Remarks to the morfology of skull and jaw growth

The persecution of Christians began in Alexandria during the reign of the Emperor Philip. The first victim of the pagan mob was an old man named Metrius, who was tortured and then stoned to death. The second person who refused to worship their false idols was a Christian woman named Quinta. Her words infuriated the mob and she was scourged and stoned. While most of the Christians were fleeing the city, abandoning all their worldly possessions, an old deaconess, Apollonia, was seized. The crowds beat her, knocking out all of her teeth. Then they lit a large fire and threatened to throw her in it if she did not curse her God. She begged them to wait a moment, acting as if she was considering their requests. Instead, she jumped willingly into the flames and so suffered martyrdom.

Skeleton of the face, thickened and weakened areas of the skull. Forming jaws and dental arches. Anatomical base of cleft face and palate.

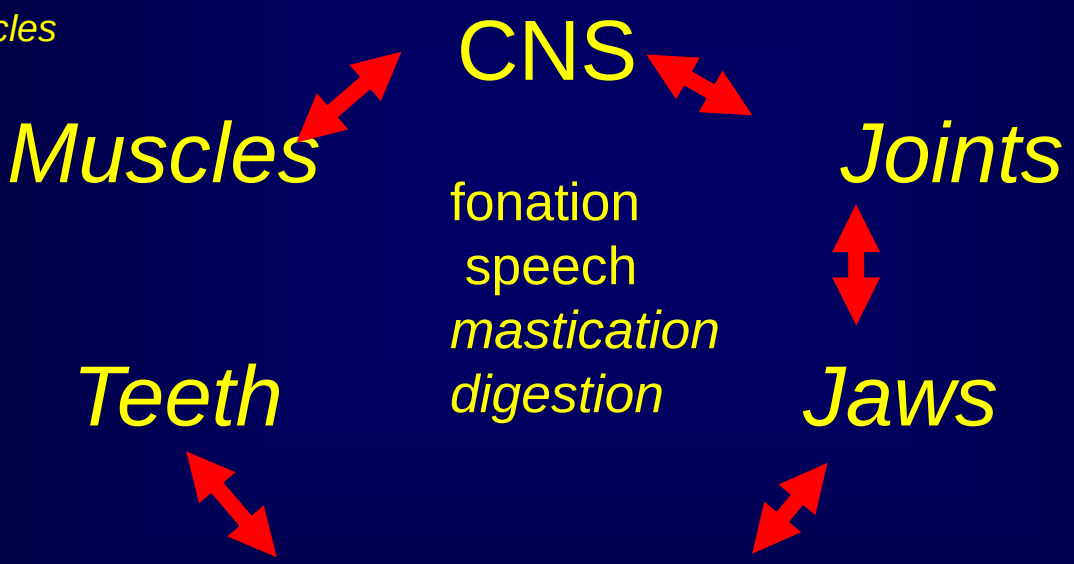
Ivo Klepáček

OROFACIAL SYSTEMA

Multifunctional systema of the structues

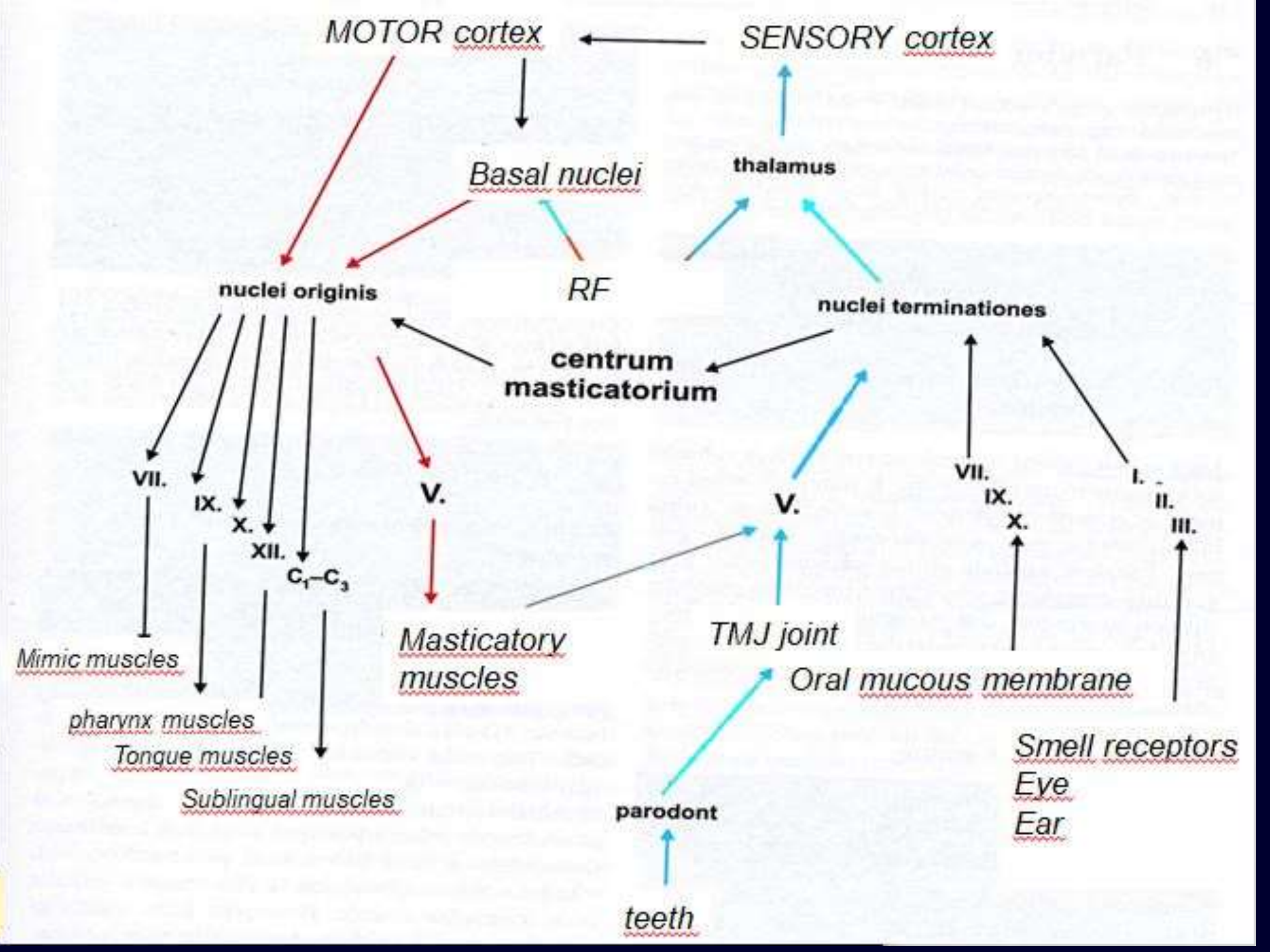
teeth, muscles attaching mandible, inner and outer tongue muscles

parodont joints,ligaments Nuchal muscles



Fast healing Infectious terrain

Esthetic important


MOTOR cortex
SENSORY cortex
Basal nuclei
thalamus
nuclei originis
RF
nuclei terminationes
centrum masticatorium
VII.
IX.
X.
XII.
C1–C3
V.
V.
VII.
IX.
X.
I.
II.
III.
Mimic muscles
pharynx muscles
Tongue muscles
Sublingual muscles
Masticatory muscles
TMJ joint
Oral mucous membrane
Smell receptors
Eye
Ear
parodont
teeth

OPG

www.norlatifah.co

Holy Smokes: 7-year Old Boy Has 526 Teeth wrecks Removed From Growth In Mouth | My Word[P]ress

Ideální vztahy mezi obličejovými a zubními komponentami: Cefalometrická analýza dokáže rozlišit a vyjasnit zubní a skeletální příspěvky k malokluzím, které představují identické dentální vztahy.

The ideal relationships of the facial and dental components can be represented as shown in A. Cephalometric analysis can distinguish and clarify the differing dental and skeletal contributions to malocclusions that present identical dental relationships.

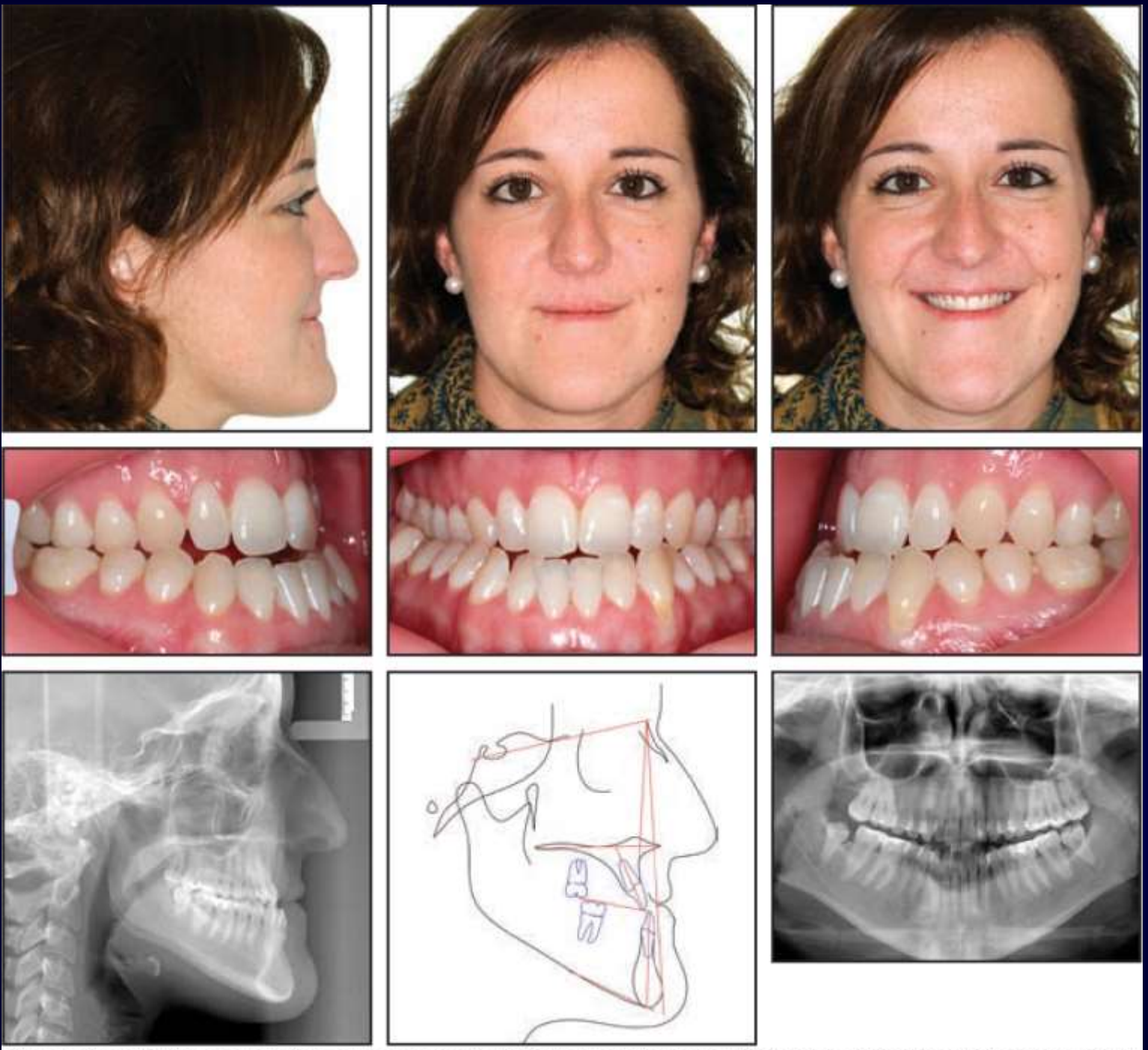
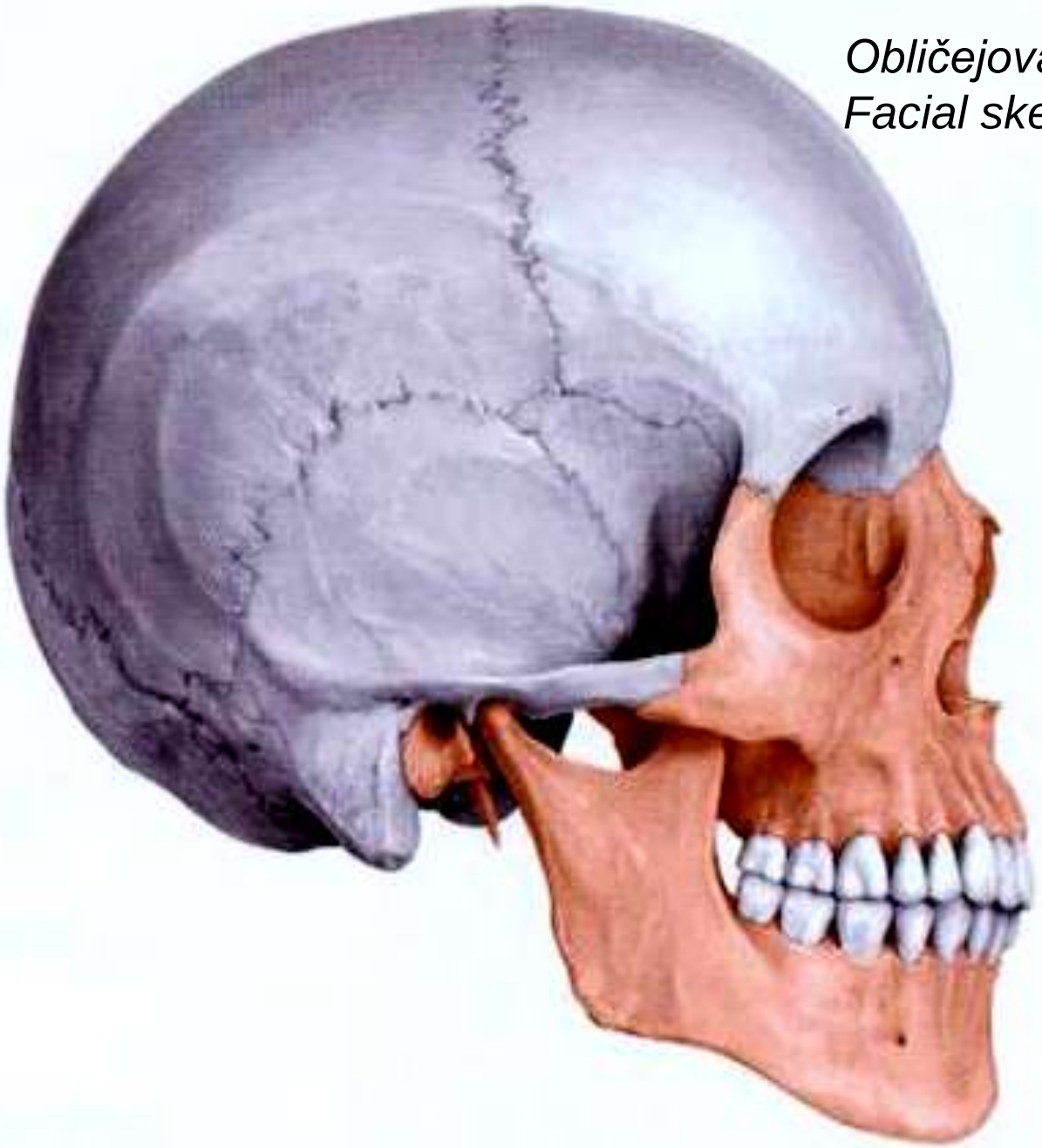
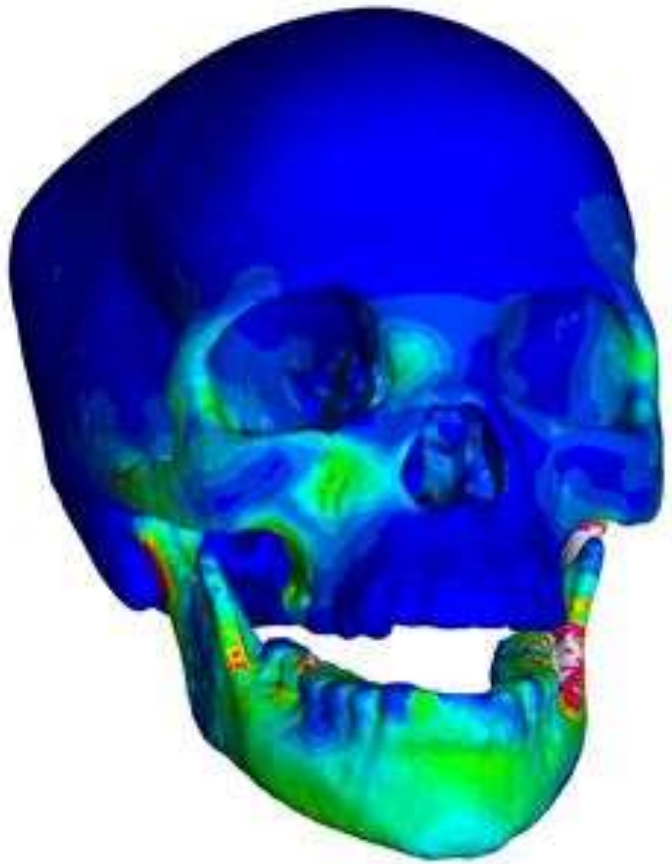


Fig. 11 Case 2. 31-year-old female patient with severe skeletal and dental Class III malocclusion and unilat-

31-year-old female patient with severe skeletal and dental Class III malocclusion and unilateral crossbite before treatment.

Obličejová kostra
Facial skeleton



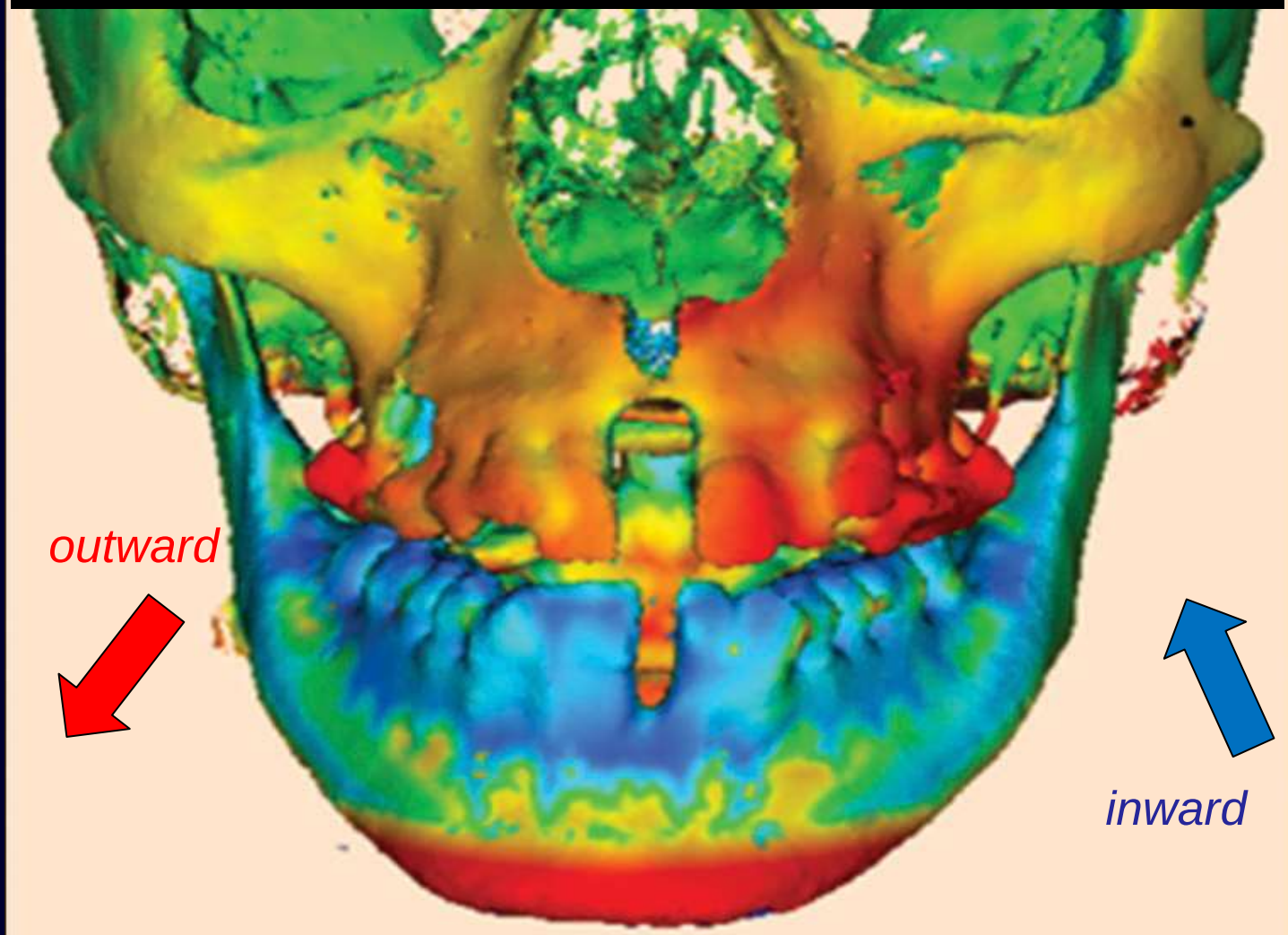


These images of a human and early human (*Paranthropus boisei*) skulls allowed scientists to compare bite forces.

