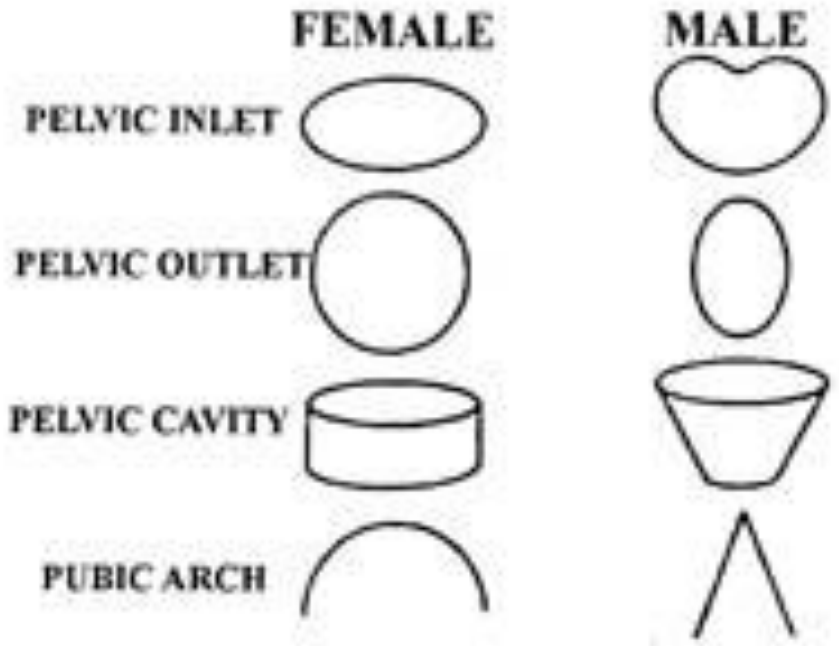
- 理學七項
  - GCS
    - 氣管是否偏移、頸靜脈是否怒張
    - 呼吸胸部起伏是否對稱、兩側肺音
    - 腹部是否腫脹、是否壓痛
    - 是否黑便血便血尿拉肚子
    - 上下肢是否水腫浮腫紅疹紫斑針孔
    - 上下肢感覺運動功能

- 1.周邊循環三項
  - 膚色是否蒼白發紺
  - 末端肢體是否濕冷
  - CRT

骨盆骨折


Illium
Illium
Sacrum
Sacroiliac Joint
Sacroiliac Joint


SACROTUBEROUS LIGAMENT
SACROSPINOUS LIGAMENT
GREATER SCIATIC FORAMEN
SACRO-SPINOUS LIG.
LESSER SCIATIC FORAMEN
SACROTUBEROUS LIG.


FEMALE
MALE
PELVIC INLET
PELVIC OUTLET
PELVIC CAVITY
PUBIC ARCH

AP view of pelvic bone

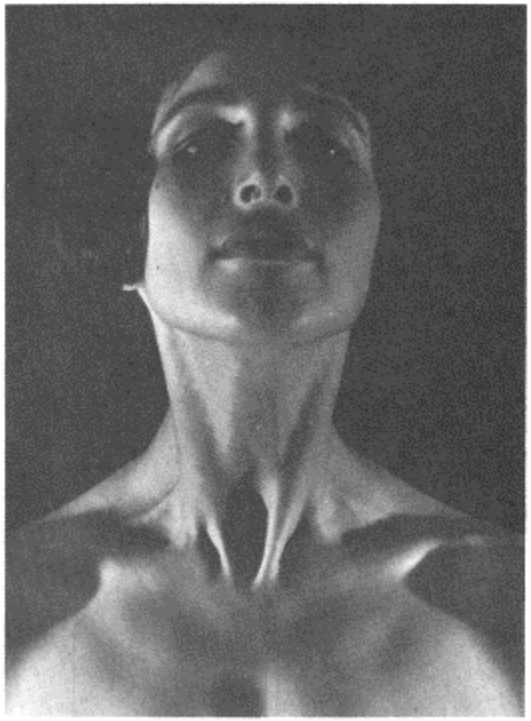
comminuted tibia & fibular

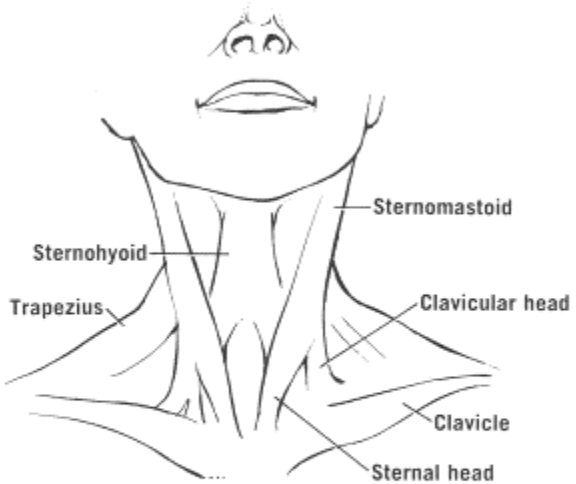
Case 03

The need of concepts by EMTP

- 認識熟悉交感神經系統與副交感神經系統
- 血壓與電壓Ohm law
- 身體石門水庫
- 身體壓力儲存所
- 為什麼60, 70, 80, 90mmHg.

- 認識熟悉頸椎解剖
- coma原因鑑別診斷
- 昏迷與網狀活化系統Coma and RAS




Sternomastoid
Sternohyoid
Trapezius
Clavicular head
Clavicle
Sternal head

我這樣賣力請給個交代

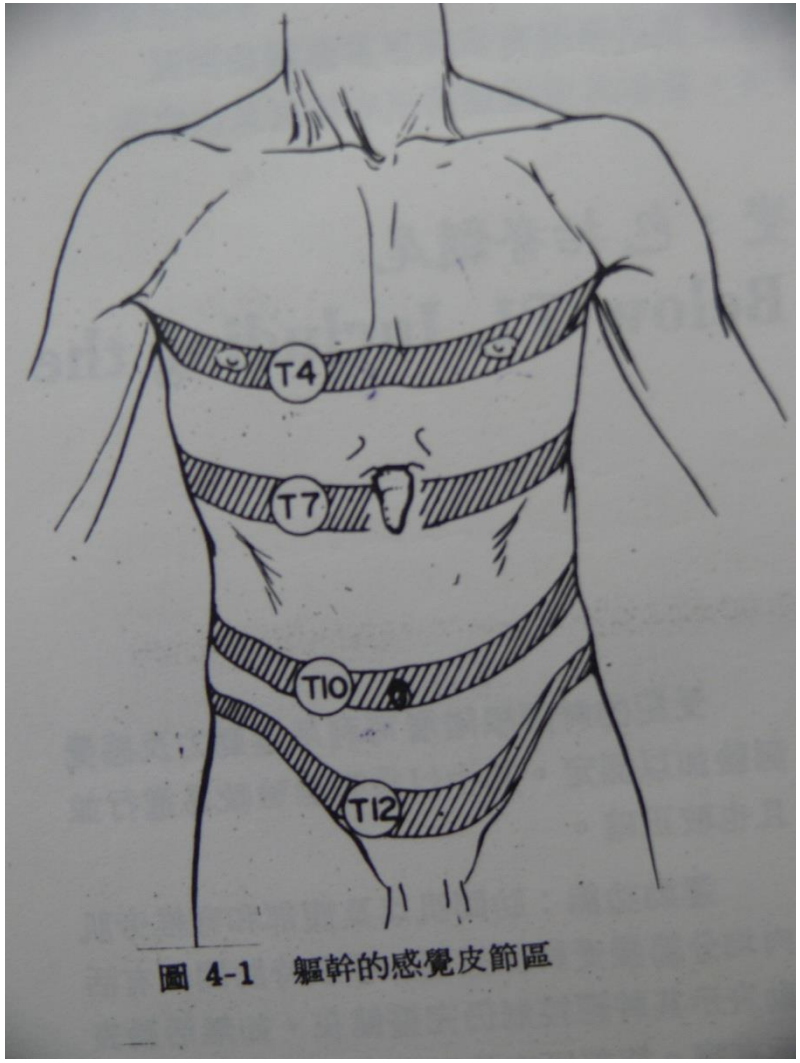
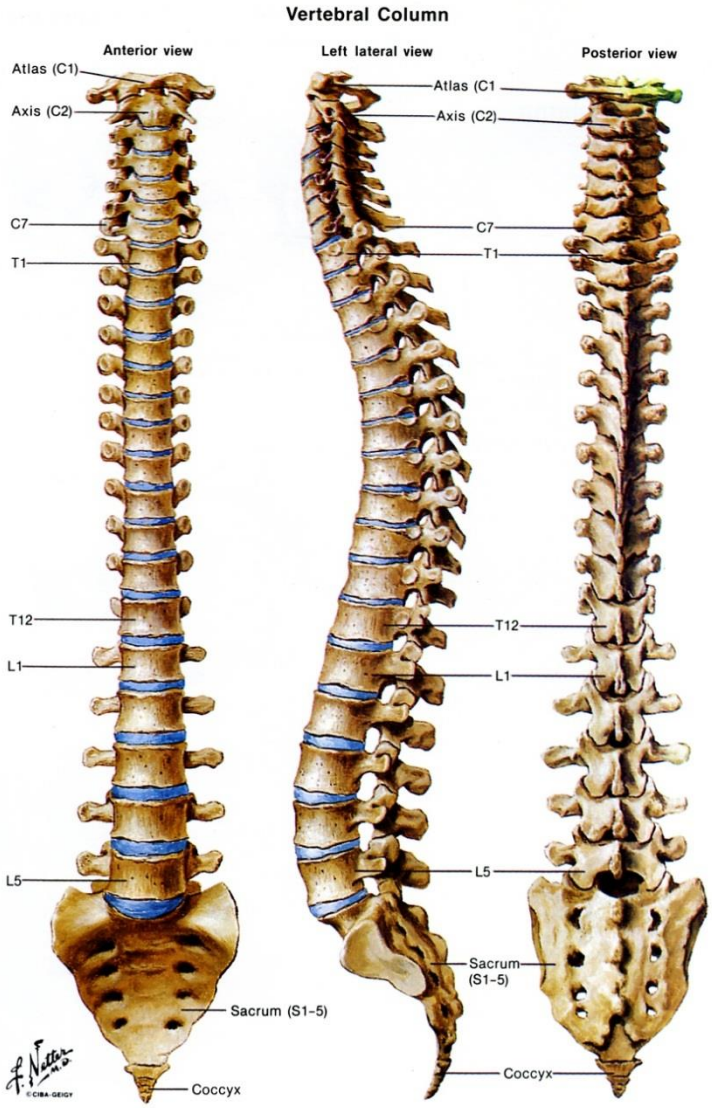


圖 4-1　軀幹的感覺皮節區

Back

Vertebral Column and Pelvis



Vertebral Column

The vertebral column is built up from alternating bony vertebrae and fibrocartilaginous discs that are intimately connected by strong ligaments and supported by powerful musculotendinous masses (Plate 8). The individual bony elements and ligaments are described in Plates 9–18.

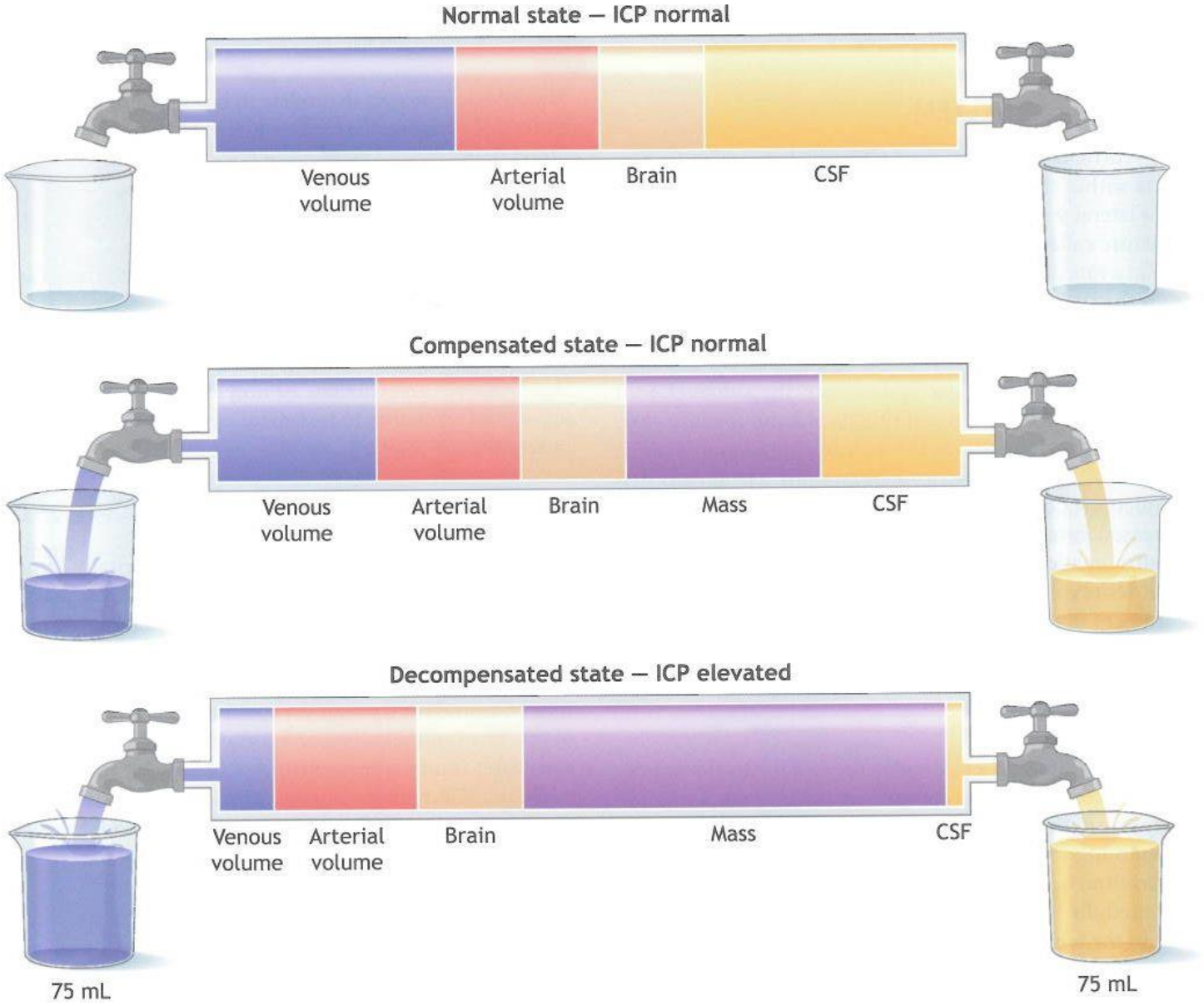
There are 33 vertebrae (7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal), although the sacral and coccygeal vertebrae are usually fused to form the sacrum and coccyx. All vertebrae conform to a basic plan, but individual variations occur in the different regions. A typical vertebra is made up of an anterior, more-or-less cylindric *body* and a posterior *arch* composed of two *pedicles* and two *laminae*, the latter united posteriorly to form a *spinous process*. These processes vary in shape, size, and direction in the various regions of the spine. On each side, the arch also supports a *transverse process* and *superior* and *inferior articular processes*; the latter form synovial joints with corresponding processes on adjacent vertebrae. The spinous and transverse processes provide levers for the many muscles attached to them. The increasing size of the vertebral bodies from above downward is related to the increasing weights and stresses borne by successive segments, and the sacral vertebrae are fused to form a solid wedge-shaped base—the keystone in a bridge whose arches curve down toward the hip joints. The *intervertebral discs* act as elastic buffers to absorb the many mechanical shocks sustained by the vertebral column.

