

The Aging Voice

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 - Pan-American Vocology Association
 - American Choral Directors Association
- **Author of: *The Evolving Singing Voice: Changes Across the Life Span***

The Evolving Singing Voice

Changes Across the Lifespan

KAREN BRUNSSSEN



PLURAL
PUBLISHING
INC.

At every age, vocal function is dependent upon how the body is progressively and constantly changing.

The Evolving Singing Voice

(available on Amazon or www.pluralpublishing.com)

Growth and development changes directly impact the singing voice.

A deeper understanding of chronological development offers a "lifetime perspective" for optimal, realistic potential at every age.

Senior Singer Realities

Every age has its limitations.
There are no age limits for singing

Less oxygenation
Take more breaths

Muscles loose 30% of strength by age 80
Challenge your support

Vagus nerve slower
Challenge coloratura

Lungs and bronchial function diminishes 40% from years 40 – 80
Slower recoil of lungs
Need more time for breath

Hearing loss
Affects internal and external sense of sounds
Concentrate

Registration narrows
Slower Vibrato
Less color in sound
Mindful efforts

Memory affected by loss of neurons
Use music

Water content lowers newborns 80% adults 60%
Drink more water

Reflexes are slower
Concentrate
Challenge them

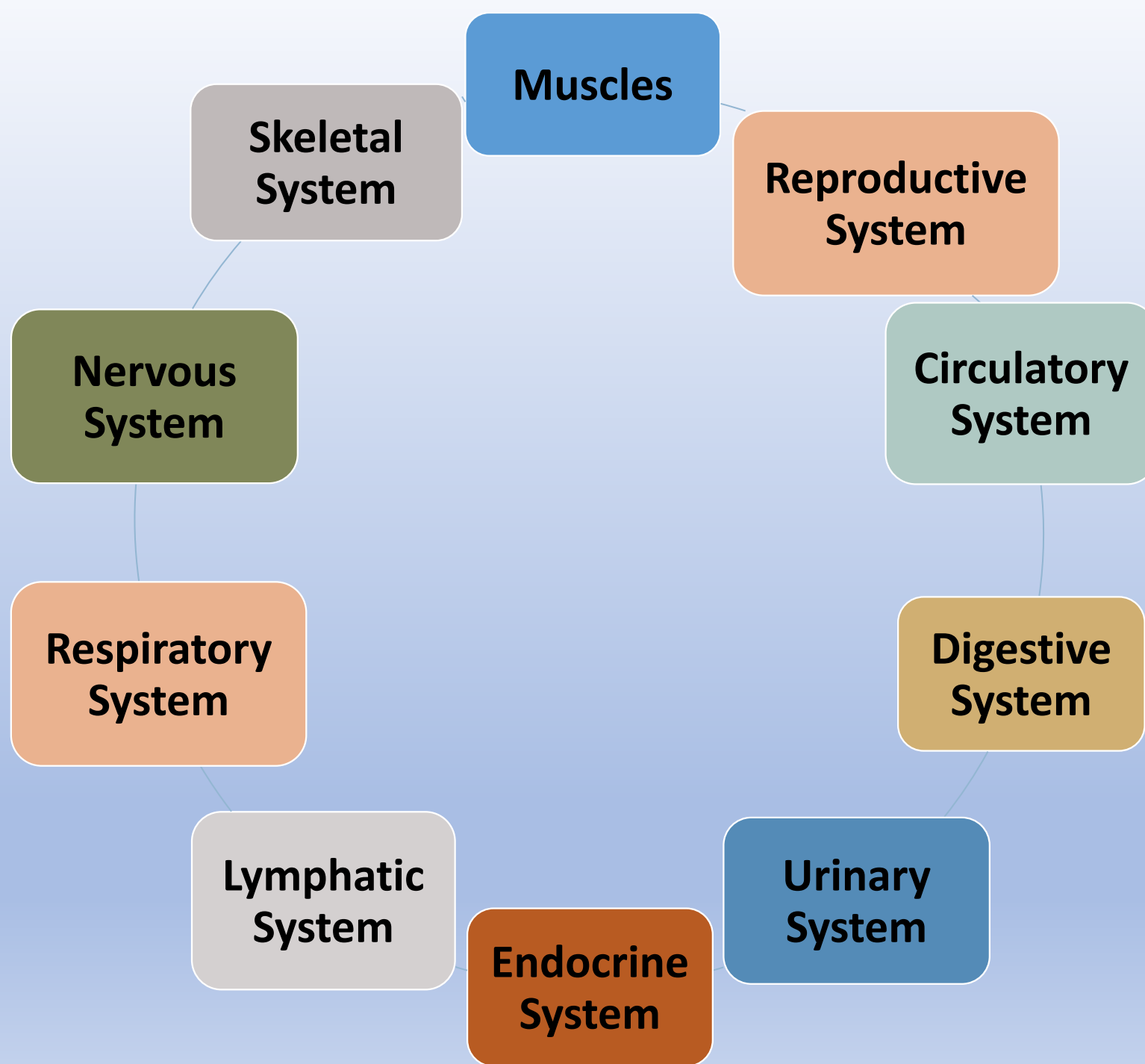
Harder to stand for a long time
Sit or use a stool as needed



**Musicianship,
communication,
passion, and
expression
have no age
limits!!**

**Time Talent Experience
Interest Socialization
Engagement Lifelong Learning
Mental, Emotional, Physical
Activity and Health**



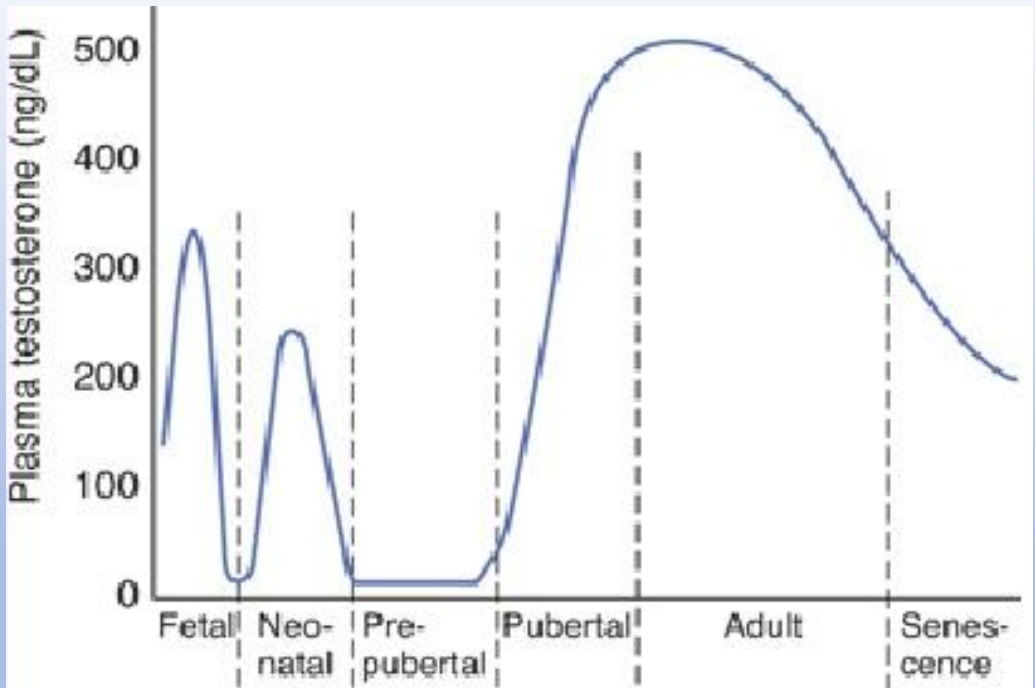
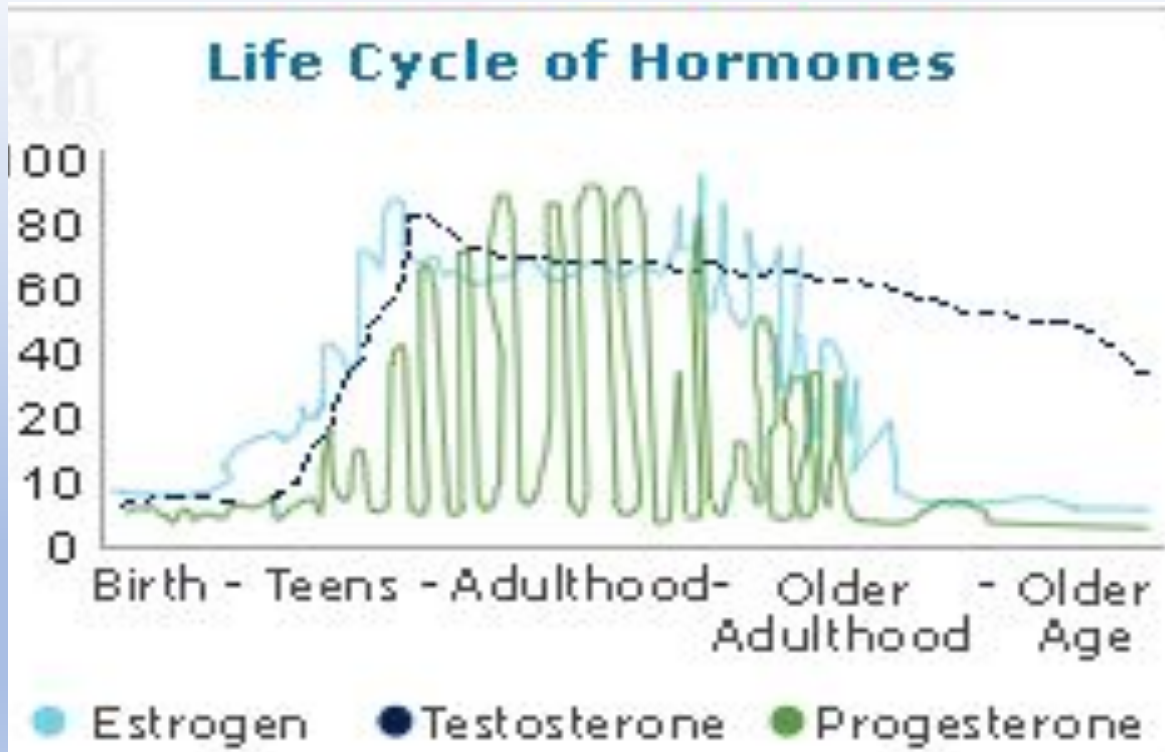


The Aging Voice

- 1. Hormones**
- 2. Innervation / Vagus Nerve**
- 3. Respiration / exercises**
- 4. Vibration / exercises**
- 5. Resonance / exercises**

FEMALE

MALE



Source: Barrett KE, Barman SM, Boitano S, Brooks H: *Ganong's Physiology, 23rd Edition*; <http://www.accessmedicine.com>

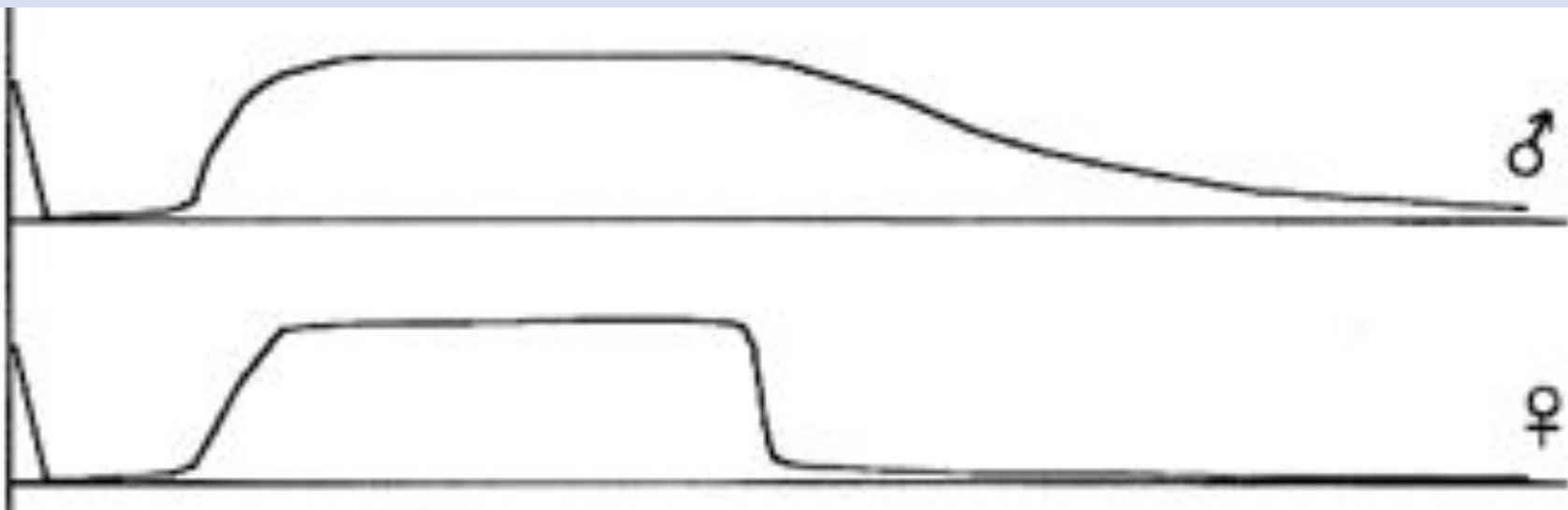
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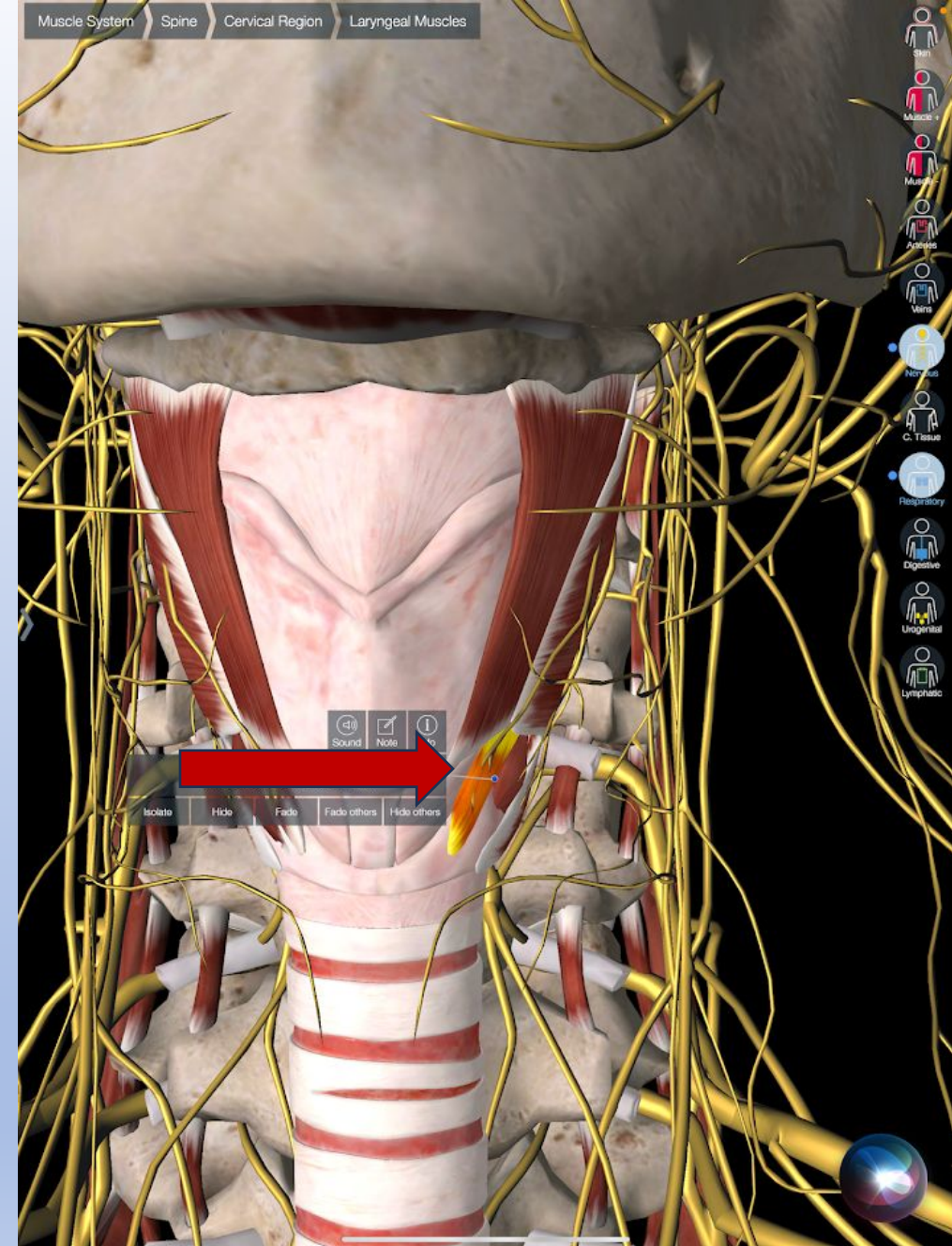
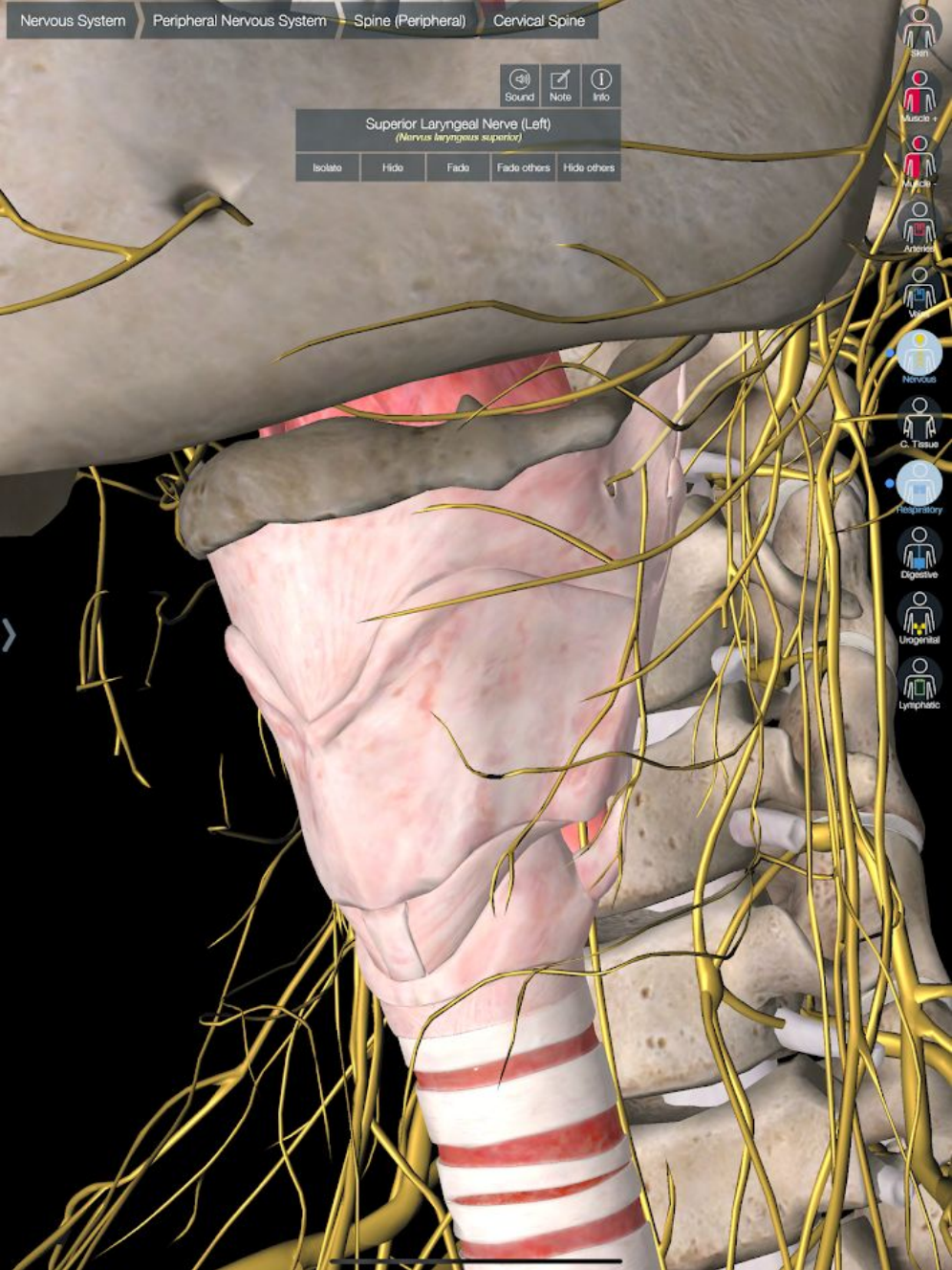
**Testosterone or
Dihydrotestosterone**