vodorovná rovina
horizontal

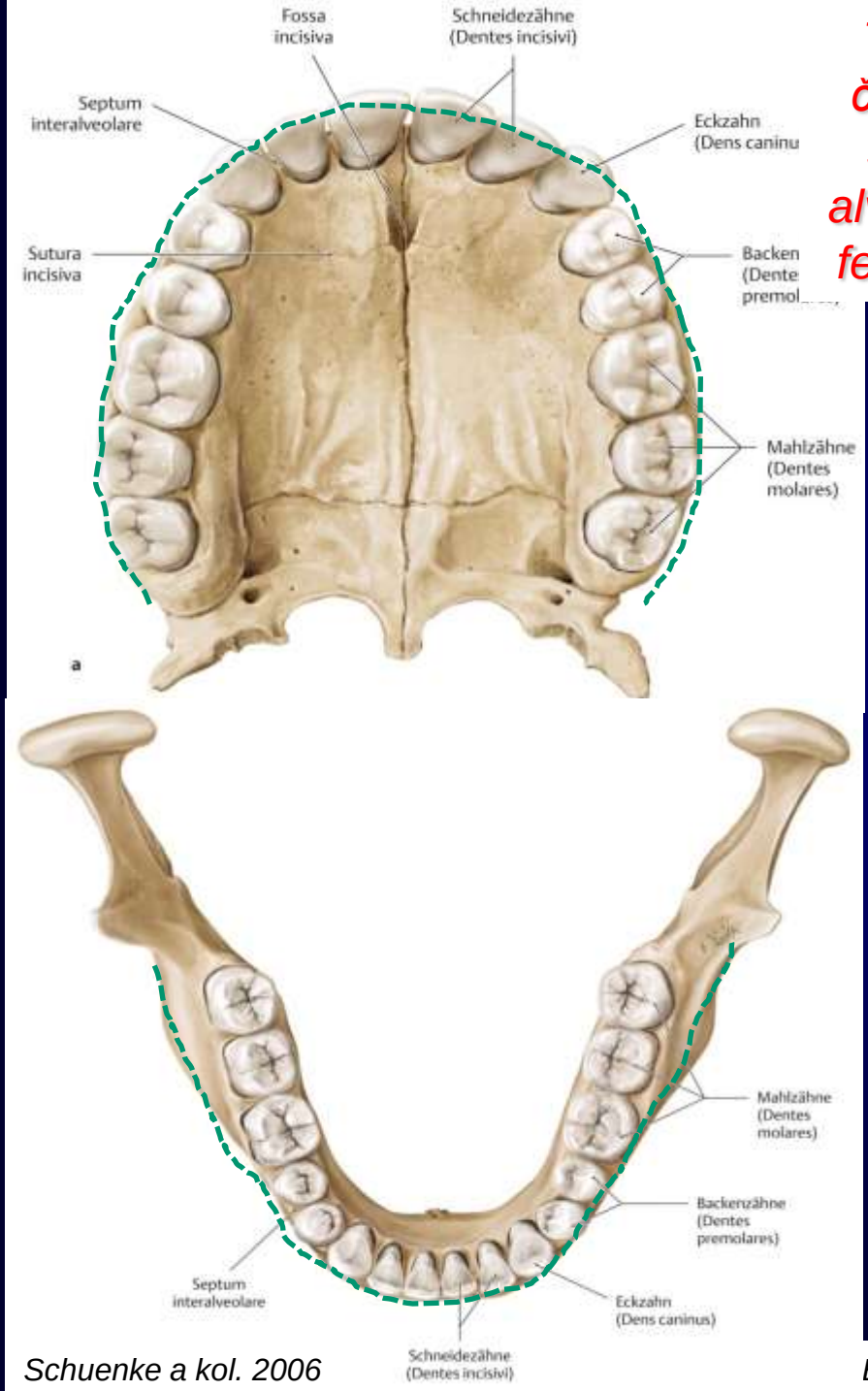
Rozložení tlaku v kostech lebky při zatížení

3D skeletal color maps of superimpositions of T2 over T1 registered at the anterior cranial base with a scale of -4 to +4 mm. Red represents outward displacement of T2 relative to T1. Blue represents inward displacement



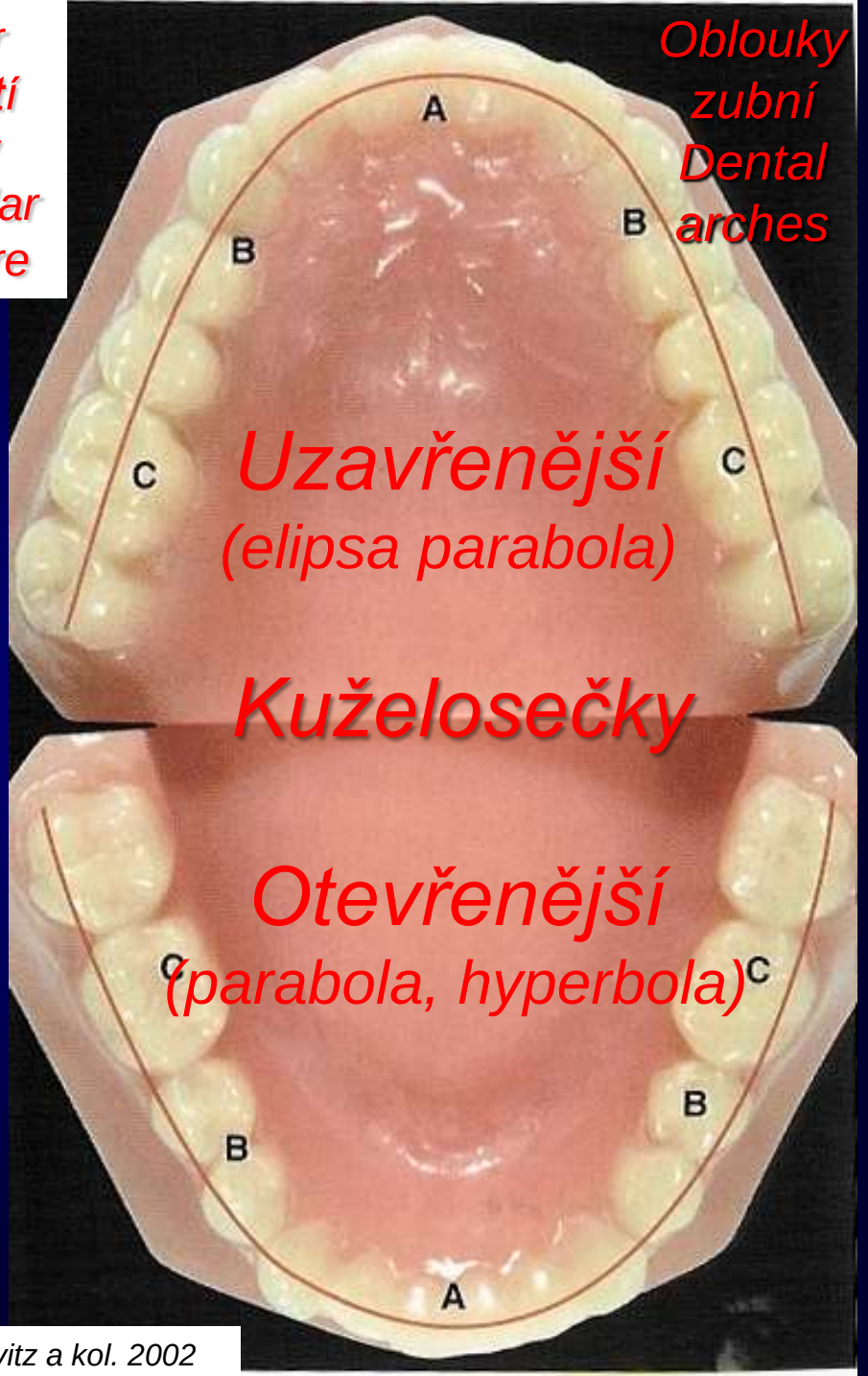
3D kostrové barevné mapy superpozic T2 nad T1 registrované na obličejové části lebky v měřítku -4 až +4 mm. Červená představuje posun T2 směrem ven vzhledem k T1 směrem ven. Modrá představuje posun dovnitř

Tvar čelistí
Jaw alveolar feature

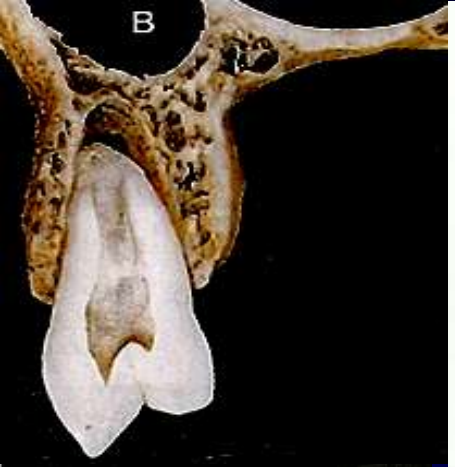


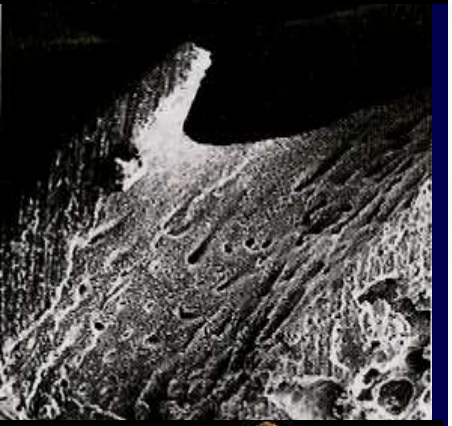
Schuenke a kol. 2006

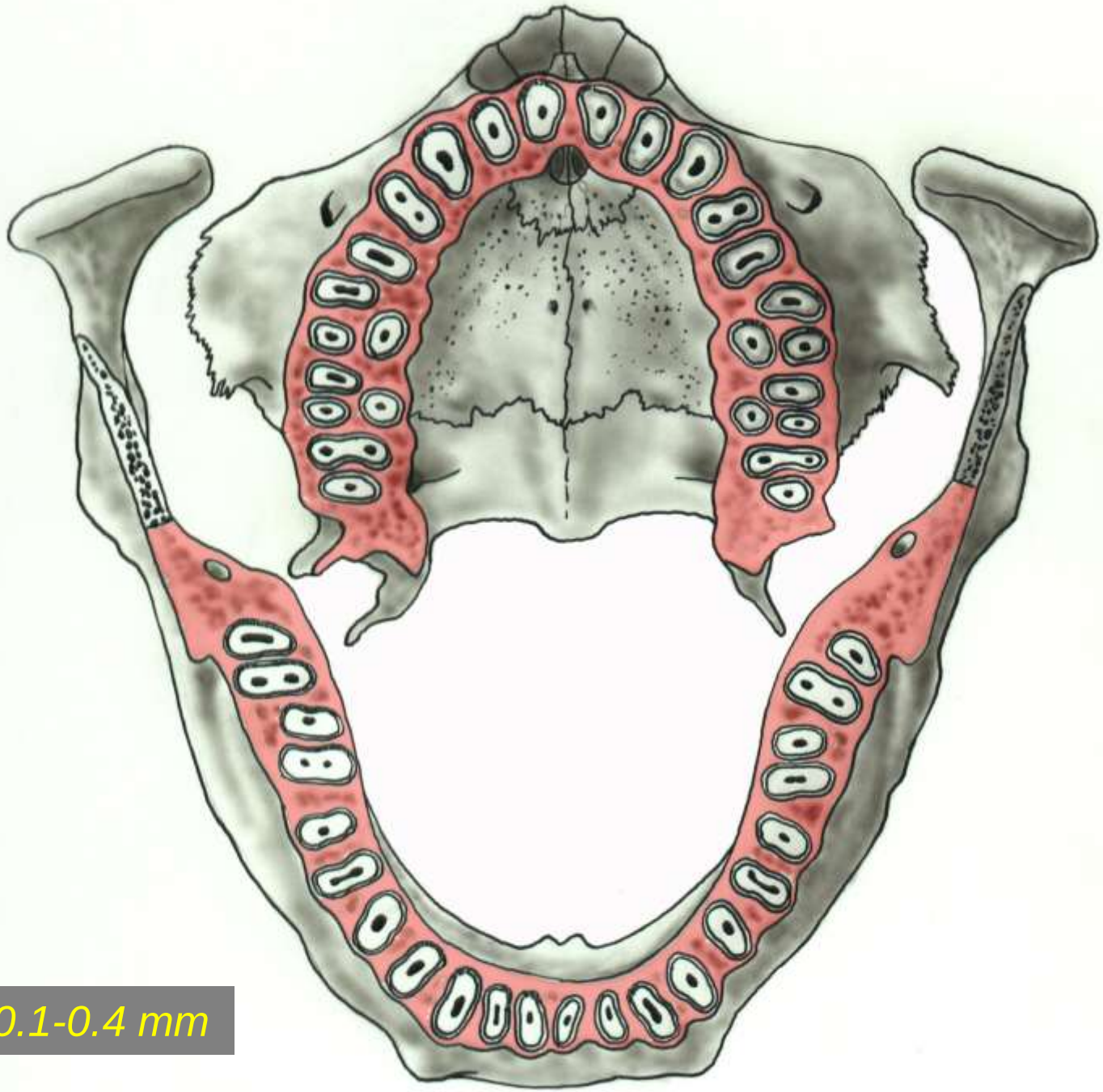
Oblouky zubní
Dental arches



Berkovitz a kol. 2002

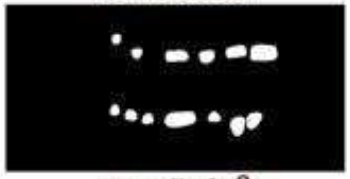




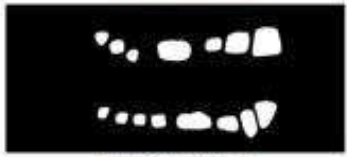


0.1-0.4 mm

5 měsíců

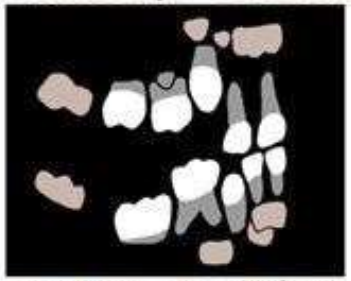


7 měsíců

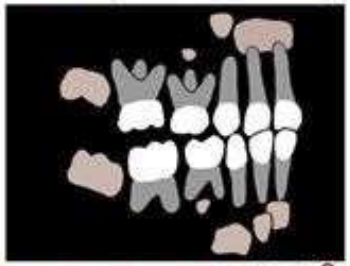


neonatus

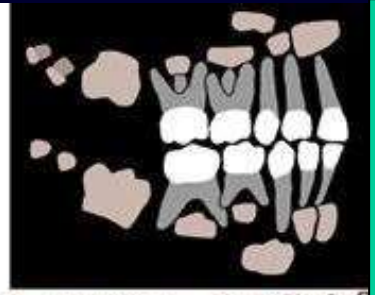
6 měsíců (+- 2 měsíce)



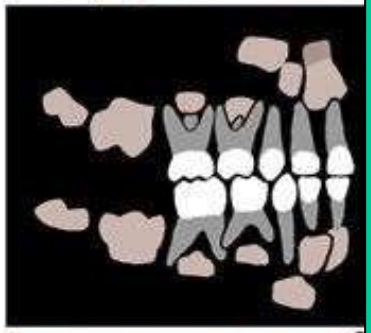
1rok (+- 3 měsíce)



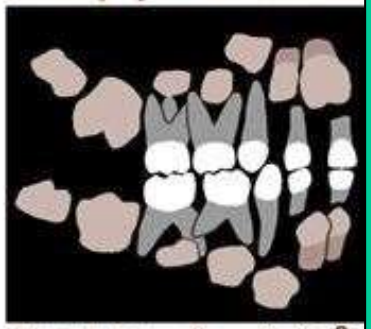
2 roky (+- 6 měsíců)



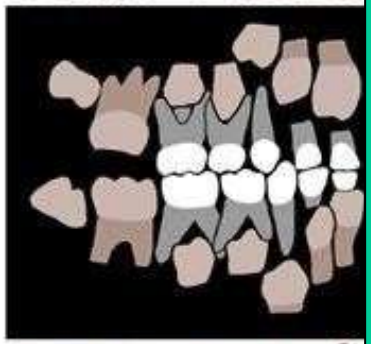
3 roky (+- 6 měsíců)



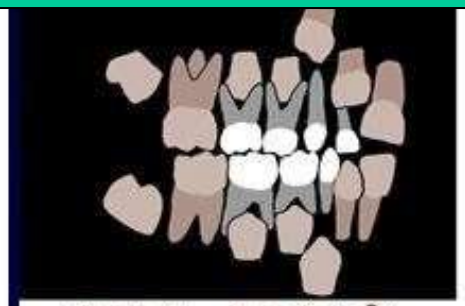
4 roky (+- 9 měsíců)



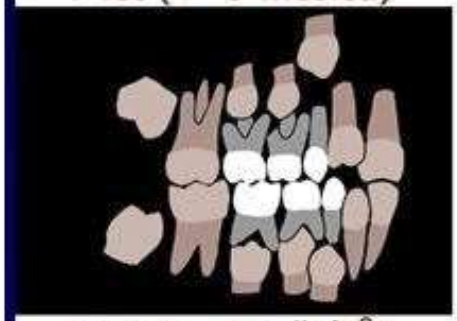
5 let (+- 9 měsíců)



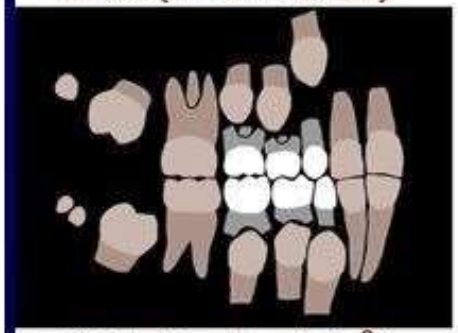
6 let (+- 9 měsíců)



7 let (+- 9 měsíců)



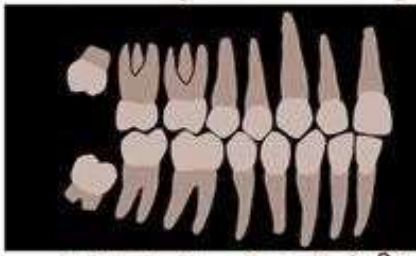
8 let (+- 9 měsíců)



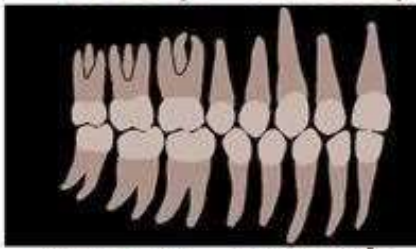
9 let (+- 9 měsíců)

11 let (+- 9 měsíců)

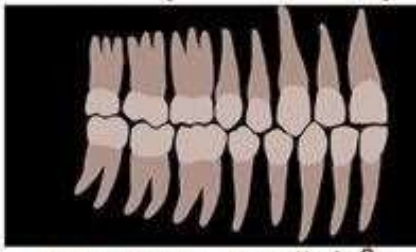
12 let (+- 9 měsíců)



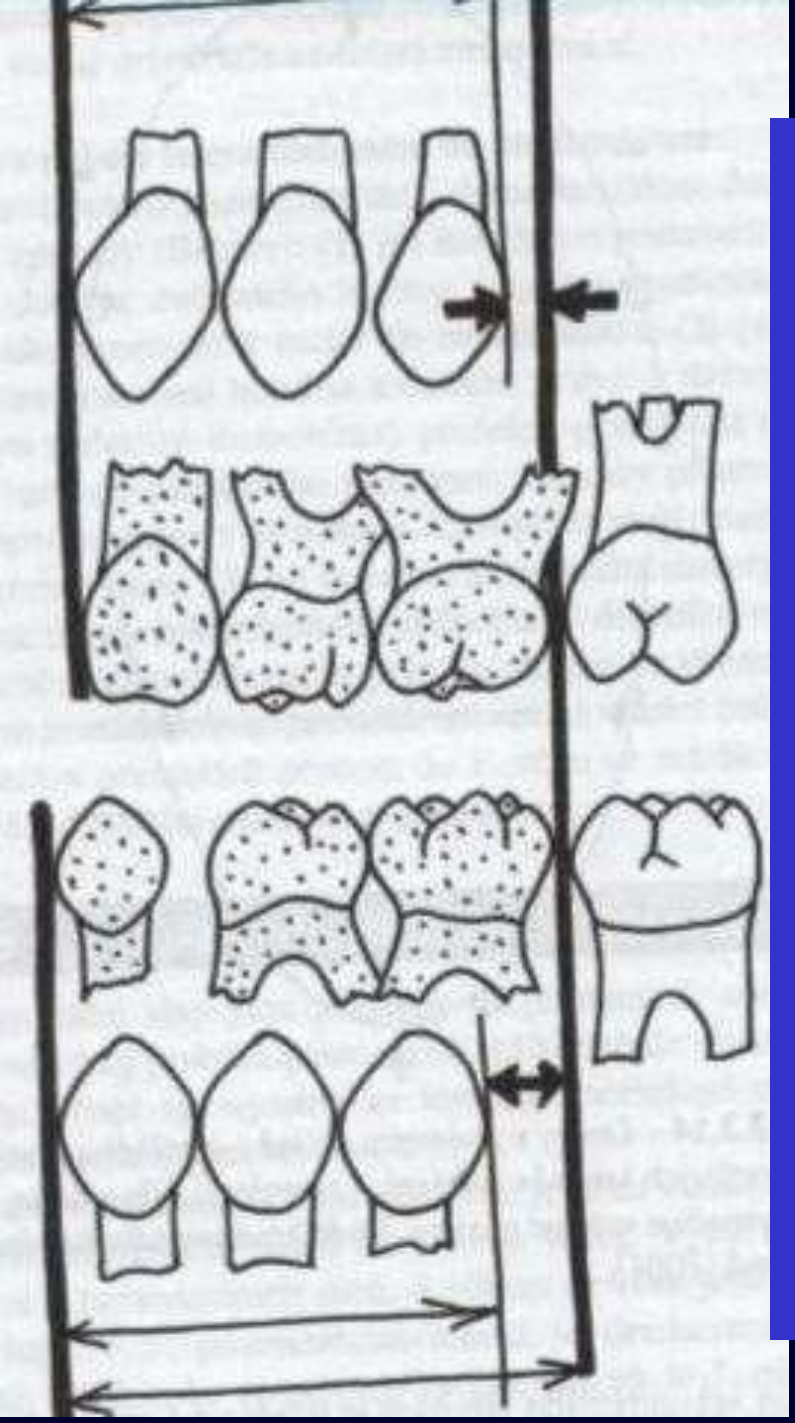
15 let (+- 9 měsíců)