Only limited movements are possible between adjacent vertebrae, but the sum of these movements confers a considerable range of mobility on the vertebral column as a whole. Flexion, extension, lateral bending, rotation, and circumduction are all possible, and these actions are freer in the cervical and lumbar regions than in the thoracic region. Such differences exist because the discs are thicker in the cervical and lumbar areas, the splinting effect produced by the thoracic cage is lacking, the cervical and lumbar spinous processes are shorter and less closely apposed, and the articular processes are shaped and arranged differently.

At birth, the vertebral column presents a general dorsal convexity, but later, the cervical and lumbar regions become curved in the opposite directions—when the infant reaches the stages of upright (6–9 months). The dorsal convexities are *primary curves* associated with the fetal uterine position, whereas the cervical and lumbar ventral *secondary curves* are compensatory to permit the assumption of the upright position. There may be additional slight lateral deviations resulting from unequal muscular traction in right-handed and left-handed persons.

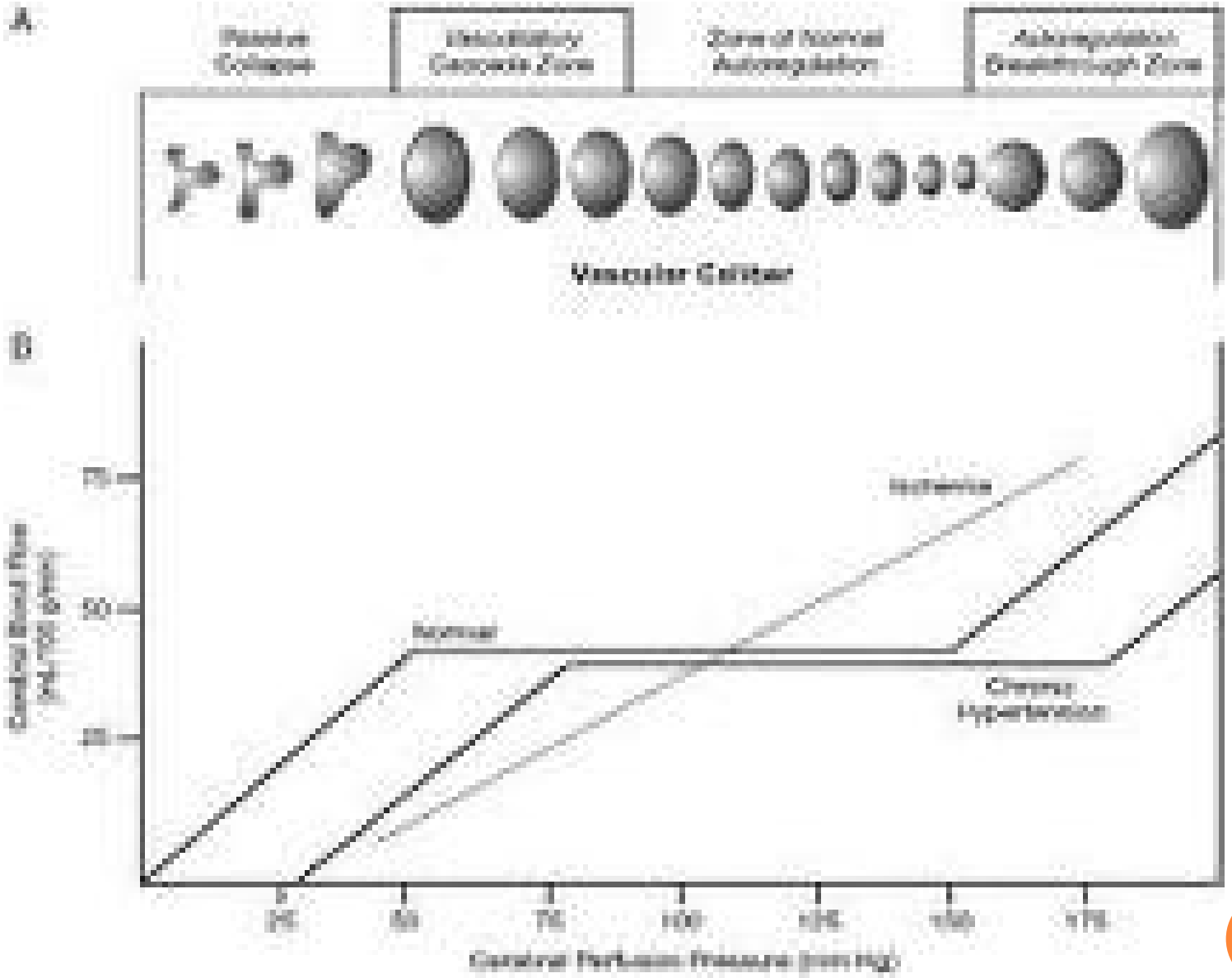
Man's evolution from a quadrupedal to a bipedal posture was mainly effected by the tilting of the sacrum between the hipbones, by an increase in lumbosacral angulation, and by minor adjustments of the anterior and posterior depths of various vertebrae and discs. An erect posture greatly and good as these ancestral adaptations were, some static and dynamic imperfections remain and predispose to strain and backache.

The length of the vertebral column averages 72 cm in the adult male and 7 to 10 cm less in the female. The *vertebral canal* extends through the entire length of the column and provides an excellent protection for the spinal cord, the cauda equina, and their coverings. Vessels and nerves pass through *intervertebral foramina* formed by notches on the superior and inferior borders of the pedicles of adjacent vertebrae, bounded anteriorly by the corresponding intervertebral discs and posteriorly, by the joints between the articular pro-


Normal state — ICP normal
Venous volume
Arterial volume
Brain
CSF
Compensated state — ICP normal
Venous volume
Arterial volume
Brain
Mass
CSF
Decompensated state — ICP elevated
Venous volume
Arterial volume
Brain
Mass
CSF
75 mL
75 mL

傷害已經造成
如何預防或減少二次傷害

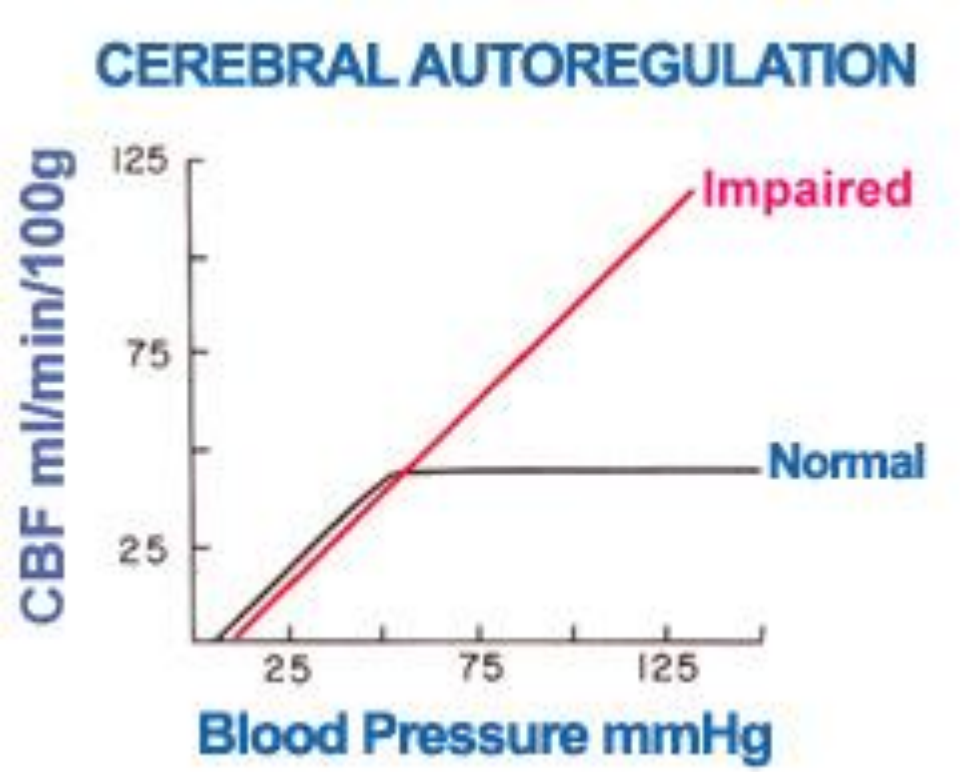
- 避免缺氧、缺血壓
- 缺氧維持呼吸及呼吸道暢通
- 缺血壓儘速找原因矯正
- CPP=MAP-ICP


A
Vascular Caliber
B
Normal
Cerebral Perfusion Pressure (mm Hg)

INCREASED INTRA-CRANIAL PRESSURE (IICP)

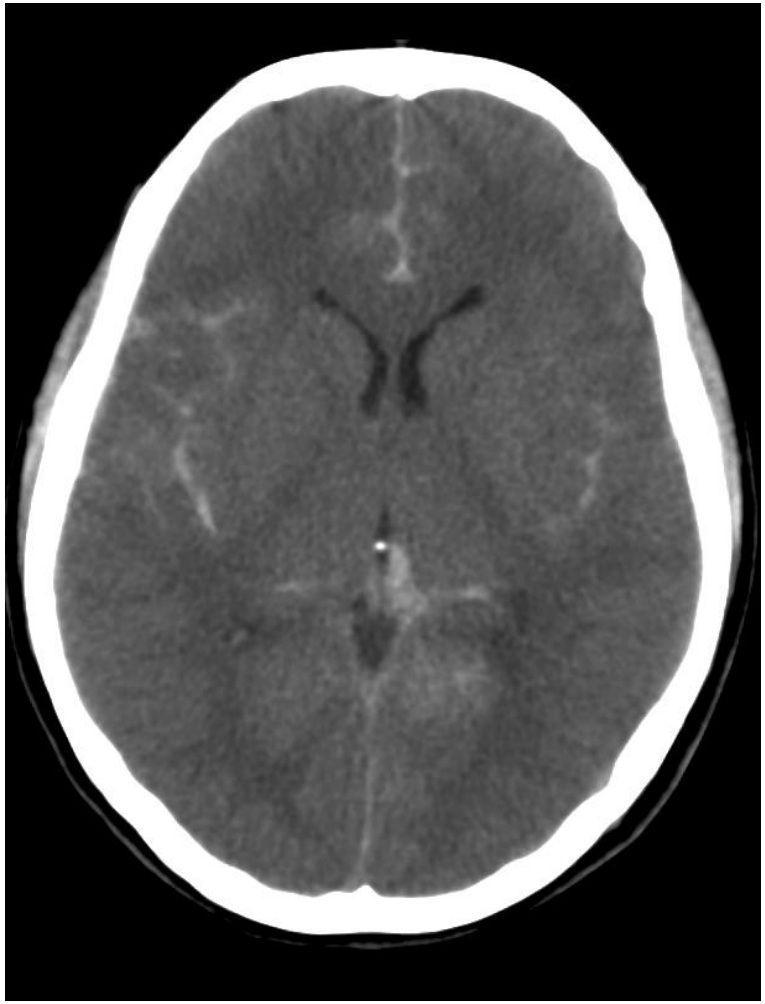
- ICP 大於 20 mmHg→IICP.
- ICP大於(above) 40 mmHg→非常嚴重與危險.
- Treatments:
  - 30 degrees head-up position, 頭抬高出30度
  - CSF drainage,
  - mannitol (0.5-1.0 g/kg body weight),
  - lasix (0.5 mg/kg),
  - hyperventilation to keep PaCO2 25-30 mmHg,
  - emergency craniectomy,
  - barbiturate coma therapy.

CEREBRAL AUTOREGULATION

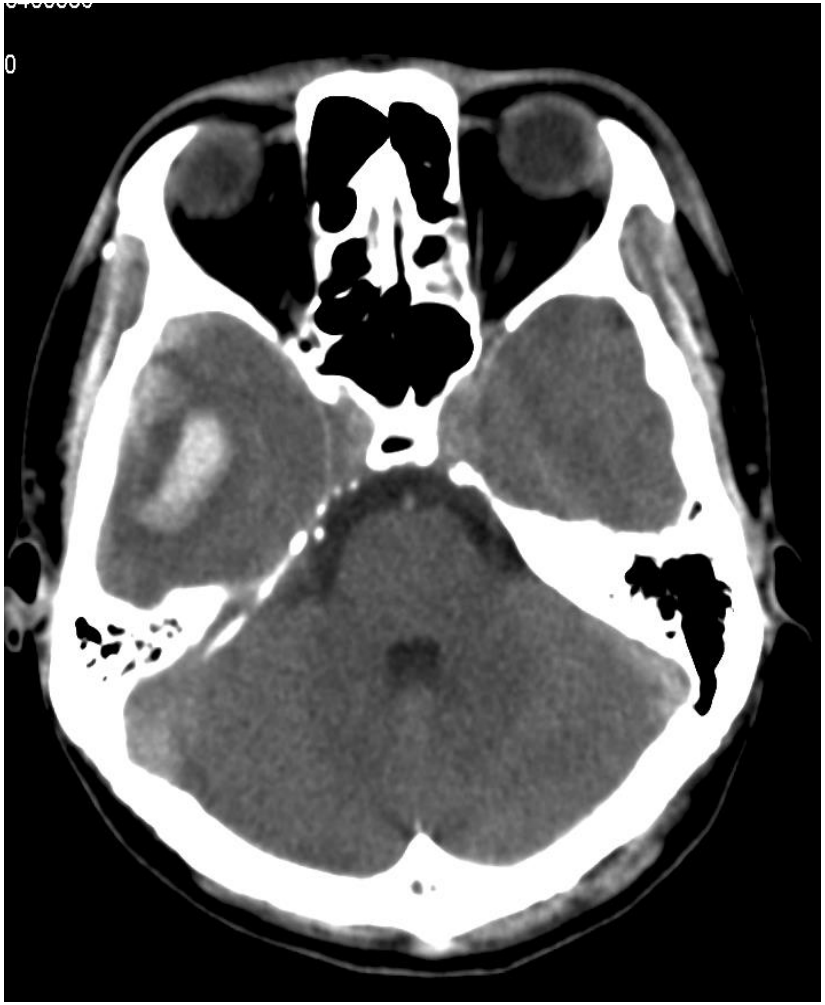


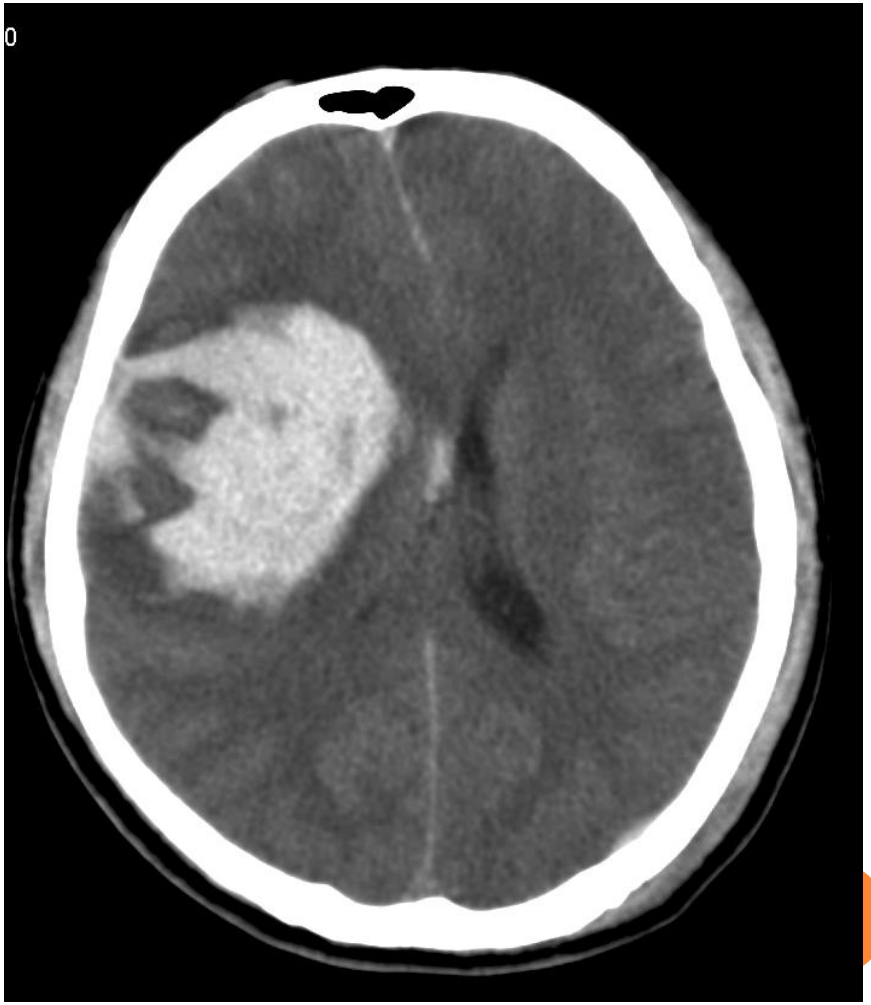
http://cme.medscape.com/viewarticle/528848