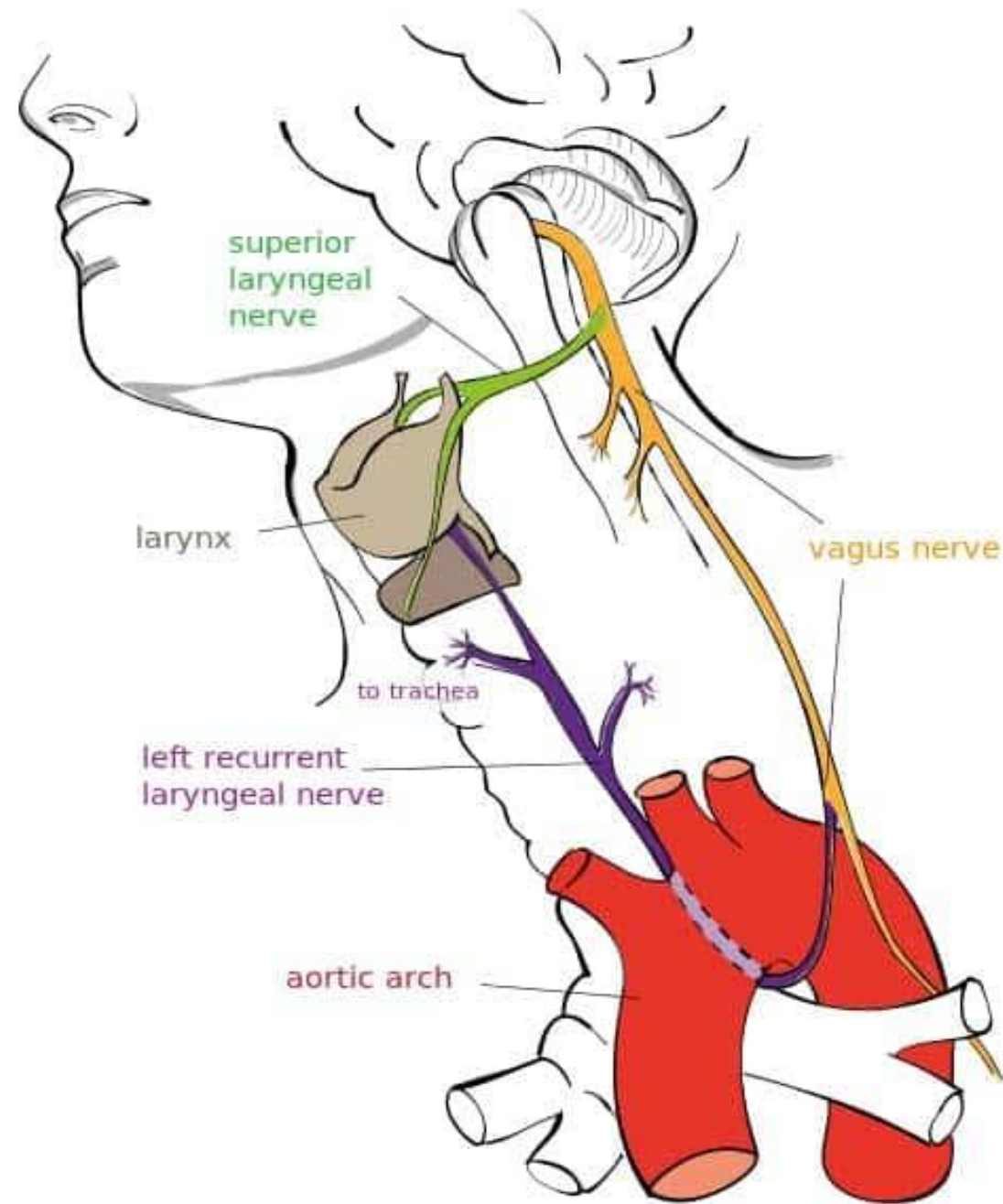
Estradiol

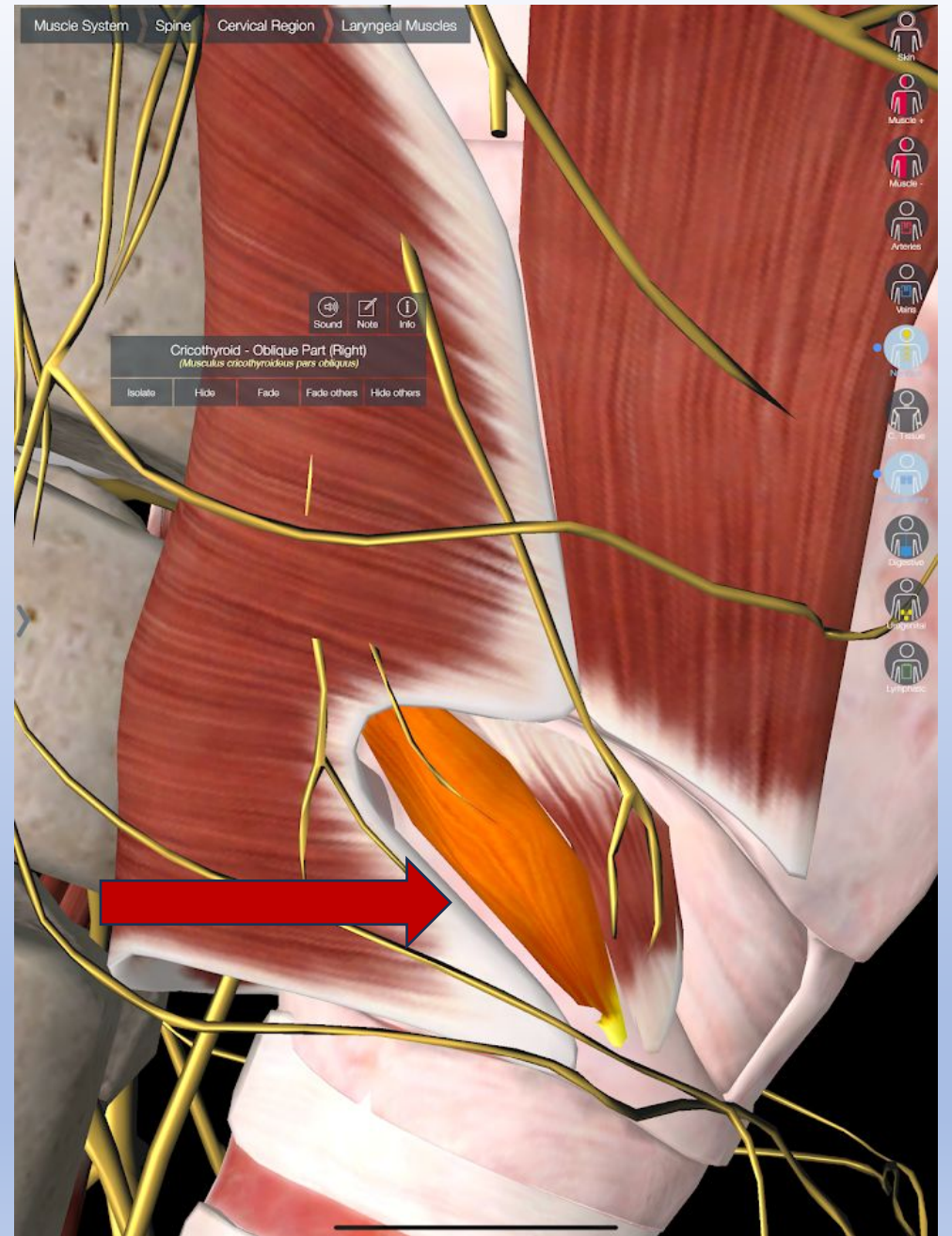
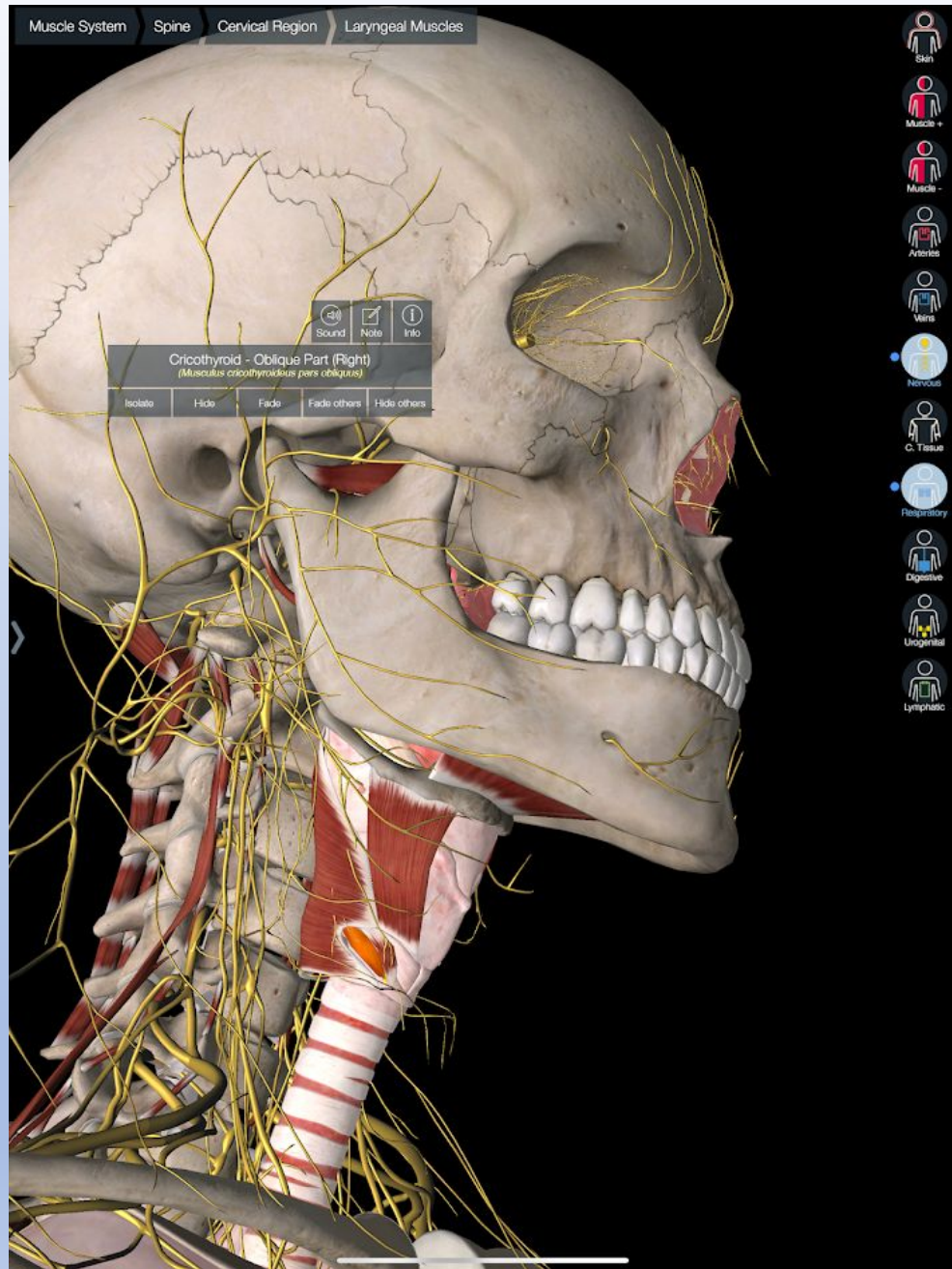
♂

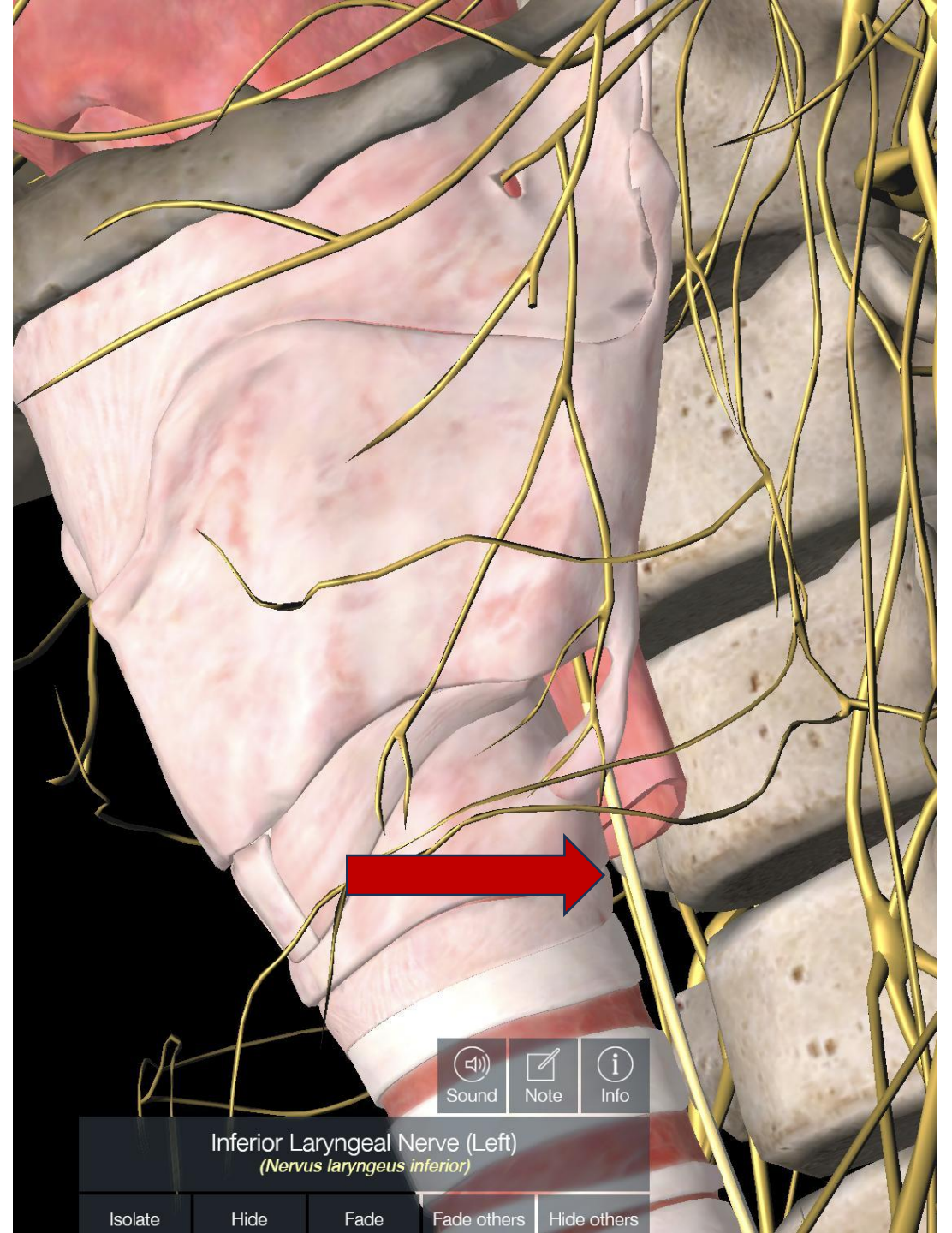
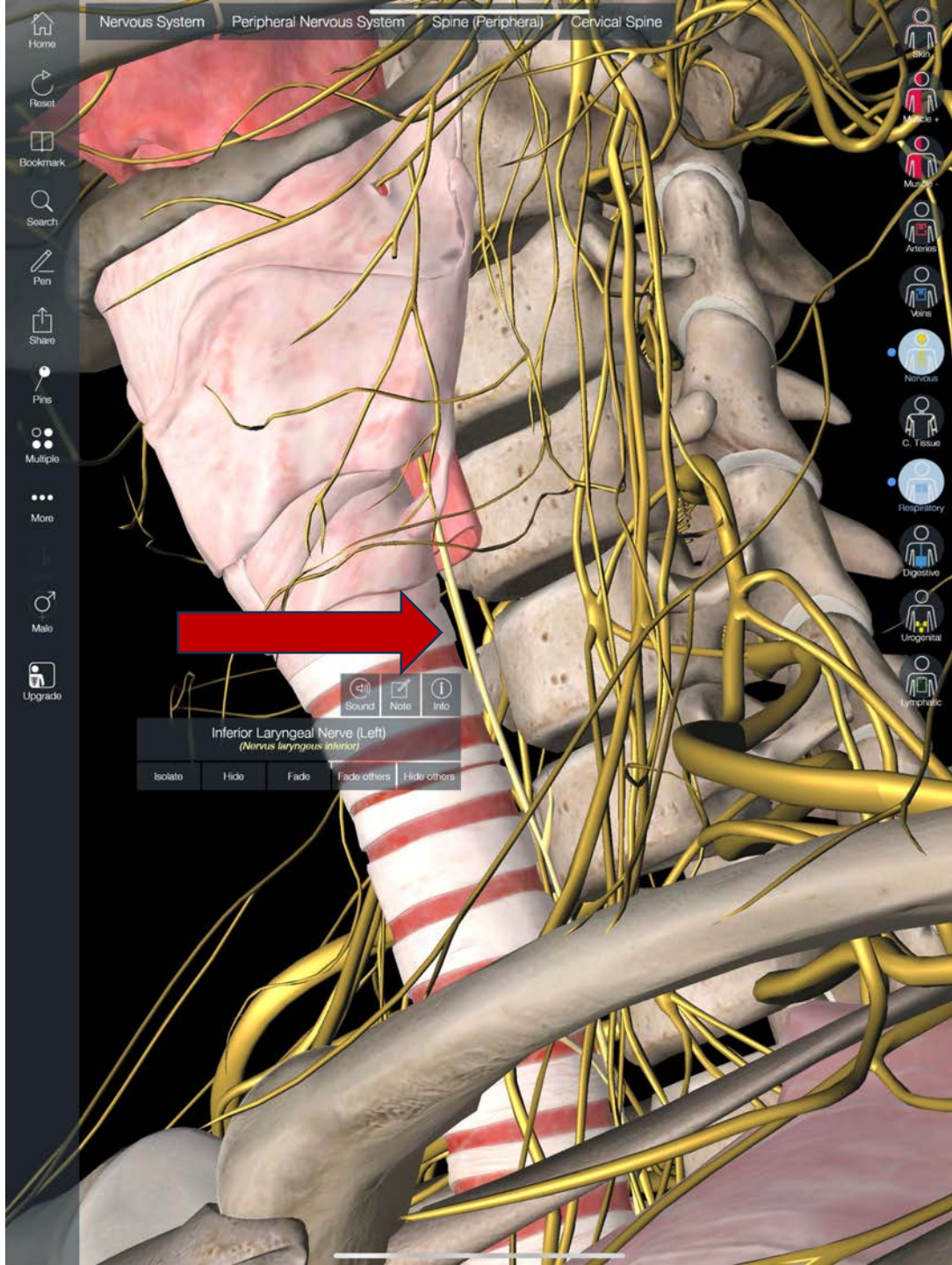
♀











Singing is the interaction of:



RESPIRATION

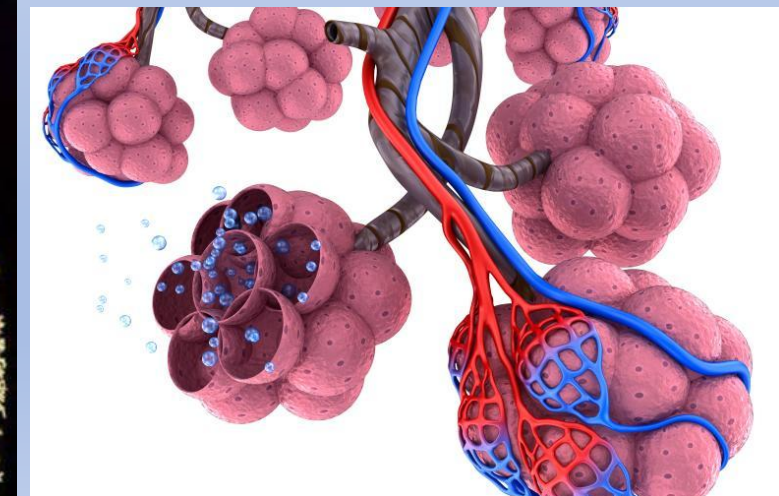
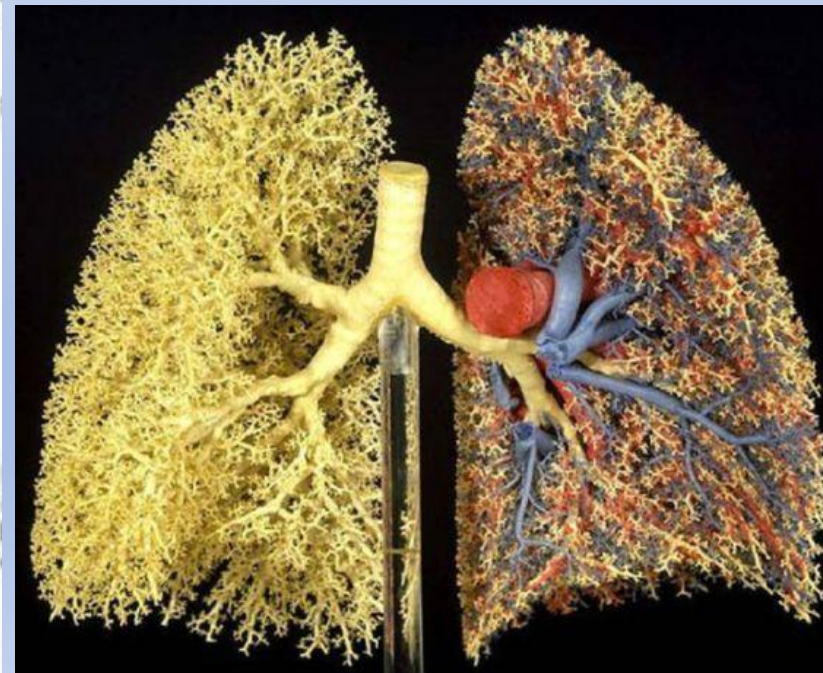
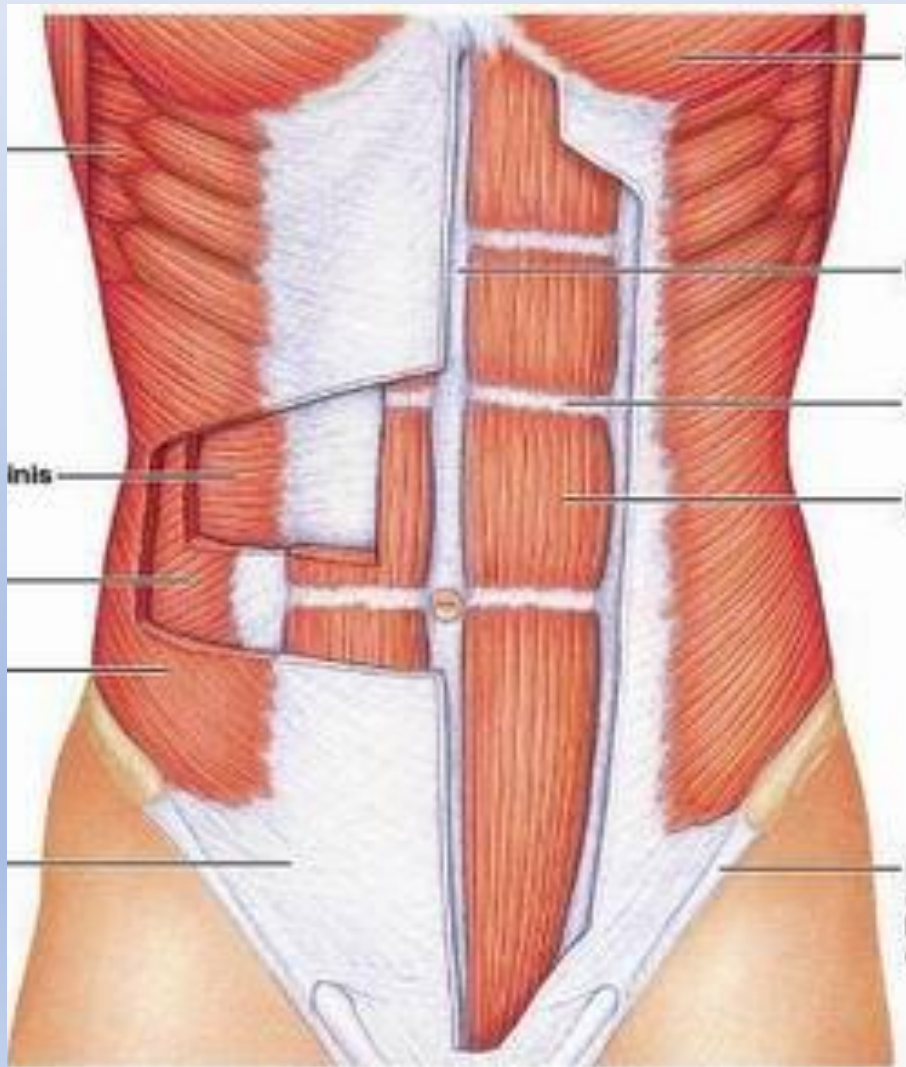
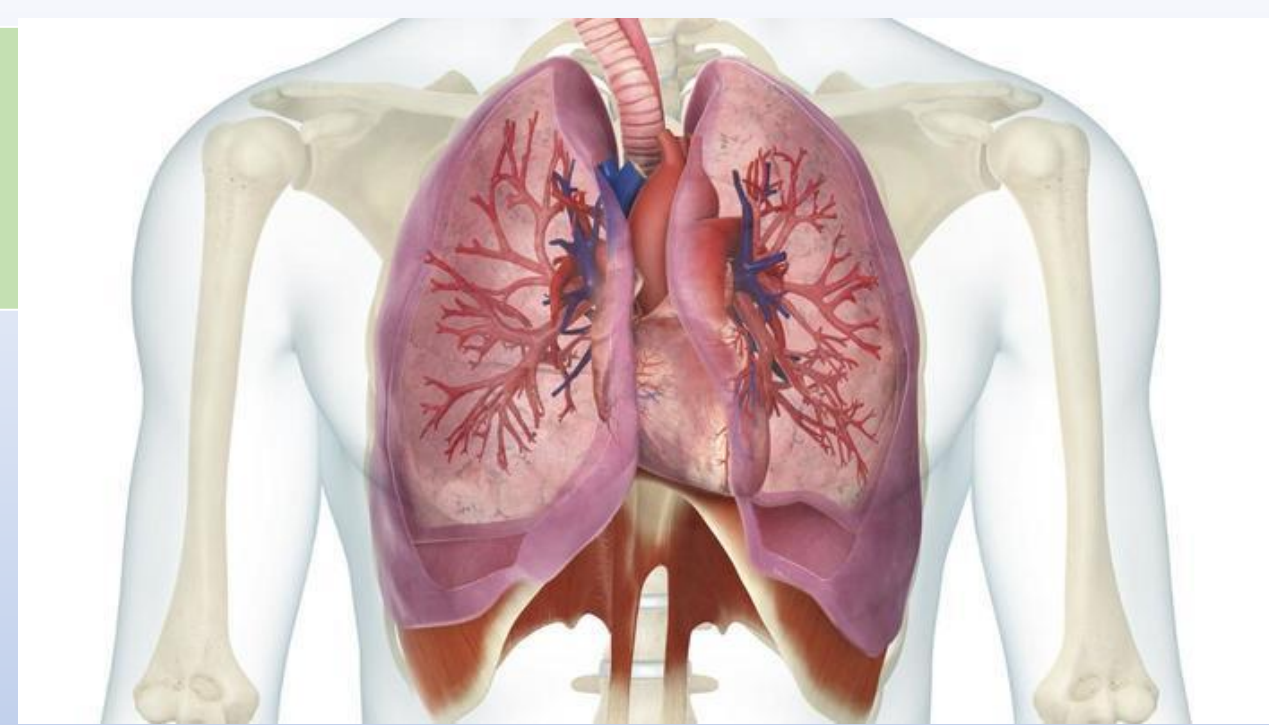
Air flow that causes vibration

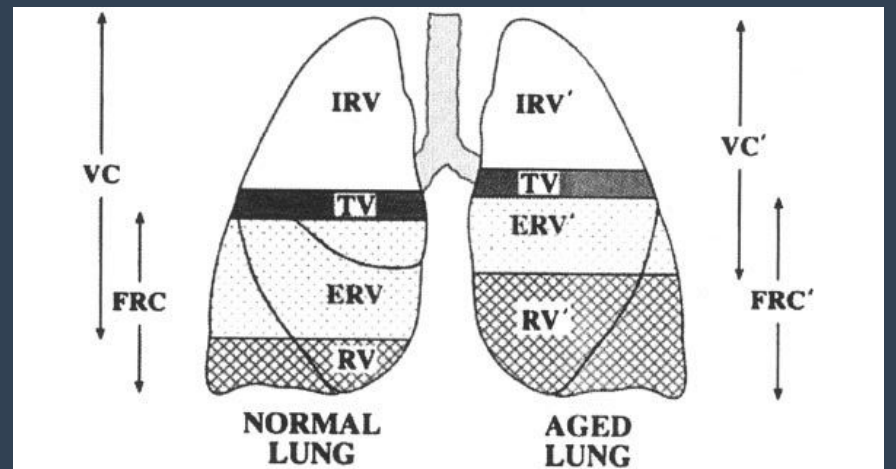
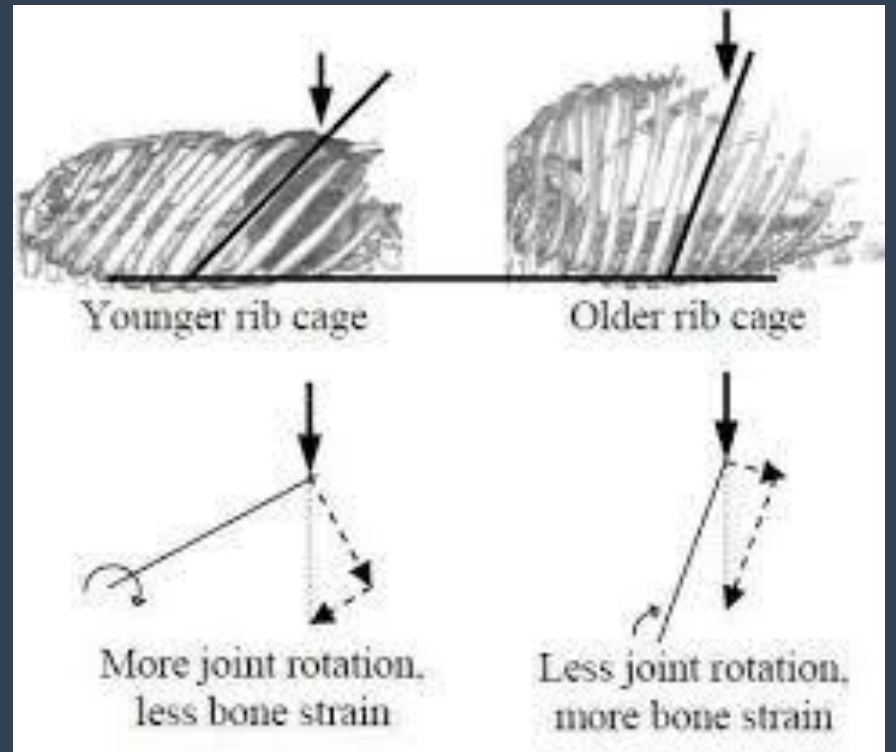
Air pressure variations for 5 textures of singing:

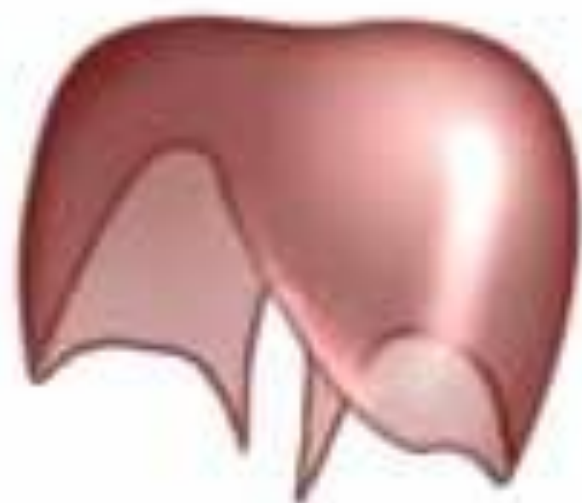
legato, staccato, coloratura, messa di voce, articulation

Breath pressure and expressivity

Moving air to sing is a big physical activity!







The diaphragm
is shaped
like a parachute



EXERCISES for BREATH SUPPORT

5 places to feel support muscle engagement

SOVTE VVVVVV 1 3 5 8 5 3 1 OR 1 3 5 3 1

- a. **Obliques**
- b. **Pecs**
- c. **Upper Back**
- d. **Pelvic Bone Area**
- e. **Rearend**

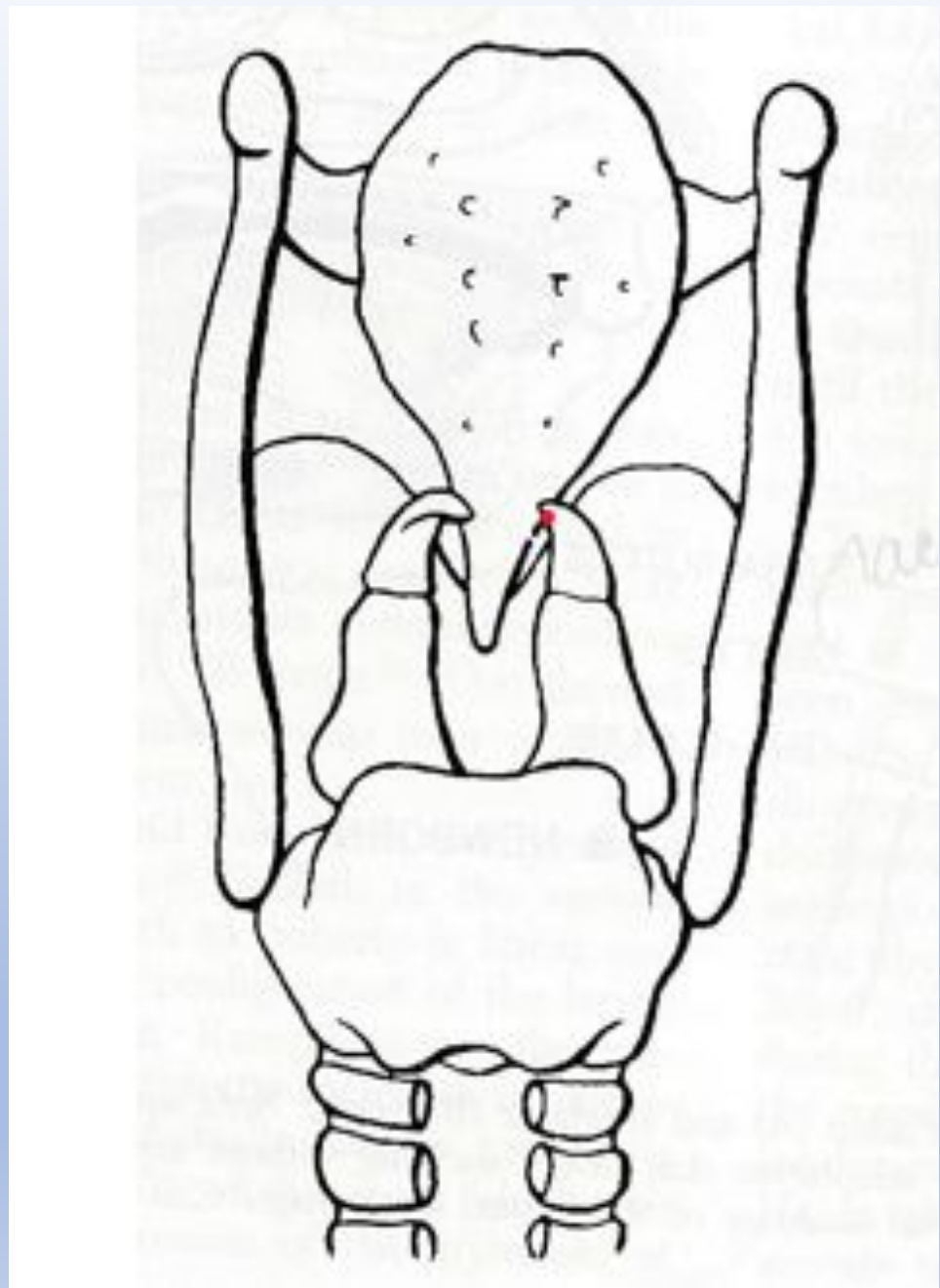
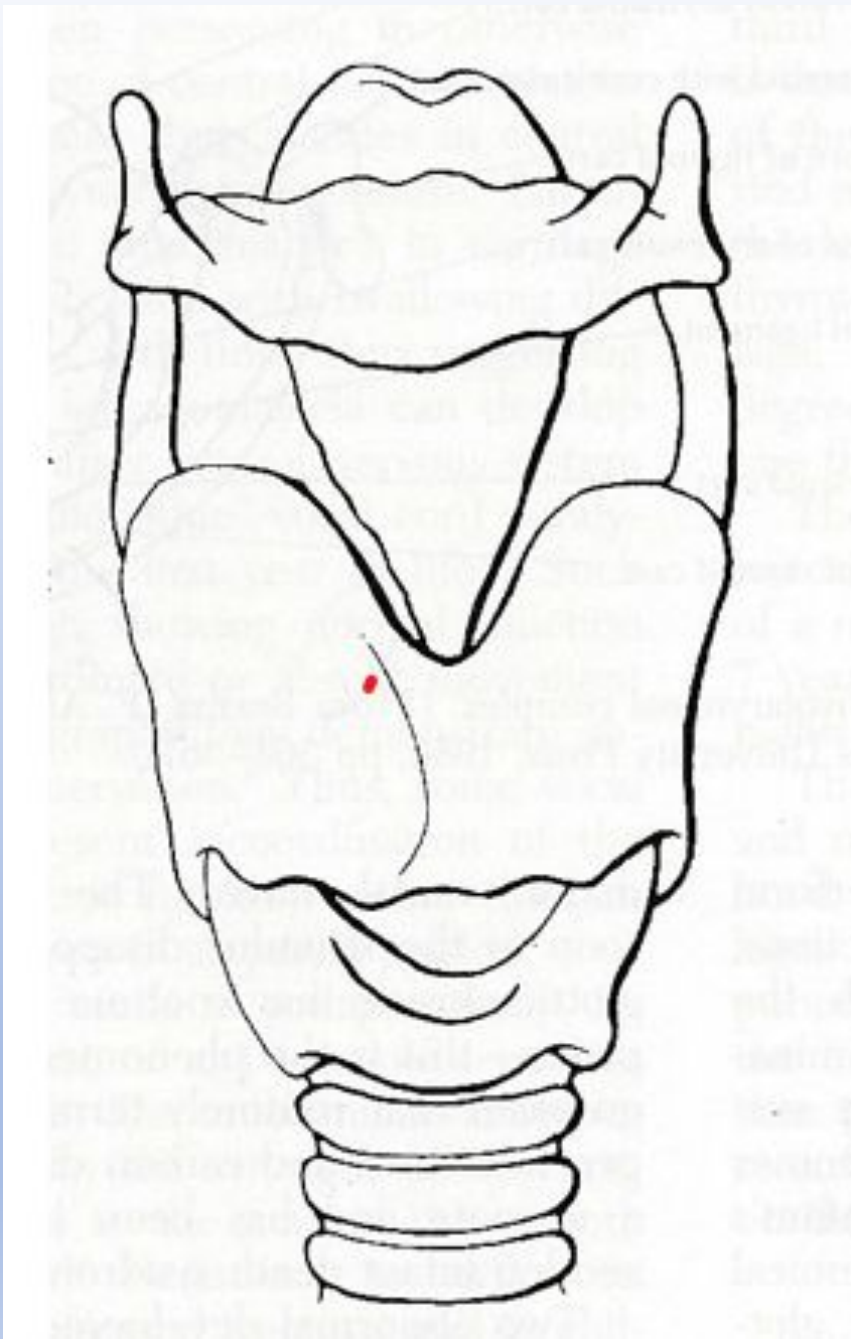
Unvoiced to Voiced Consonants