21 let (+- 9 měsíců)



35 let (+- 9 měsíců)



Space (leeway space) : Diference between mesiodistal width of the support zone (c-m1m2) and group of the permanent teeth (C-P1P2)

maxilla- 1.5mm

mandible- 3mm

This is an consequence of the different position and form of m2 and P2

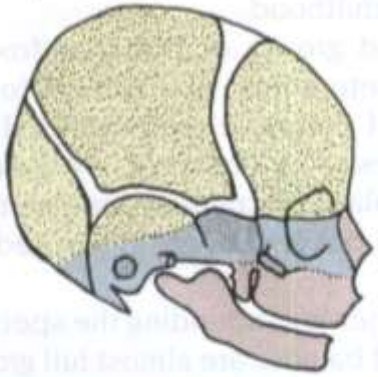
Utváření lebky před a těsně po narození

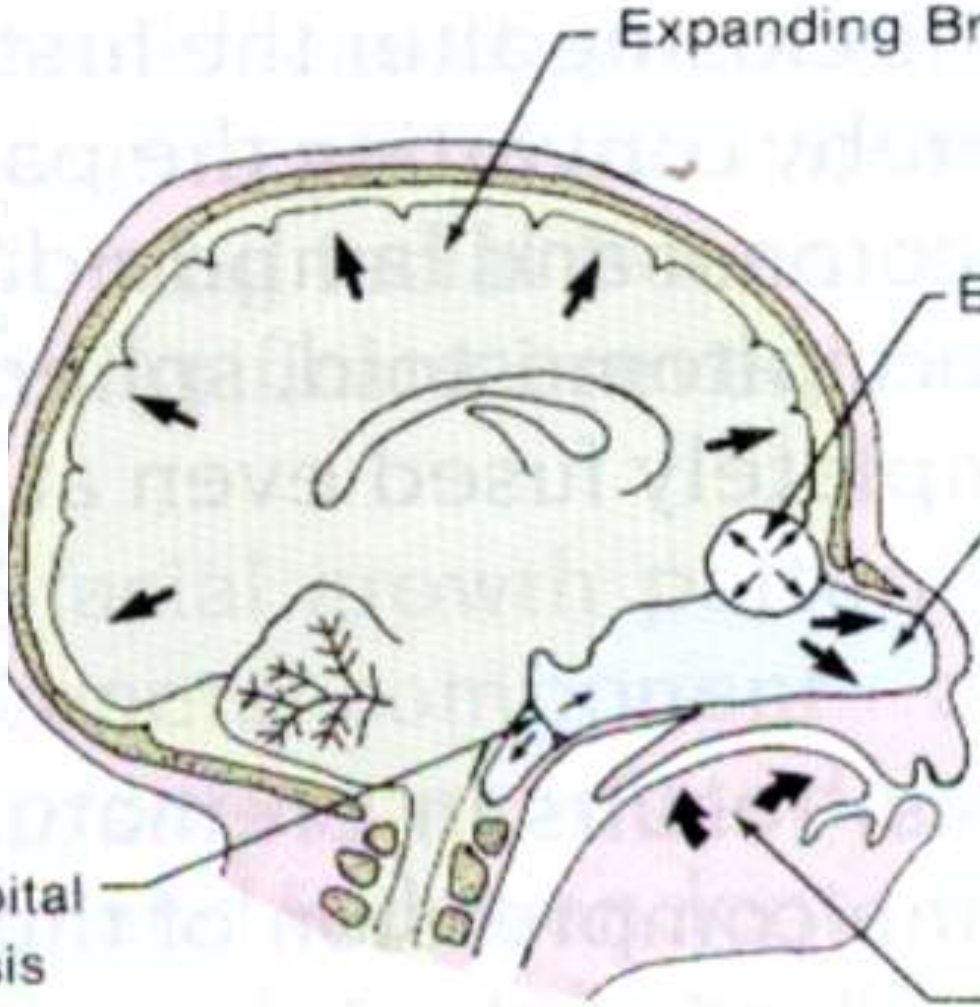
Formation of the skull pre- and early postnatal

The main events determining skull form

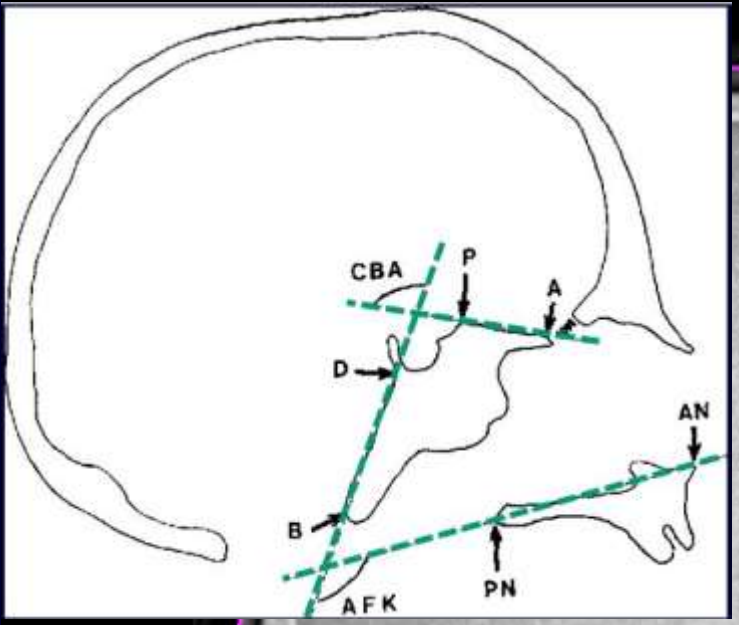
Brain growth; ossification of synchondrosis sphenooccipitalis; expanding of eye bulb, muscle drawing; nasal septum growth; teeth eruption

Growth types:
General – to 70% final size 6 yr
Cranial – to 80% final size 6 yr
Facial – to 80% final size 6 yr





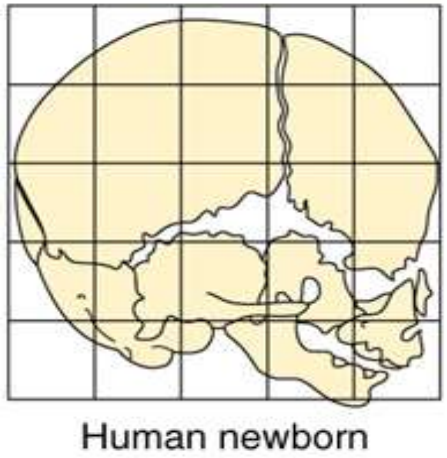
Pořadí:
Calvaria
Maxilla
Mandibula



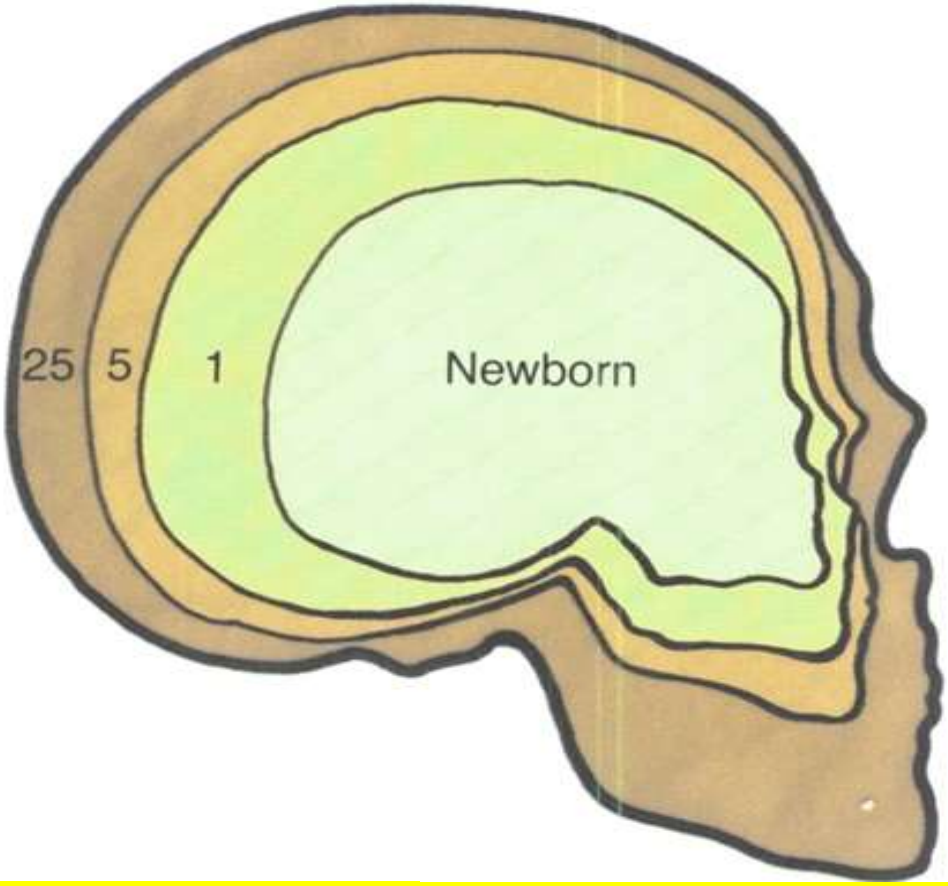
Cephalometric analyse

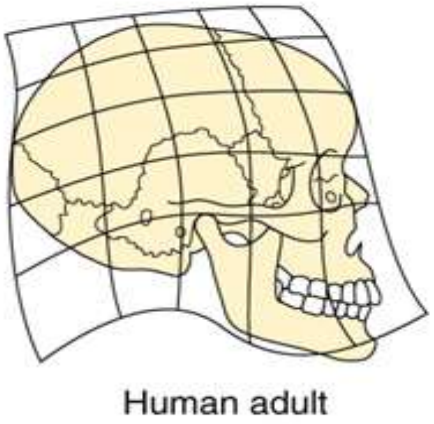
CBCT

FIG. 3.2. Growth of the skull from infancy to adulthood. Newborn, 1 year, 5 years, 25 years. The majority of the skull's growth takes place in the first 5 years of life with only slow changes from 5 years to maturity. Skull growth is essentially complete by age 12. (After Lowrey, 1986.)



Human newborn





Human adult

Postnatal:

Width of face is enlarged slowely and is finishing that early

Face high is enlarged more and finish late

After year 40 resorption is up the aposition;

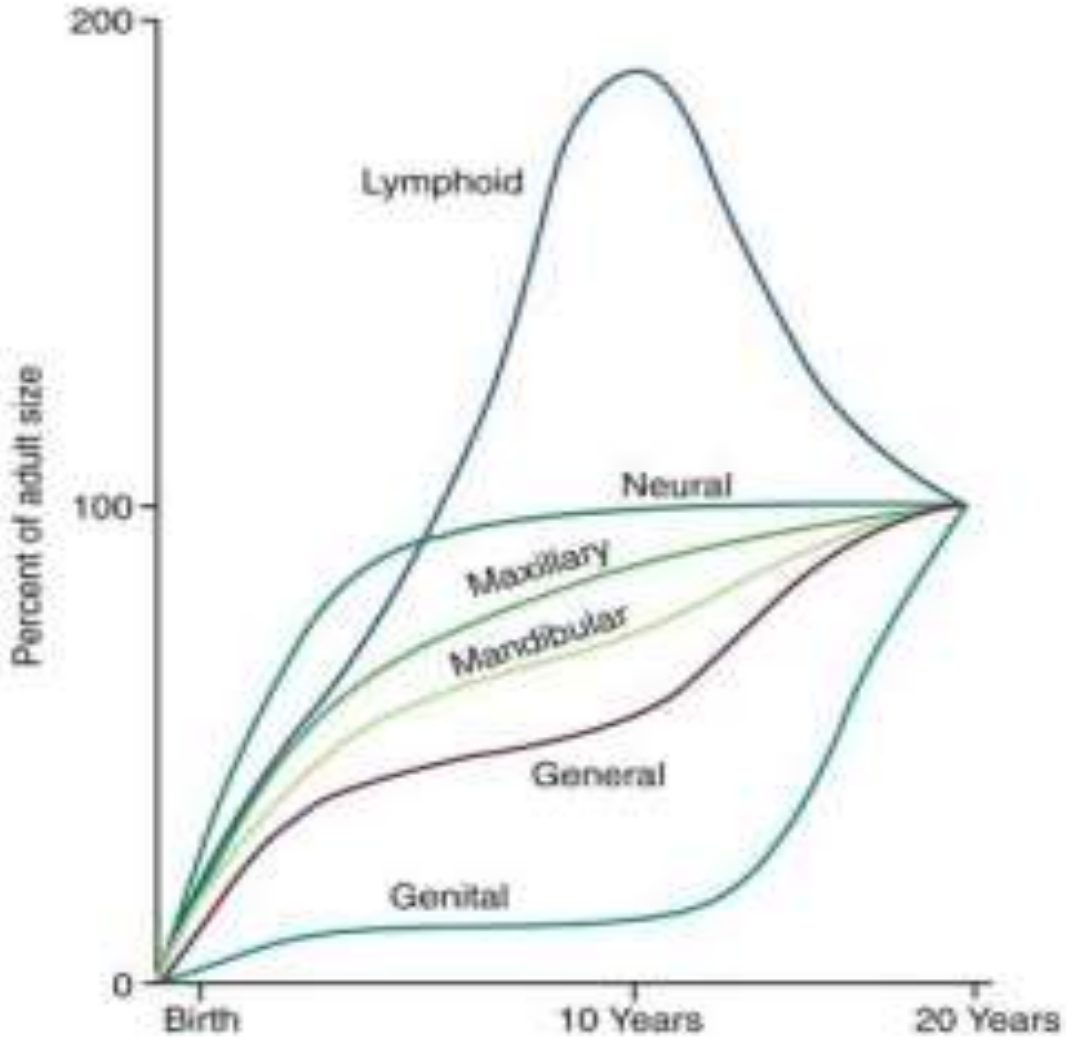
Mandible grows very long

Jaw growth: ***anteriorotation***

Physiologic (ventrocaudaly)

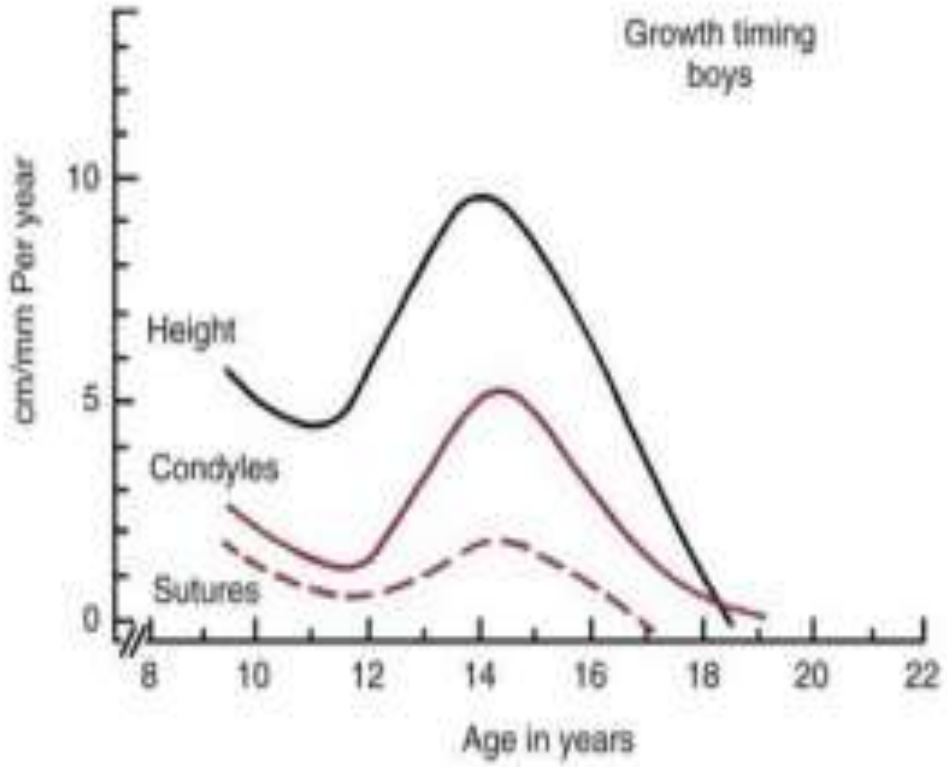
Total (whole) influences also activity of the surrounding structures *matrix or apparent rotation)*

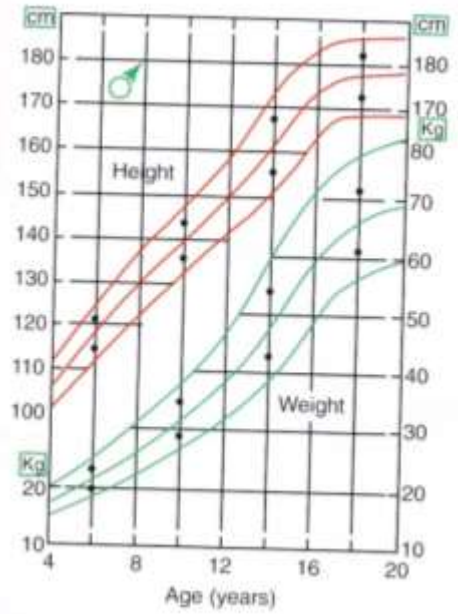
rotation of the matrix: (intramatrix rotation, angular remodelling)



Timing of Puberty

There is a great deal of individual variation, but puberty and the adolescent growth spurt occur on the average nearly 2 years earlier in girls than in boys (Figure 4-3). Why this occurs is not known, but the phenomenon has an important





USA

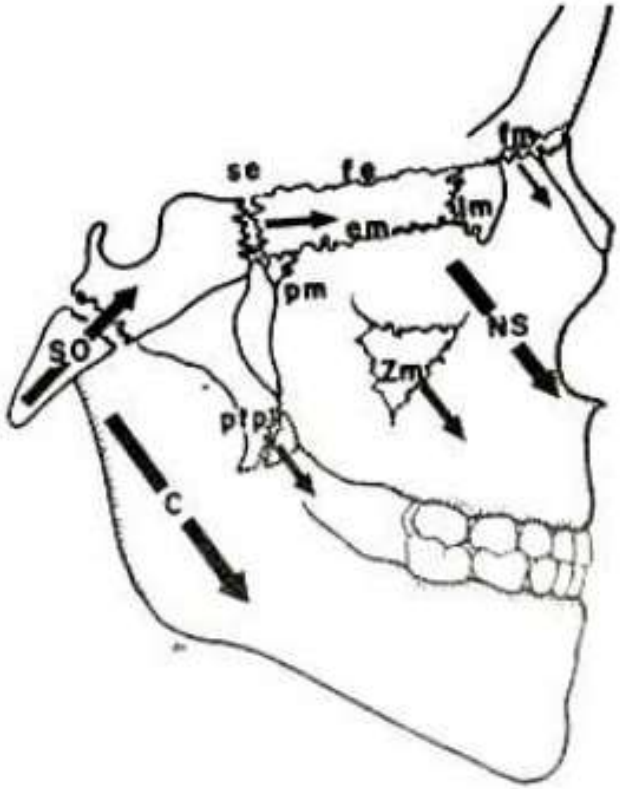
The Netherlands

(Data from Woodside DG. In: Salzmann JA, ed. Orthodontics in Daily Practice. Philadelphia: JB Lippincott; 1974.)