223471, 19 Y/O FEMALE



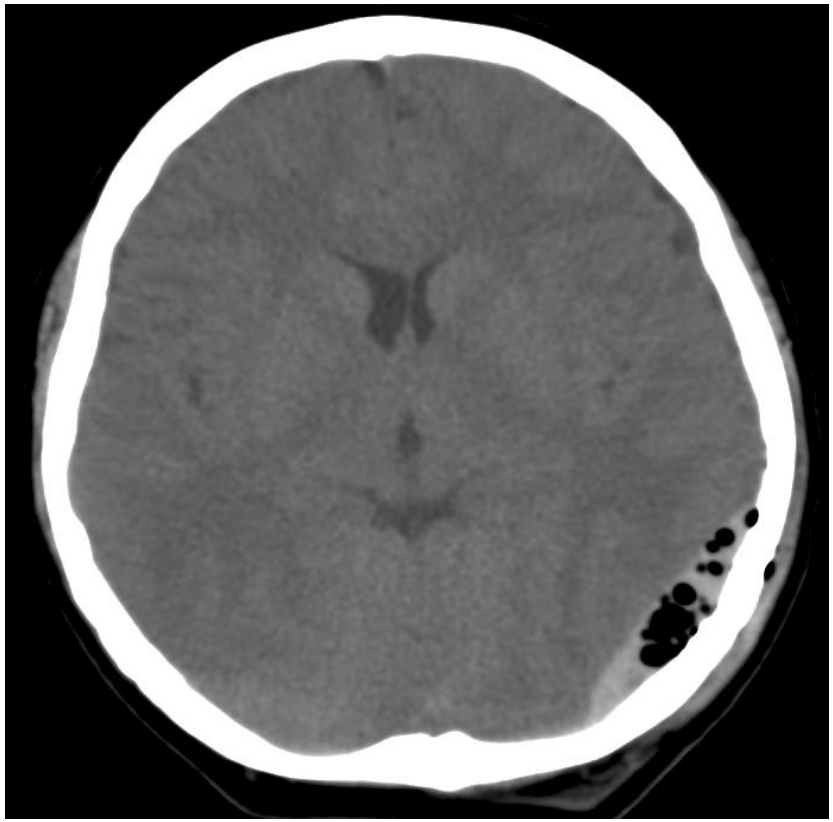
065721, 24 Y/O MALE

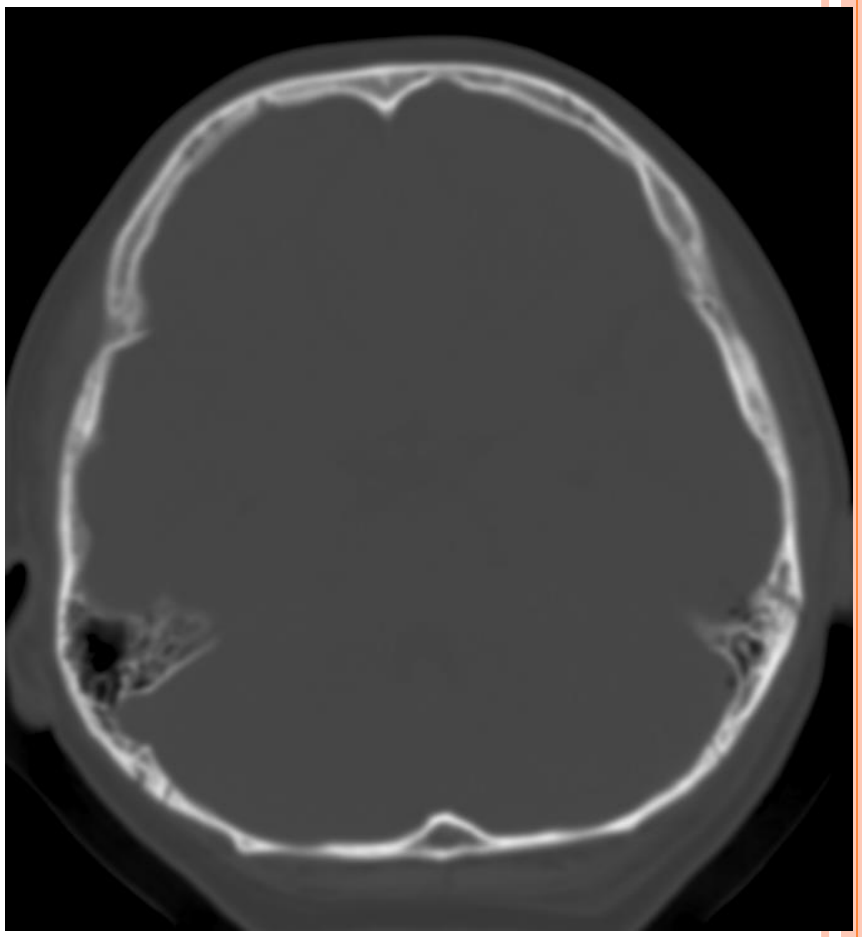




韋X安 12 Y/O BOY 009033

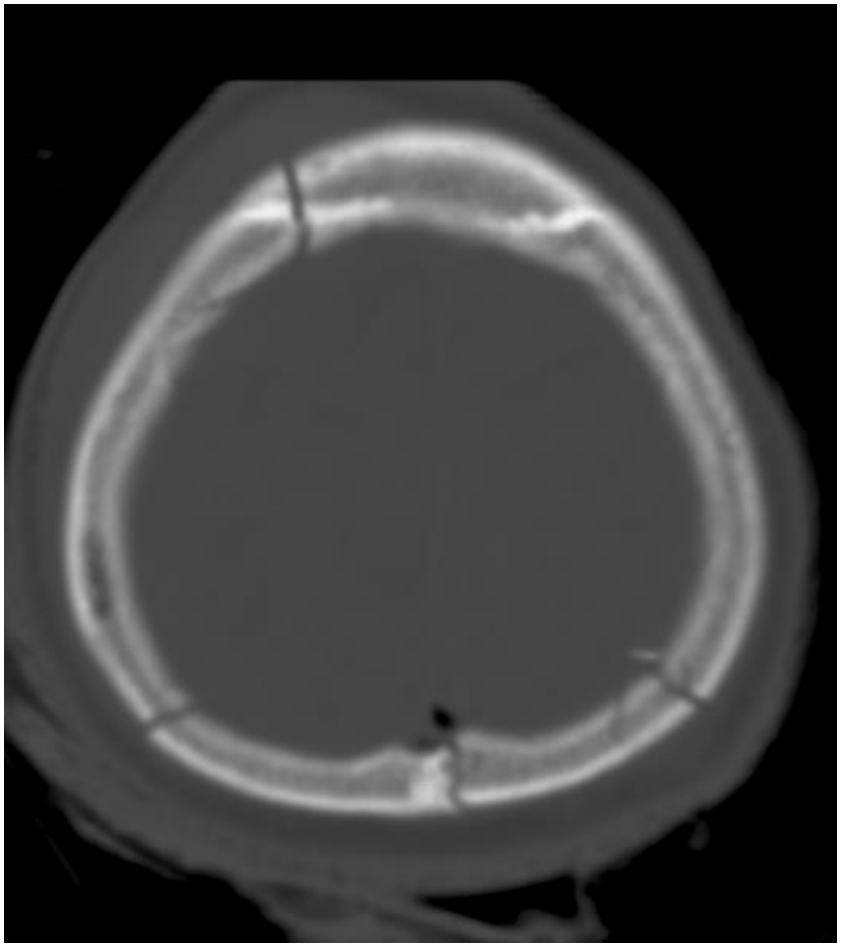
HEAD INJURY WITH SCALP CONTUSION AND LEFT EAR HEARING IMPAIRMENT

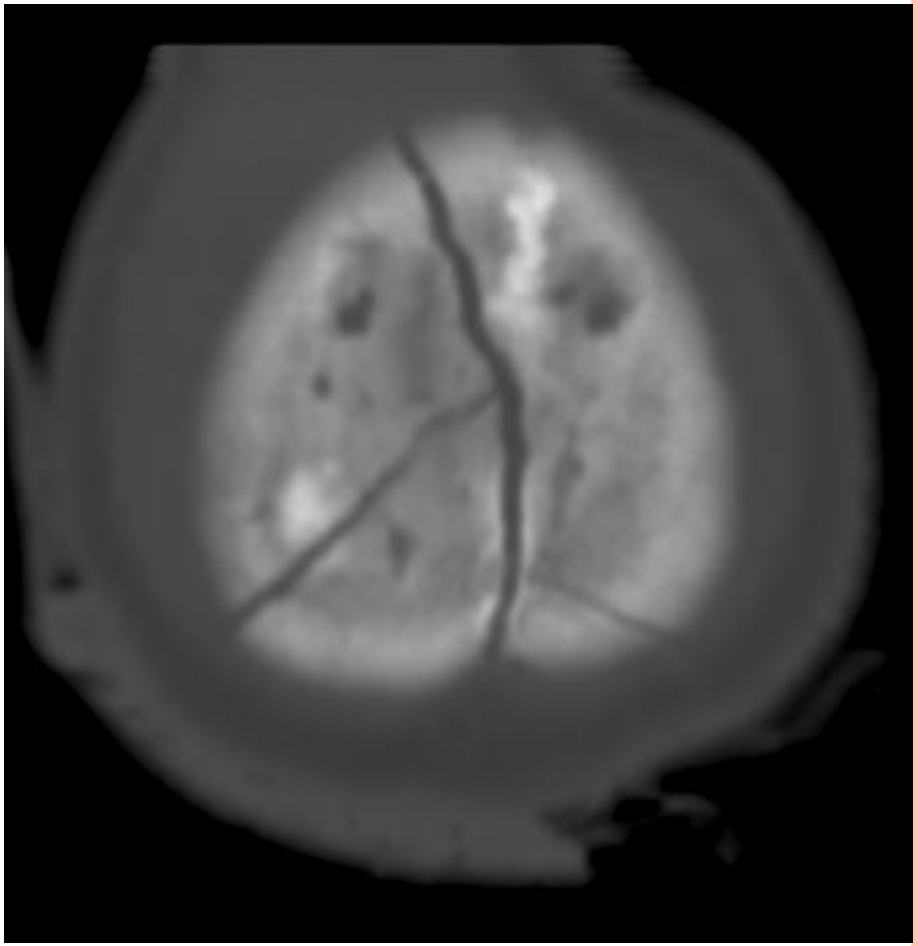




潘X揮 286204

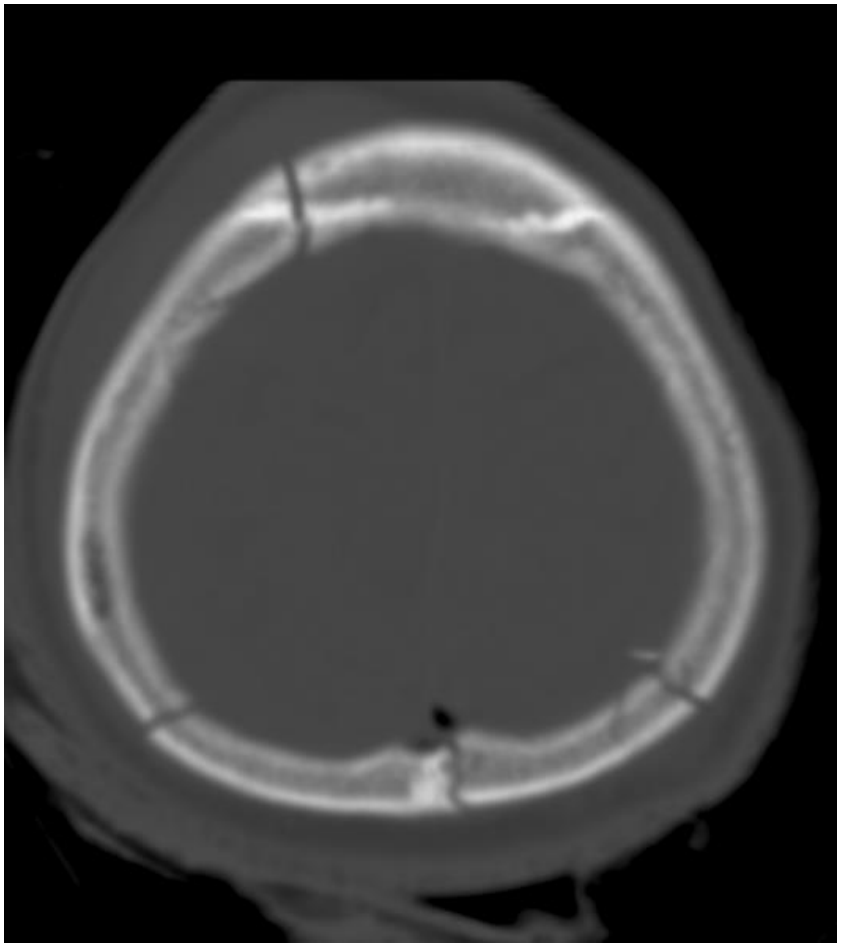
PATIENT OF FALL ACCIDENT AS HIGH AS 15 M