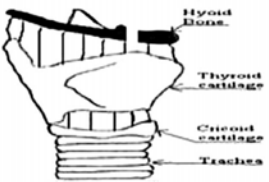
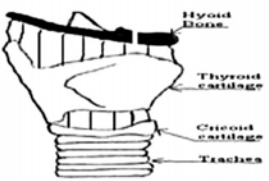
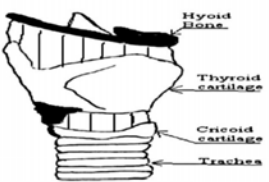
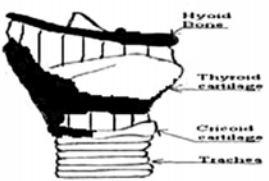
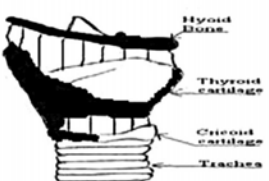
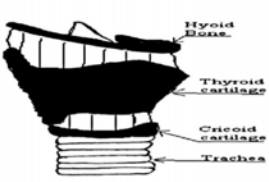
- a. **FFFF - VVVV**
- b. **SSSS - ZZZZ**
- c. **SHSHSHS - ZHZHZH**
- d. **ththththth - THTHTHTH**

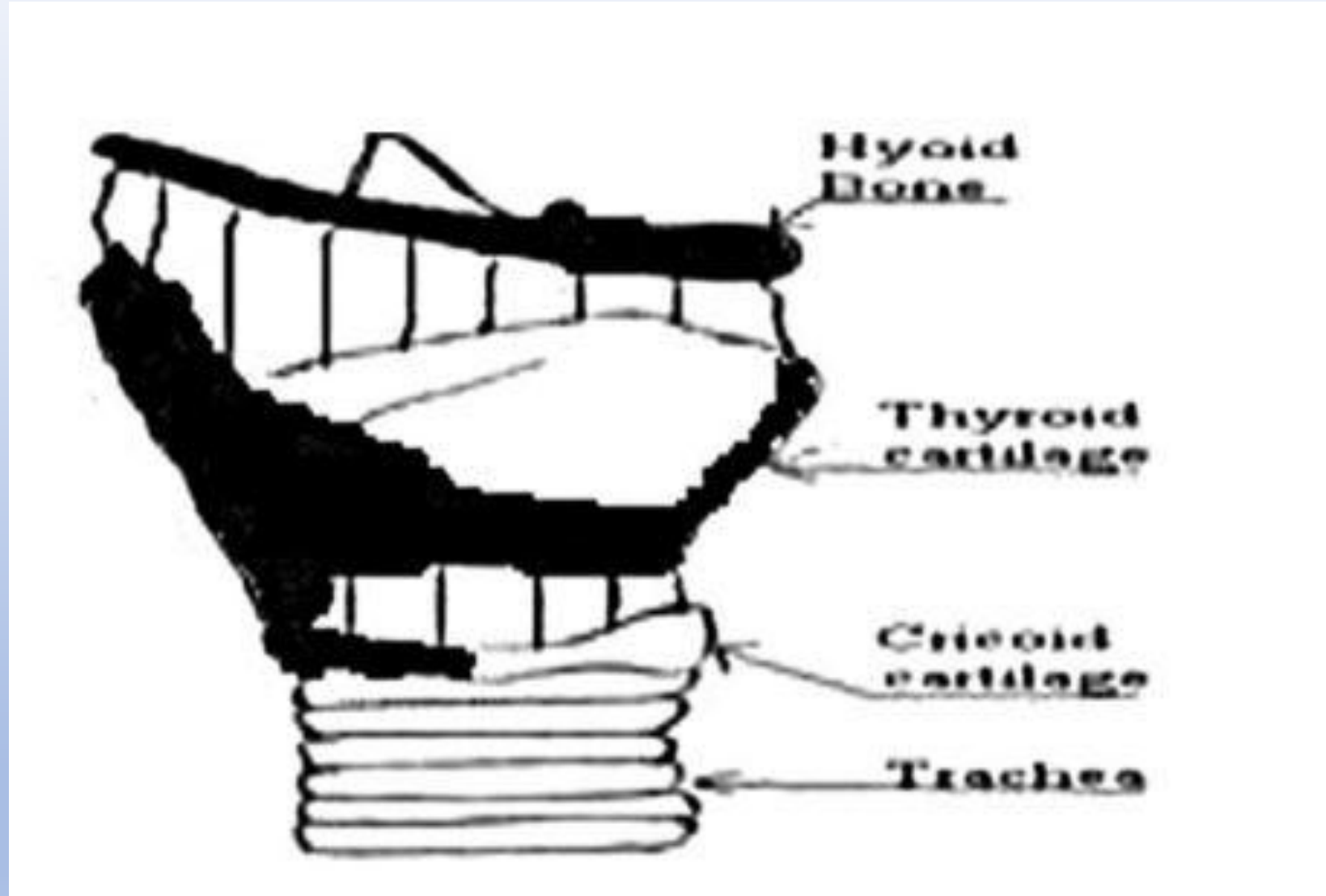
VIBRATION

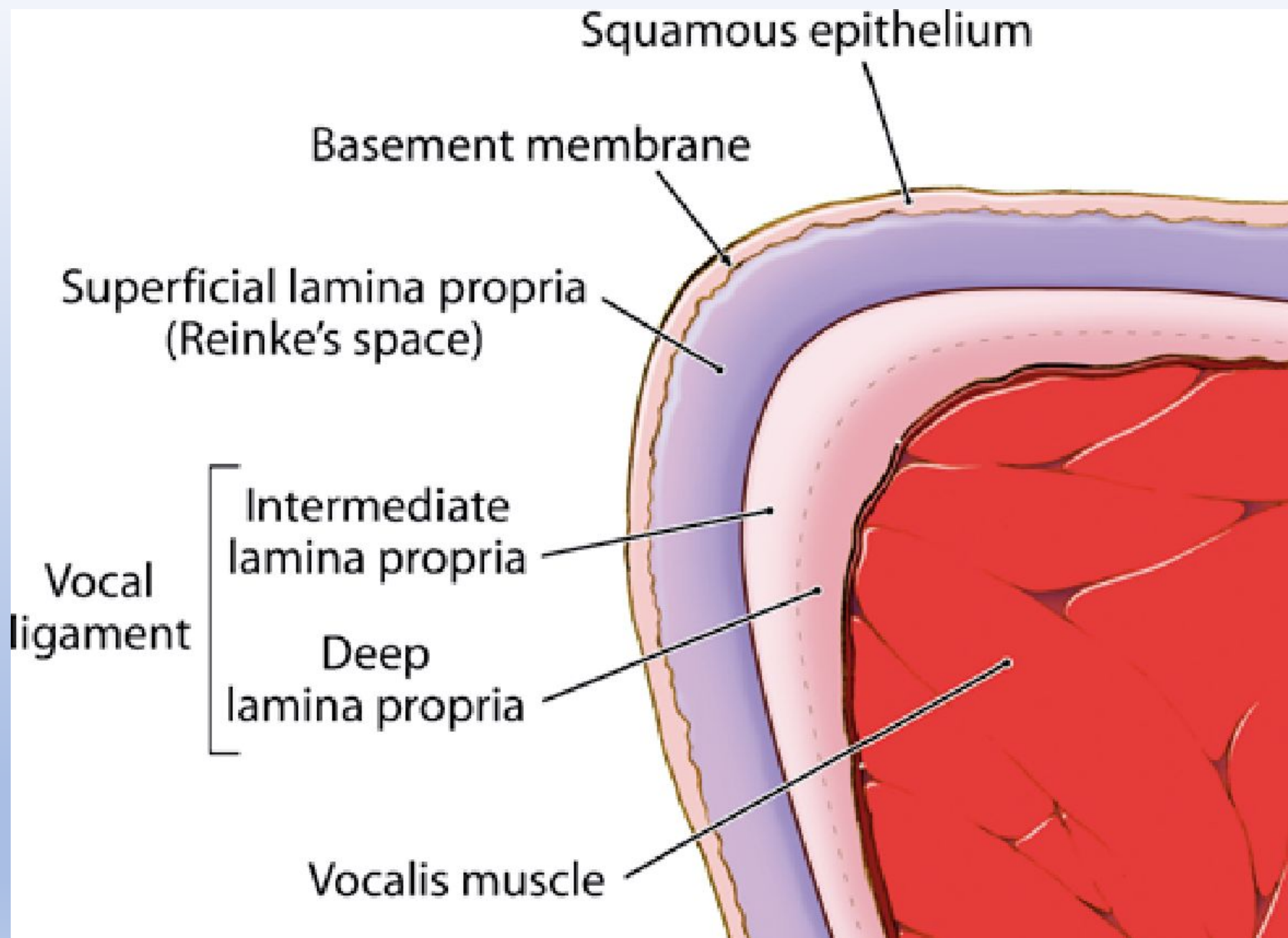
The source of human vocal sounds

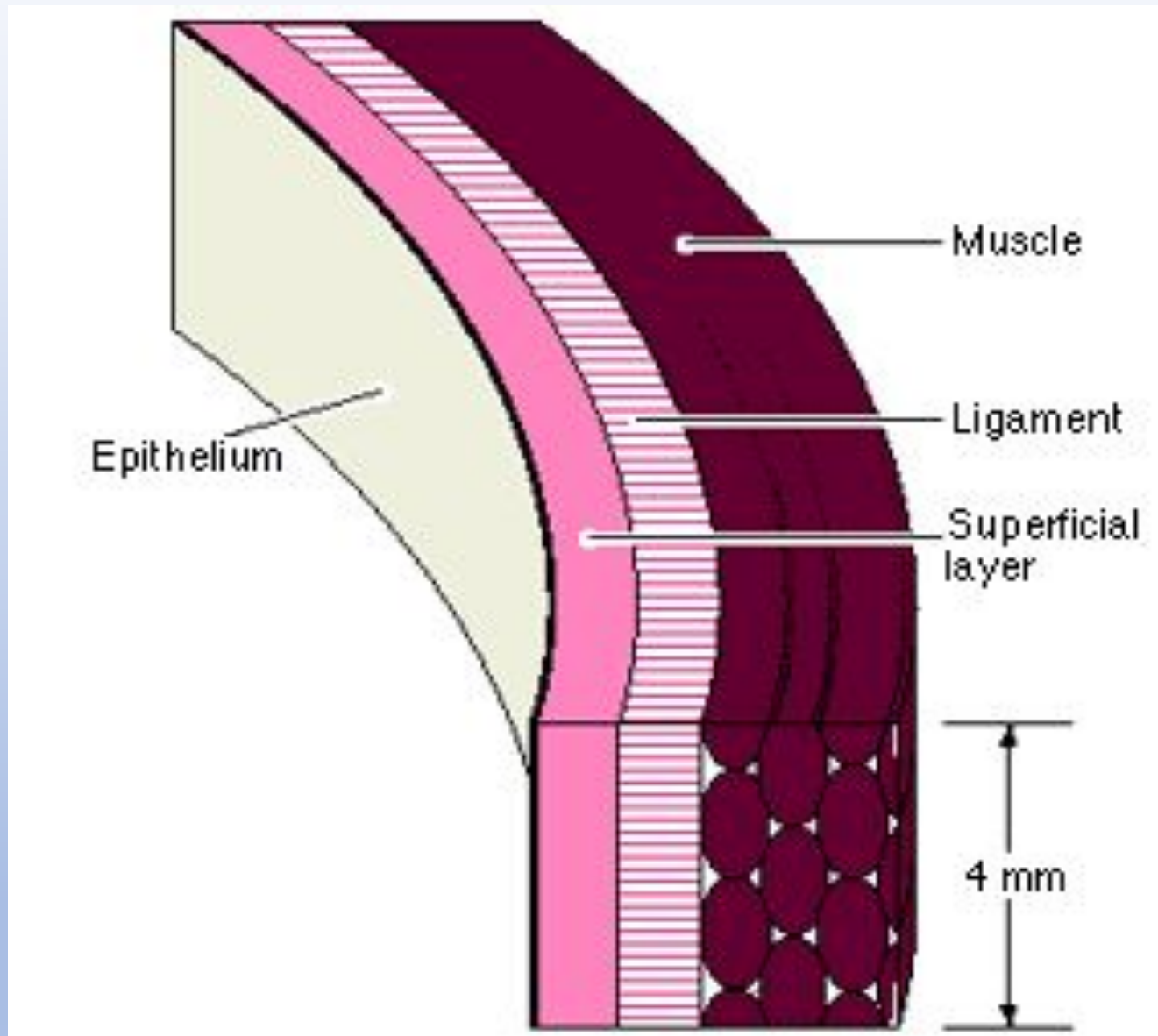
Vocal folds ripple as the air is
alternately trapped and then released



Age (years)	Predicted ossification in the decade
0-9	
10-19	
20-29	
30-39	
40-49	
>50	







<http://www.ncvs.org/ncvs/tutorials/voiceprod/tutorial/cover.html>

A blueprint: the human vocal fold

The surface is much like the inside of your cheek →

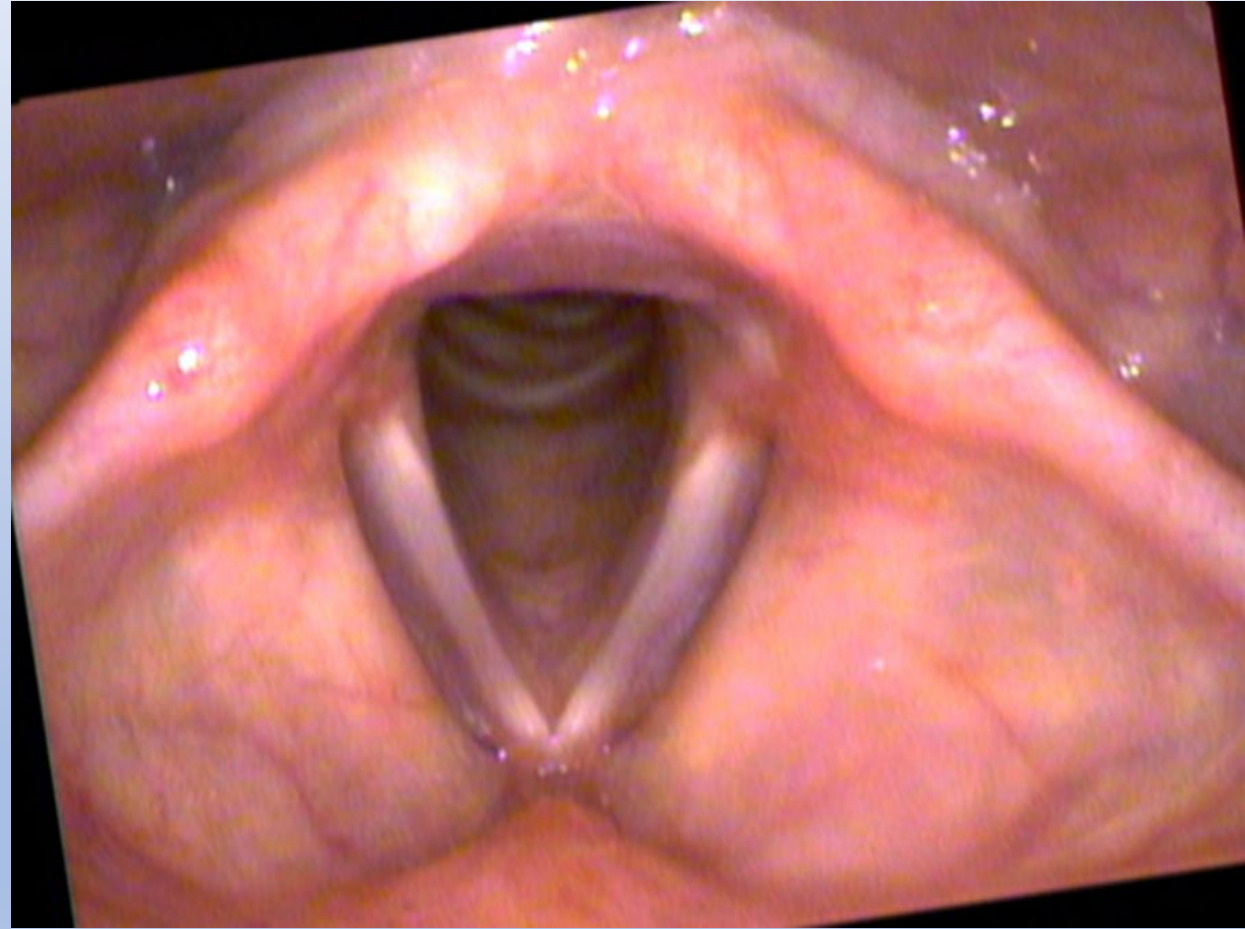
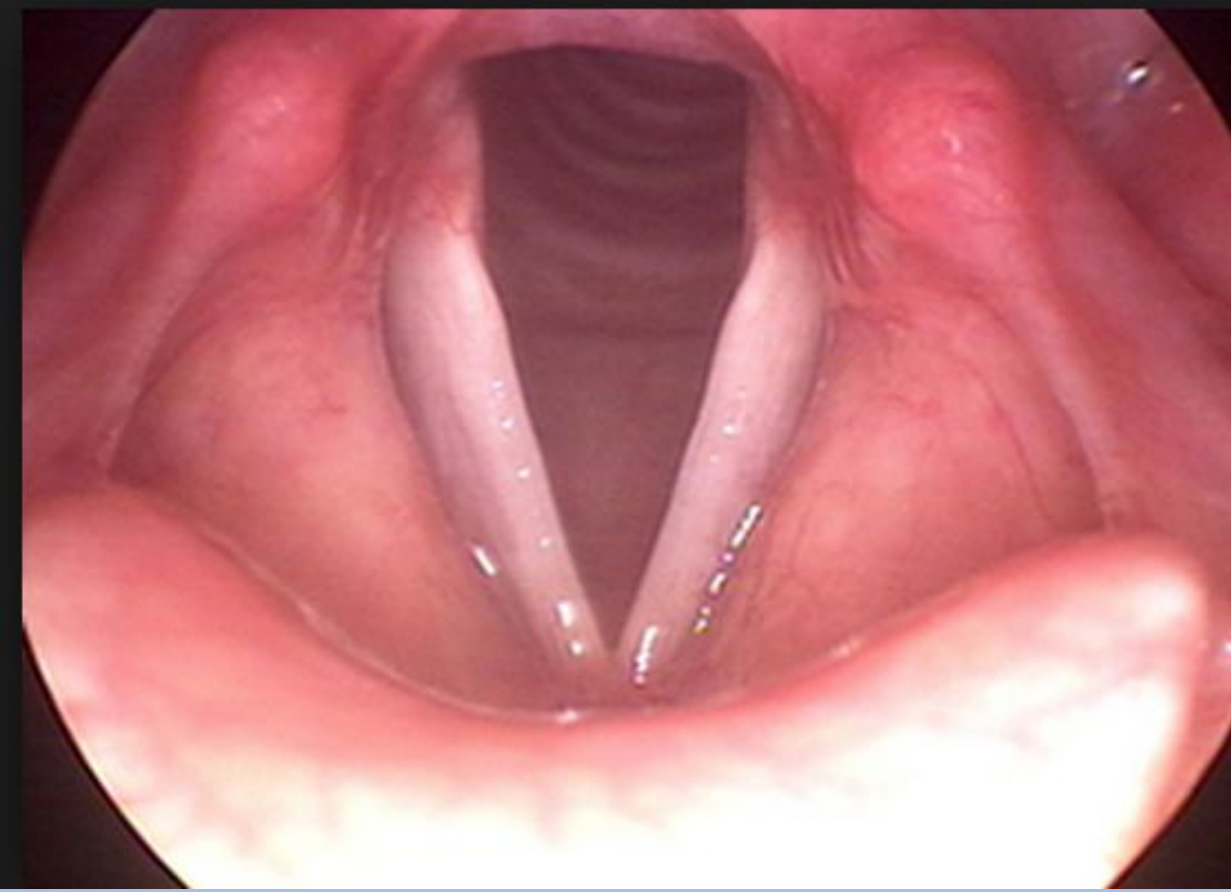
Moving inward, it's soft and squishy - like Jell-O →