Growth acceleration of the jaw growth relatively follows wight increasement if you are zoung

Growth at sutures

- Fronto-nasal
- Fronto- maxillary
- Zygomatic-temporal
- Zygomatico-maxillary
- Pterygo-palatine



- All are oblique; more or less parallel to each other
- Downward and forward growth

- Suture is a **tension adapted** tissue
- Suture doesn't grow when transplanted
- Growth takes place in untreated cases of cleft palate

Growth of skull basis

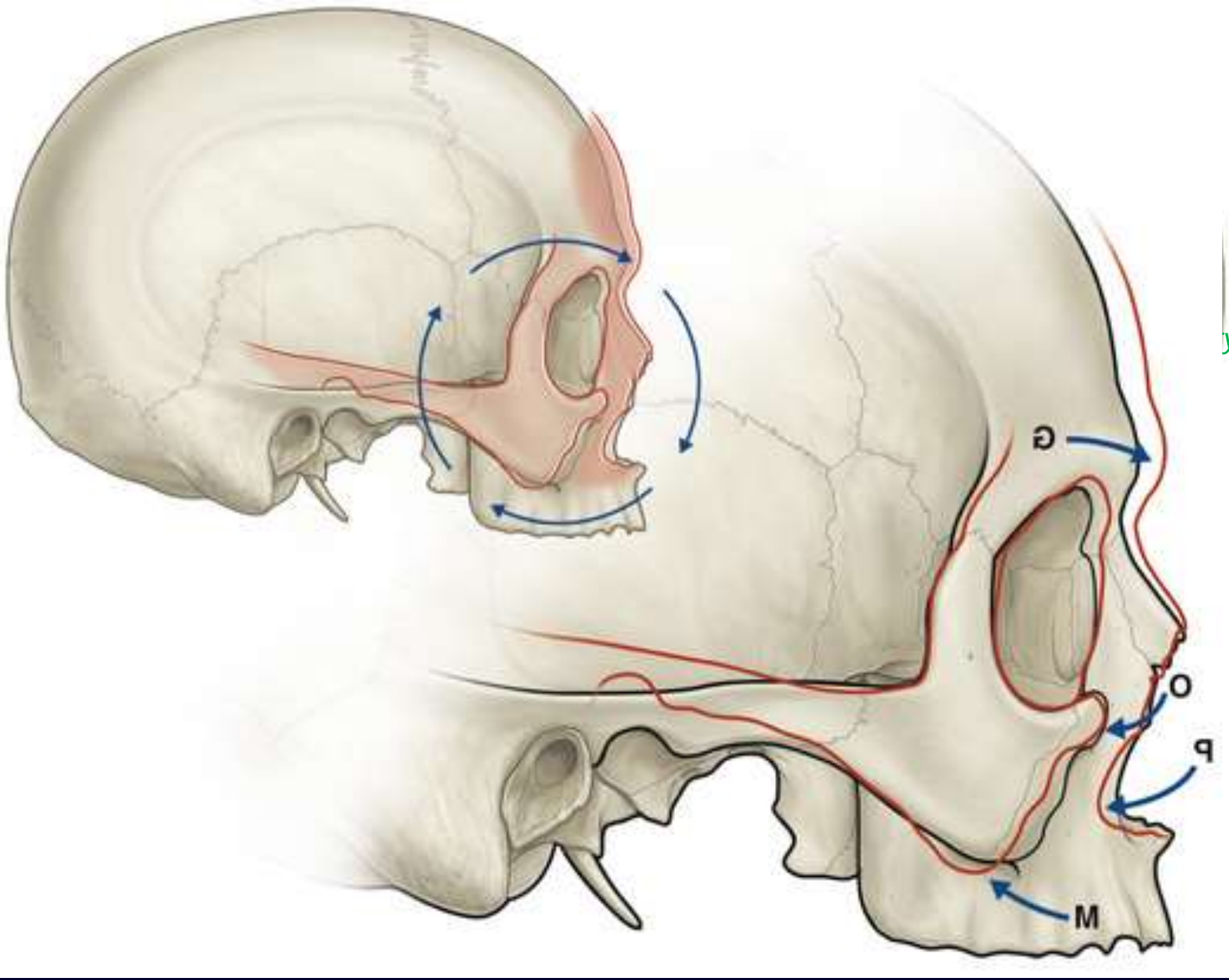
1 yr os frontale (sinus frontalis)
4 yr cribriform lamina of ethmoidal bone
7 yr spheno-ethmoid,-frontal; fronto-sphenoid

resorptive areae – around lacerum foramen, jugular fossa, medial lamina of pterygoid process

nazozygomaxillar complex – from sutures surrounding maxilla

infrazygomatic crest –
sutura palatina transversa

after Enlow


G
O
P
M

cranial growth *size about 90%*

very low pubertal spurt *5-7 year* *final size*

facial growth *6 year cca 80%*

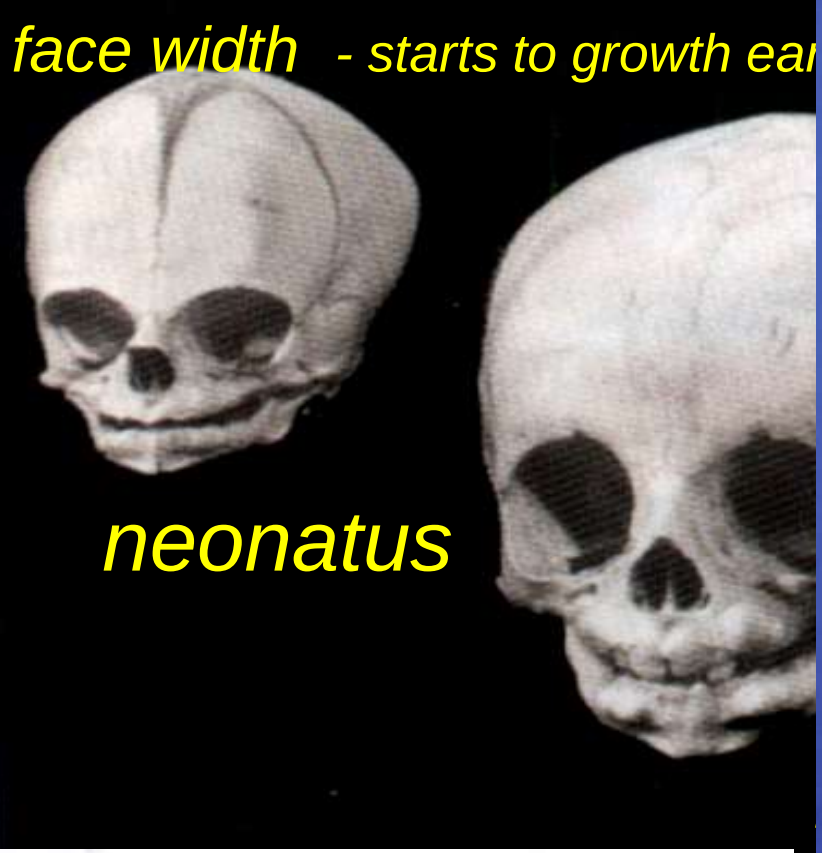
pubertal spurt is proportional *final size*

skeletal (general) growth *about 6 year*

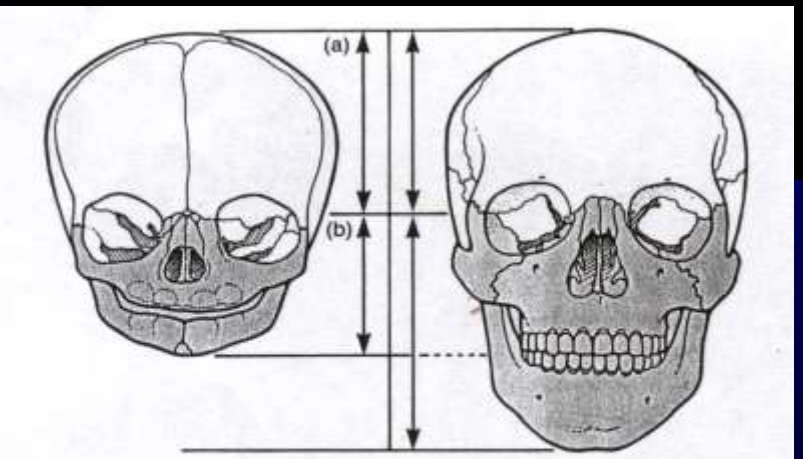
pubertal spurt accelerate *cca 70%*

final size

face width - starts to growth ear



neonatus



Growth of the skull. The height of the cranial vault (distance between planes a and b) is drawn the same in both the infant and adult skulls. Growth of the skull occurs almost exclusively within the bones of the facial region.

Orbit and piriform aperture.

the rounded orbit shape initially increases its size, while maintaining the shape. later the latero-inferior border presents a more pronounced resorption. the maximum measurement of piriform aperture increases with aging, being prominent in skulls >50 years.

Maxilla and mandible.

there is an increase in maxillary resorption with aging, which is associated with decrease in skin fat and collagen contents and leads to midface soft-tissue descent. also, with increasing age, the mandible loses its vertical projection and is more fragile.

Zygoma.

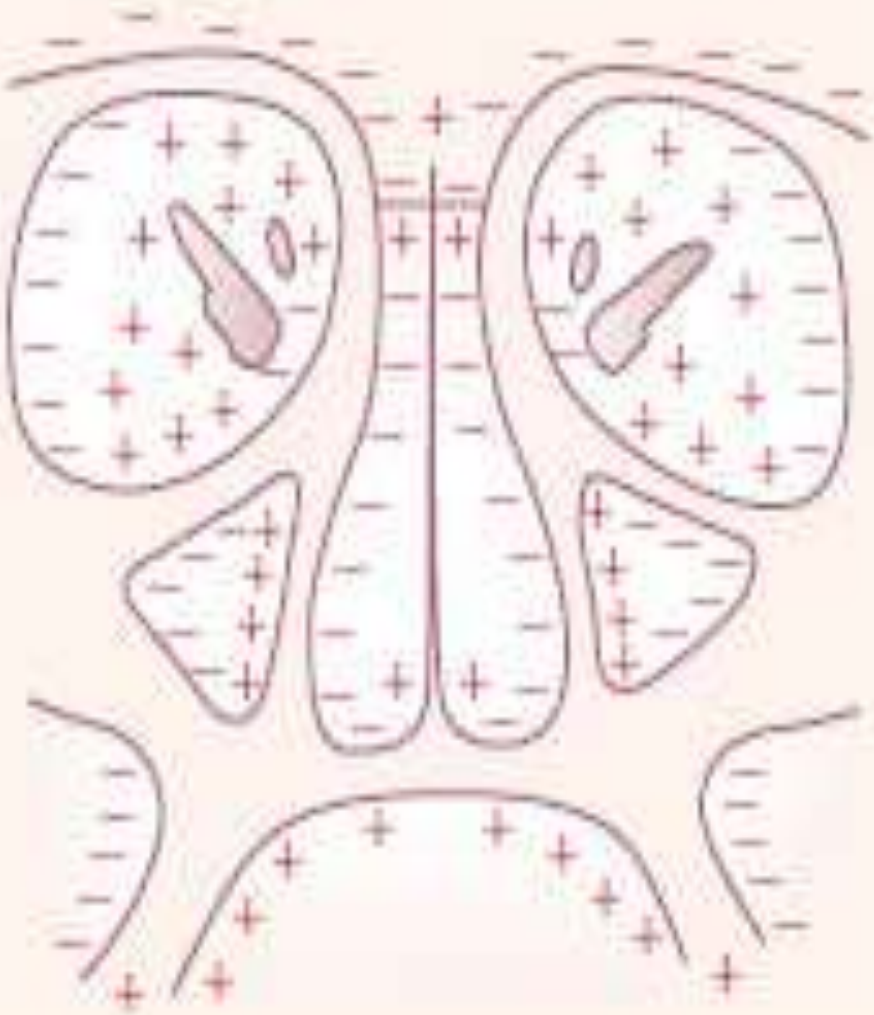
Considering the skull in anatomic position, the zygoma becomes more retropositioned with aging, with an increasing angle between an imaginary vertical line and the anterior border of the zygoma.

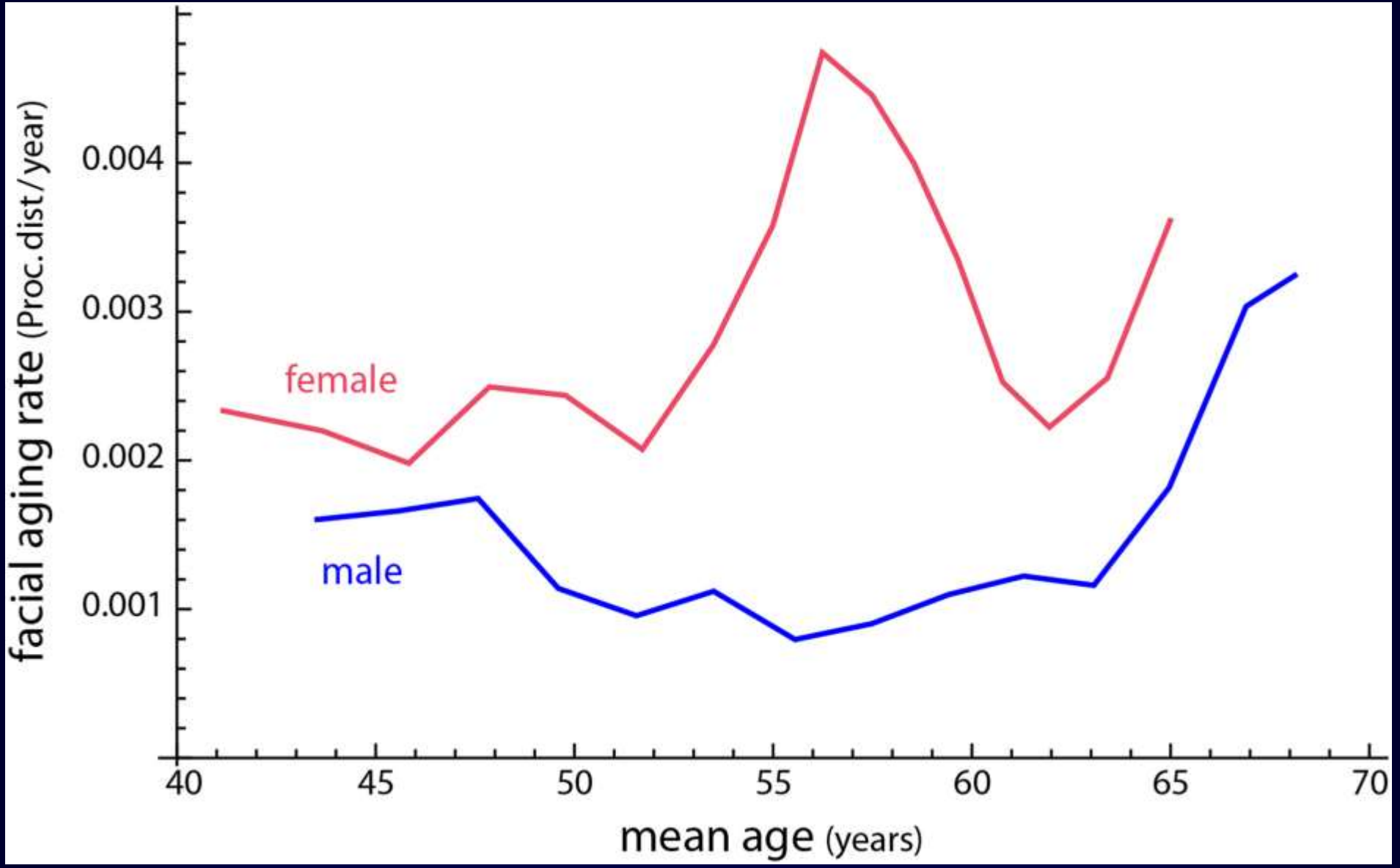
NEWBORN

CHILD
AGE
6

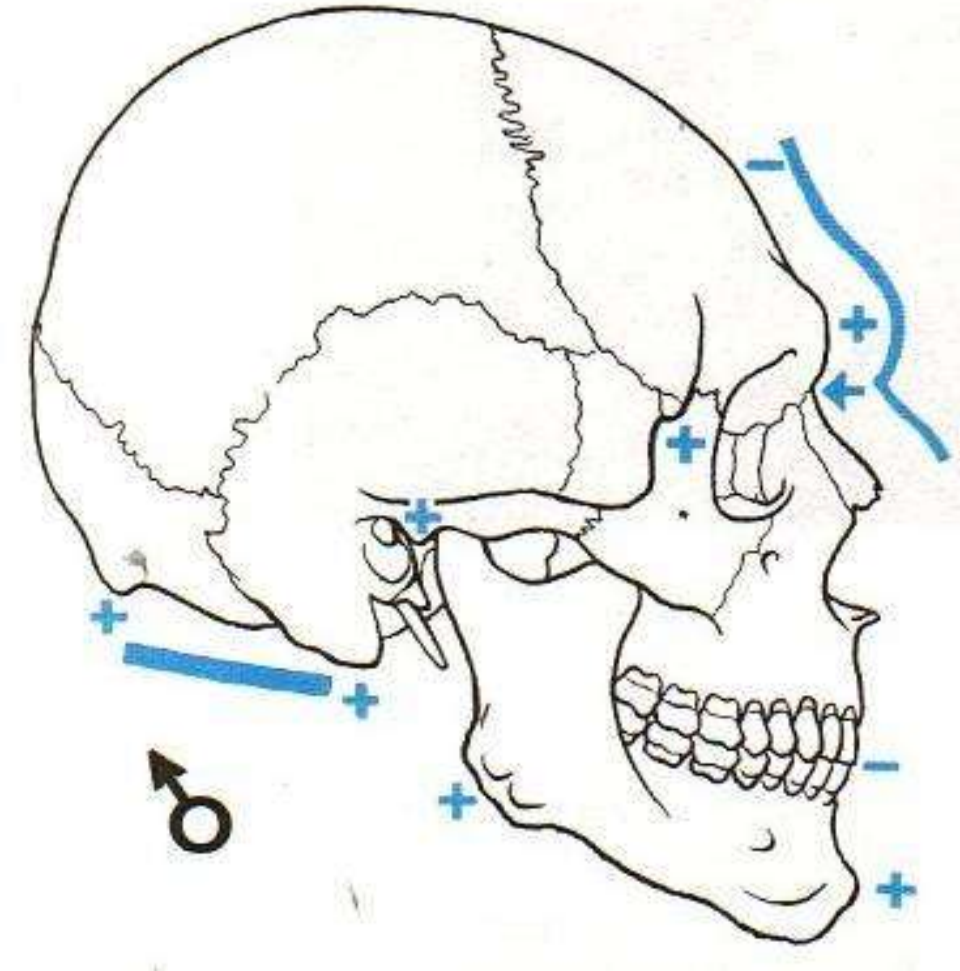
ADULT
AGE
35

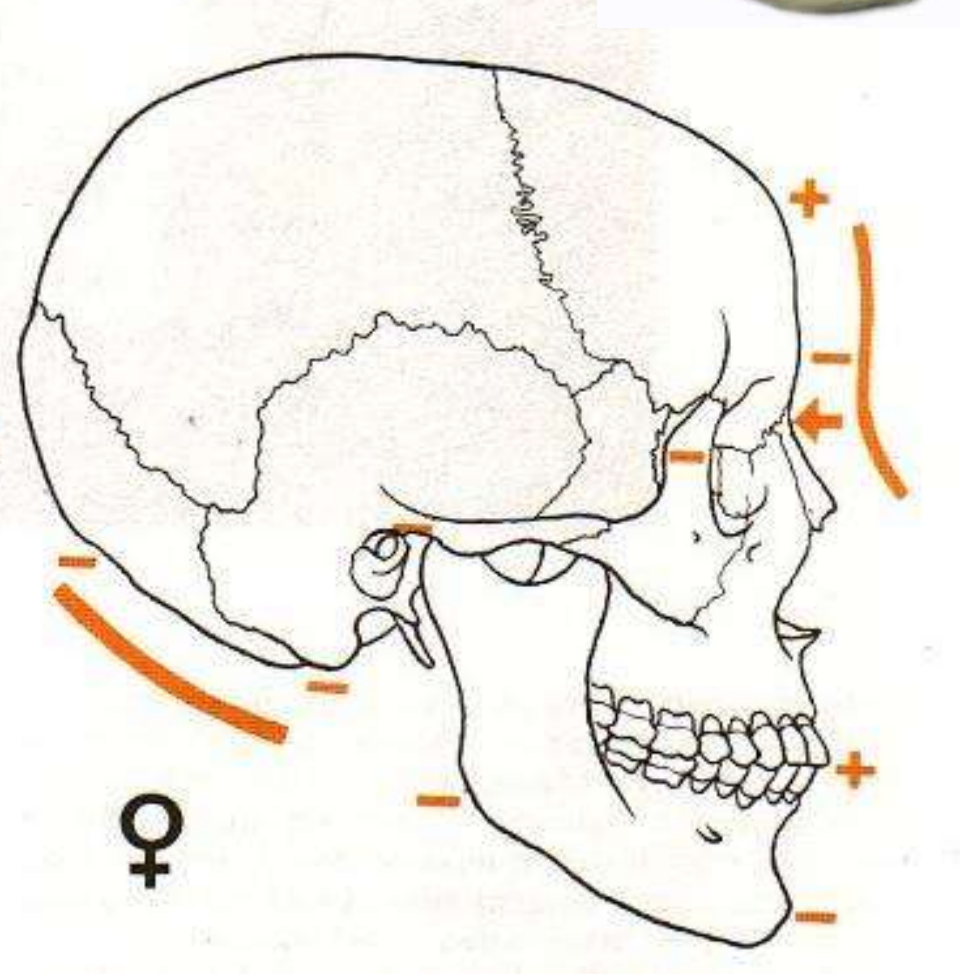
ELDERLY
AGE
80




facial aging rate (Proc. dist/year)
0.004
0.003
0.002
0.001
female
male
40
45
50
55
60
65
70
mean age (years)