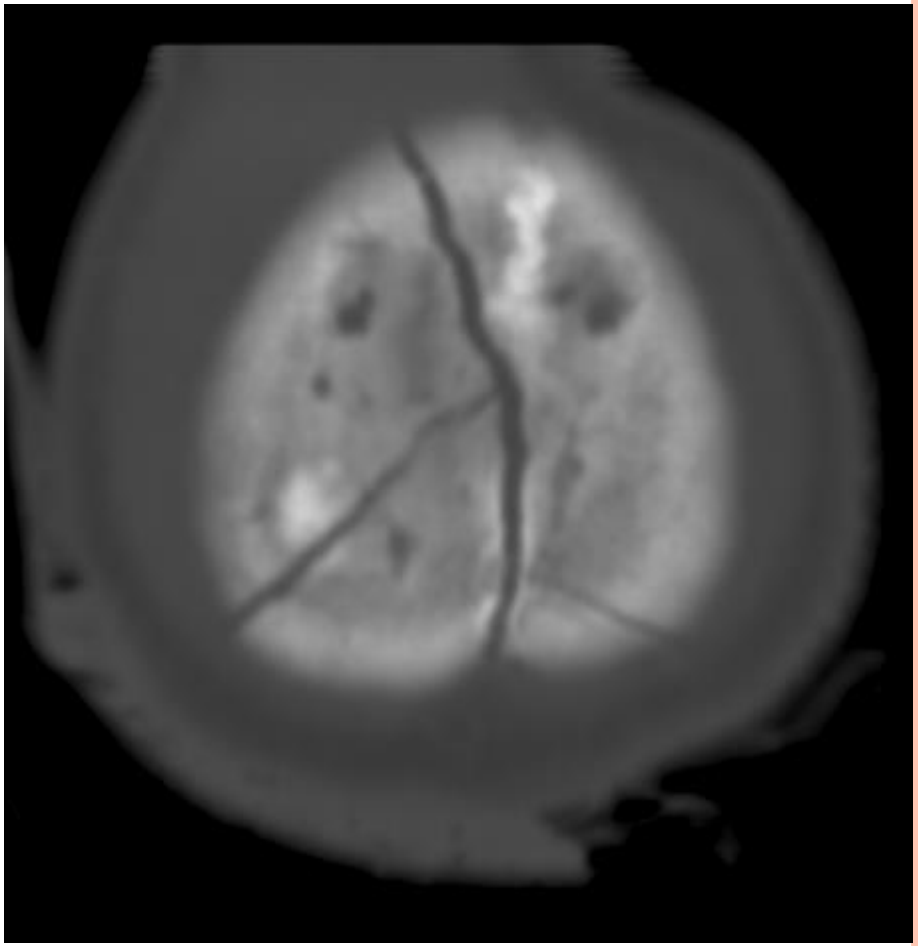




潘X揮 286204

PATIENT OF FALL ACCIDENT AS HIGH AS 15 M

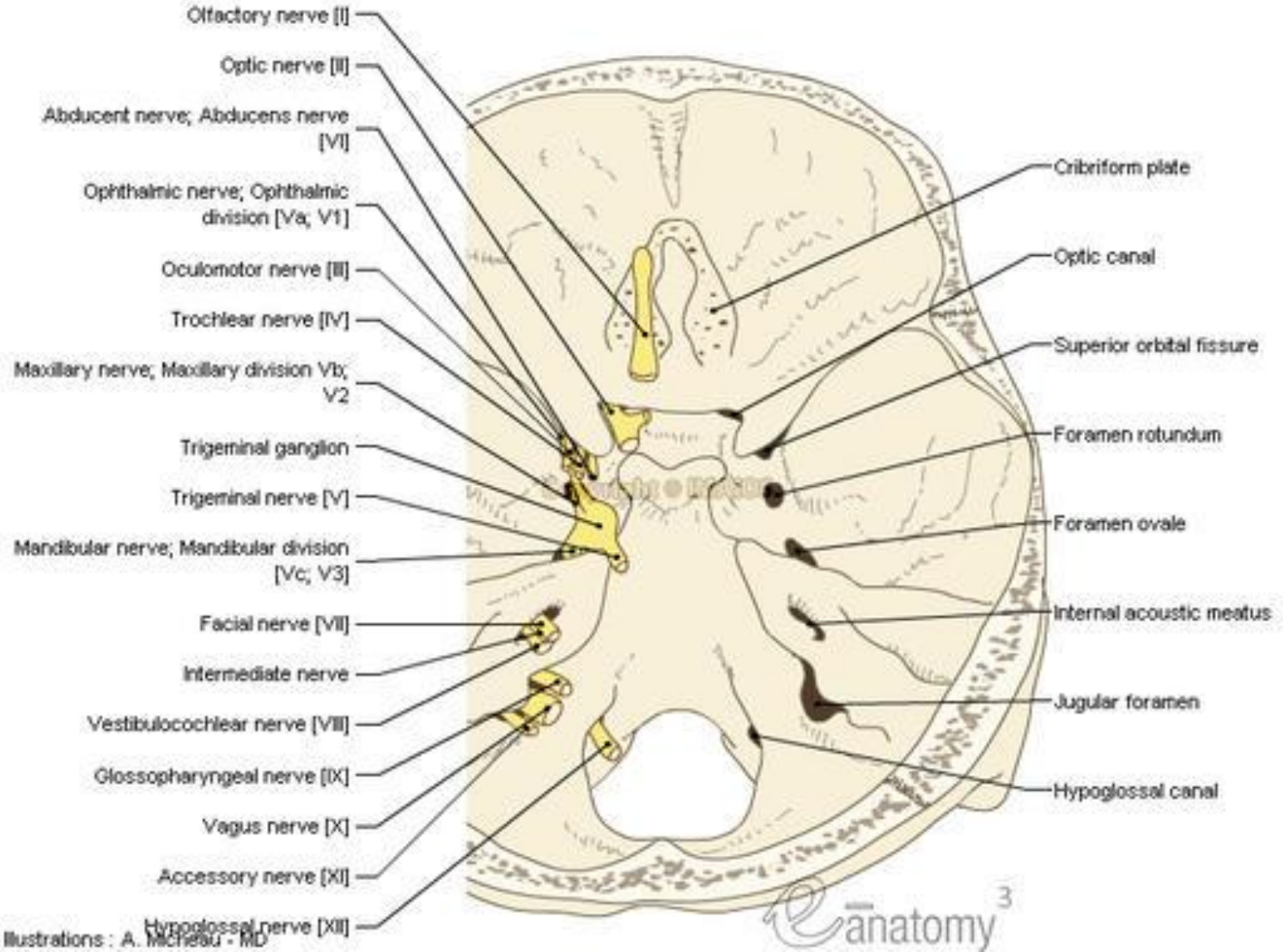




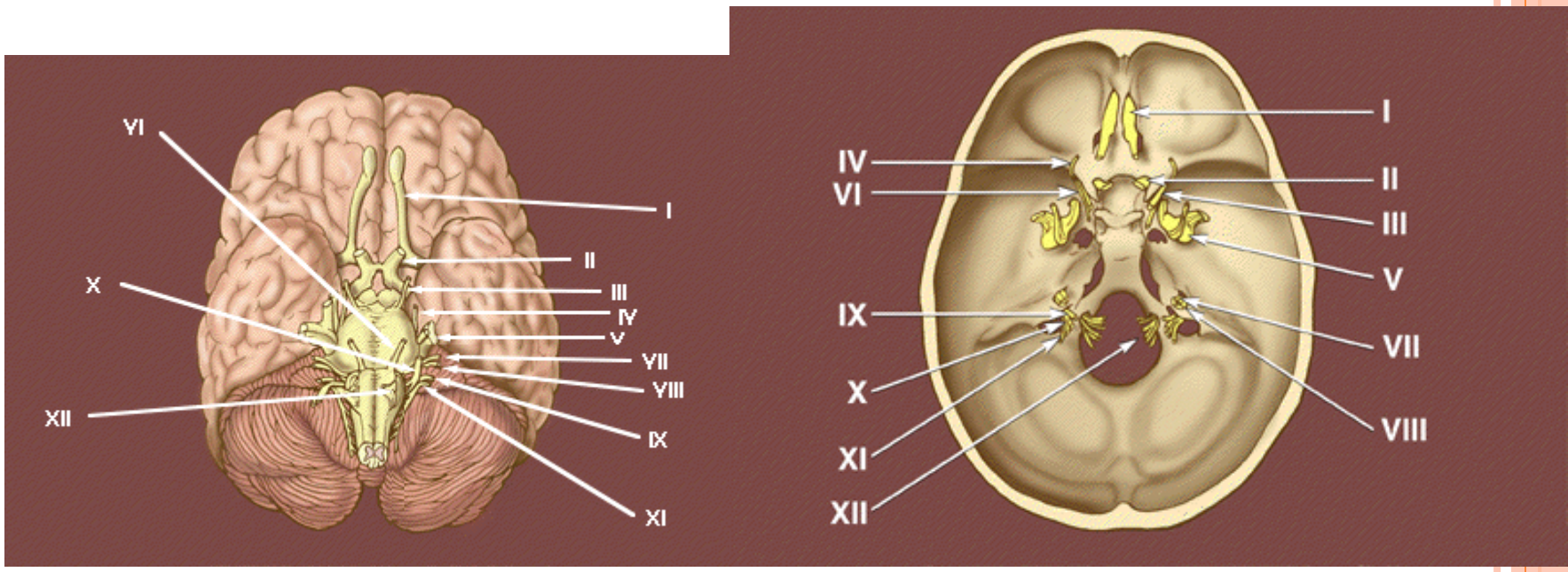
台灣！厲害喔

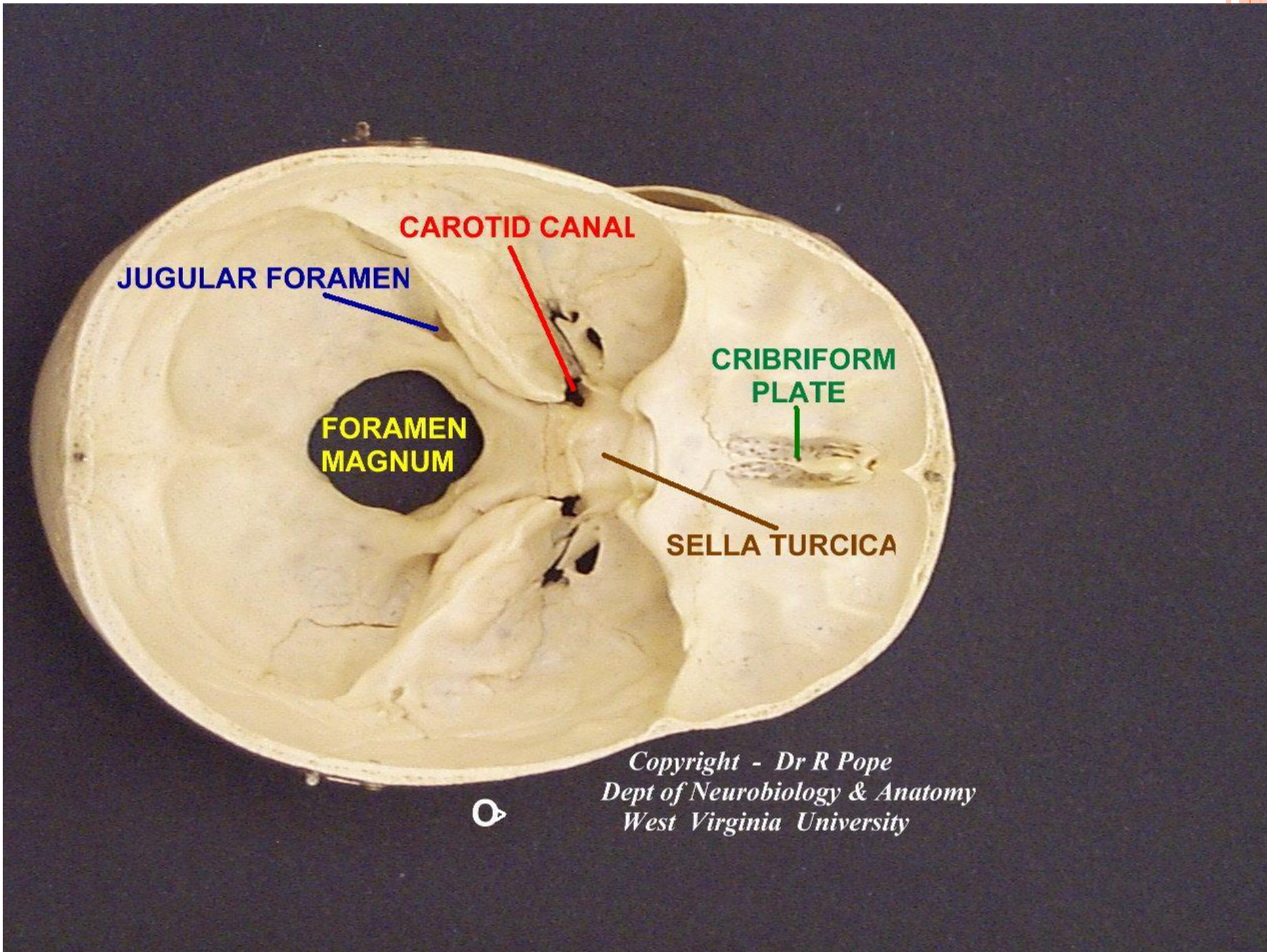

TALL
REGULAR

KEY WORD SKULL ANATOMY

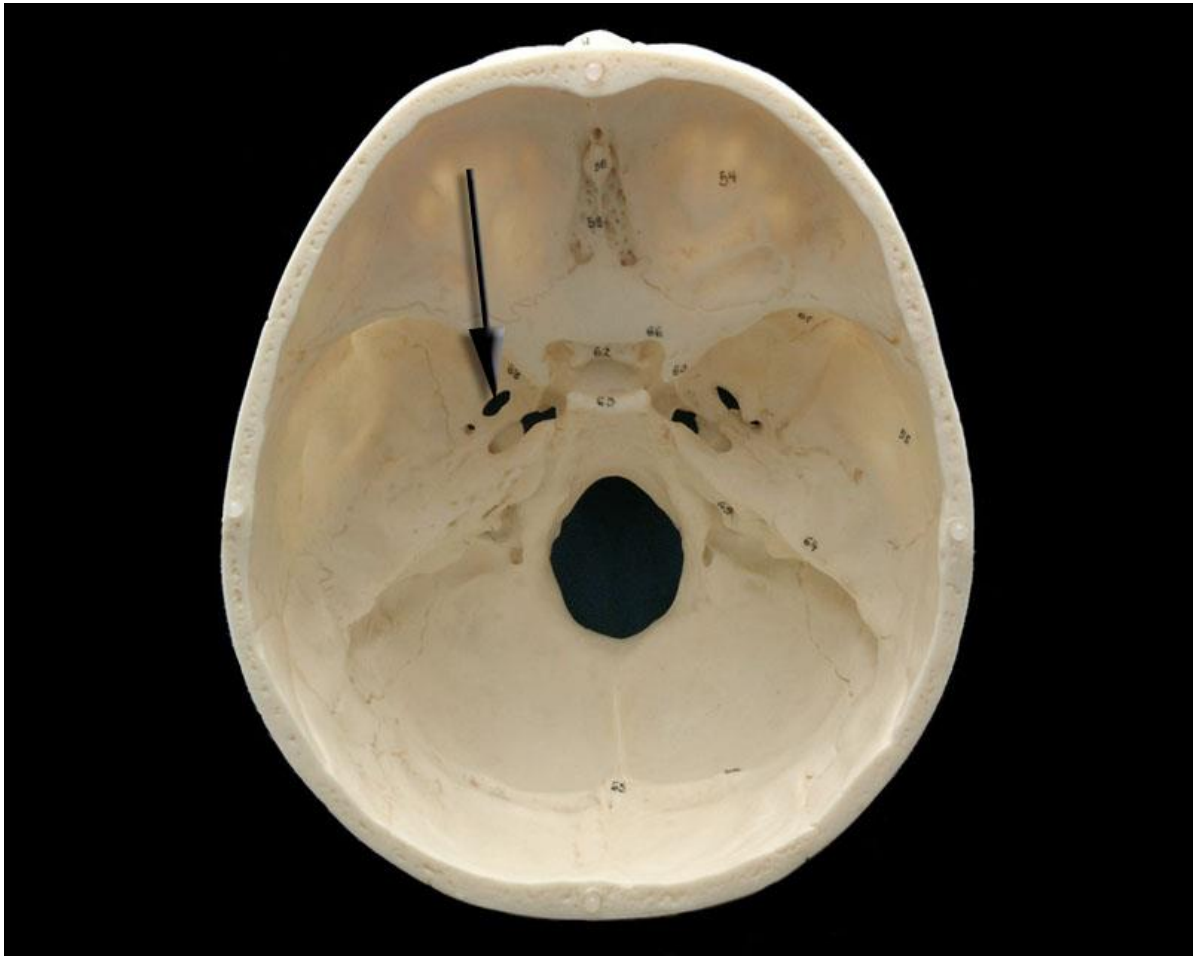