The middle layer has a consistency like rubber bands →

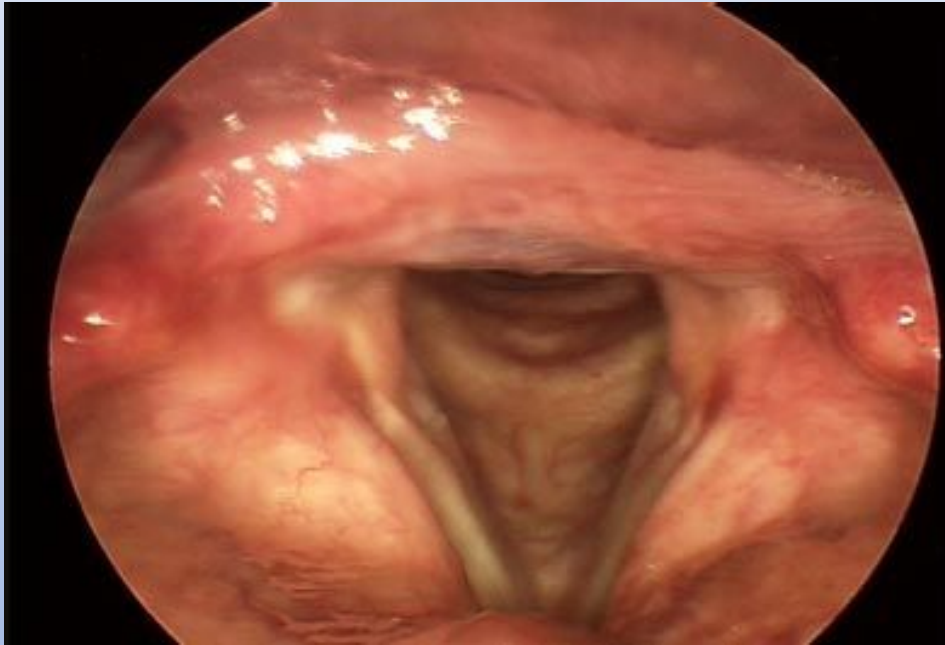
This layer's less stretchy: like cotton string →

And, the base: a muscle with a dreadfully long name, the thyroarytenoid →

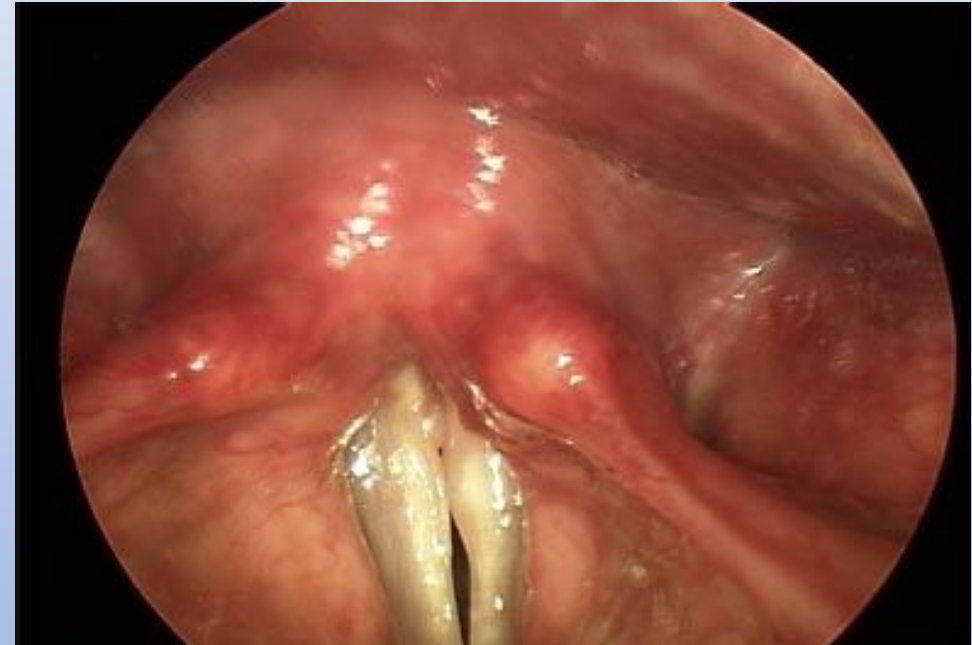




Aging Vocal Folds



<http://www.nyee.edu/cfv-spotlight.html>



<http://www.nyee.edu/cfv-spotlight.html> Aged vocal folds- not closing completely

EXERCISES for VIBRATION

1. Humming or NG with thumb under chin

5 4 3 2 1

2. Onset exercises with fists digging into obliques muscles on sides

a. i-i-i-i-i

b. o-o-o-o-o

3. Staccati

a. i-i/i-i/i-i/i-i/i-i-i-i-i

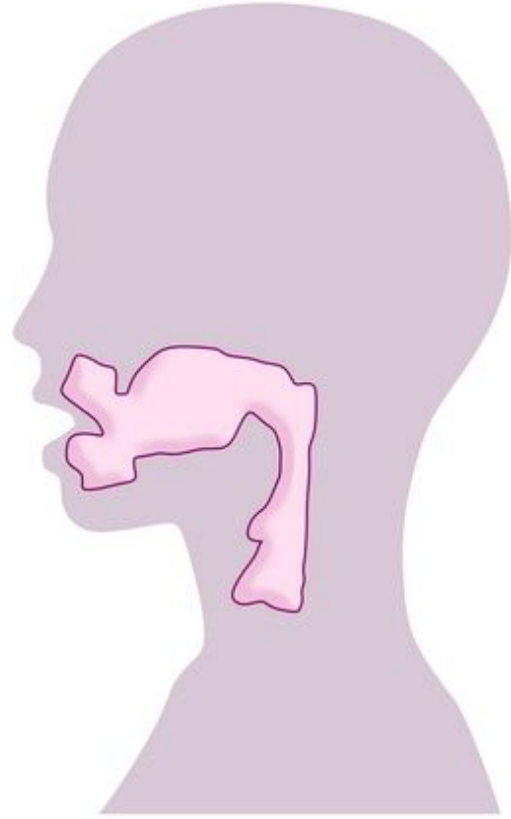
1 1 3 3 5 5 3 3 1 1 1 1 1

4. Creaking

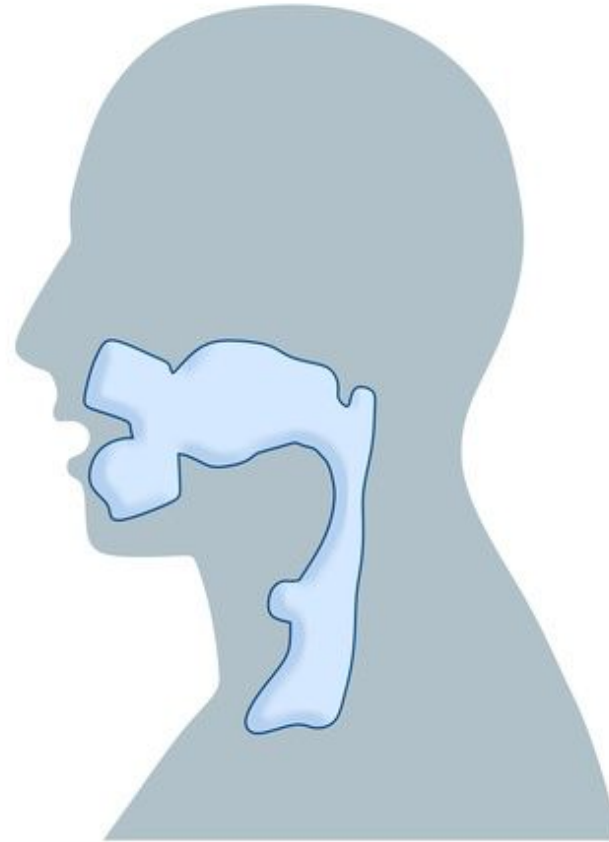
RESONANCE

- **Acoustic party in your head**
 - **Acoustic Aura**
 - **SOVTE**
 - **Formant tuning**
- **Ring/Singer's Formant Cluster**

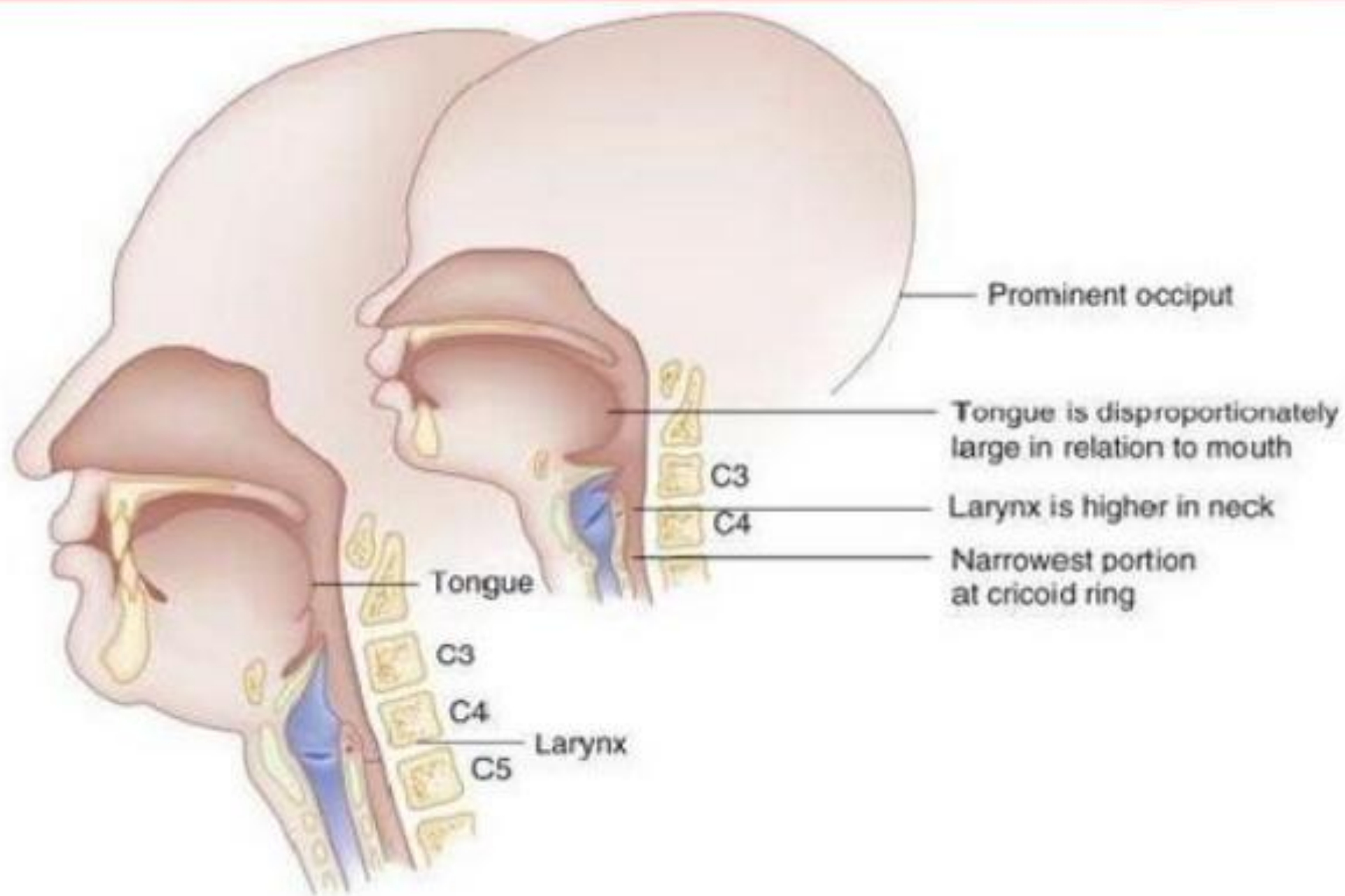




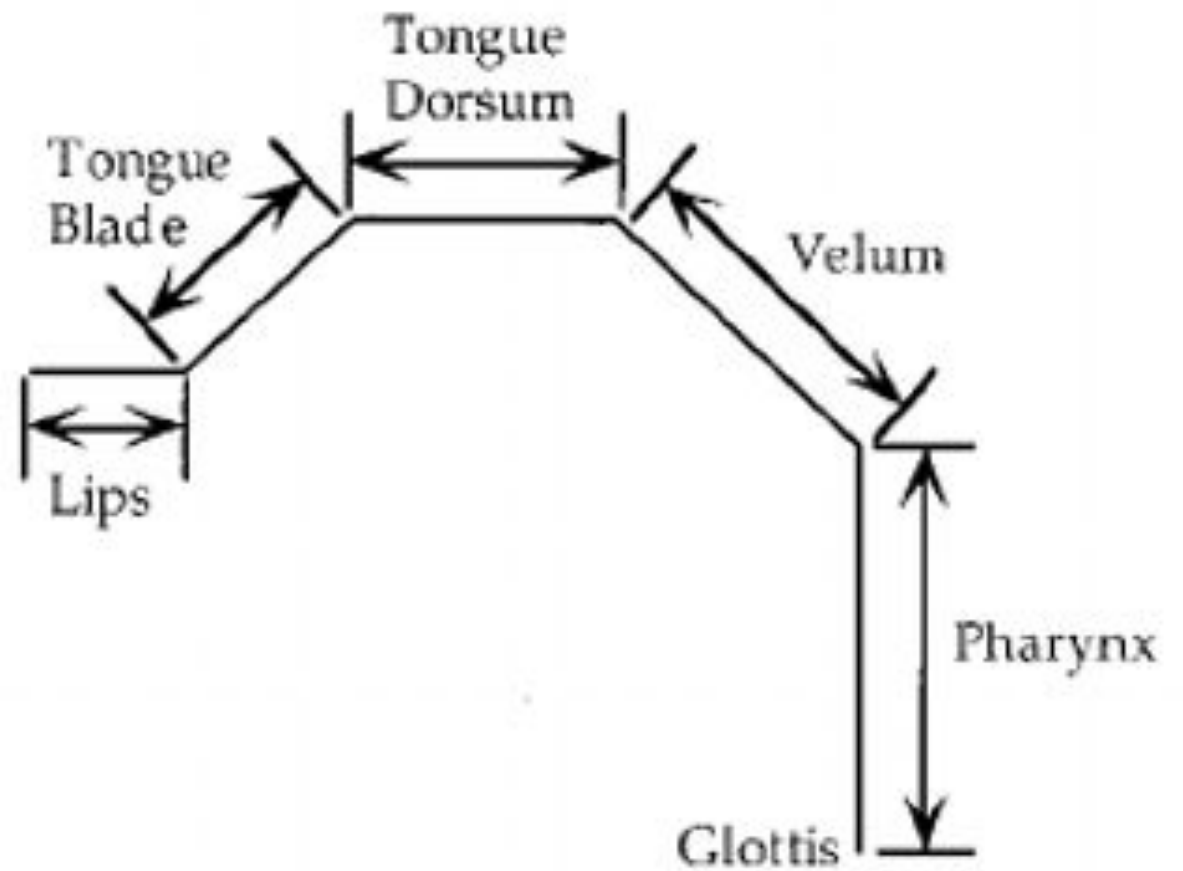
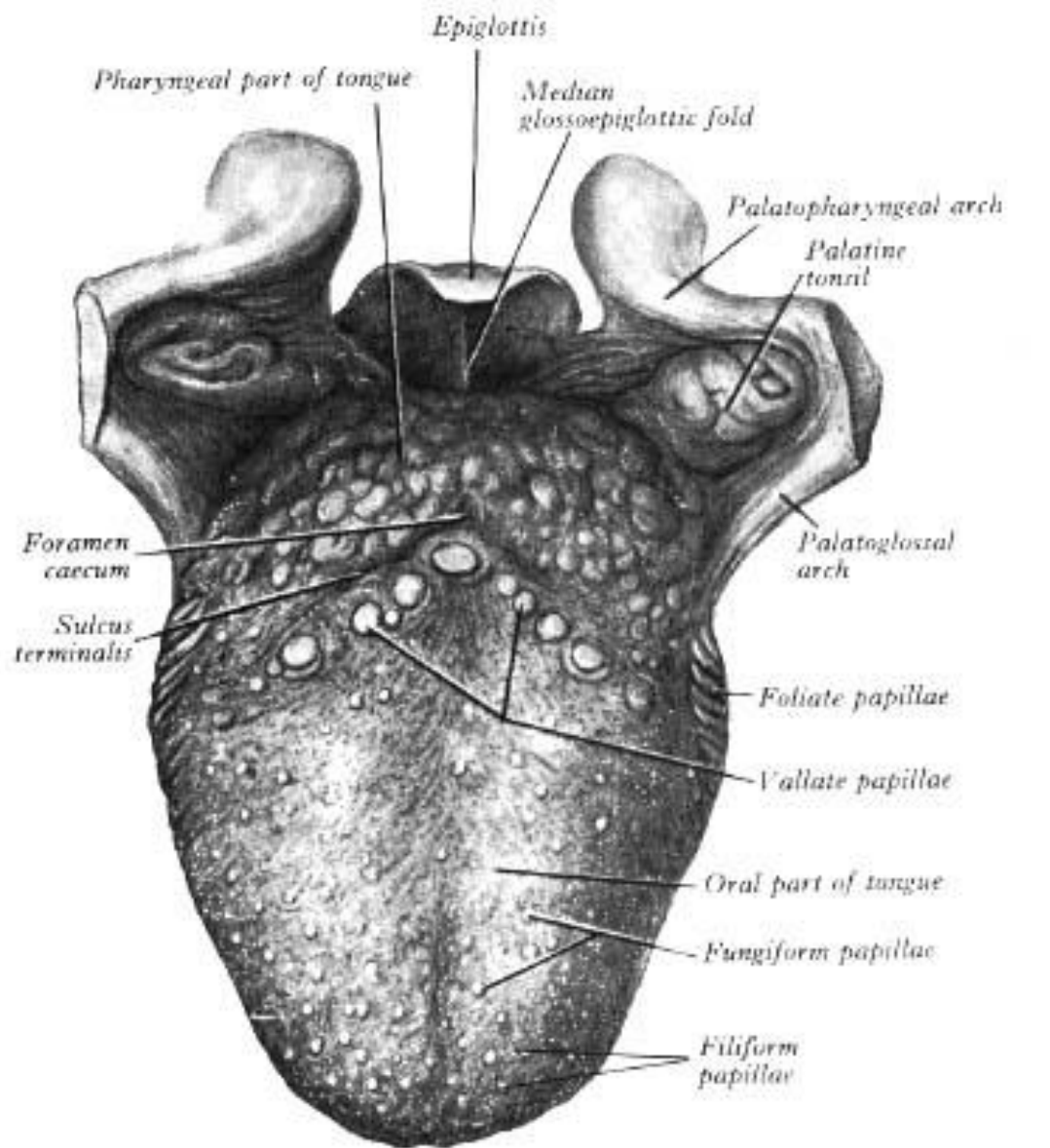
Female
Vocal Tract



Male
Vocal Tract



Comparison of adult and pediatric airways. (From Finucane BT: *Principles of Airway Management*. Philadelphia, FA Davis, 1988.)