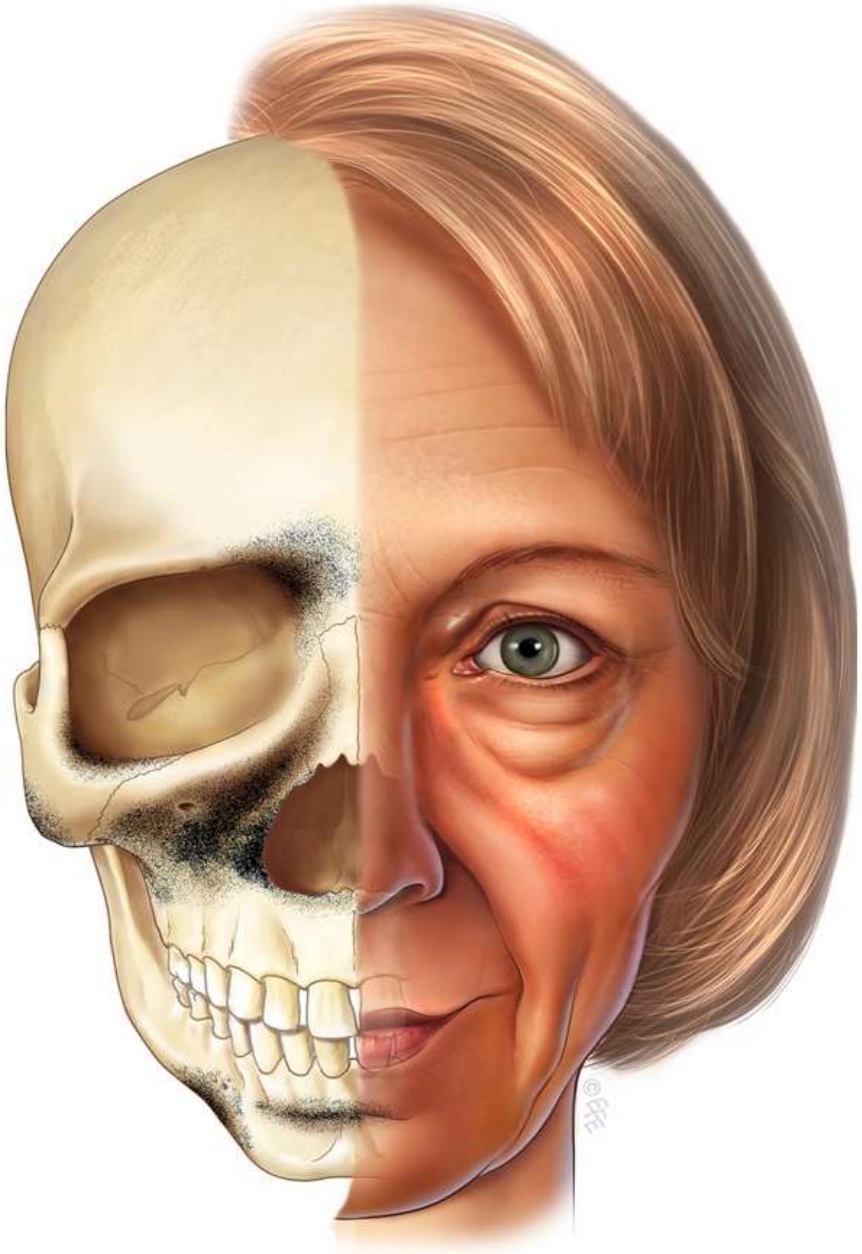
Gender differences between male and female skulls





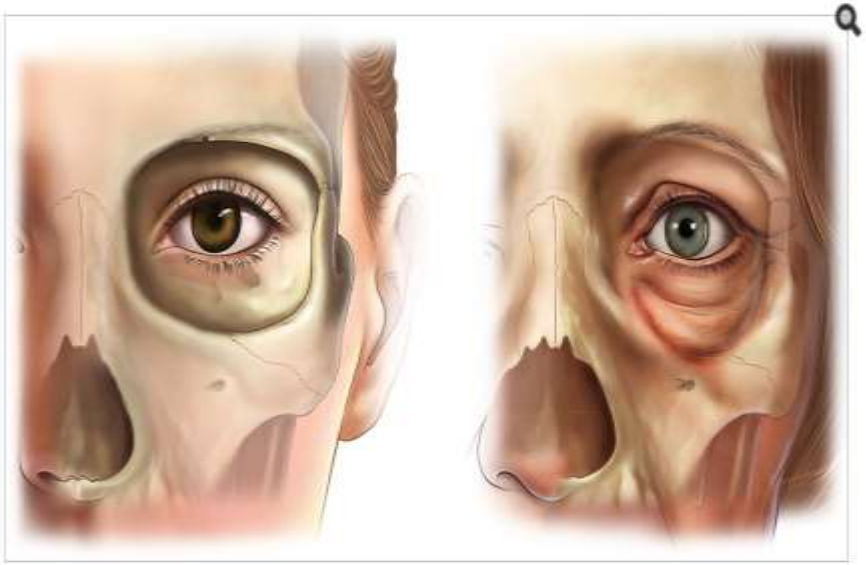

BC-133 Human Female European
BC-149 Human Female Asian
©Bone Clones® 2013
BC-178 Human Female African-American
BC-110 Human Male African
BC-253 Human Male Asian
BC-107 Human Male European

Fig. 6

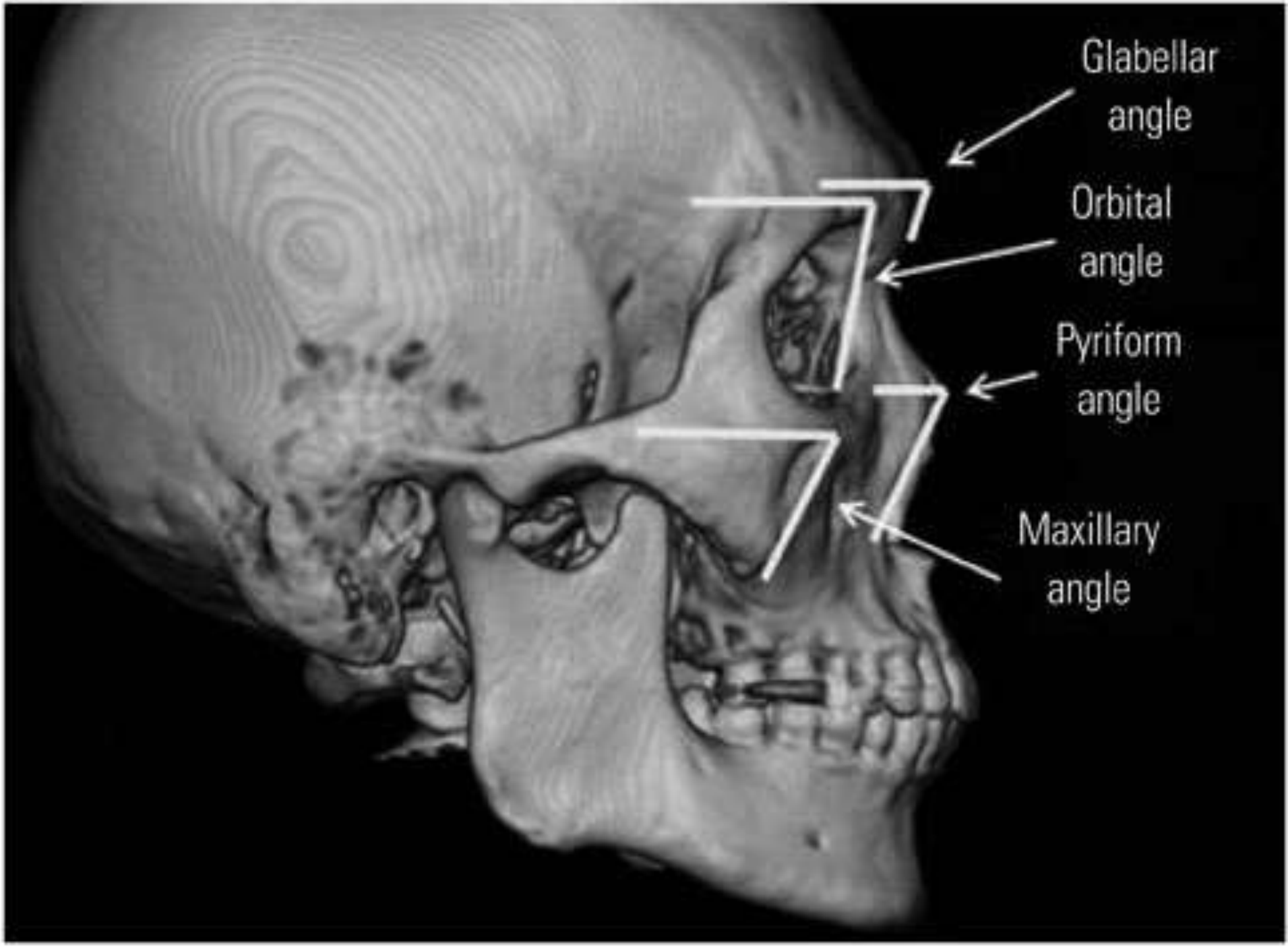


The *darker areas* are those of the greatest bone loss. The stigmata of aging, manifested by the facial soft tissues, corresponds with the areas of weakened skeletal support

Fig. 1



Orbital aging. The superomedial and inferolateral aspects of the orbit have the greatest tendency to resorb. This contributes to the stigmata of periorbital aging such as increased prominence of the medial fat pad, elevation of the medial brow, and lengthening of the lid cheek junction

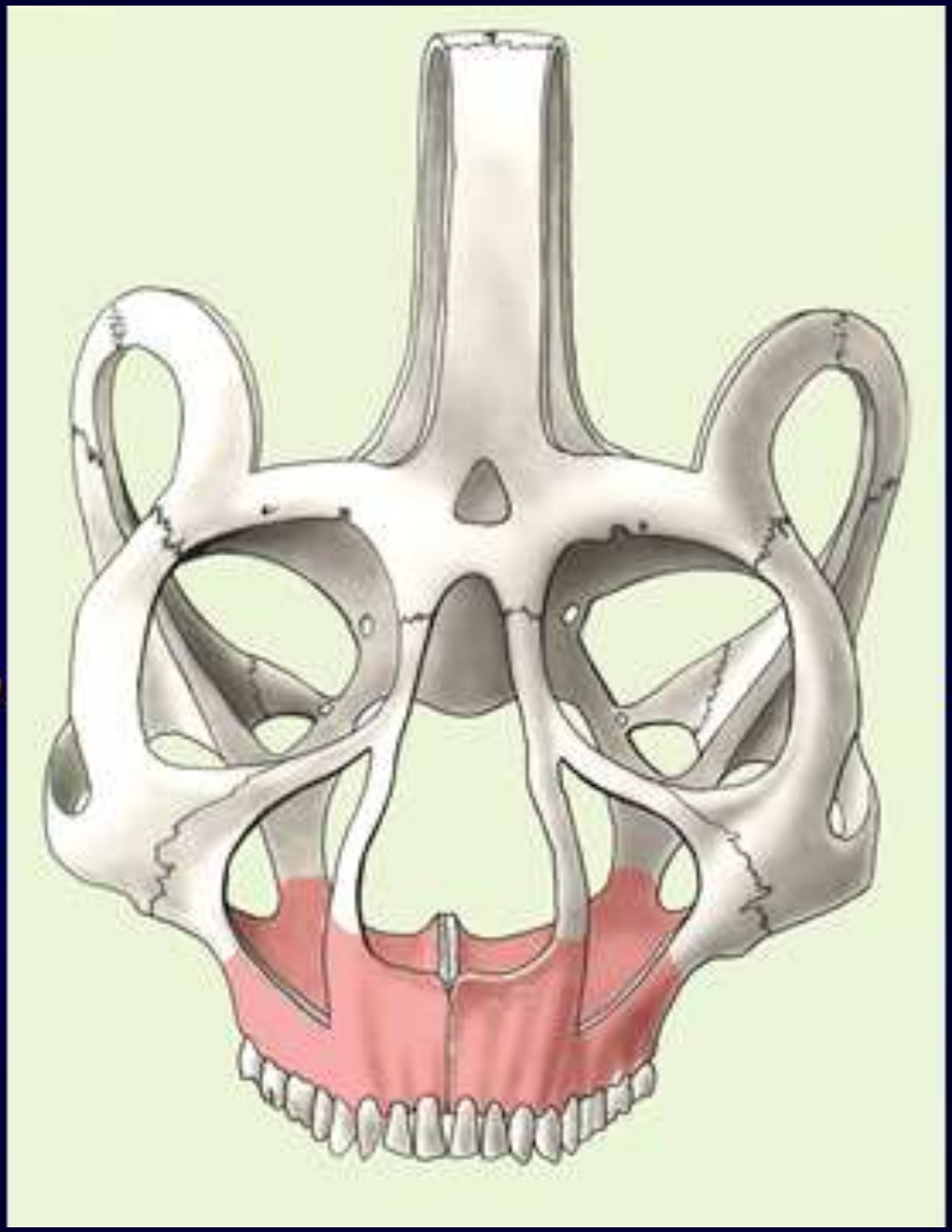

Glabellar angle
Orbital angle
Pyriform angle
Maxillary angle

Zesílená a zeslabená místa obličejového skeletu

Thickened and weakened areas of the facial skeleton

Patrová deska

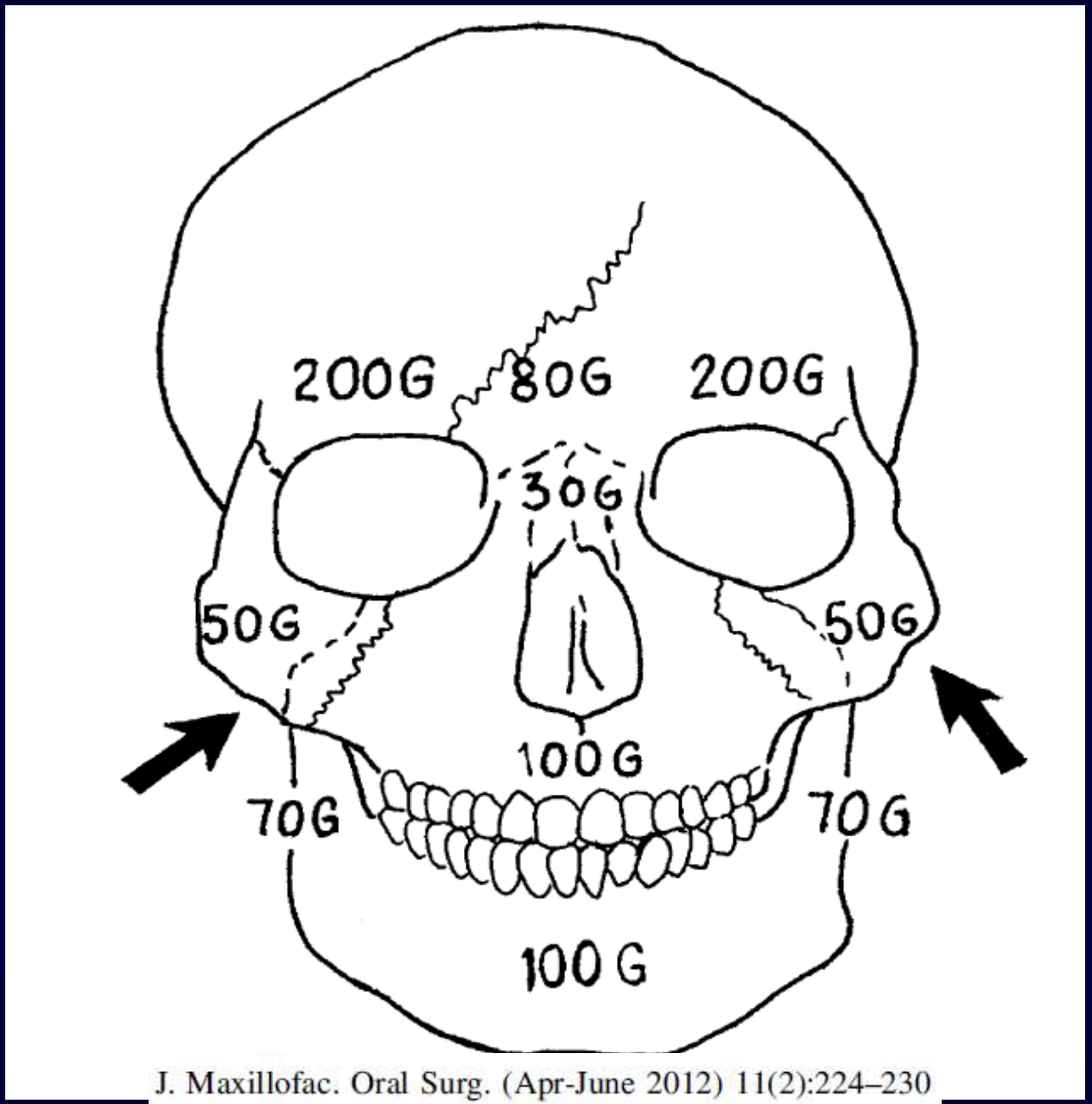
Palate plate



Podle Deffeze 1985

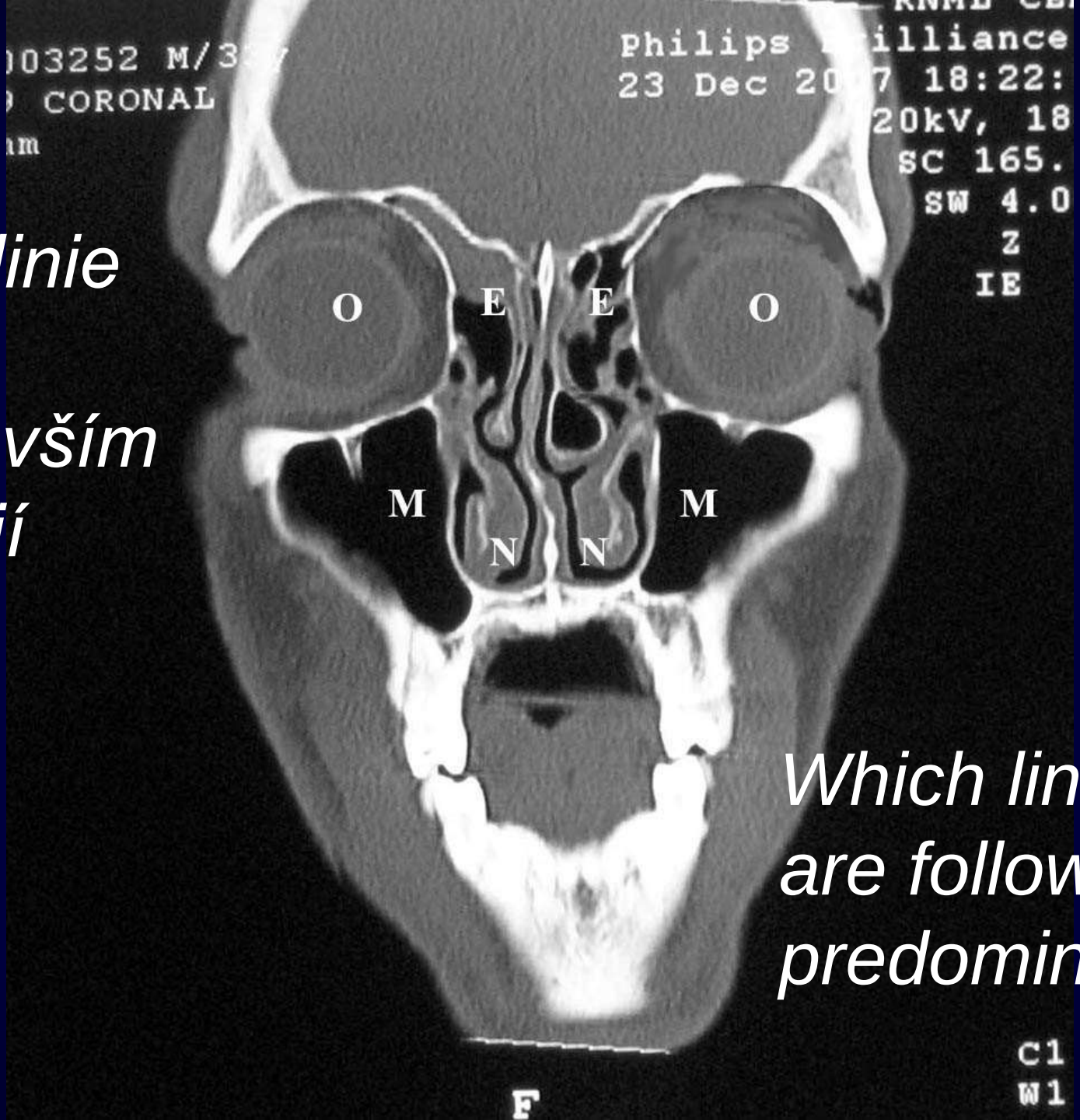
After Deffez 1985

Classification of the facial bones into degree of resistance to impact



J. Maxillofac. Oral Surg. (Apr-June 2012) 11(2):224–230
DOI 10.1007/s12663-011-0289-7

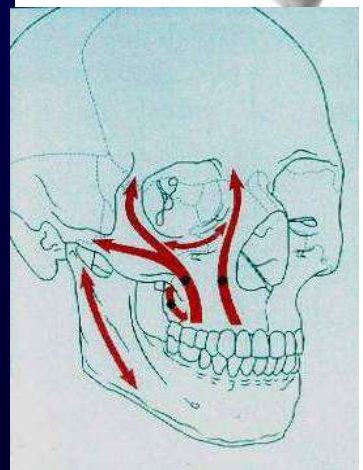
Jaké linie se především sledují



Which lines are followed predominantly

Midface buttresses; tension and traction lines

- Three buttresses allow face to absorb force
  - Nasomaxillary (medial) buttress
  - Zymaticomaxillary (lateral) buttress
  - Pterygomaxillary (posterior) buttress