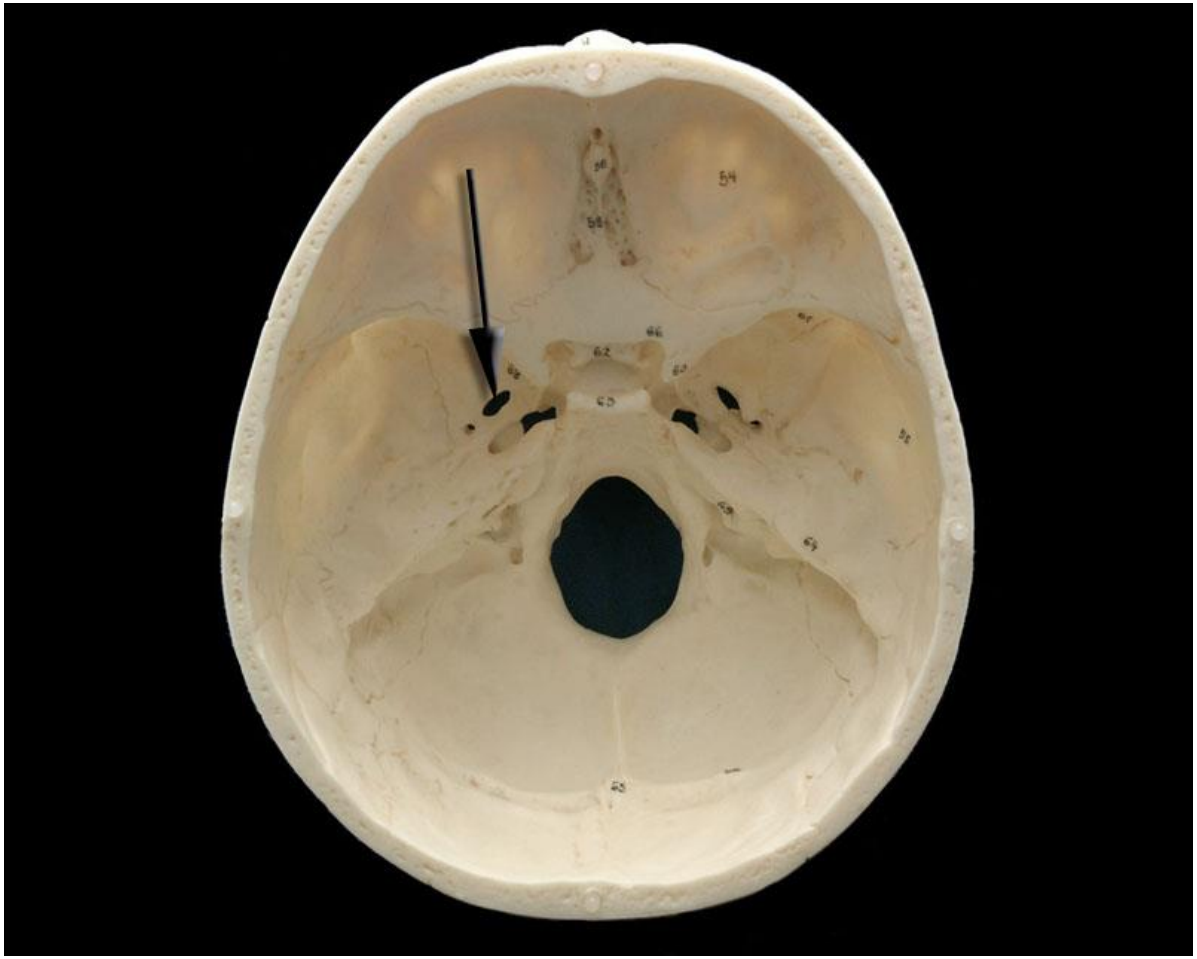
Key word basal skull anatomy

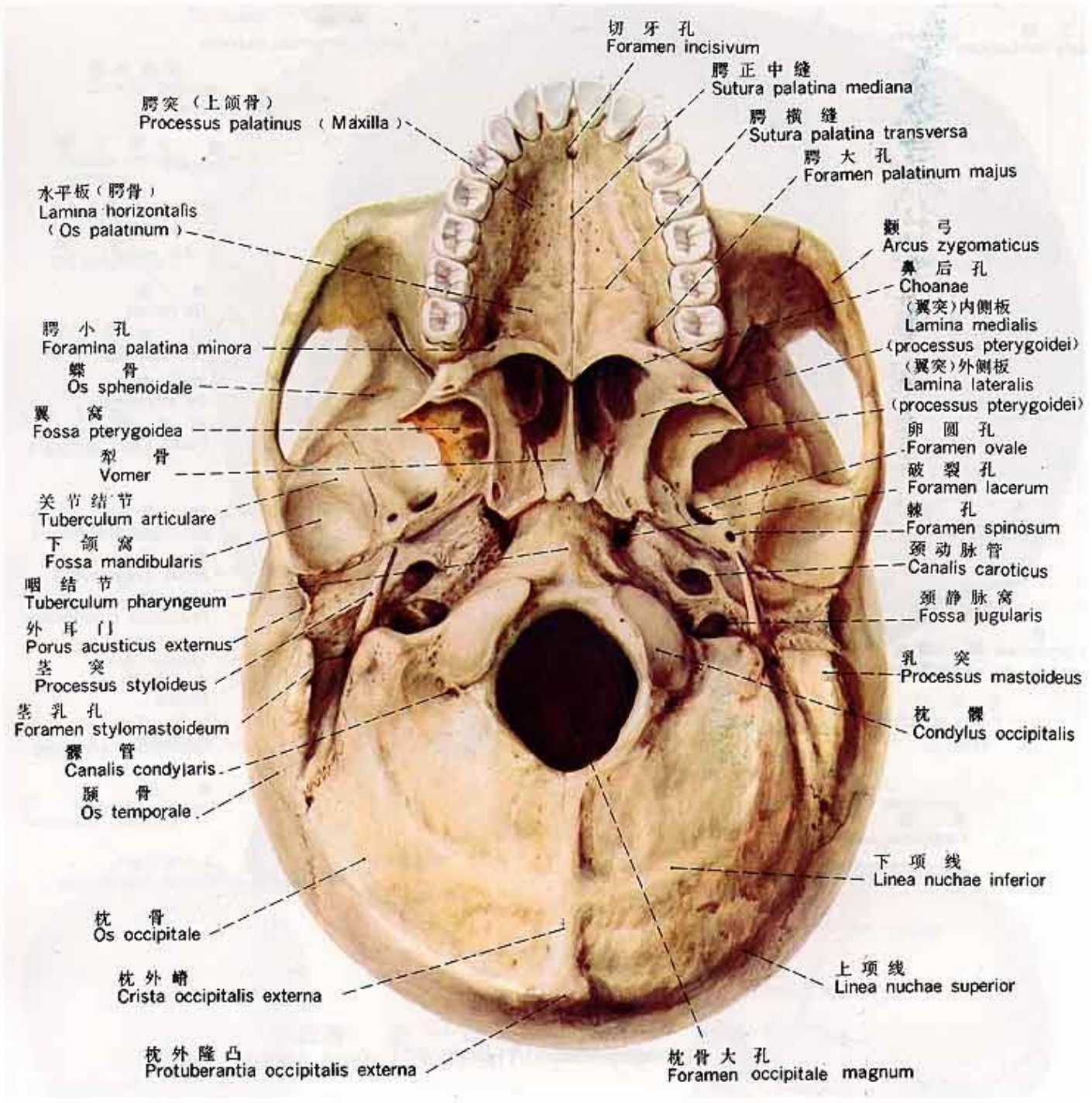


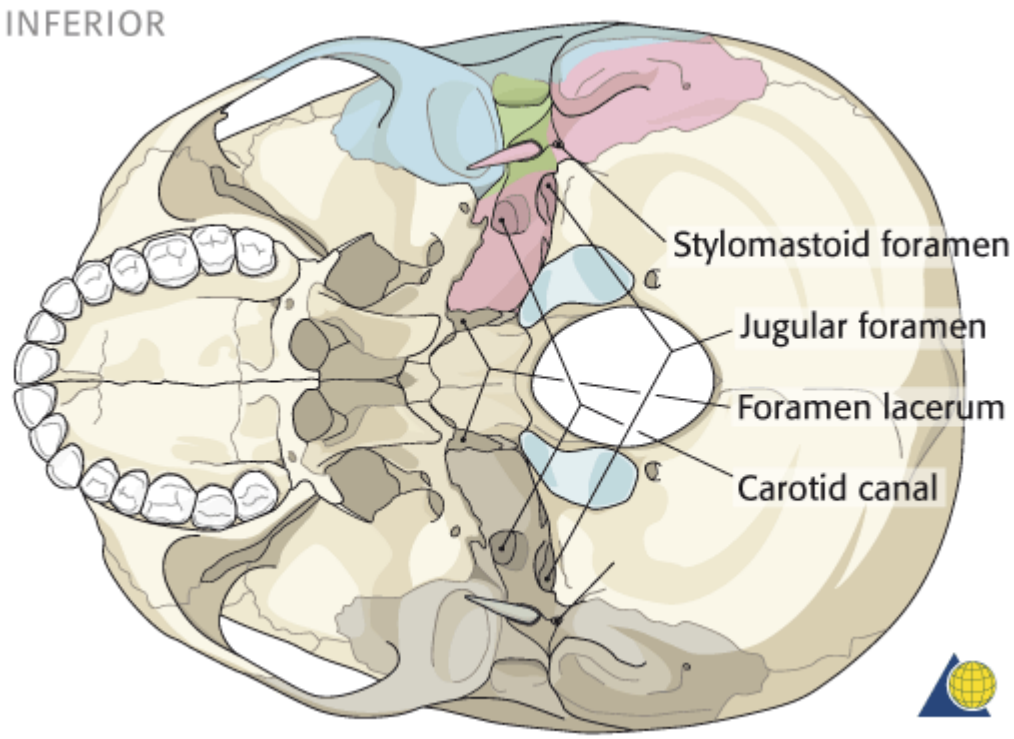

CAROTID CANAL
JUGULAR FORAMEN
CRIBRIFORM PLATE
FORAMEN MAGNUM
SELLA TURCICA
Copyright - Dr R Pope
Dept of Neurobiology & Anatomy
West Virginia University