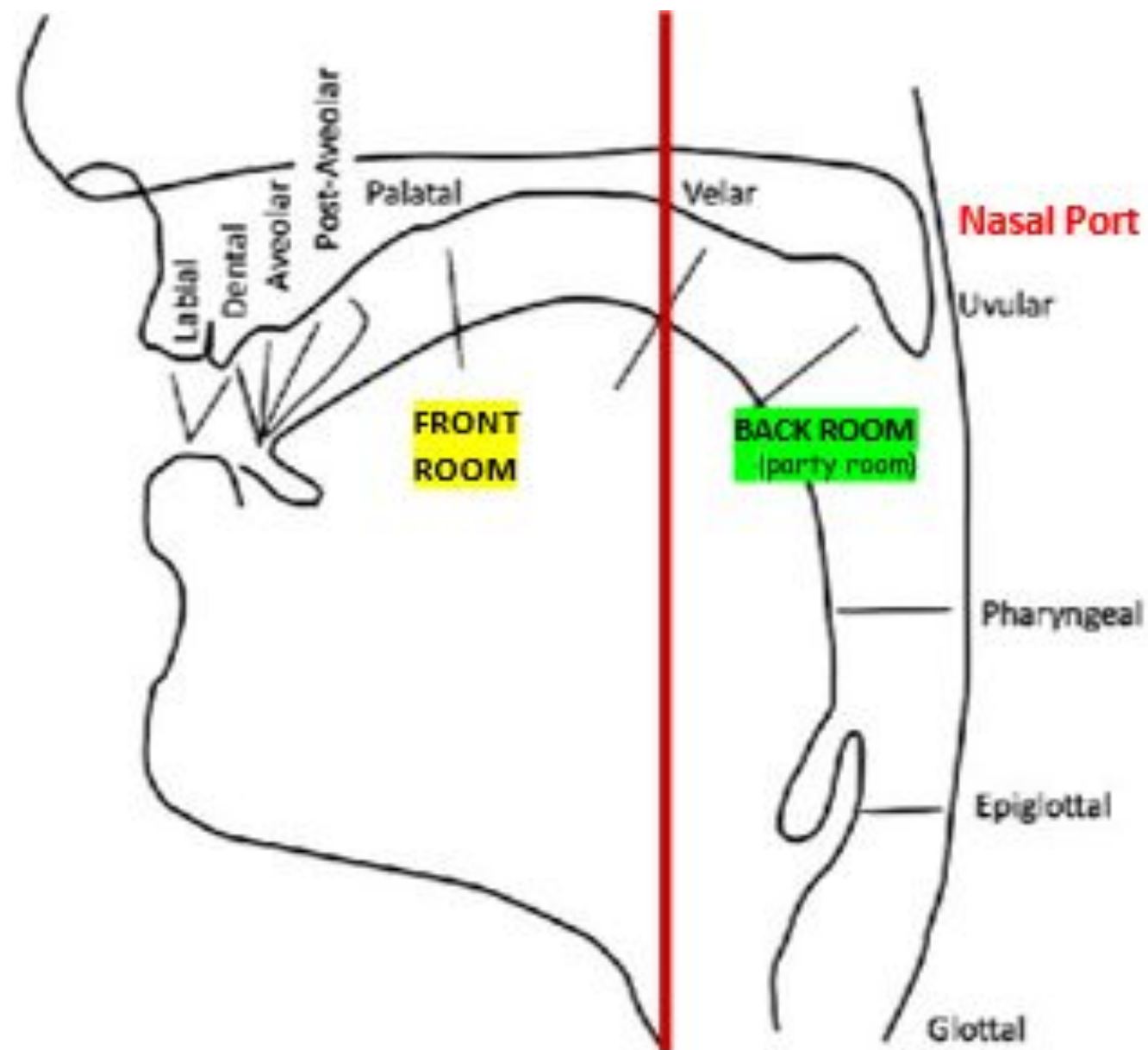


Vocal Tract

Tongue
Lips
Velum
Jaw
Pharynx
Larynx

Articulation Points

Labial
Dental
Alveolar ridge
Palatal
Velar
Glottal

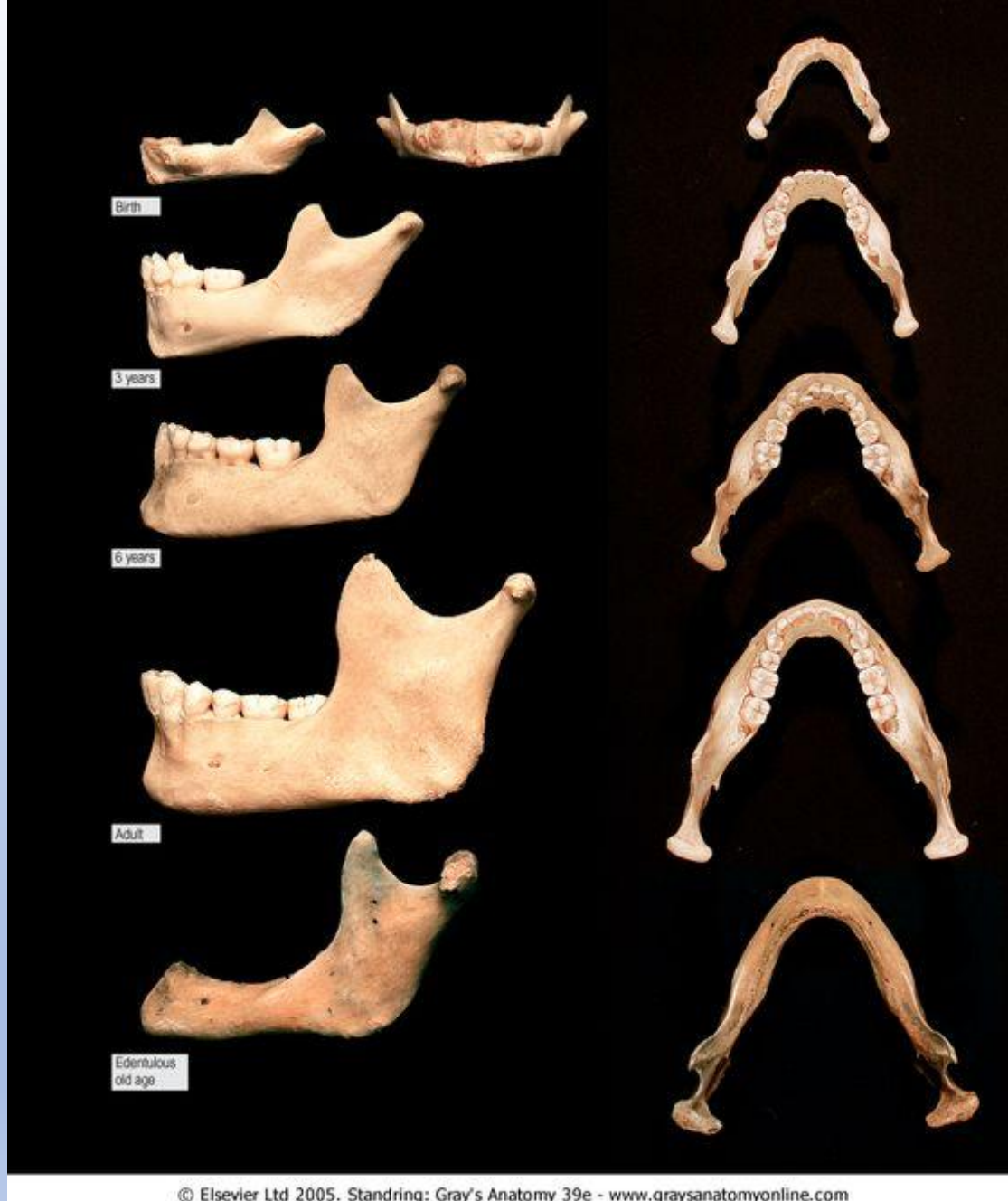


Young Female



Old Female





Exercises for Resonance

Bibbity Bobbety, Bibbety, Bobbety Boo

5 4 3 2 1

Giggedy Gaggedy Giggedy Gaggedy Goo

5 4 3 2 1

Digguh Digguh Digguh Digguh Doo

5 4 3 2 1

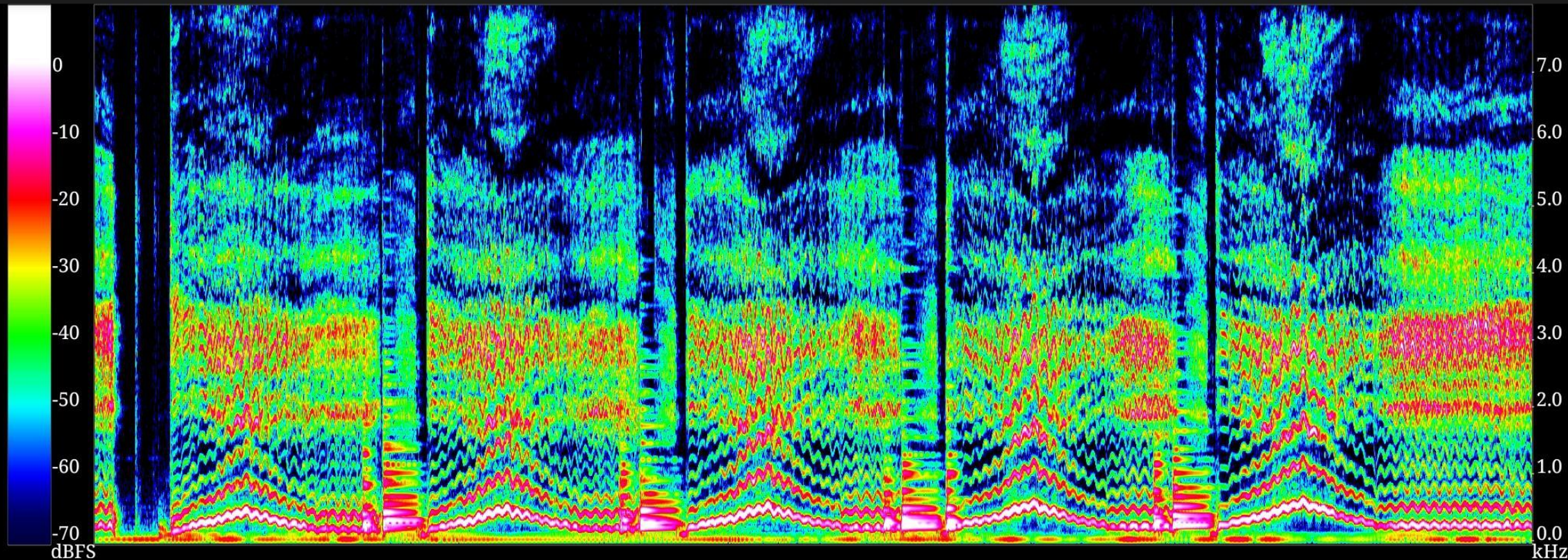
Tee aye - Tee ah - Tee aye

5 1

5 1

5 8 5 3 1

SpectralView Analyzer



SCROLL

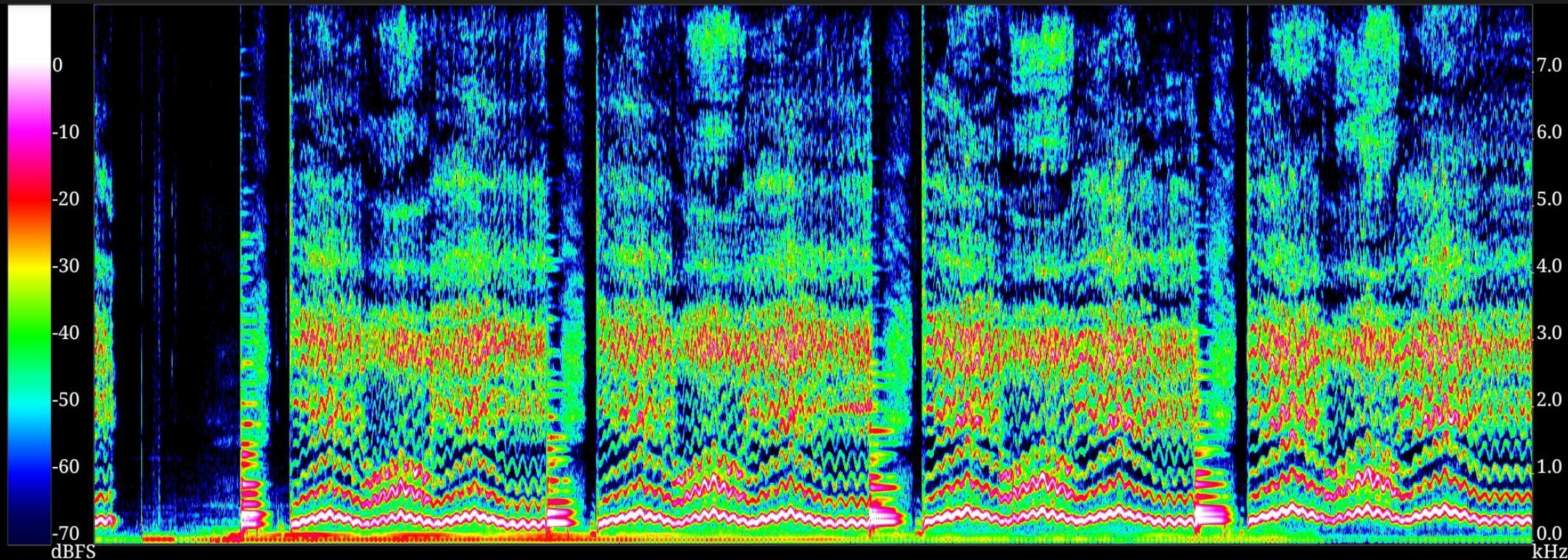
COLOR

OPTIONS

START



SpectralView Analyzer



SCROLL

COLOR

OPTIONS

START



Karen Brunssen Allen Henderson
 Bienen School of Music Northwestern University NATS Past President
 Gretsch School of Music Georgia Southern University NATS Executive Director

21st Century state of the art tools that work in the choral setting
World Choral Expo Exchange
 Tuesday, September 6, 2022, 10:00am
 with **Shalloway Youth Choir**
 directed by Kellie Walsh



POSTURE

- Feet parallel
- Three-pronged plug
- Poised - finger
- Occipital Joint / Bobble head

SOVT Exercises

semi-occluded vocal tract exercises



MMMMMM

TTTTTTTT

ZZZZZZZZZZ

VVVVVVVV

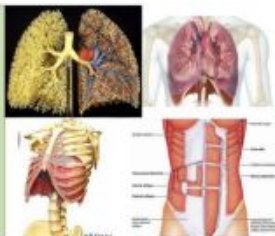
Lip Trills

Straw

Rasberries

Straw in water

Coordination to move air from the inside out



VIBRATION



- Relaxed neck muscles
- Optimal vibration
- HNR 99% clear
- It's a package deal

Respiration - Vibration - Resonance

resonance

Acoustic party in your head
 Acoustic Aura
 Semi-occlusion
 Formant tuning
 Ring/Singer's Formant Cluster



PRESENTERS

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 Professor of Music, NATS Executive Director

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ONLINE RESOURCES

Aaron M. Johnson MRI showing articulation: *Singing if I Only Had a Brain* from "The Wizard of Oz"

<https://www.youtube.com/watch?v=OCvJiqKZbz4>

Tyler Ross Making the Voice Visible - MRI showing movements of the vocal tract

<https://www.youtube.com/watch?v=czy6veUt8vw>

UNT Diction Resources for Singers - a lot of websites for word-by-word translations, libretti with IPA and translations, web resources, sound files of IPA, etc

<https://voice.music.unt.edu/diction/singers>

Explanation about the Vocal Tract

<https://www.voicescienceworks.org/vocal-tract.html>

Vocology Toolbox about sound, larynx, breath, harmonics and formants, straw phonation, resonance, and more

<https://www.voicescienceworks.org/vocology-toolbox.html>

NATSCast Podcast Network: The Full Voice, The Holistic Voice, New York Vocal Coaching, VocalFri, Too Many Frocks, The business Savvy Singer with Greta Pope

<https://www.nats.org/NATSCast.html>

NATS Chat - Hosted by Karl Ragans, live online, real-time discussion for voice teachers and singers. Topics vary widely.

<https://www.nats.org/nats-chat.html>

NATS Live Learning Center - sessions are available for purchase from a wide selection of live recordings from NATS workshops and conferences

<https://nats.sc.livelearningcenter.com/MVSite/Default.aspx>

So You Want to Sing: Guides for Performers - a series of works providing a complete survey of what it means to sing within a particular genre.

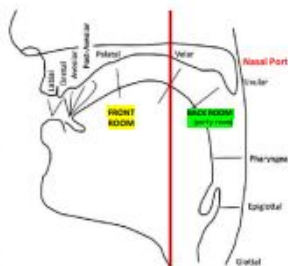
https://www.nats.org/So_You_Want_To_Sing_Book_Series.html

Vocal Tract

Tongue
 Lips
 Velum
 Jaw
 Pharynx
 Larynx

Articulation Points

Labial
 Dental
 Alveolar ridge
 Palatal
 Velar
 Glottal



Pharyngeal Stretch

hands on pees
 open mouth
 open the pharyngeal space
 notice engagement of pees
 notice expansion in the upper back
 notice lucky wucky.

Bibbly bobbly
 bibbly bobbly
 boo

Giggedy gaggedy
 giggedy gaggedy
 goo

Digguh digguh
 digguh digguh
 dig

LABAN efforts

time
 weight
 space
 flow

sudden or sustained
 light or strong



Exercises



- **MMMING**
- **SSSing and ZZZing**
(voiceless to voiced)
- **Lip and tongue trills**
- **Finger kazoo**
- **VVVing**
- **Straw**
- **Card buzz**

TEXTURES

Legato

Staccato

Coloratura

Messa di voce

Articulation

Range/Tessitura

**Vocal Color and
Volume**

Sustainability

Exercises

- **Creaking**
- **Inner smile – pharyngeal stretch**
- **Various exercises for “5 Textures of Singing”**
- **Onset exercises**
- **Snore when breathing to relax throat**
- **Wolf tone to relax laryngeal position**
- **Inhalation singing**
- **5 ways to feel muscles of support**

SOVTE

semi-occluded vocal tract exercises

MMMMMM

ηηηηηηηηηη
η

ZZZZZZZZZZ

VVVVVVVVV

Lip Trills

Straw

Rasberries

Straw in
water

Snag Your Own Resonance

Bibbedy bobbedy
bibbedy bobbed boo

Giggedy gaggedy giggedy
gaggedy goo

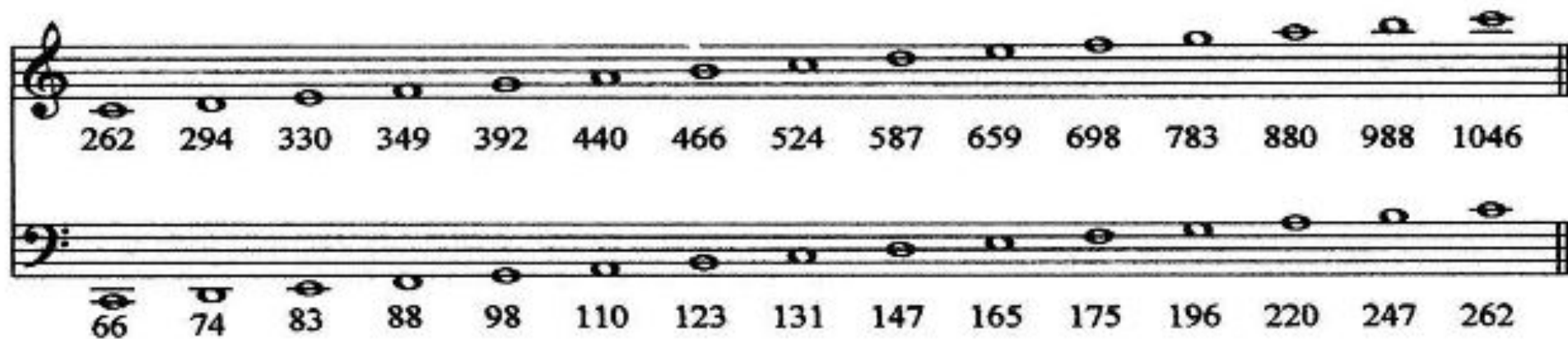
Digguh digguh digguh
digguh dig

National Center for Voice and Speech

1. Drink at least 64 ounces of water a day to maintain hydration.
2. Support the voice from abdominal muscles when speaking or singing.
3. Avoid "vocally abusive" activities: excessive yelling, screaming, coughing and throat-clearing.
4. Warm up the voice before using it.
5. Don't talk or sing at unnatural pitches. (too high or too low)
6. Stay away from over-the-counter medications such as aspirin, which thin the blood increasing the risk of bleeding of the vocal folds. (unless your doctor orders you to)
7. Drinks including caffeine and alcohol remove moisture from your system and should each be counteracted with an equal-sized glass of water.