Vertical and transverse pillars

Transfer of chewing pressure to skull structures

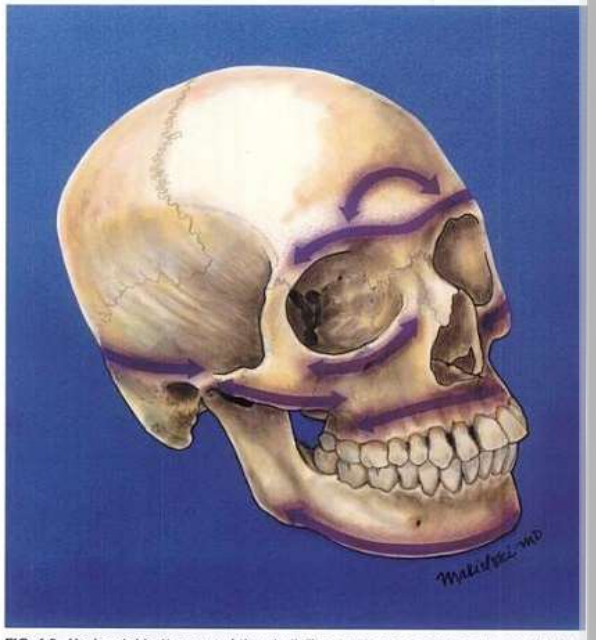
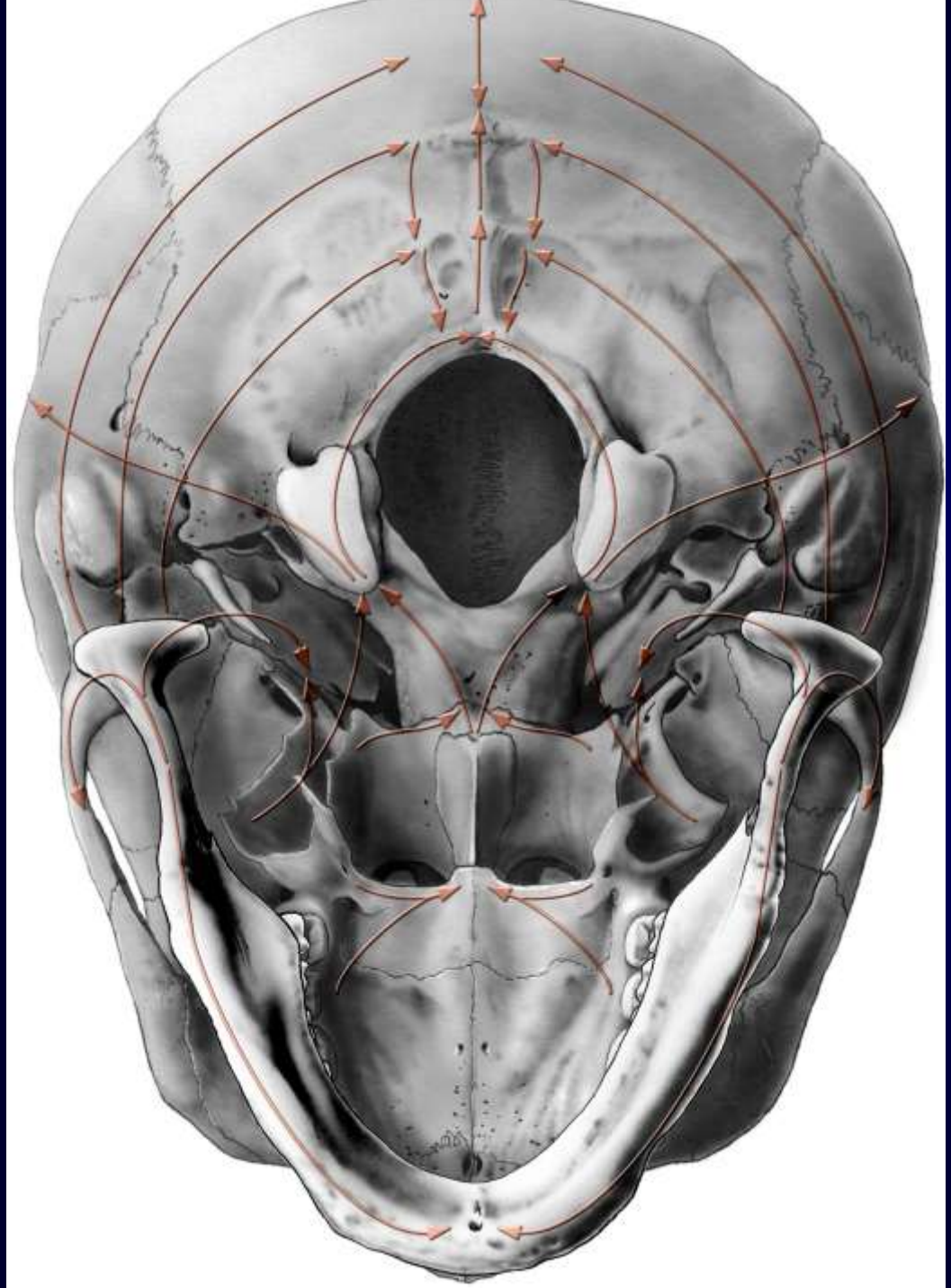


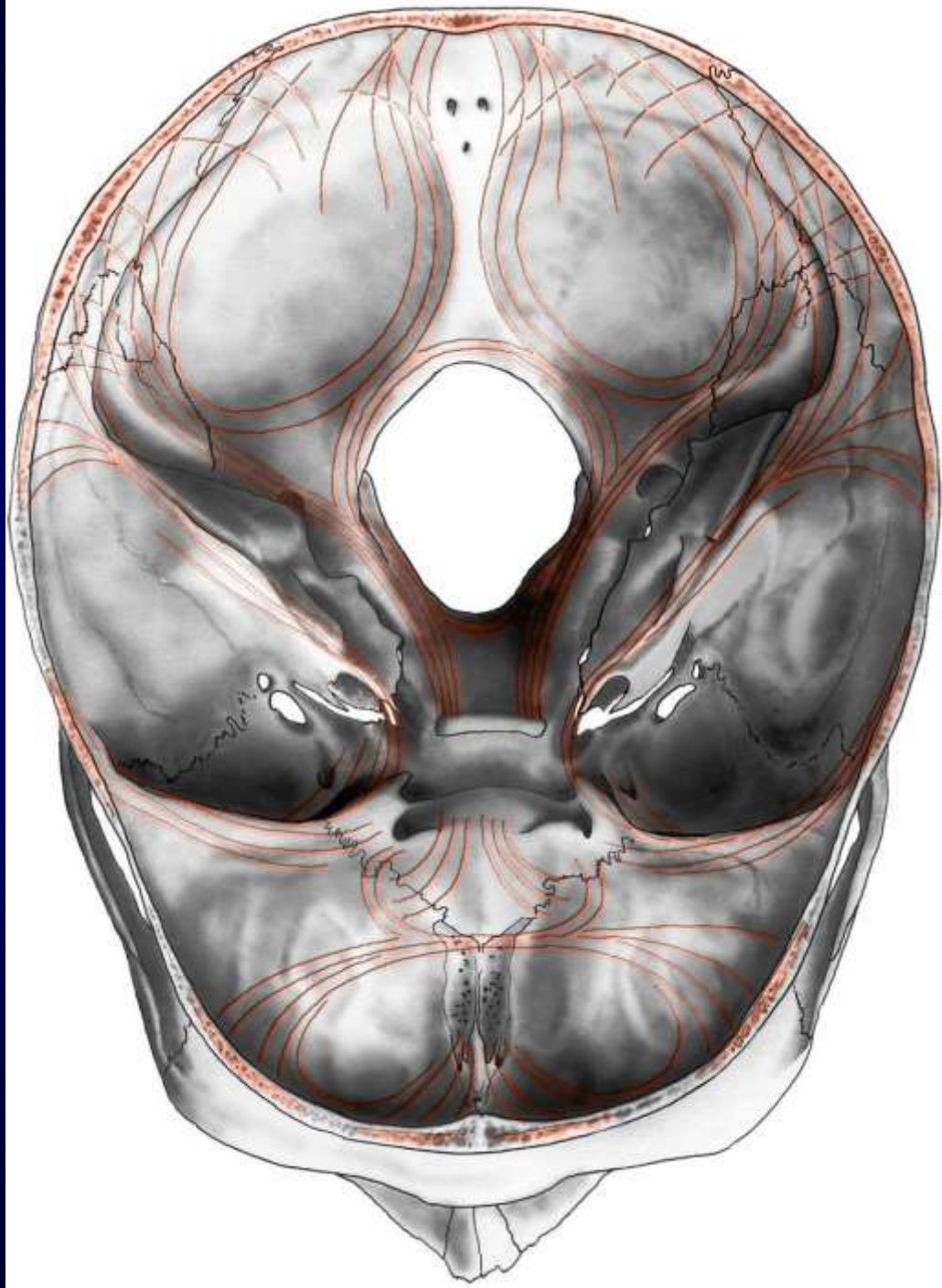
FIG. 4.8. **Horizontal buttresses of the skull.** The purple areas represent areas of thicker facial bone that are less likely to fracture than intervening areas.

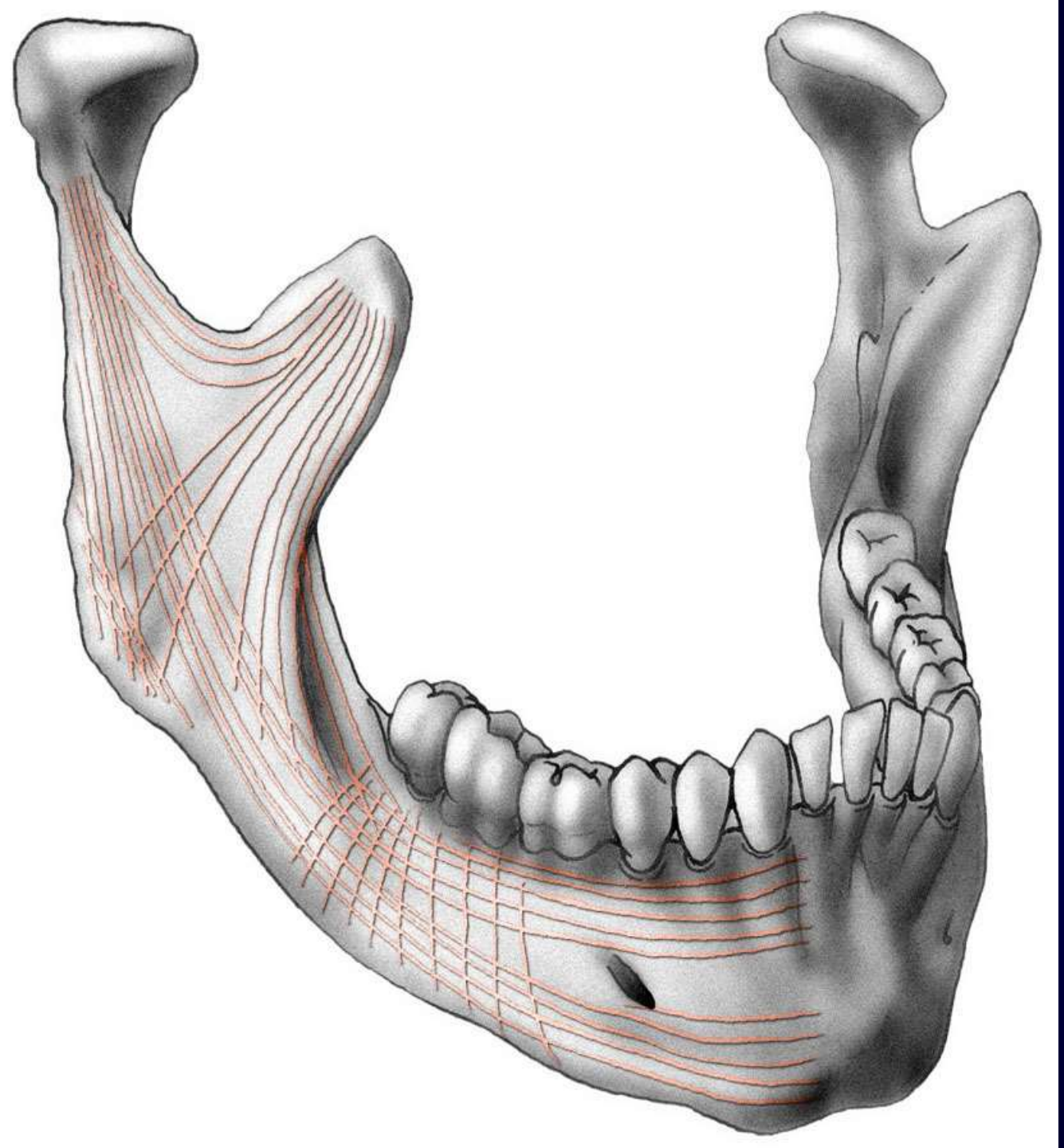
FIG. 3.9. **Vertical buttresses of the skull.** The purple areas represent areas of thicker facial bone that are less likely to fracture than intervening areas. Depending on the development of the sinuses, the buttress may follow the supraorbital rim and skirt the frontal sinus.



Power transfer in the in skull basis

Traction and tension lines in skull base



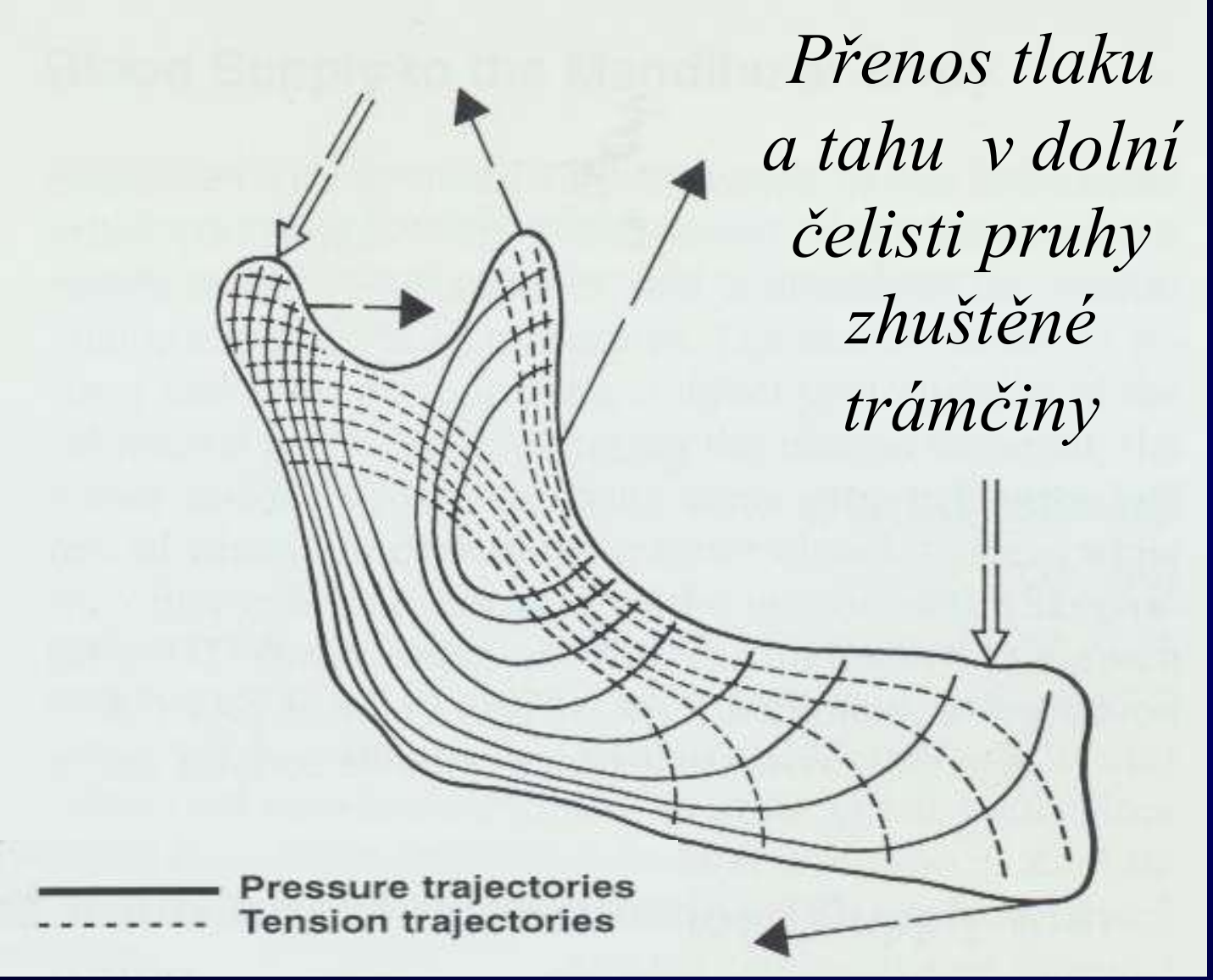


Trajectories inside madible

trabeculae

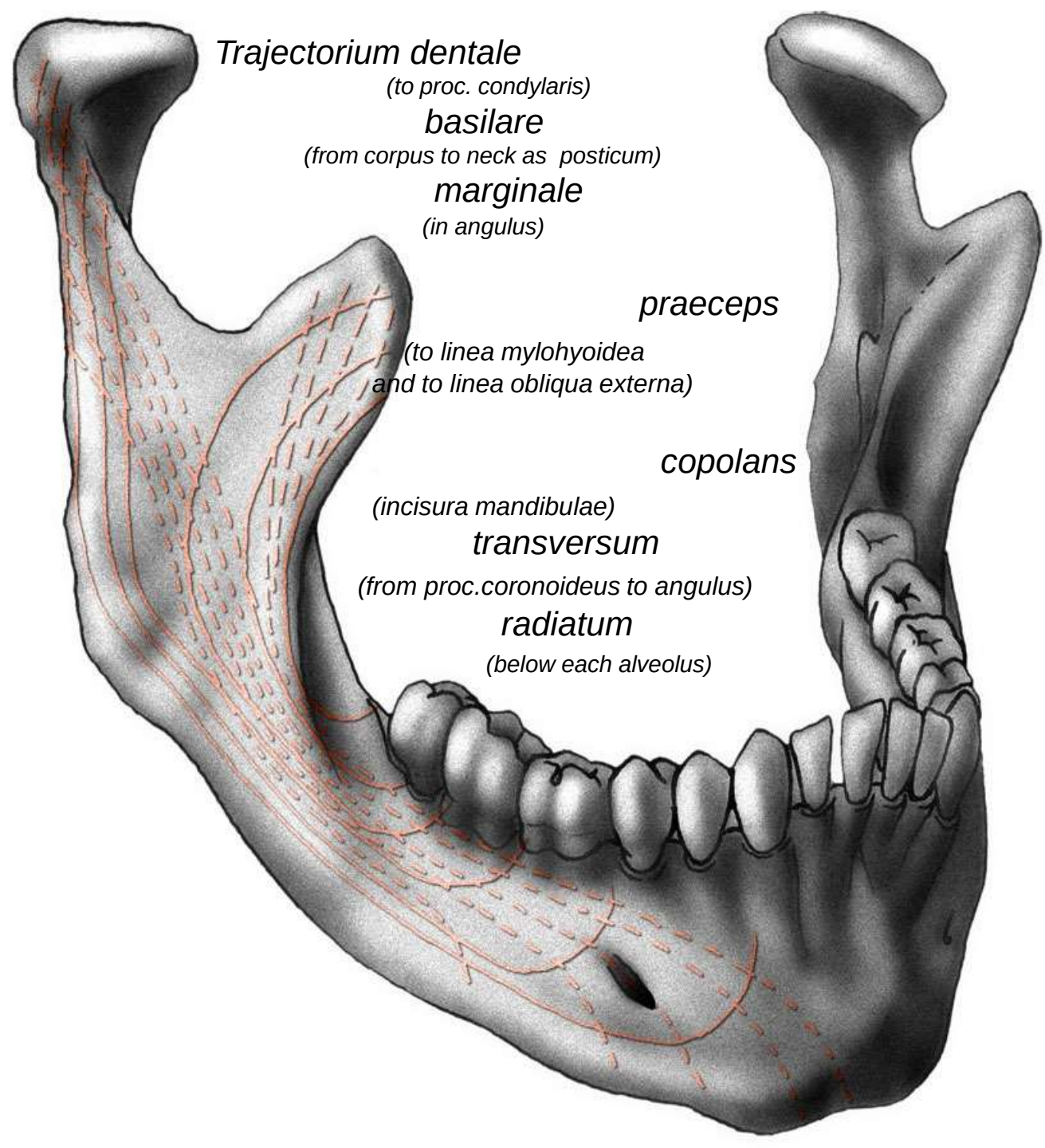
Upraveno z Langa 1995

Přenos tlaku a tahu v dolní čelisti pruhy zhuštěné trámčiny

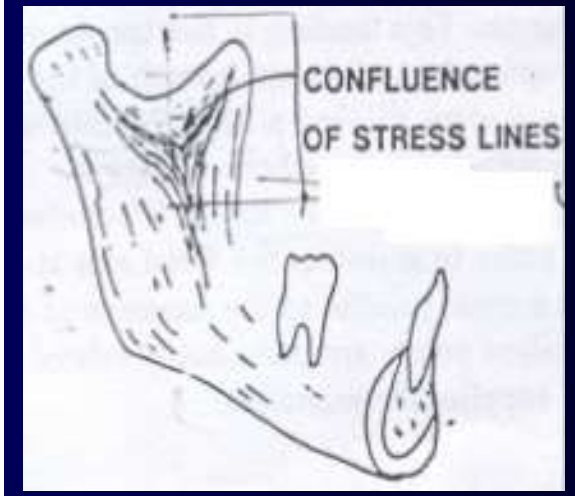


Tlakové a tahové linie v dolní čelisti

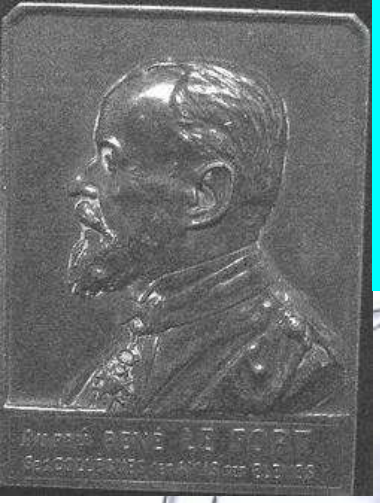
Tillmann et al. 1983)