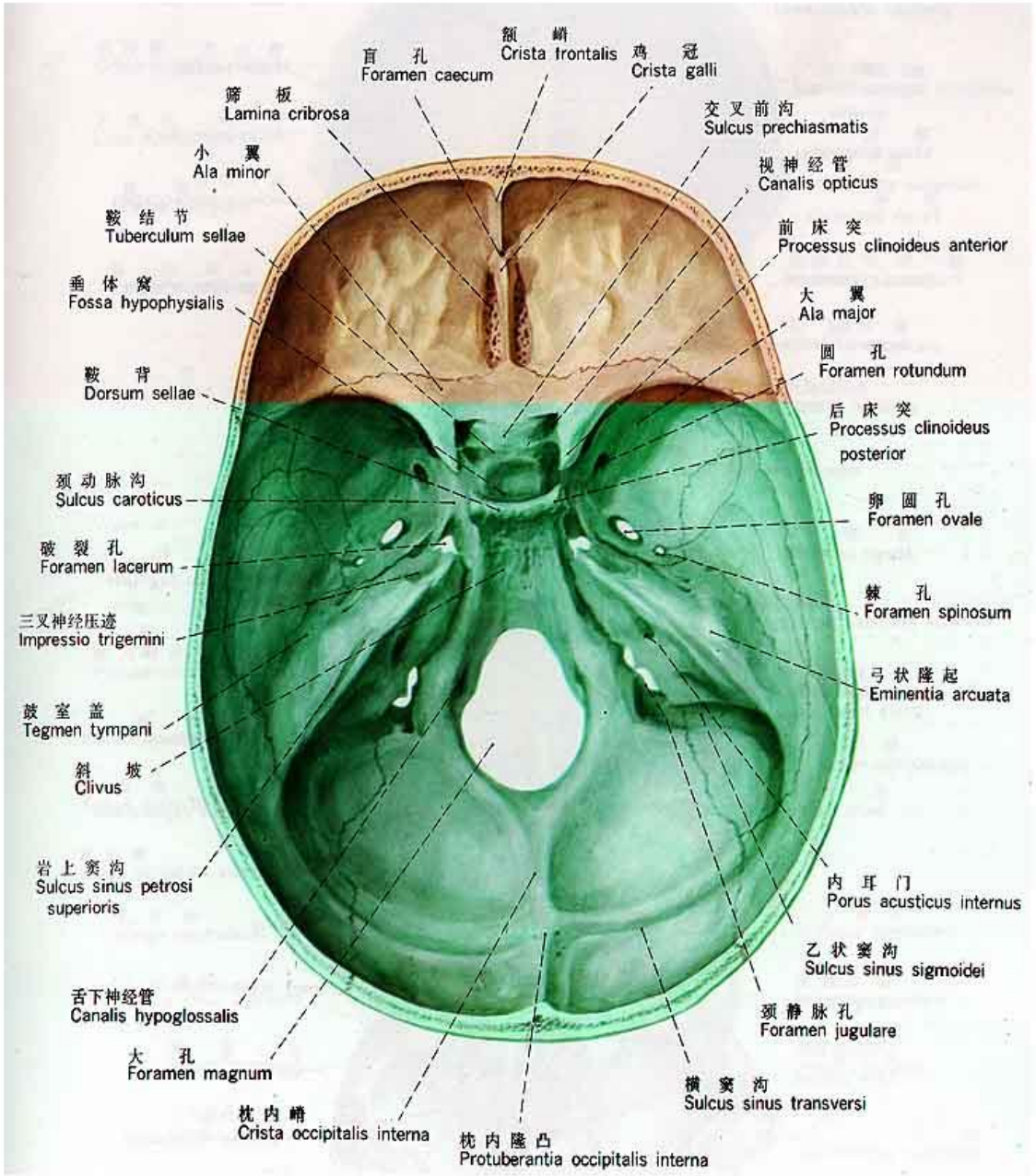
Carotid canal→ internal carotid artery

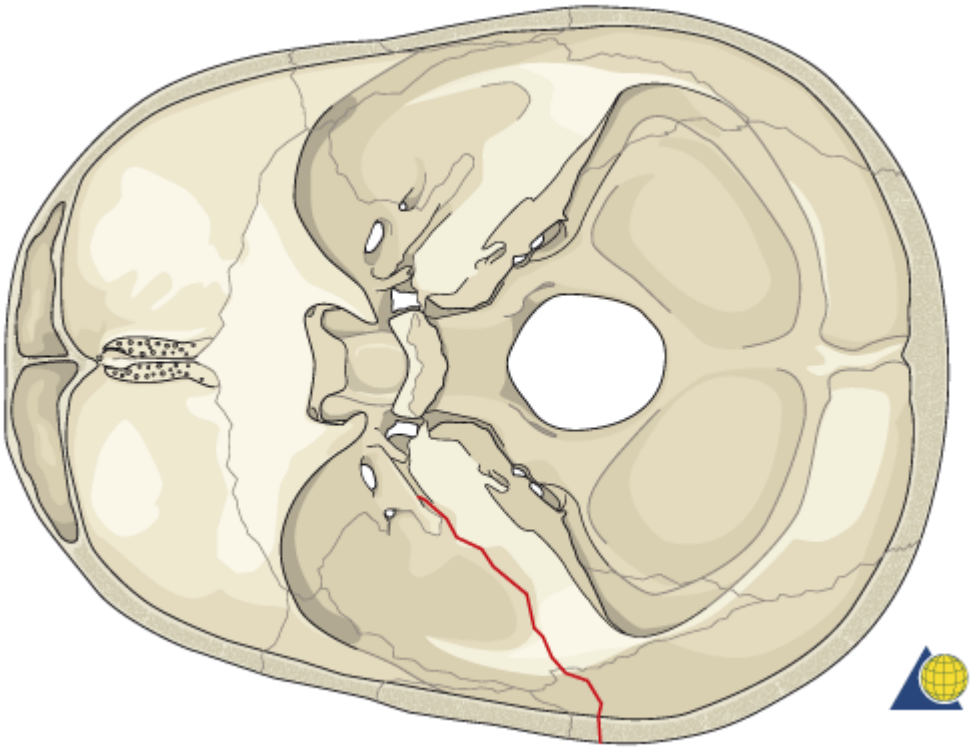


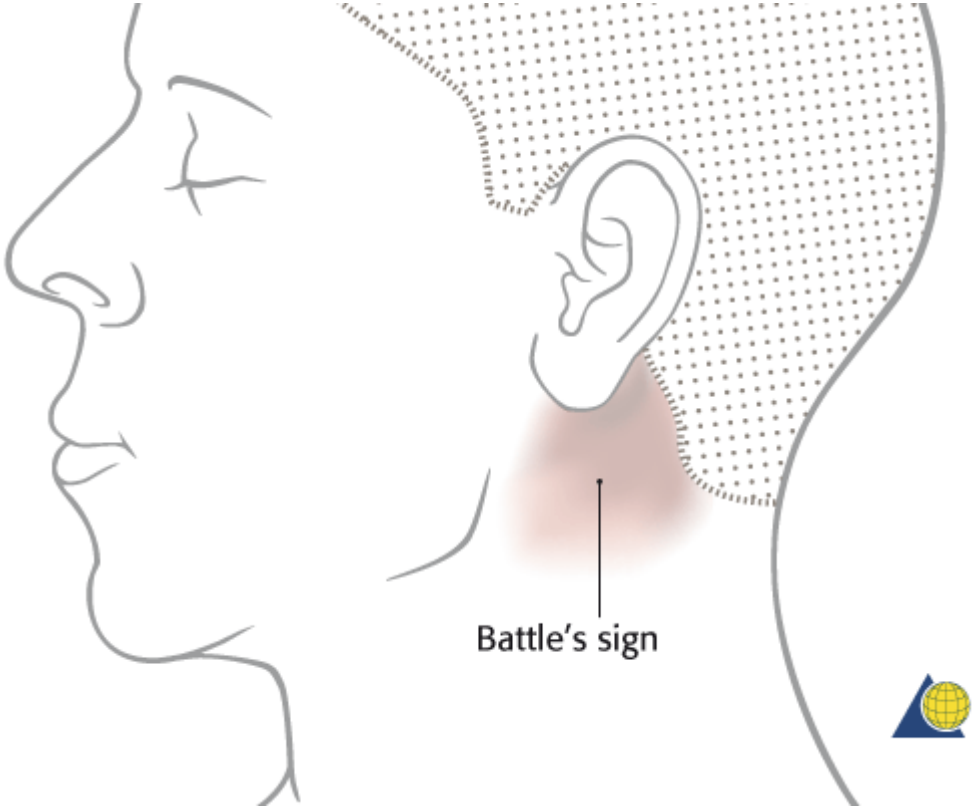


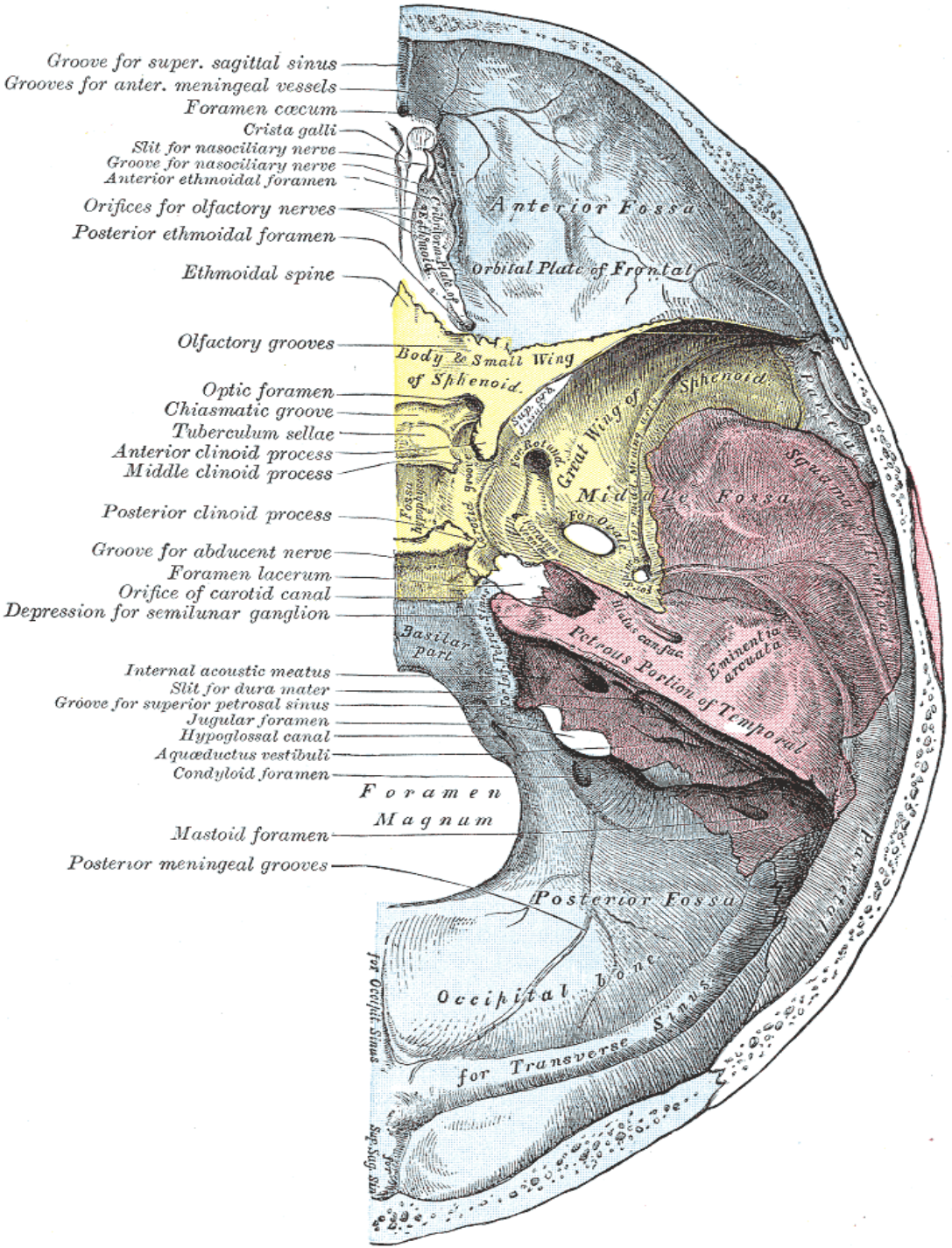

切 牙 孔
Foramen incisivum
腭 正 中 缝
Sutura palatina mediana
腭 横 缝
Sutura palatina transversa
腭 大 孔
Foramen palatinum majus
腭突（上颌骨）
Processus palatinus （Maxilla）
水平板（腭骨）
Lamina horizontalis
（Os palatinum）
颧 弓
Arcus zygomaticus
鼻 后 孔
Choanae
（翼突）内侧板
Lamina medialis
（processus pterygoidei）
腭 小 孔
Foramina palatina minora
蝶 骨
Os sphenoidale
（翼突）外侧板
Lamina lateralis
（processus pterygoidei）
翼 窝
Fossa pterygoidea
卵 圆 孔
Foramen ovale
犁 骨
Vomer
破 裂 孔
Foramen lacerum
关节结节
Tuberculum articulare
棘 孔
Foramen spinosum
下 颌 窝
Fossa mandibularis
颈 动 脉 管
Canalis caroticus
咽 结 节
Tuberculum pharyngeum
颈 静 脉 窝
Fossa jugularis
外 耳 门
Porus acusticus externus
乳 突
Processus mastoideus
茎 突
Processus styloideus
枕 髁
Condylus occipitalis
茎 乳 孔
Foramen stylomastoideum
髁 管
Canalis condylaris
颞 骨
Os temporale
下 项 线
Linea nuchae inferior
枕 骨
Os occipitale
枕 外 嵴
Crista occipitalis externa
上 项 线
Linea nuchae superior
枕 外 隆 凸
Protuberantia occipitalis externa
枕 骨 大 孔
Foramen occipitale magnum

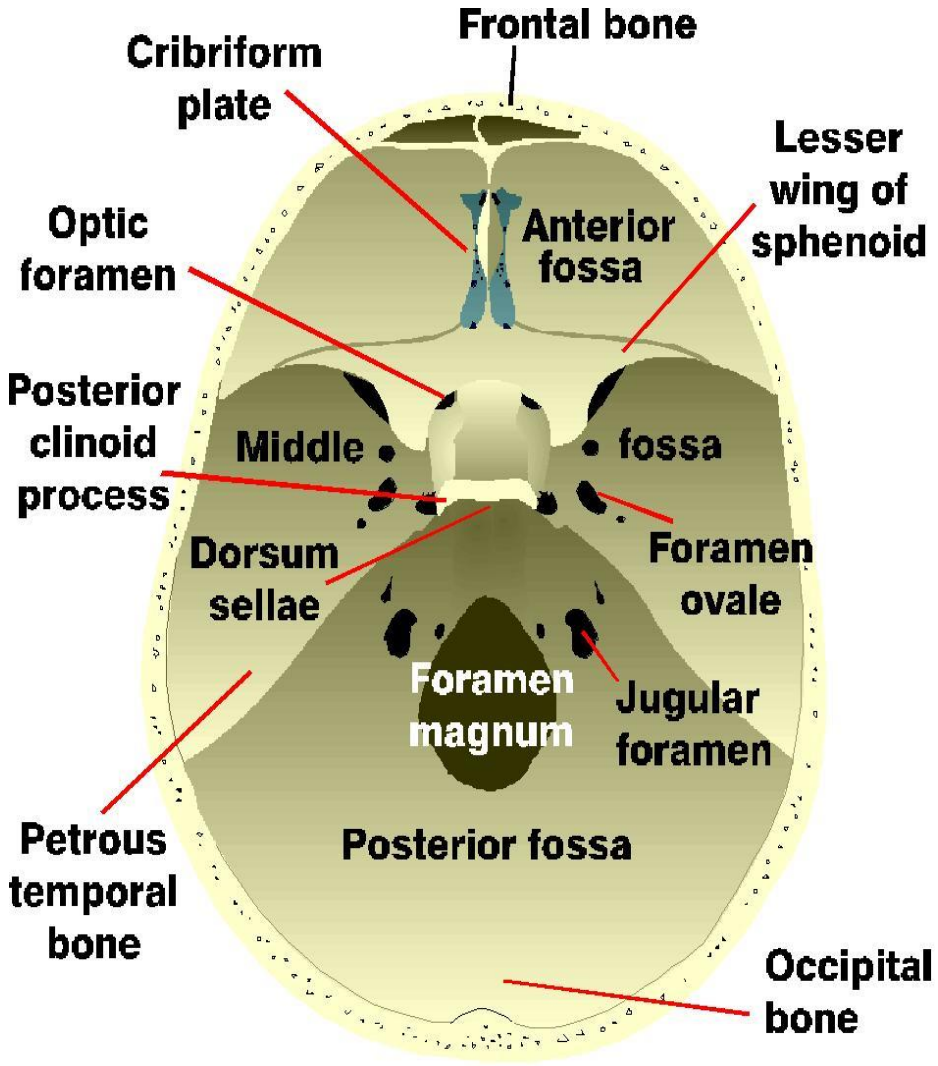

INFERIOR
Stylomastoid foramen
Jugular foramen
Foramen lacerum
Carotid canal

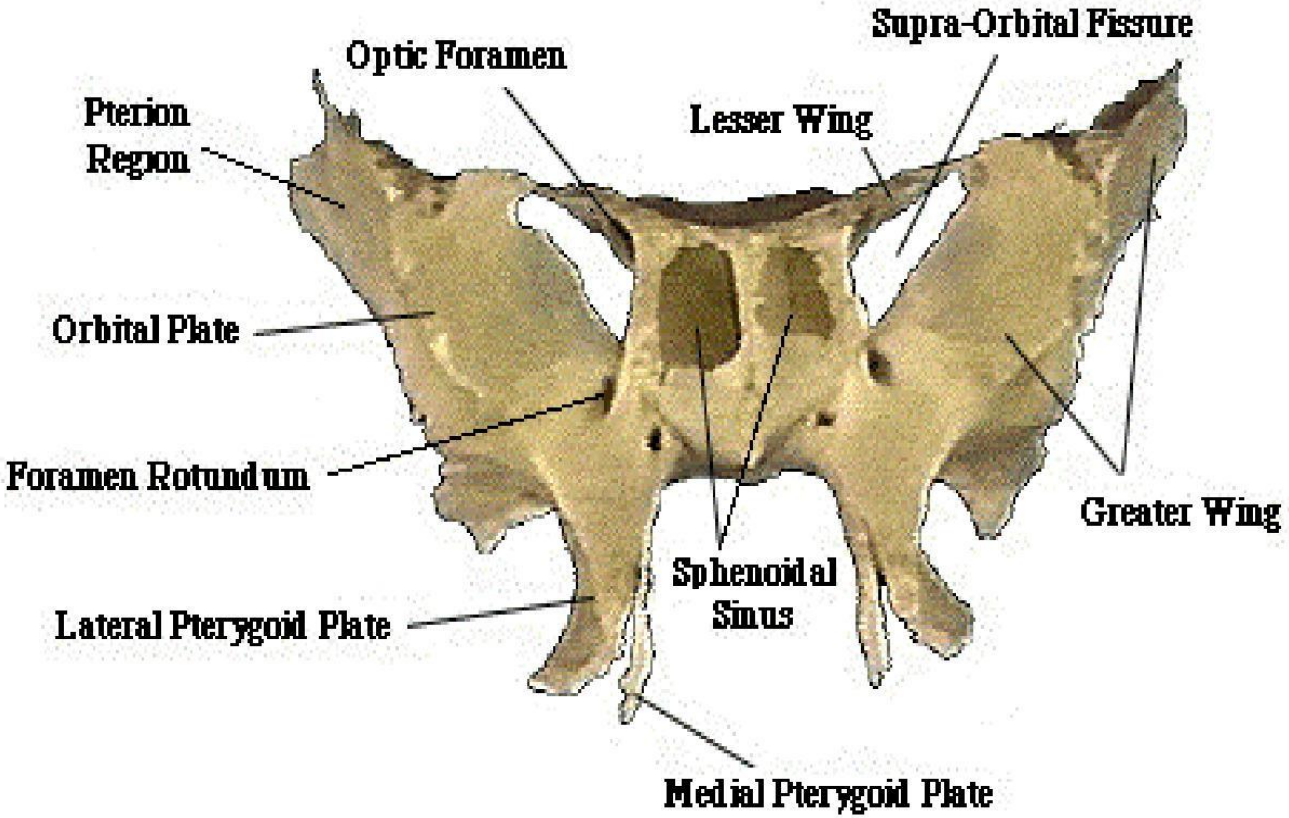

盲孔
Foramen caecum
额嵴
Crista frontalis
鸡冠
Crista galli
筛板
Lamina cribrosa
交叉前沟
Sulcus prechiasmatis
小翼
Ala minor
视神经管
Canalis opticus
鞍结节
Tuberculum sellae
前床突
Processus clinoideus anterior
垂体窝
Fossa hypophysialis
大翼
Ala major
鞍背
Dorsum sellae
圆孔
Foramen rotundum
后床突
Processus clinoideus posterior
颈动脉沟
Sulcus caroticus
卵圆孔
Foramen ovale
破裂孔
Foramen lacerum
棘孔
Foramen spinosum
三叉神经压迹
Impressio trigemini
弓状隆起
Eminentia arcuata
鼓室盖
Tegmen tympani
斜坡
Clivus
岩上窦沟
Sulcus sinus petrosi superioris
内耳门
Porus acusticus internus
乙状窦沟
Sulcus sinus sigmoidei
舌下神经管
Canalis hypoglossalis
颈静脉孔
Foramen jugulare
大孔
Foramen magnum
横窦沟
Sulcus sinus transversi
枕内嵴
Crista occipitalis interna
枕内隆凸
Protuberantia occipitalis interna