Thank You!!

Vocal Fold Vibration & Pitch



Adolescent Changing Voice

Female

- Vocal folds lengthen 34%
- 2 mm at birth – grows .4 mm/Year to 10 mm.
- Estrogen & progesterone
- Puberty starts age 8-14
- Complete age 14-17
- Thyroid remains at 120
- Range drops a minor third
- Brain develops on both sides

Male

- Vocal Folds lengthen 63%
- 2 mm at birth – grows .7mm to 16 mm
- Testosterone
- Puberty starts age 9.5 – 14
- Complete age 13.5 – 18
- Thyroid tips to 0
- Range drops up to an octave
- Brain develops more on left side

Gender-specific articulatory-acoustic relations

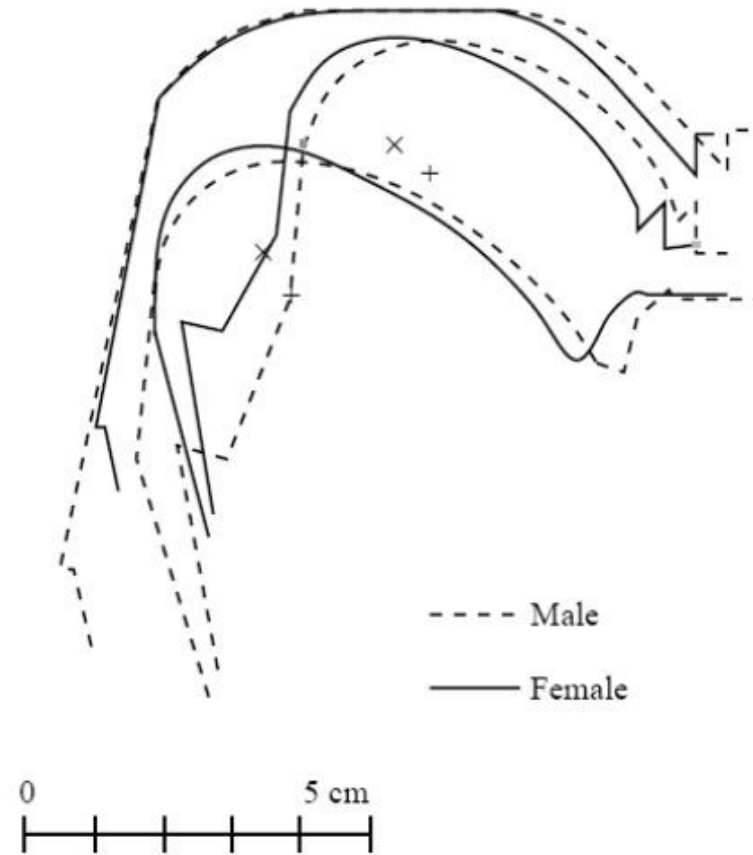
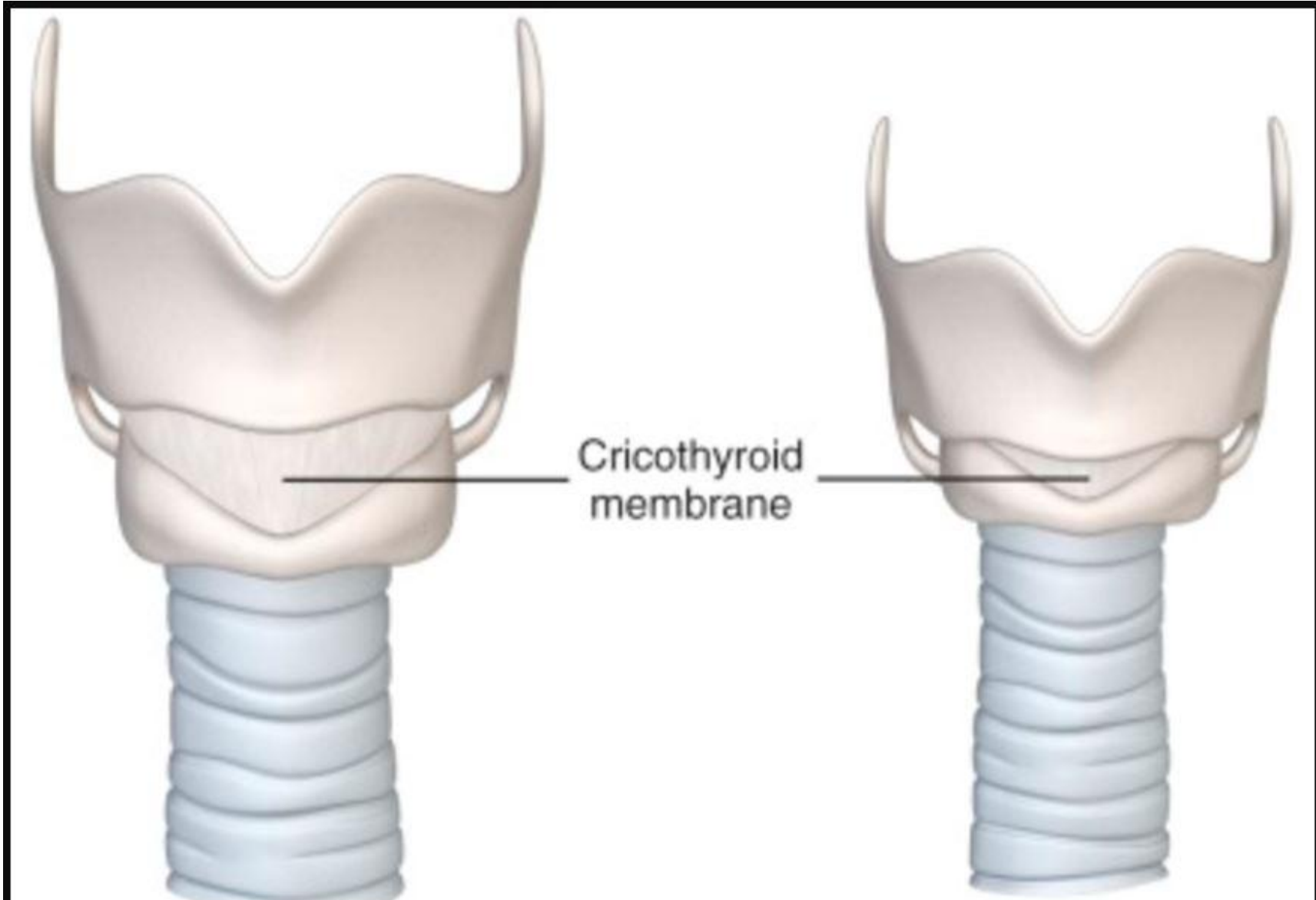
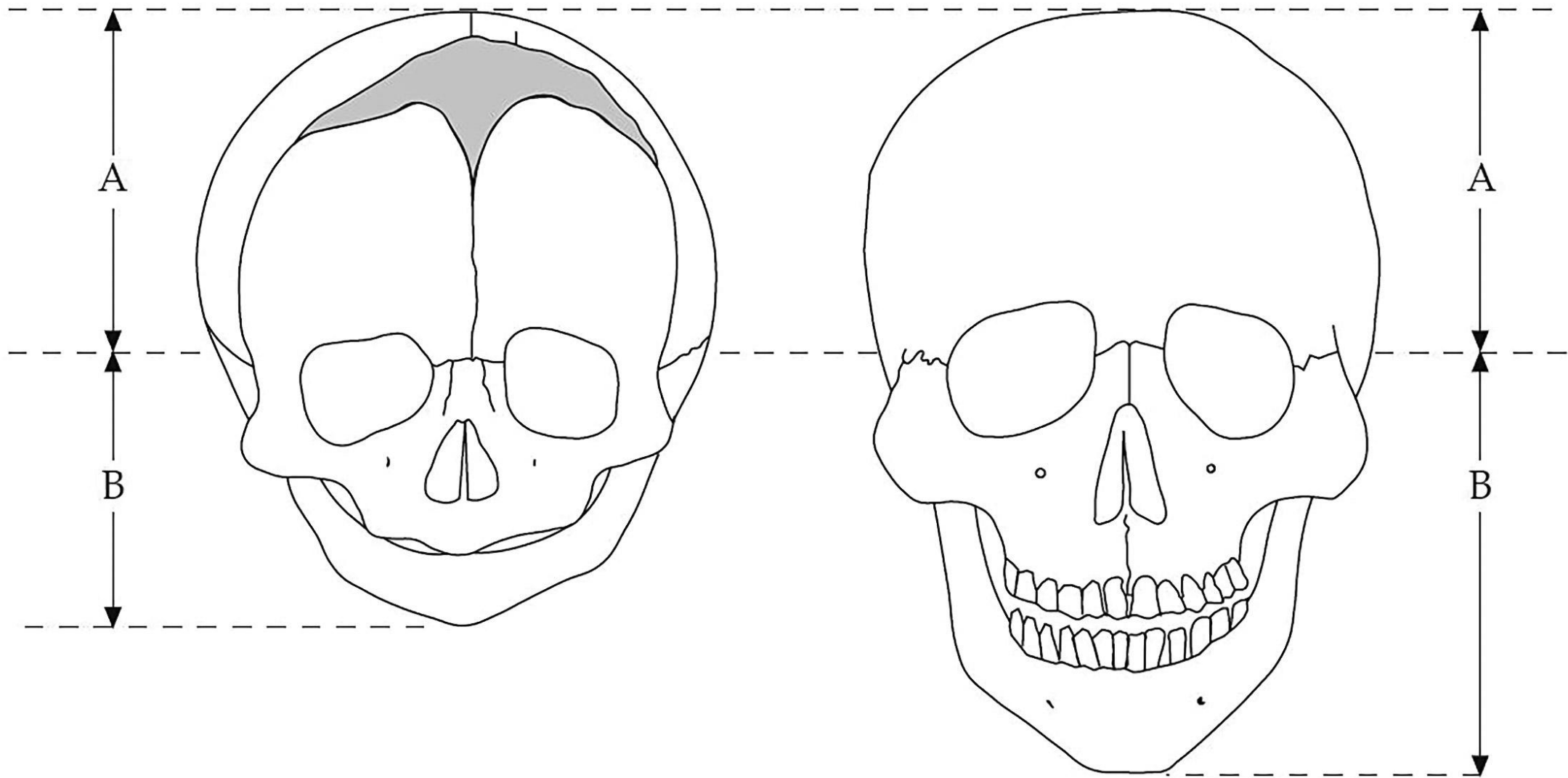


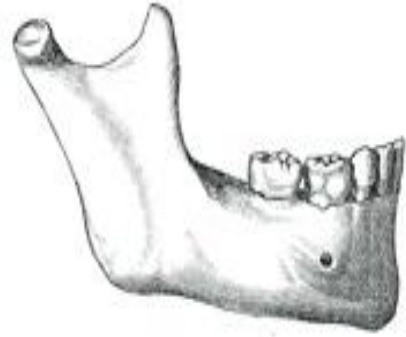
Figure 1. Mid-sagittal articulator positions for female (solid) and male (dashed) [i] and [a] taken from the appendix of Goldstein (1980). The symbols × (female) and + (male) mark the centers of the circles forming the tongue body.







Ba
by



Chil
d



Adult



Elderly

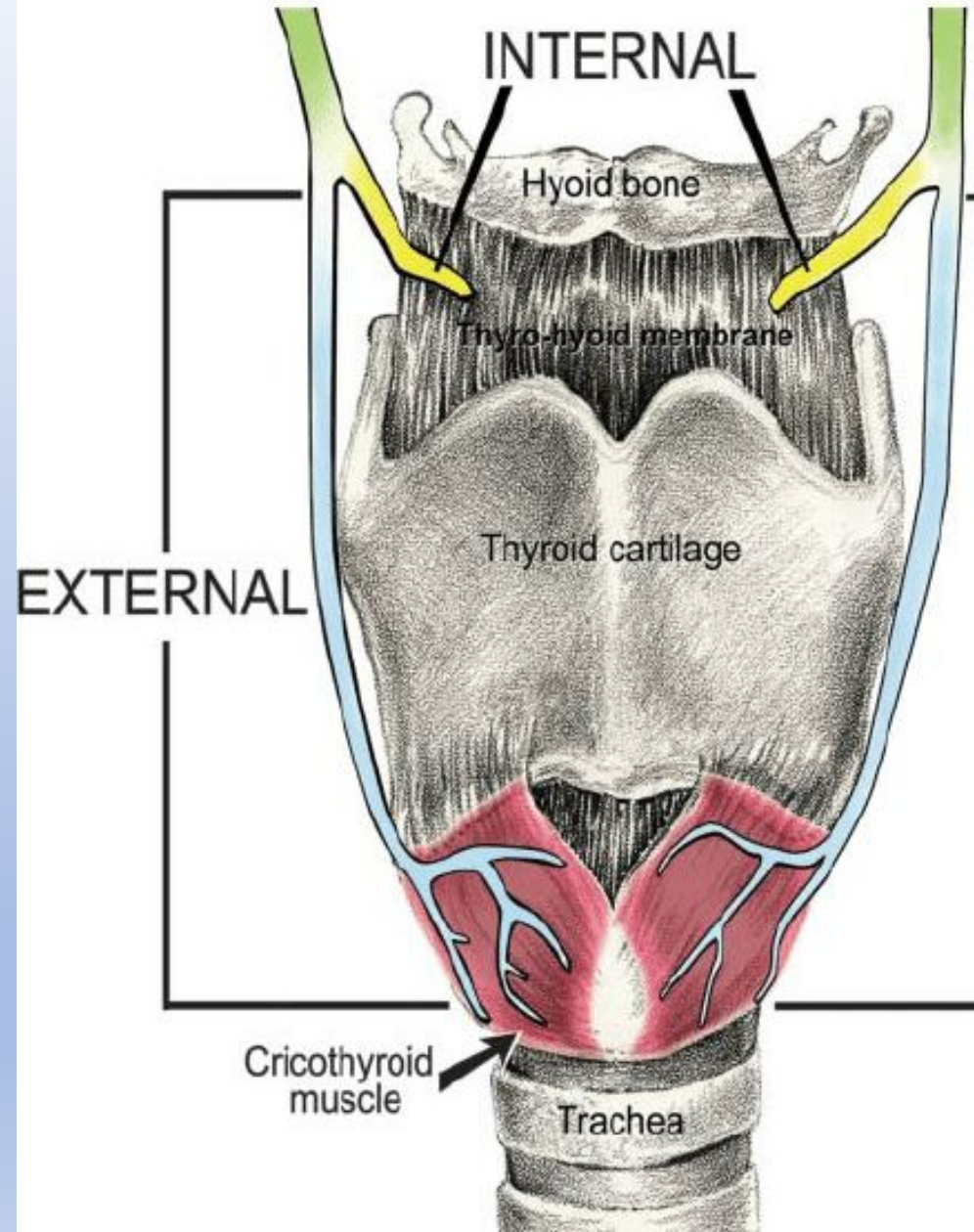


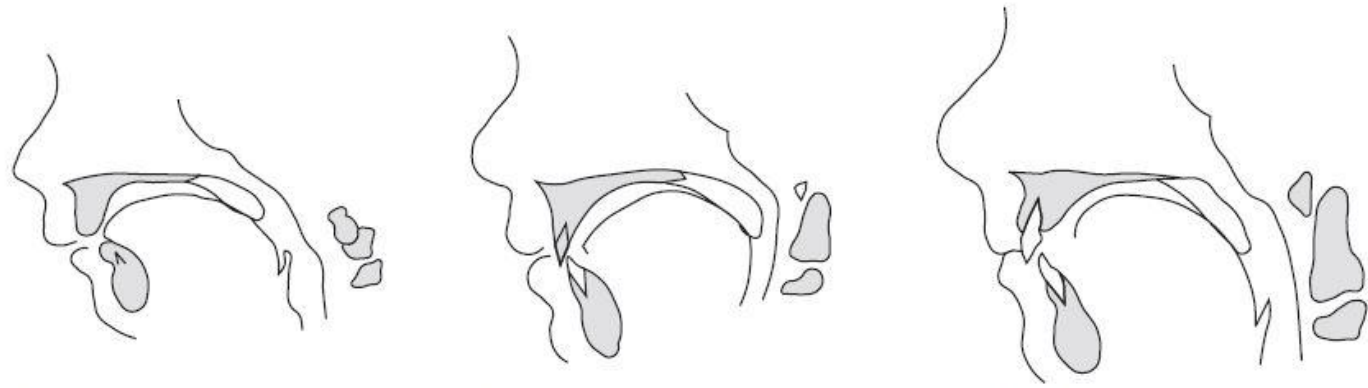
Source-filter theory of voice production

(Fant, 1960; Titze, 1994)

1. The air flow coming from the lungs induces the oscillation of the vocal cords, thus producing the “source” sound.
2. This sound is then filtered in the vocal tract (“filter”). Some frequencies, which correspond to the resonances of the vocal tract, will be amplified and other frequencies will be dampened.
3. The source determines the lowest frequency of the voice (fundamental frequency) and its harmonics, while the filter determines the spectral peaks, called “formants”.