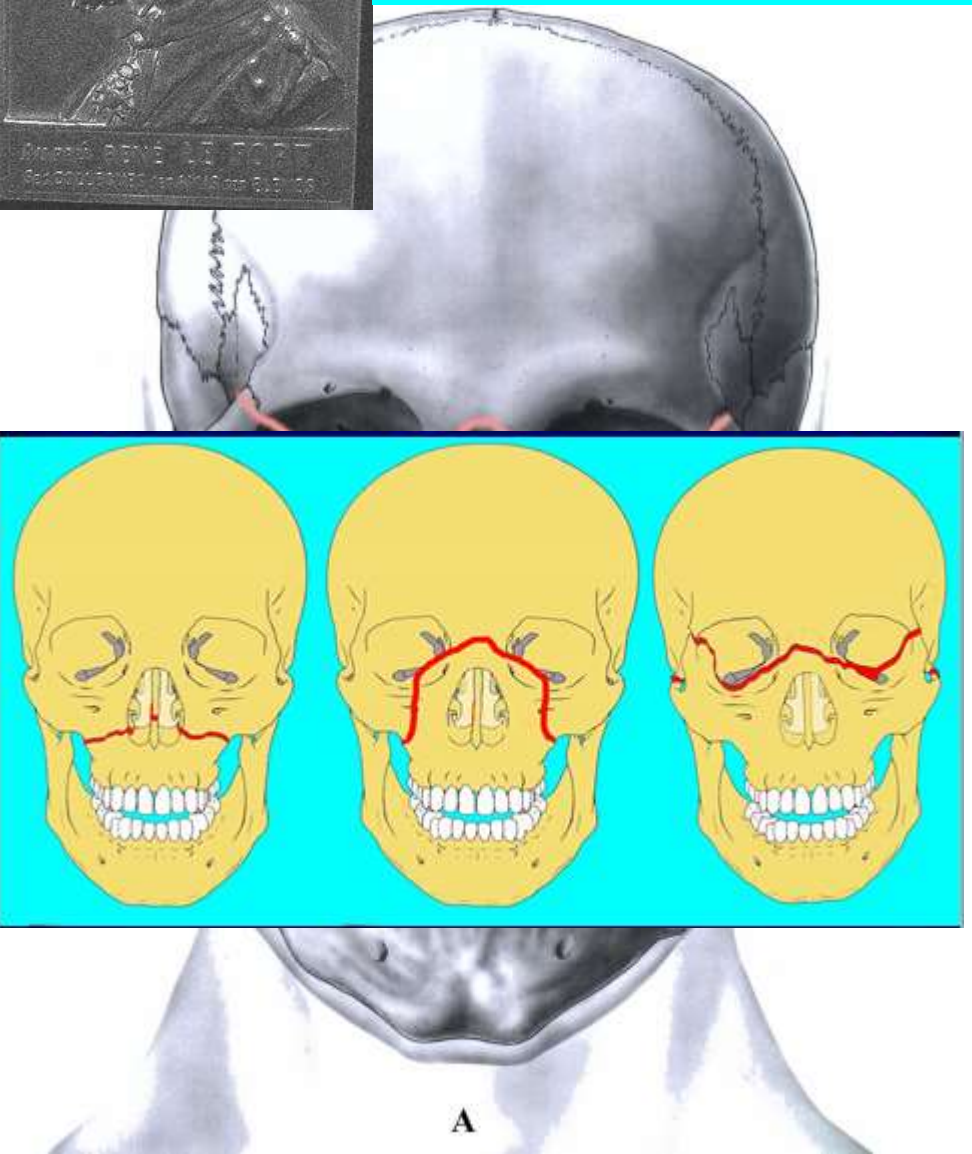
Přenos tlaku a tahu v dolní čelisti



podle Langa 1995



Etude expérimental sur les fractures de la machoire supérieure (1901)

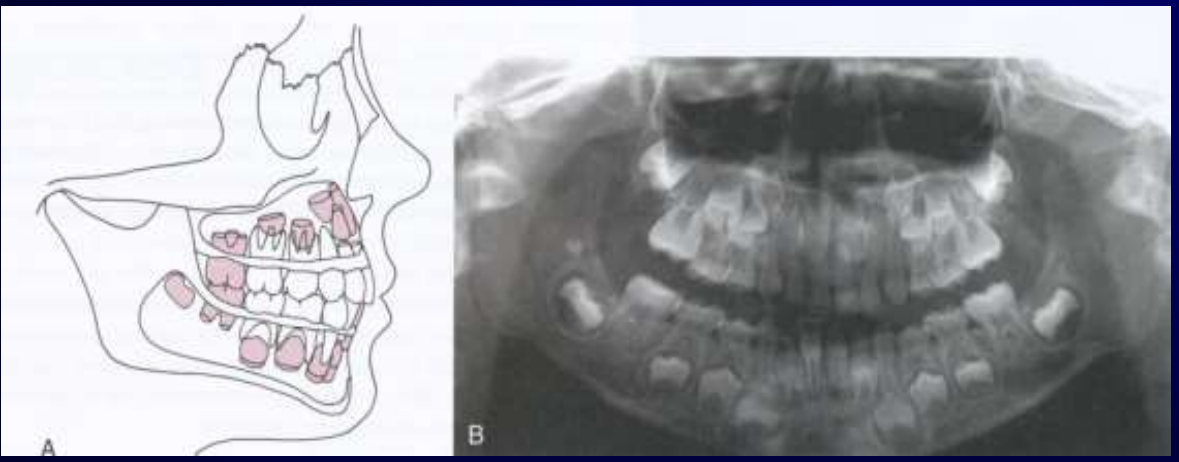


Location of the fracture lines :

- *Medial orbit wall*
- *Lateral orbit wall to sutura frontozygomatica*
- *Processus pterygoideus*
- *Basal part of the nasal septum - septum nasi*
- *arcus zygomaticus*

Chronology of Tooth Development, Permanent Dentition

	CALCIFICATION BEGINS		CROWN COMPLETED		ERUPTION		ROOT COMPLETED	
Tooth	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibul
Central	3 mo	3 mo	4½ yr	3½ yr	7¼ yr	6¼ yr	10½ yr	9½ yr
Lateral	11 mo	3 mo	5½ yr	4 yr	8¼ yr	7½ yr	11 yr	10 yr
Canine	4 mo	4 mo	6 yr	5¼ yr	11½ yr	10½ yr	13½ yr	12¼ yr
First premolar	20 mo	22 mo	7 yr	6¼ yr	10¼ yr	10½ yr	13½ yr	13½ yr
Second premolar	27 mo	28 mo	7¼ yr	7½ yr	11 yr	11¼ yr	14½ yr	15 yr
First molar	32 wk in utero	32 wk in utero	4¼ yr	3¼ yr	6¼ yr	6 yr	10½ yr	10½ yr
Second molar	27 mo	27 mo	7¼ yr	7½ yr	12½ yr	12 yr	15¼ yr	16 yr
Third molar	8 yr	9 yr	14 yr	14 yr	20 yr	20 yr	22 yr	22 yr

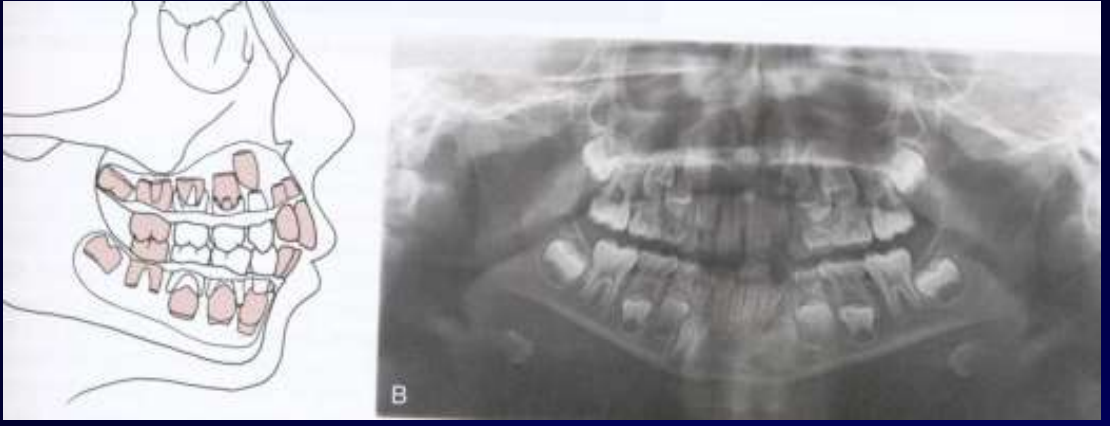


Prvá fáze erupce stálých zubů
First stadium of eruption of the permanent teeth

6 let

Téměř současná erupce M1 v dolní čelisti i horní čelisti a středních řezáků v obou čelistech

Near-simultaneous eruption of rtg mandibular i1´s , m1´s and maxillary m1´s



Dental age 8

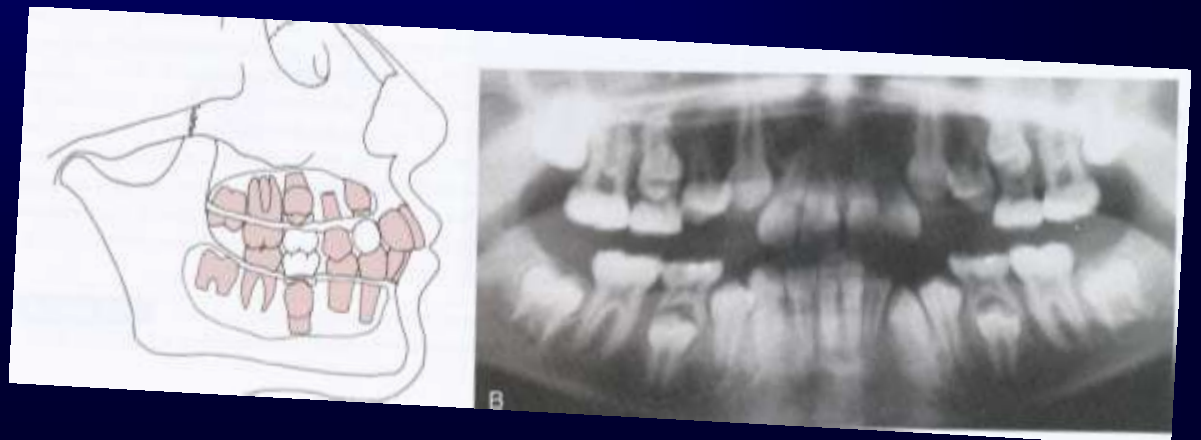
Eruption of the maxillary lateral incisors I2

Dental age 9

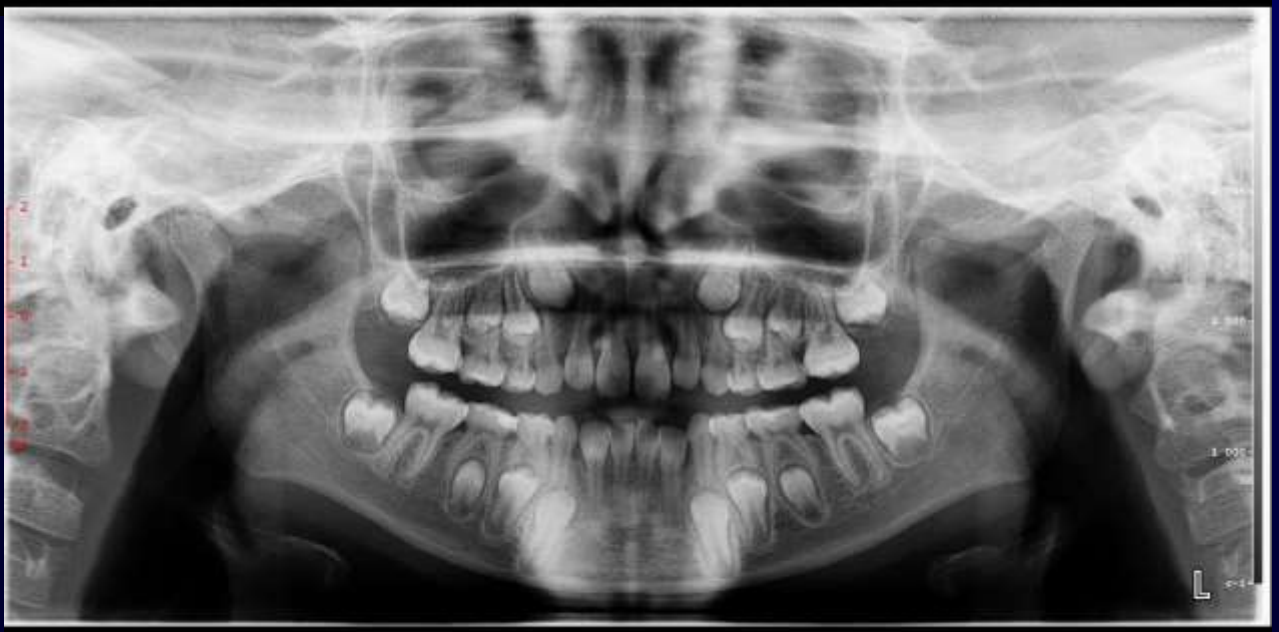
Maxillary I2´s have been in place for 1 year; other I´s and M1´s are complete. Root development of the maxillary C´s and P2´s are beginning, while about one-third of the root of mandibular C and P1´s have been completed.

Dental age 11

More or less simultaneous eruption of the mandibular C´s, P1´s, and maxillary P1´s .

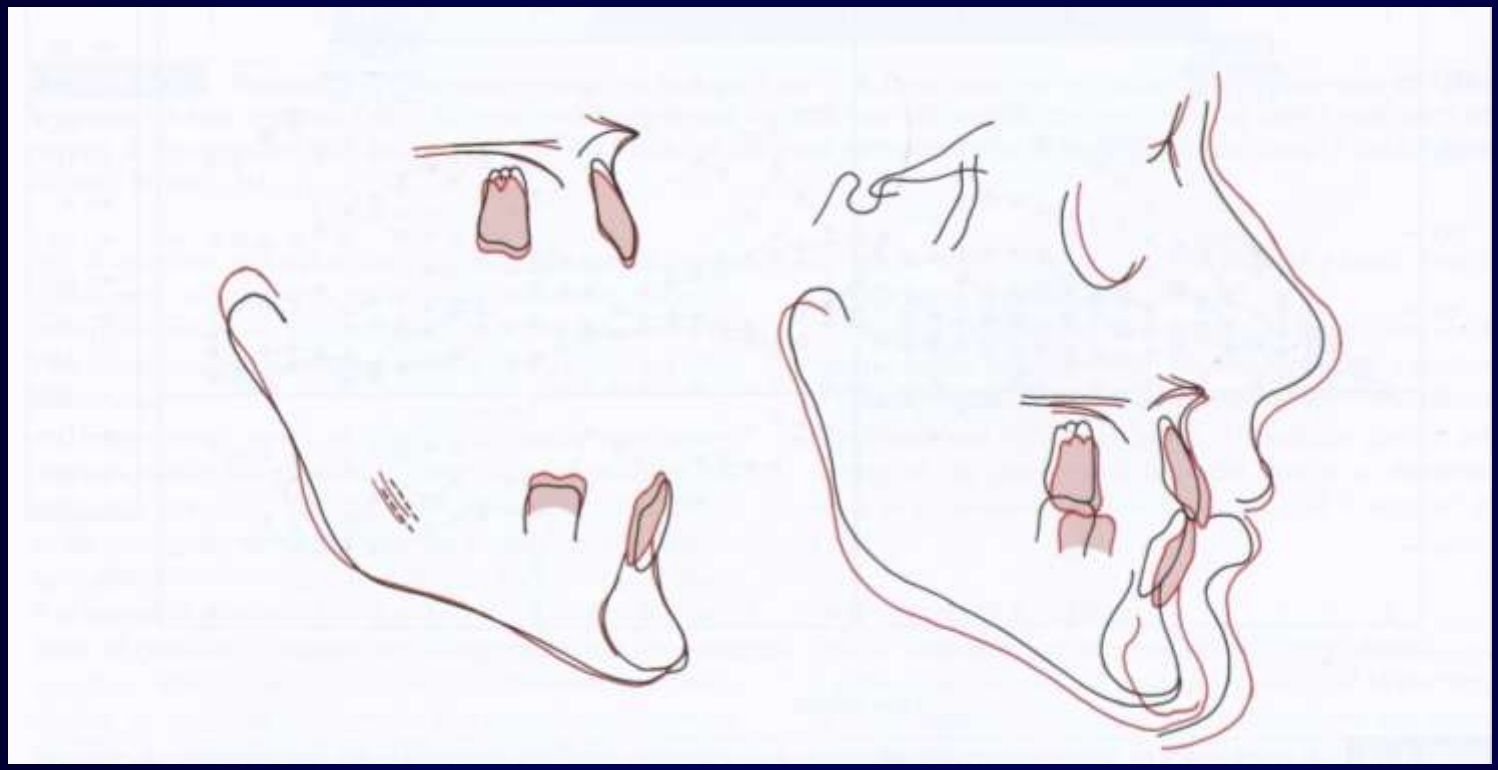


Dívka 8 let
Girl 8 year



Chlapec 8 let
boy 8 year

Obvyklá ´normální´erupce
Physiological eruption



Chlapec
Boy
10 let
10yr

Zuby (v tomto případě moláry) vstupují do okluse
a ramus mandibulae se současně vertikálně prodlužuje

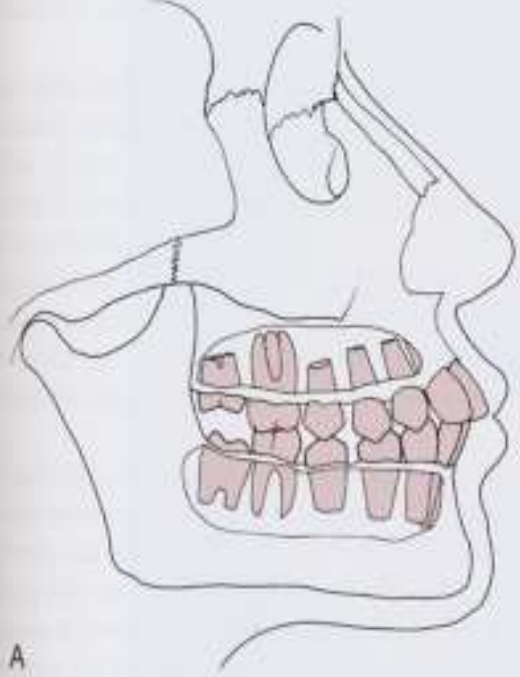
The teeth (in this case the molars) enter the occlusion and the mandible ramus is simultaneously vertically elongated