Battle's sign


Groove for super. sagittal sinus
Grooves for anter. meningeal vessels
Foramen cæcum
Crista galli
Slit for nasociliary nerve
Groove for nasociliary nerve
Anterior ethmoidal foramen
Orifices for olfactory nerves
Posterior ethmoidal foramen
Ethmoidal spine
Olfactory grooves
Optic foramen
Chiasmatic groove
Tuberculum sellae
Anterior clinoid process
Middle clinoid process
Posterior clinoid process
Groove for abducent nerve
Foramen lacerum
Orifice of carotid canal
Depression for semilunar ganglion
Internal acoustic meatus
Slit for dura mater
Groove for superior petrosal sinus
Jugular foramen
Hypoglossal canal
Aquæductus vestibuli
Condyloid foramen
Foramen Magnum
Mastoid foramen
Posterior meningeal grooves
Anterior Fossa
Orbital Plate of Frontal
Body & Small Wing of Sphenoid
Great Wing of Sphenoid
Middle Fossa
Squama of Temporal
Parietal
Basilar part
Petrous Portion of Temporal
Eminentia arcuata
Posterior Fossa
Occipital bone
for Transverse Sinus
Parietal


Frontal bone
Cribriform plate
Lesser wing of sphenoid
Optic foramen
Anterior fossa
Posterior clinoid process
Middle
fossa
Dorsum sellae
Foramen ovale
Foramen magnum
Jugular foramen
Petrous temporal bone
Posterior fossa
Occipital bone


Supra-Orbital Fissure
Optic Foramen
Pterion
Region
Lesser Wing
Orbital Plate
Foramen Rotundum
Greater Wing
Sphenoidal
Sinus
Lateral Pterygoid Plate
Medial Pterygoid Plate

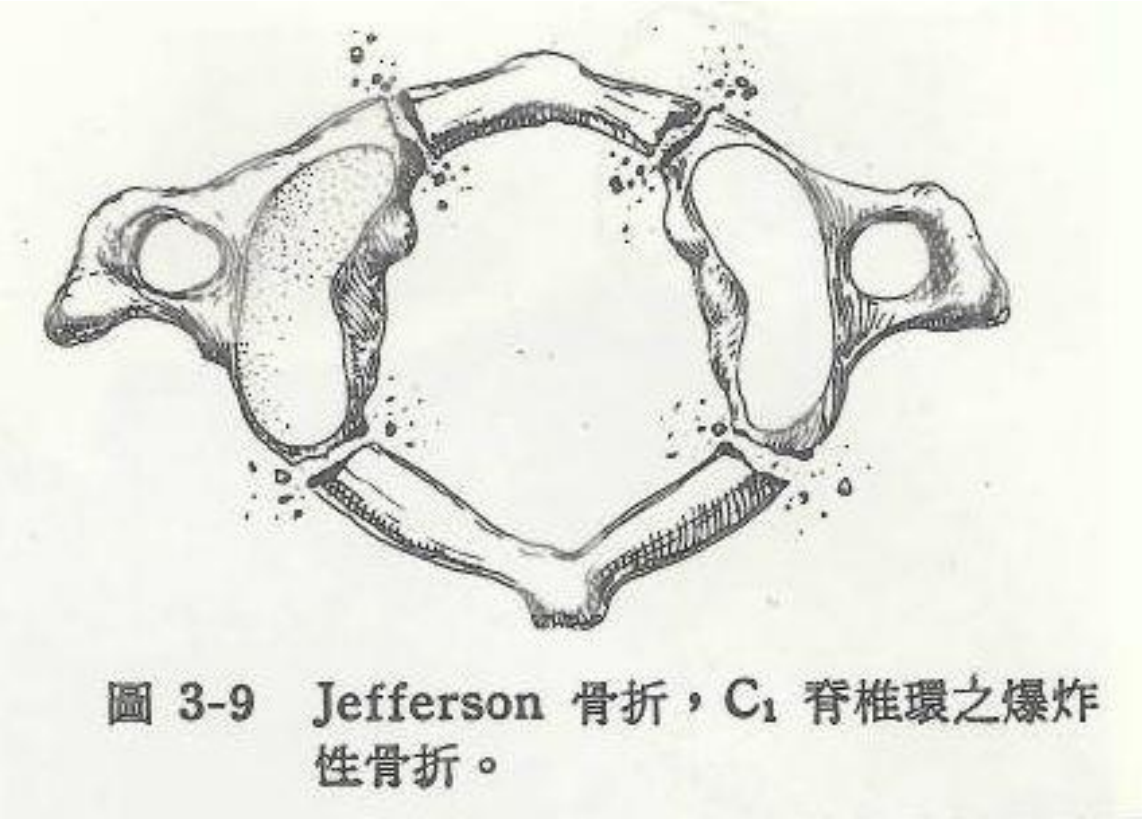
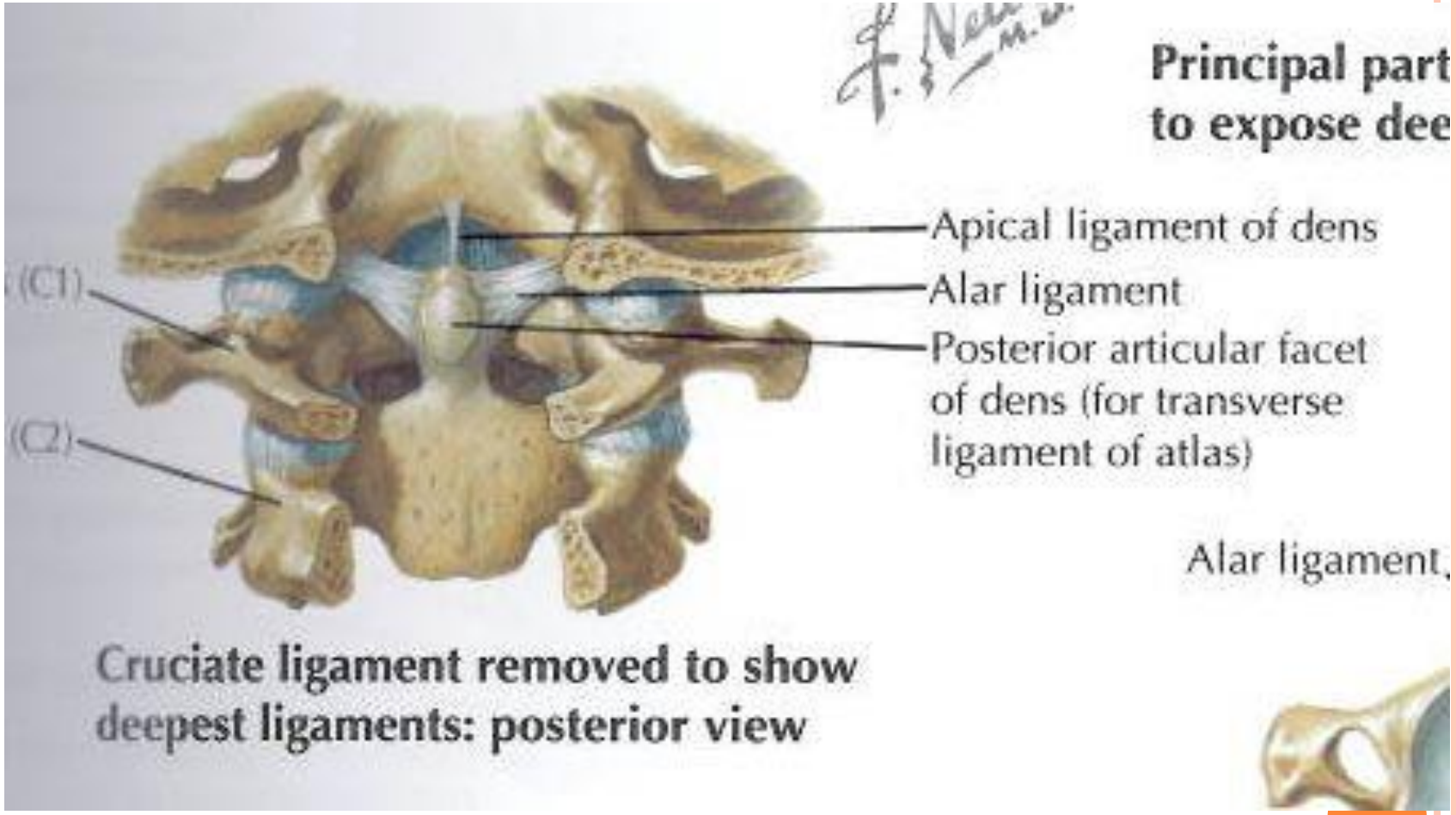
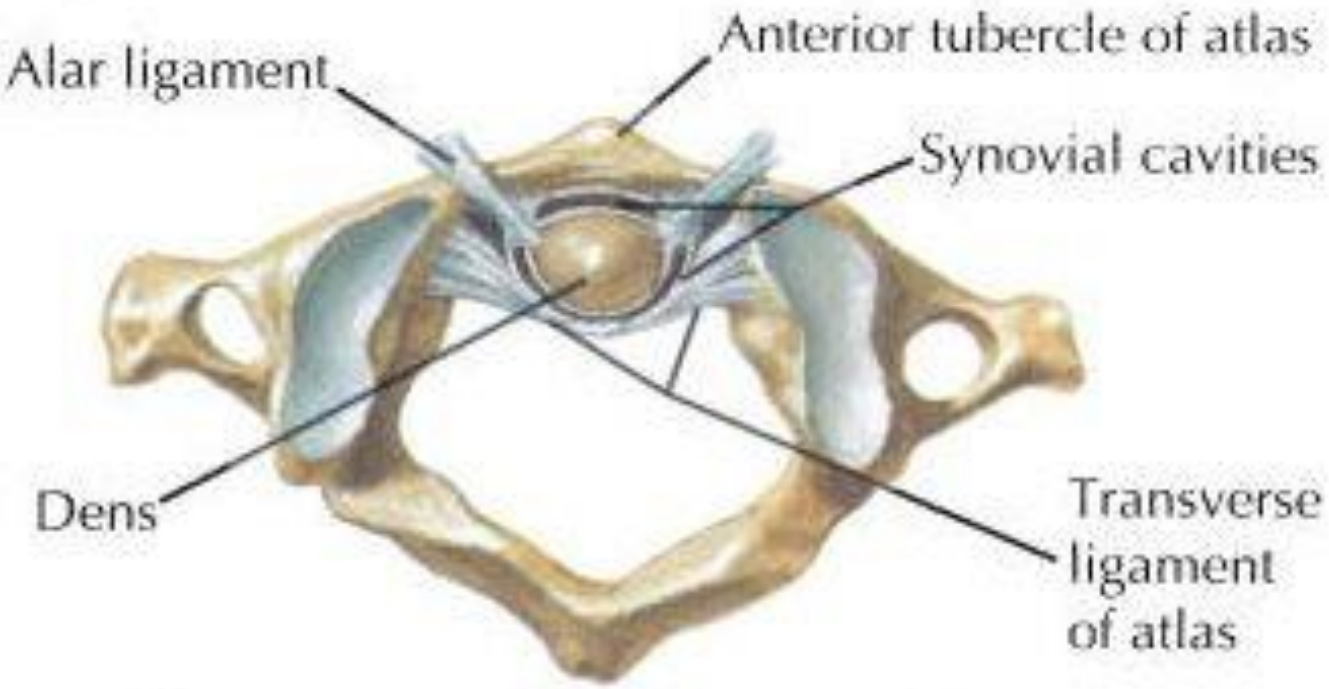


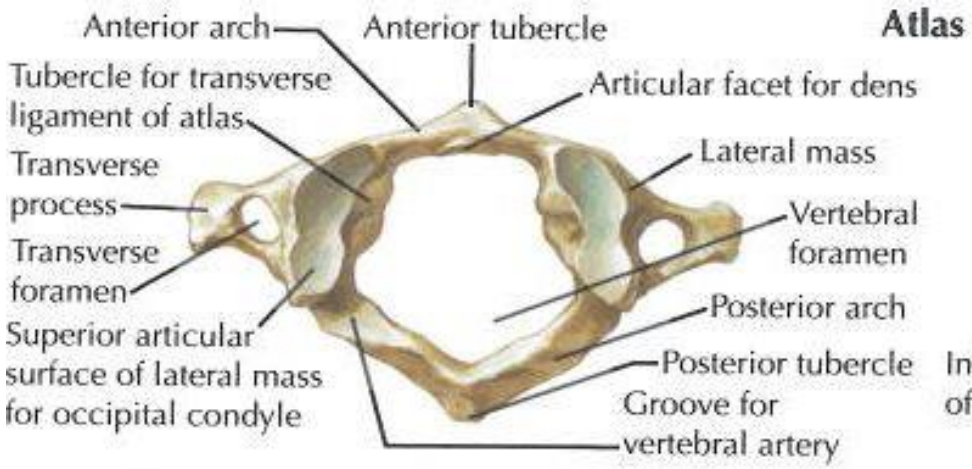
圖 3-9　Jefferson 骨折，C_1 脊椎環之爆炸性骨折。


Principal part
to expose dee
Apical ligament of dens
Alar ligament
Posterior articular facet of dens (for transverse ligament of atlas)
(C1)
(C2)
Alar ligament
Cruciate ligament removed to show deepest ligaments: posterior view