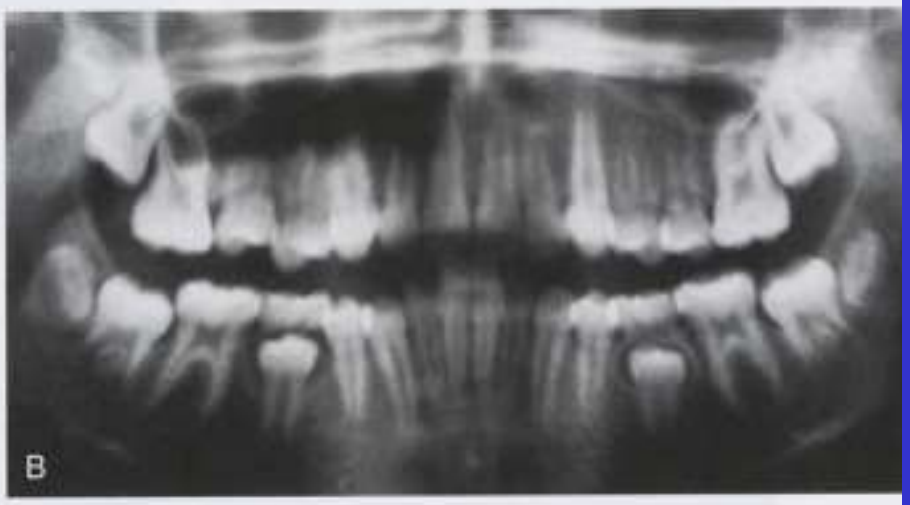
Dívka 11 let
Girl 11 year

Chlapec 11,5 let
boy 11,5 year

Dívka 14,5 let
Girl 14,5 year

Chlapec 11,5 let
boy 11,5 year



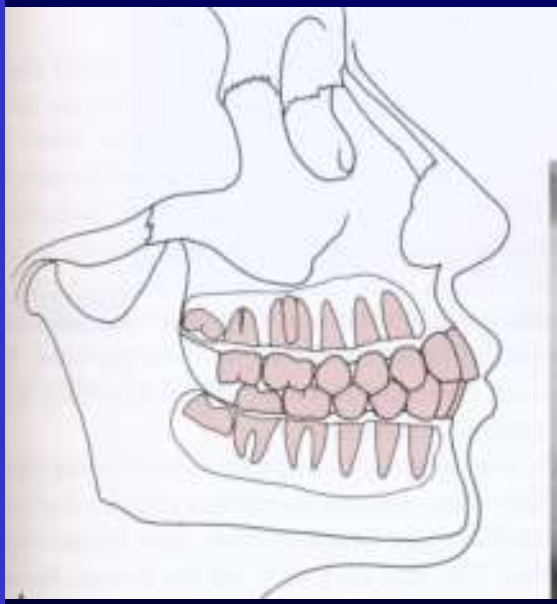


dental age 12

Eruption of the remaining succedaneous teeth (maxillary C and maxillary and mandibular P2´s) and typically a few month later the maxillary and mandibular M2´s

dental age 15

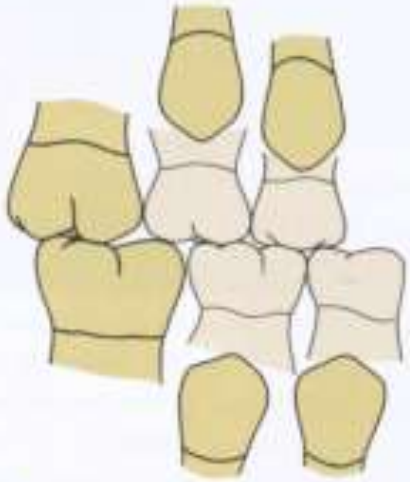
the roots of all permanent teeth (except wisdom teeth) are complete; crowns of M3 is seen



Dívka 20 let
Girl 20 year

Chlapec 20 let
boy 20 year

Rozdíl ve velikosti dočasných a stálých molárů na RTG

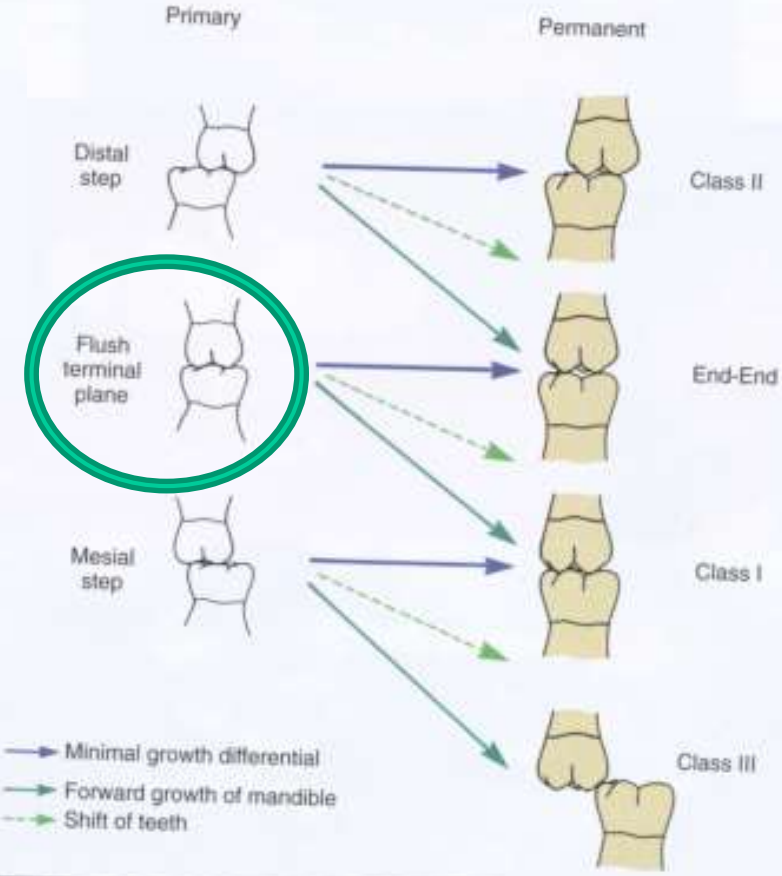


The size difference between the primary molars and permanent premolars, as would be observed in a panoramic radiograph.

vztah mezi stálými moláry má tendenci se měnit (vzájemně posunout) pod vlivem růstového spurtu v dospívání (viz šipky).

Růst čelisti a posun stoliček určuje konečný molární vztah ve stálém chrupu.

Propojenost žvýkacích ploch mezi dočasnými moláry

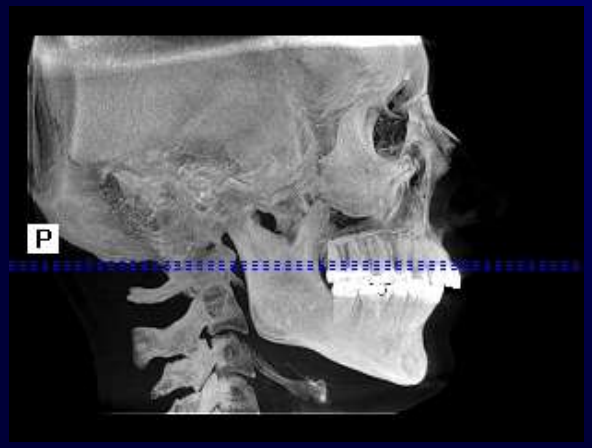


Occlusal relationships of the primary and permanent molars. The flush terminal plane relationship, shown in the middle left, is the normal relationship in the primary dentition. When the first permanent molars erupt, their relationship is determined by that of the primary molars. The molar relationship tends to shift at the time the second primary molars are lost and the adolescent growth spurt occurs, as shown by the arrows. The amount of differential mandibular growth and molar shift into the leeway space determines the molar relationship, as shown by the arrows as the permanent dentition is completed. With good growth and a shift of the molars, the change shown by the solid black line can be expected. (Modified from Moyers RE. Handbook of Orthodontics. 3rd ed. Chicago: Year Book Medical Publishers; 1973.)

Okluse mezi dočasným i a stálými moláry

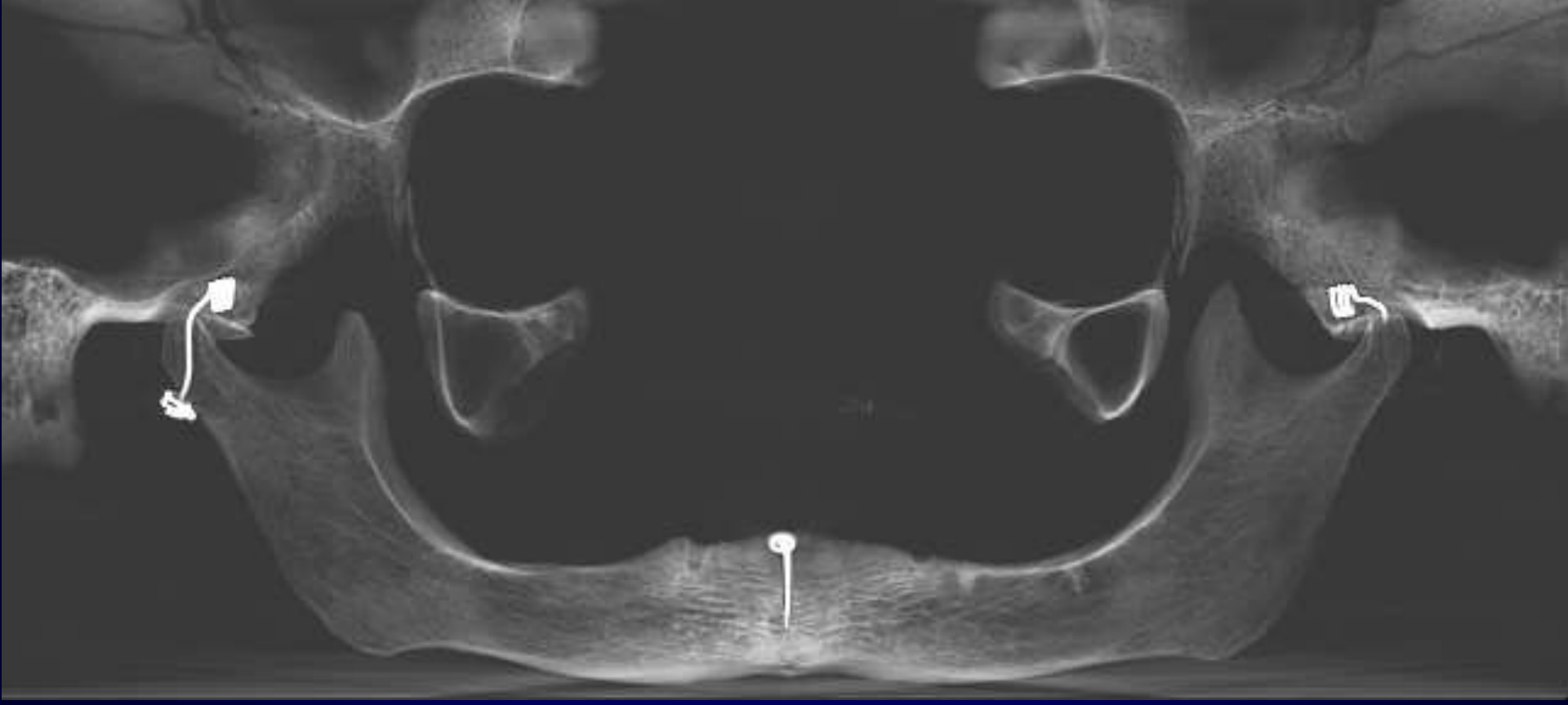
Propojenost žvýkacích ploch mezi stálými moláry

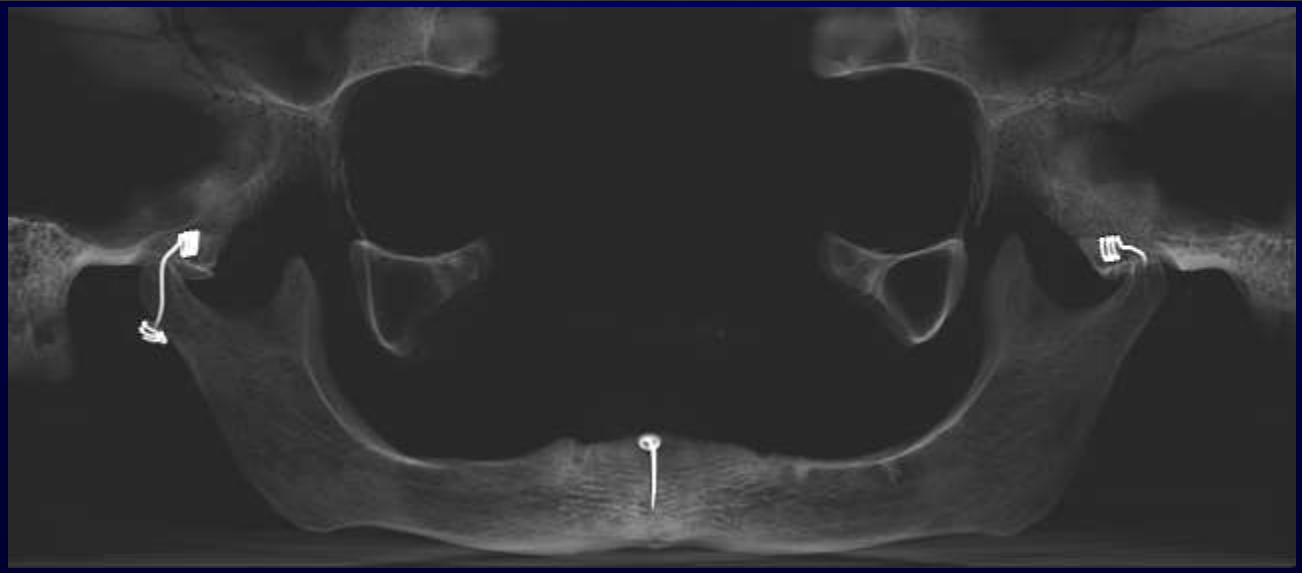
Muž 40 let



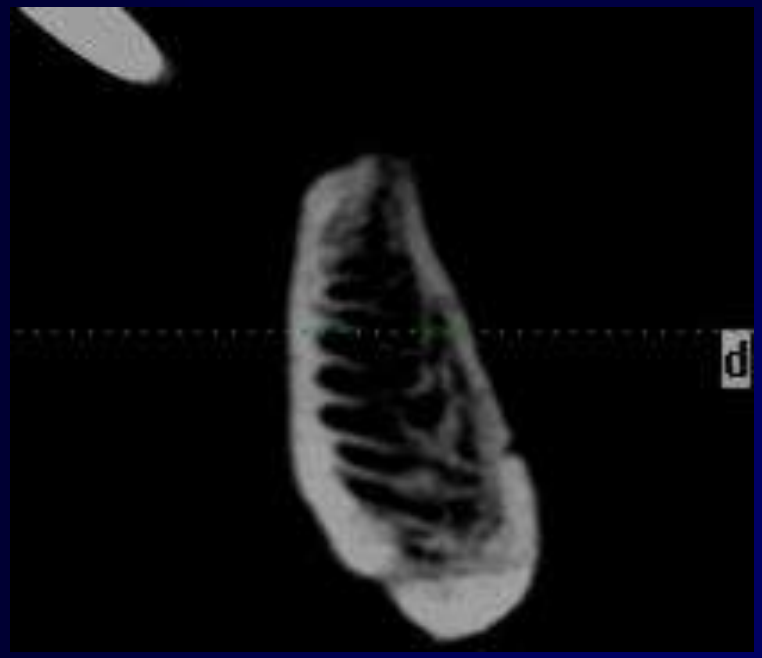
male

79 let
79 year

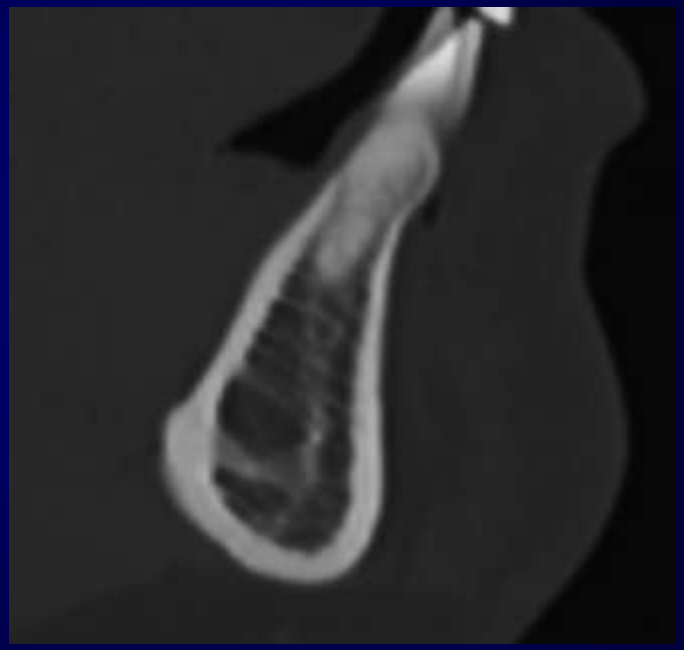




Symphysis region



Man´s skull 79 let 79 year



Man´s head 40 let 40 year

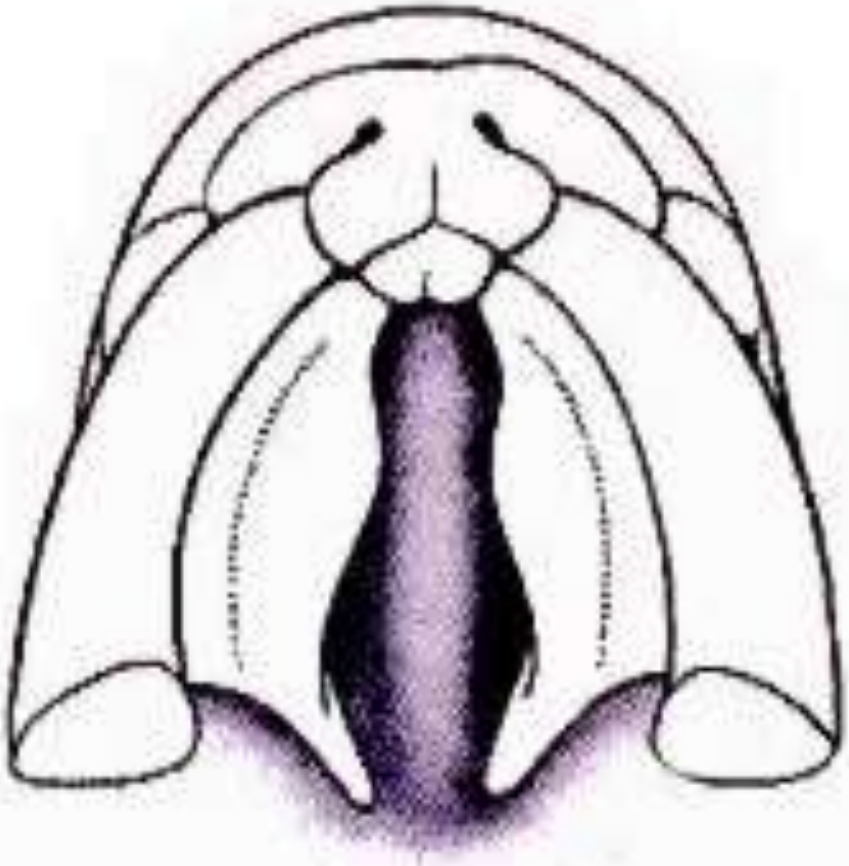
Utváření sekundárního patra

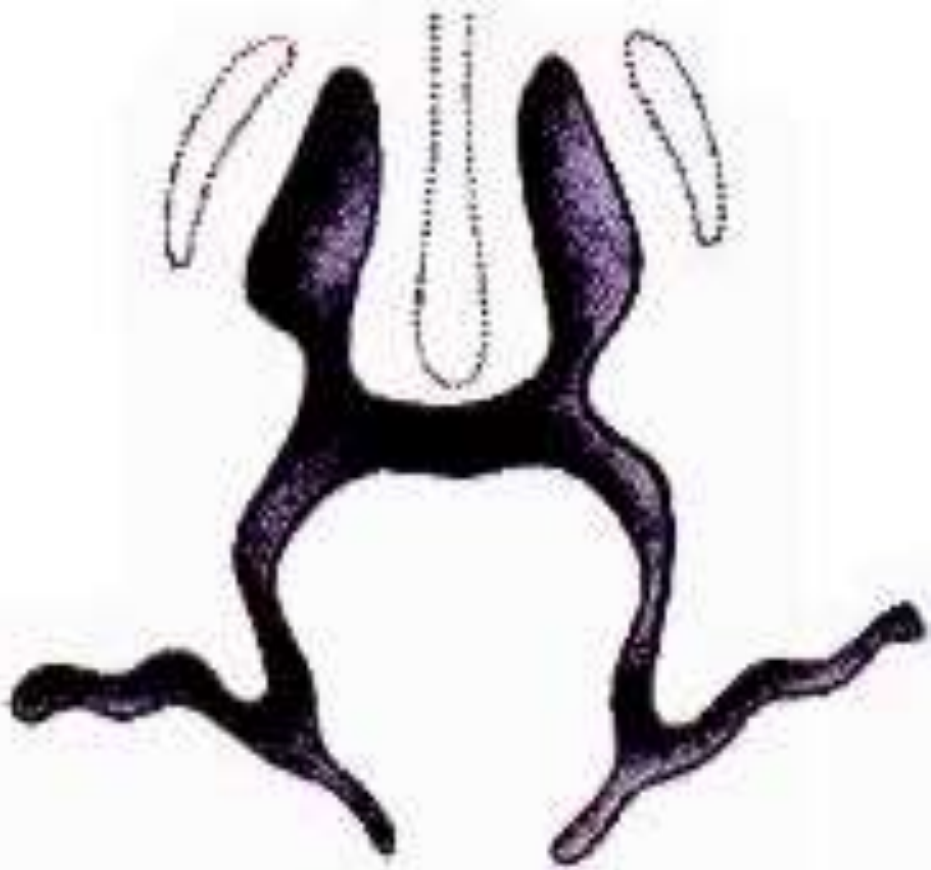
6.5-week-old embryo.

The palatine shelves are in the vertical position on each side of the tongue.

The shelves have elevated, but they are widely separated.

The primary palate has fused with the secondary pala tal shelves.






A
B
C
D

Rozštěpy

vícefaktorový

Protikřečové látky

(phenobarbital, diphenylhydantoin)

Cytostatika

Imunosupresiva, Tetracyklin,

Záření

Diabetes

Hypoglykemické stavy

Epilepsie

Stres

kortikoidy

! Preventivně léčit rozštěpy do druhého měsíce těhotenství !

Včas prenatálně diagnostikovat po třetí kritické periodě a zvážit přerušení těhotenství

Nespojení zárodečných výběžků obličeje

Vrozené a teratogenní vlivy (doba kritické periody a délka působení látky)

tři kritické periody:

25.- 35. den izolovaný rozštěp rtu

37.- 53. den izolovaný rozštěp patra poškozením plotének

53.-57. den izolovaný rozštěp patra zpomalením růstu dolní čelisti

20 procent – dědičnost

10 procent – zevní prostředí (matka, rtg.)

70 procent - nezjištěno

****