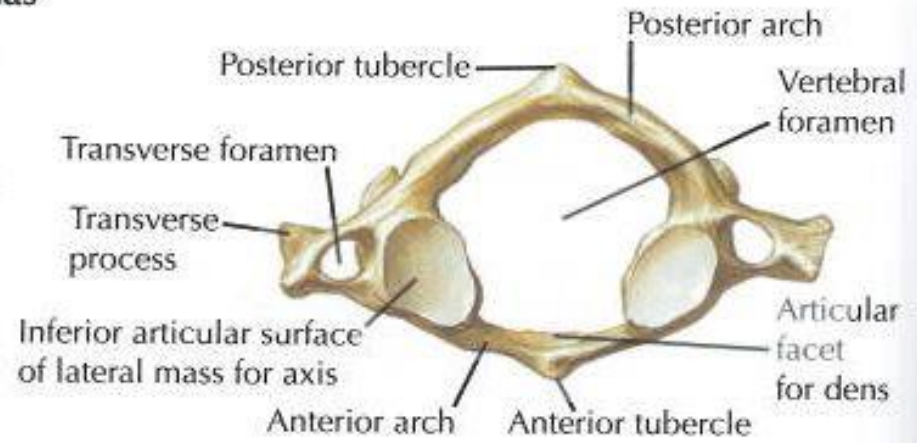
f atlas)



Median atlantoaxial joint: superior view

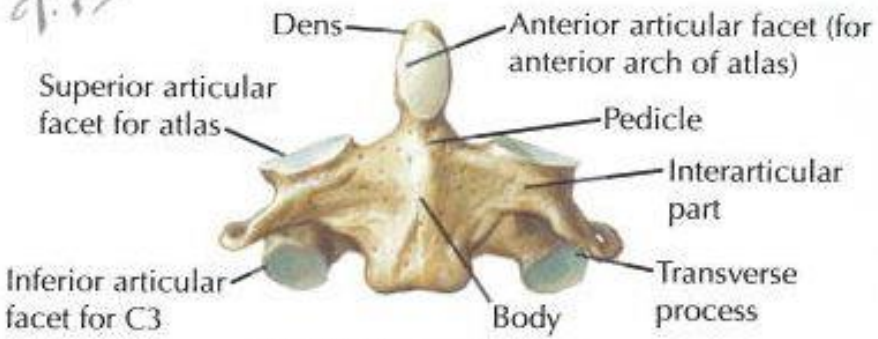


Atlas (C1): superior view

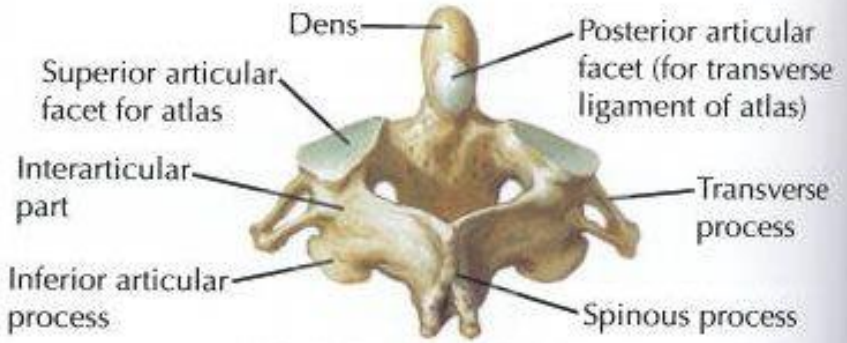


Atlas (C1): inferior view

Axis



Axis (C2): anterior view



Axis (C2): posterosuperior view

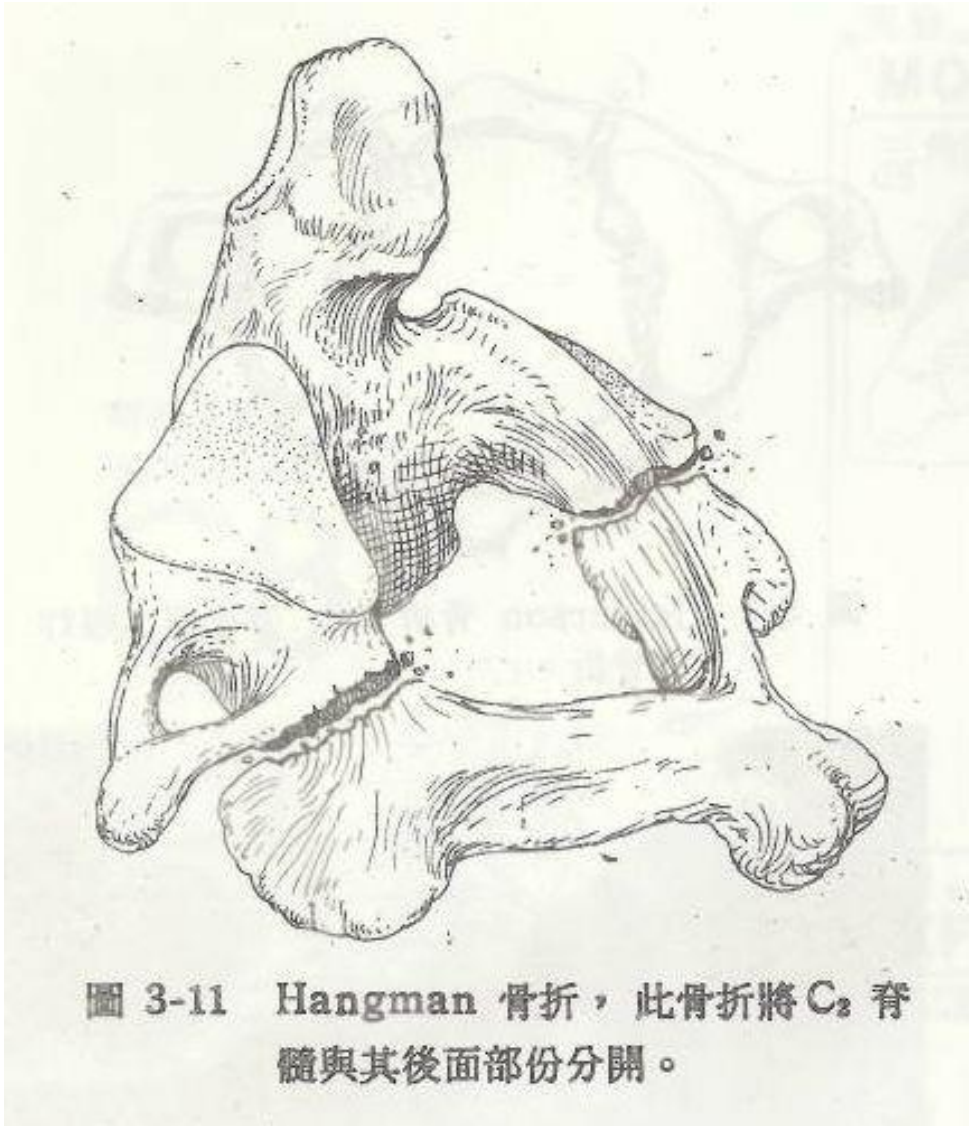
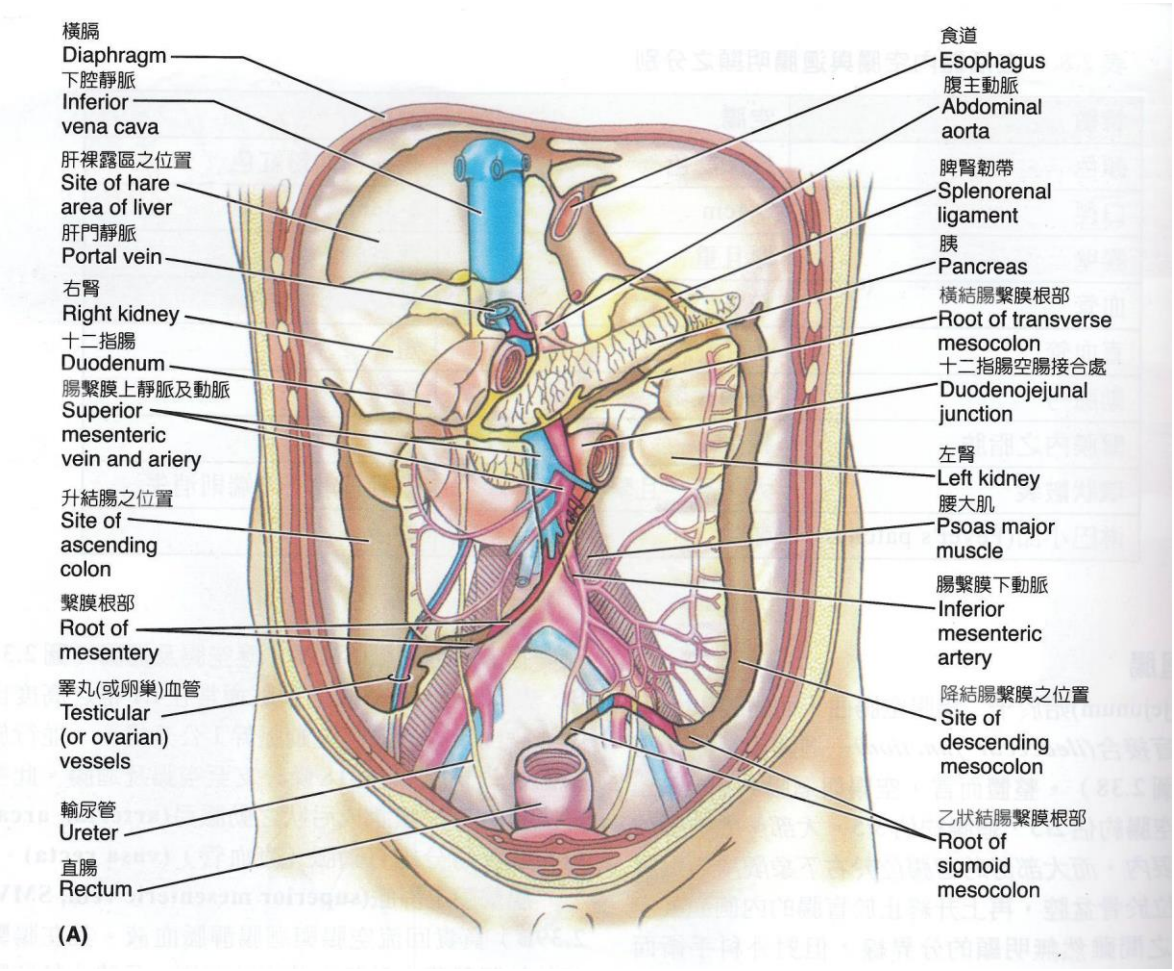


圖 3-11　Hangman 骨折，此骨折將 C_2 脊髓與其後面部份分開。


橫膈
Diaphragm
下腔靜脈
Inferior vena cava
肝裸露區之位置
Site of hare area of liver
肝門靜脈
Portal vein
右腎
Right kidney
十二指腸
Duodenum
腸繫膜上靜脈及動脈
Superior mesenteric vein and ariery
升結腸之位置
Site of ascending colon
繫膜根部
Root of mesentery
睪丸(或卵巢)血管
Testicular (or ovarian) vessels
輸尿管
Ureter
直腸
Rectum
(A)
食道
Esophagus
腹主動脈
Abdominal aorta
脾腎韌帶
Splenorenal ligament
胰
Pancreas
橫結腸繫膜根部
Root of transverse mesocolon
十二指腸空腸接合處
Duodenojejunal junction
左腎
Left kidney
腰大肌
Psoas major muscle
腸繫膜下動脈
Inferior mesenteric artery
降結腸繫膜之位置
Site of descending mesocolon
乙狀結腸繫膜根部
Root of sigmoid mesocolon

孕婦創傷 (Trauma of pregnant woman)

懷孕週數：

從恥骨聯合處量到

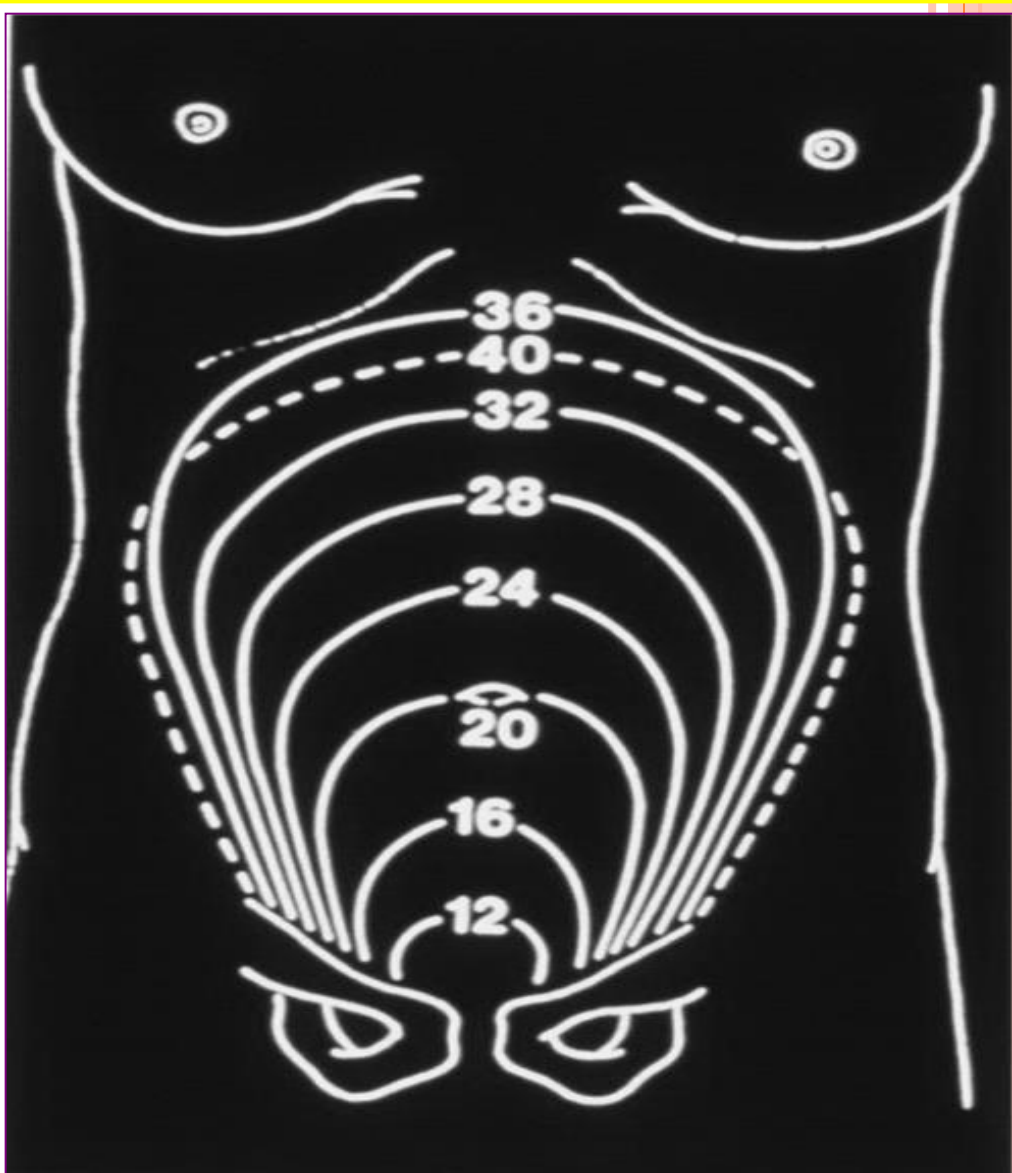
子宮最上端的公分數

12

20

26

36



子宮高度

Figure 1. Uterine Size Based On Weeks Of Gestation.