SUPERIOR LARYNGEAL NERVE

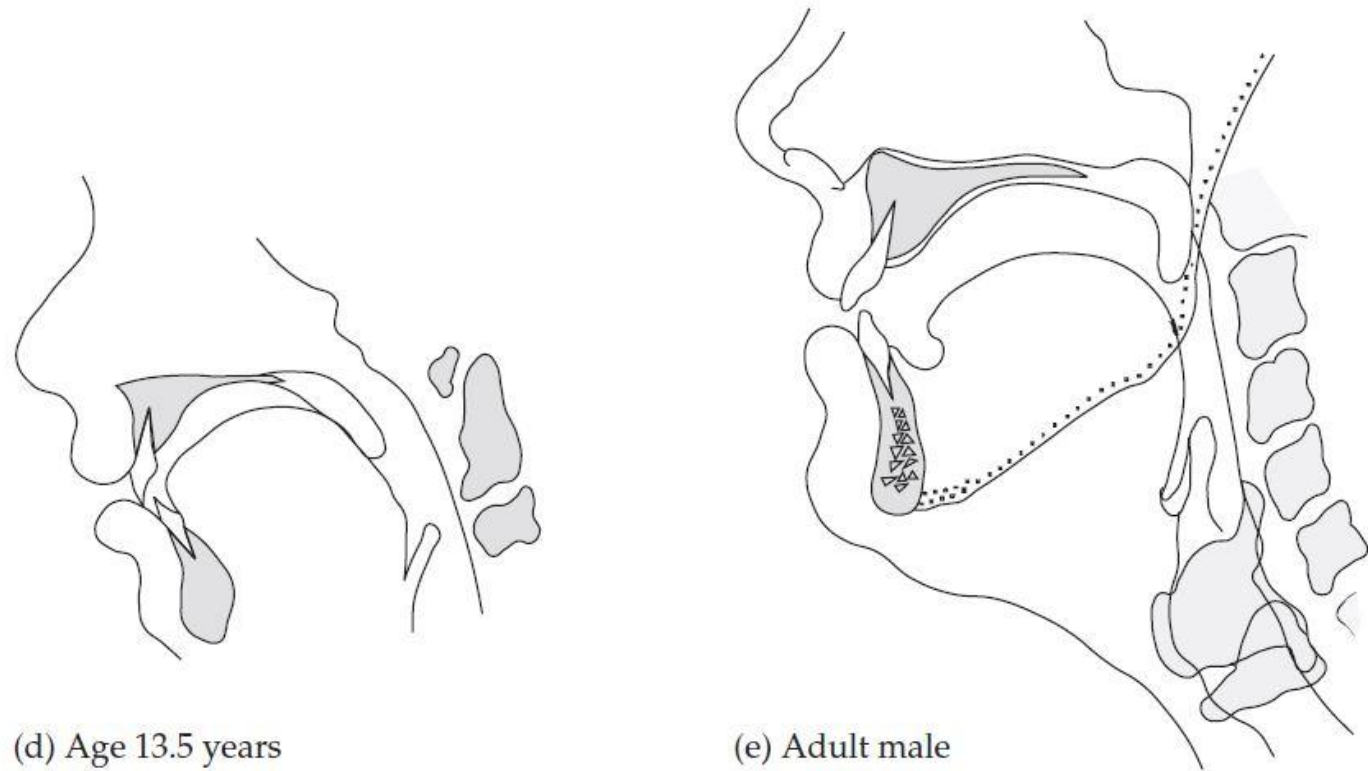




(a) Age 6 months

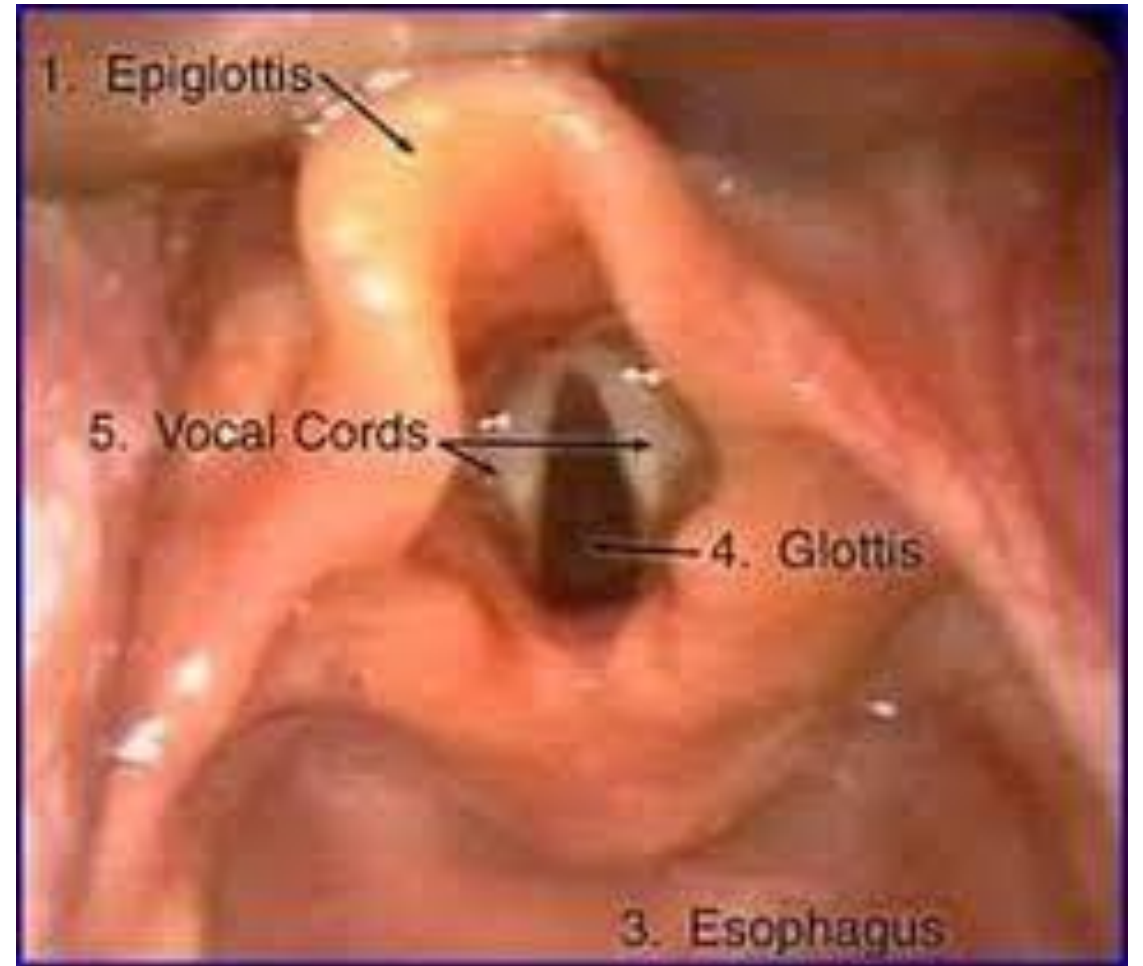
(b) Age 2 years

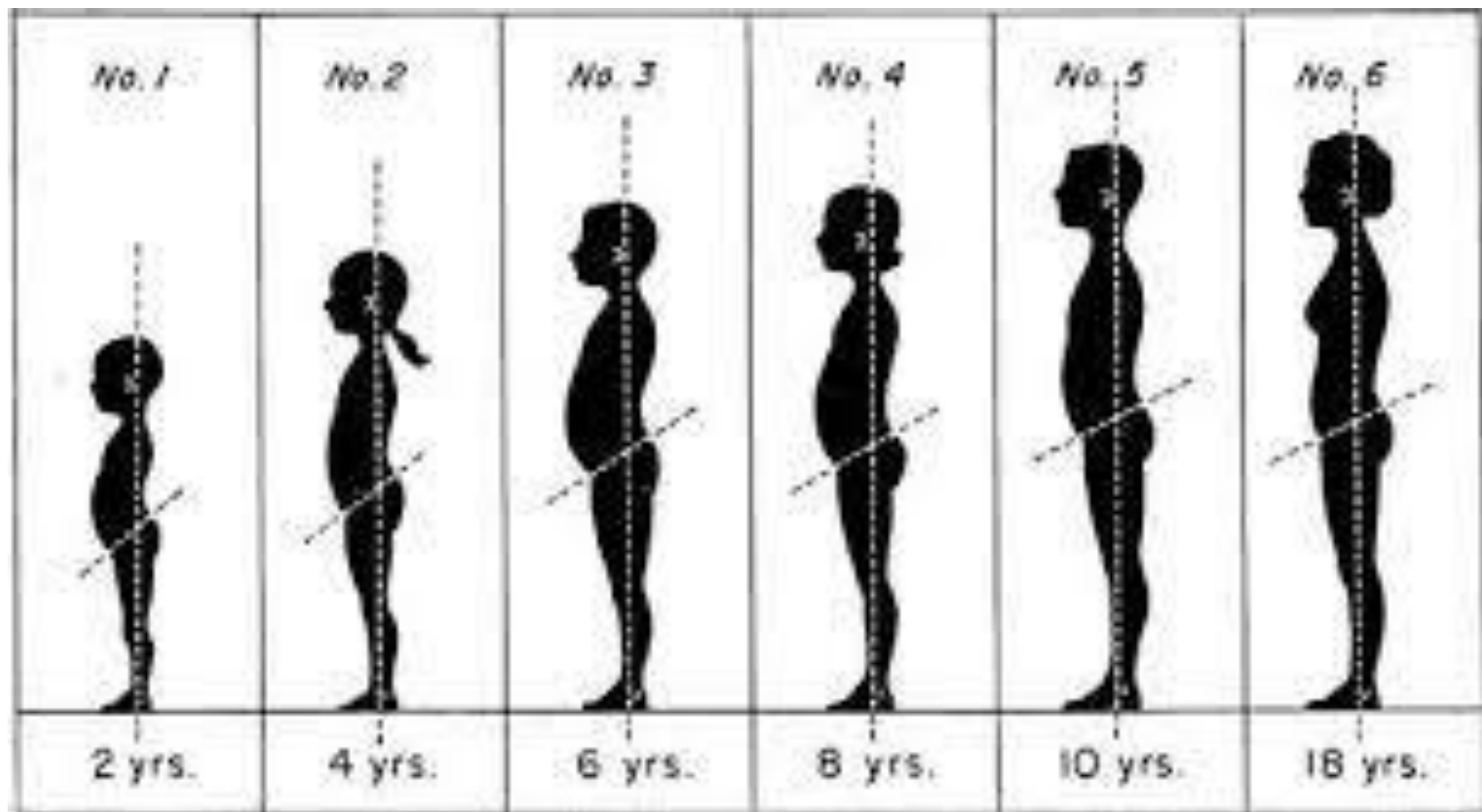
(c) Age 7 years



(d) Age 13.5 years

(e) Adult male







Size

1/8

1/4

12"

13"

14"

15"

15.5"

16"

16.5"

Age

3-5

5-7

7-9

8-10

9-12

11-13

12-14

14+

14+

**Arm Length
(Inches)**

14 - 15

15 - 18

18 - 20

20 - 22

22 - 23

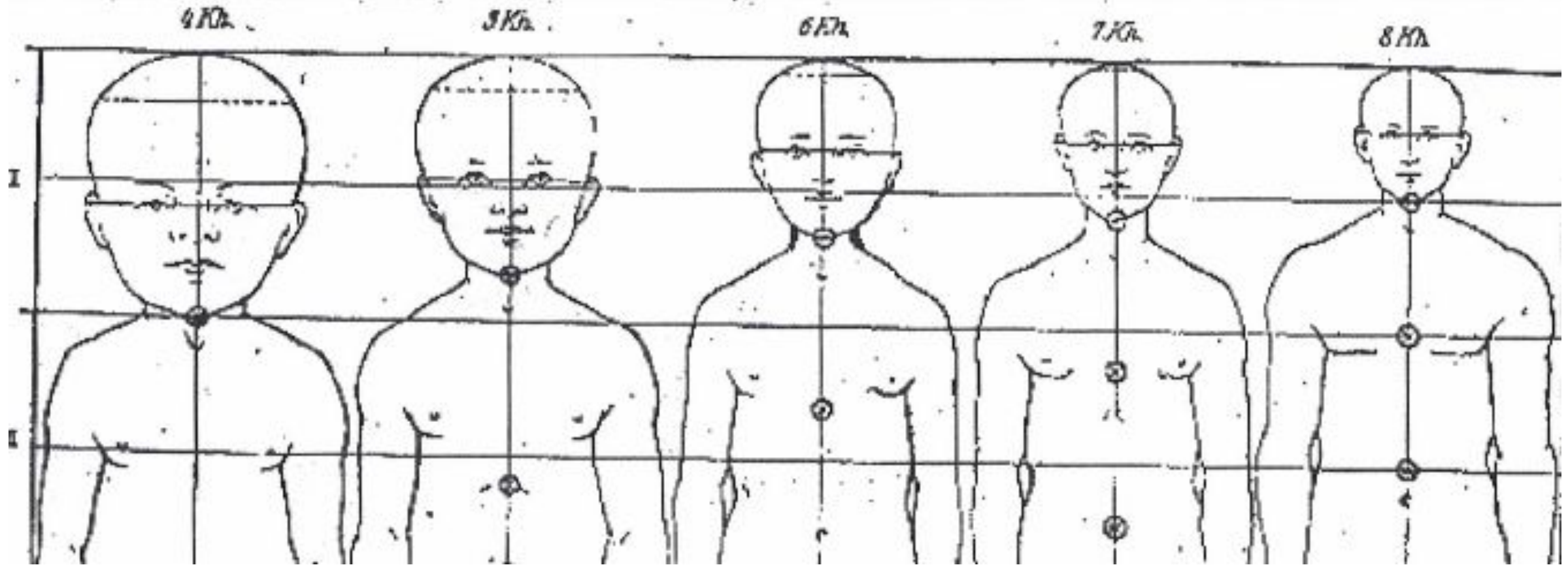
23 - 25

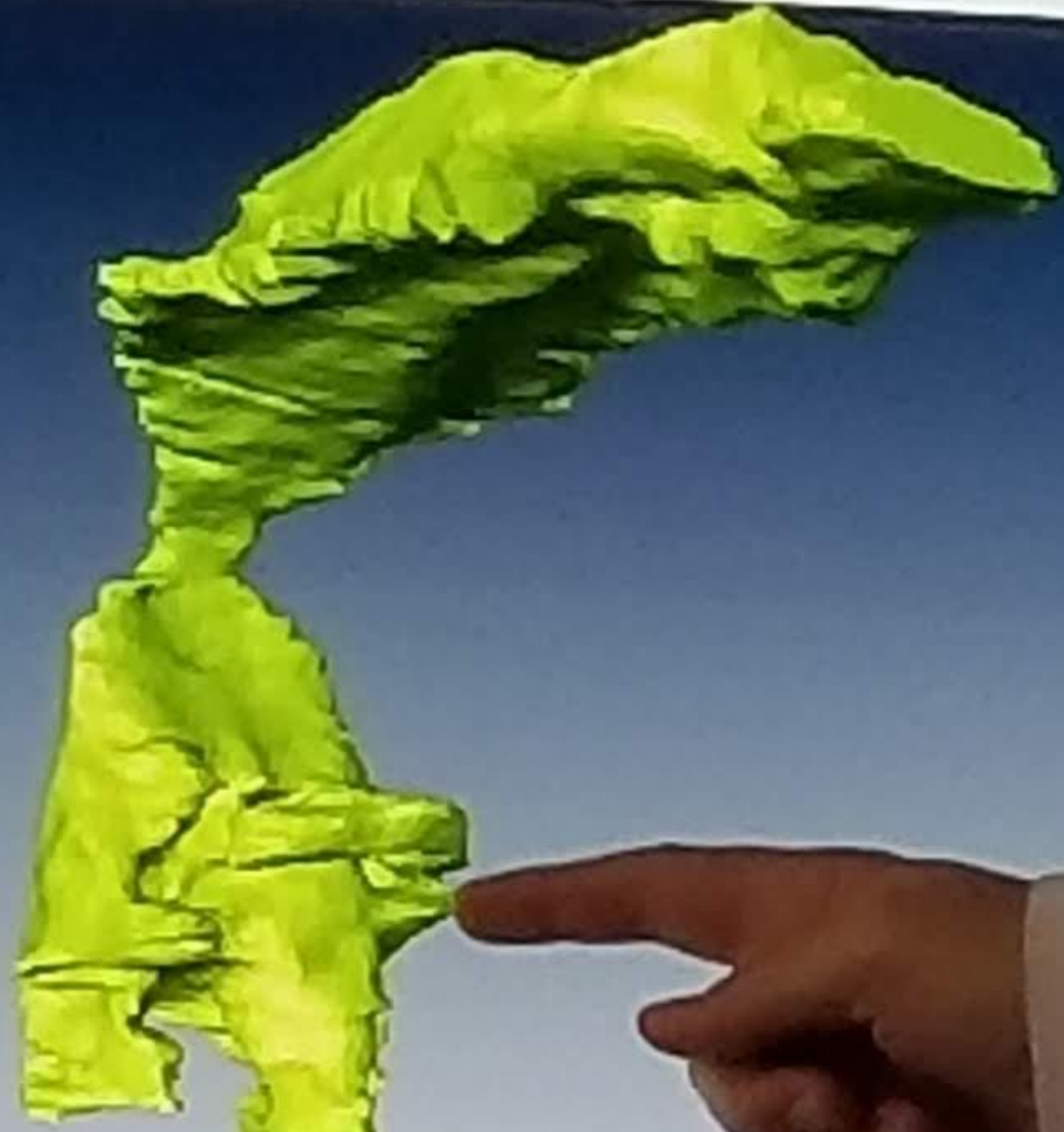
26 - 27

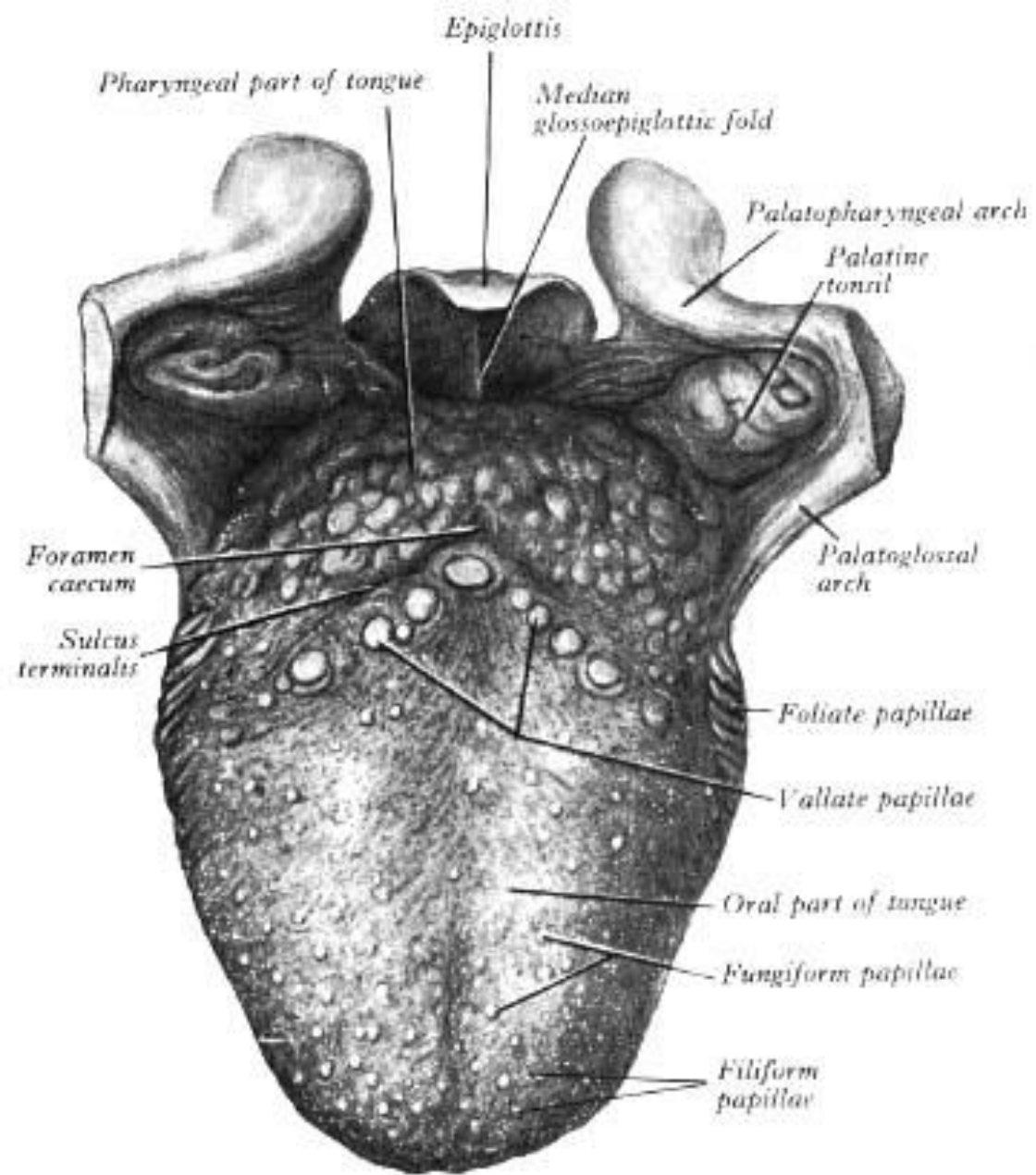
27 - 28

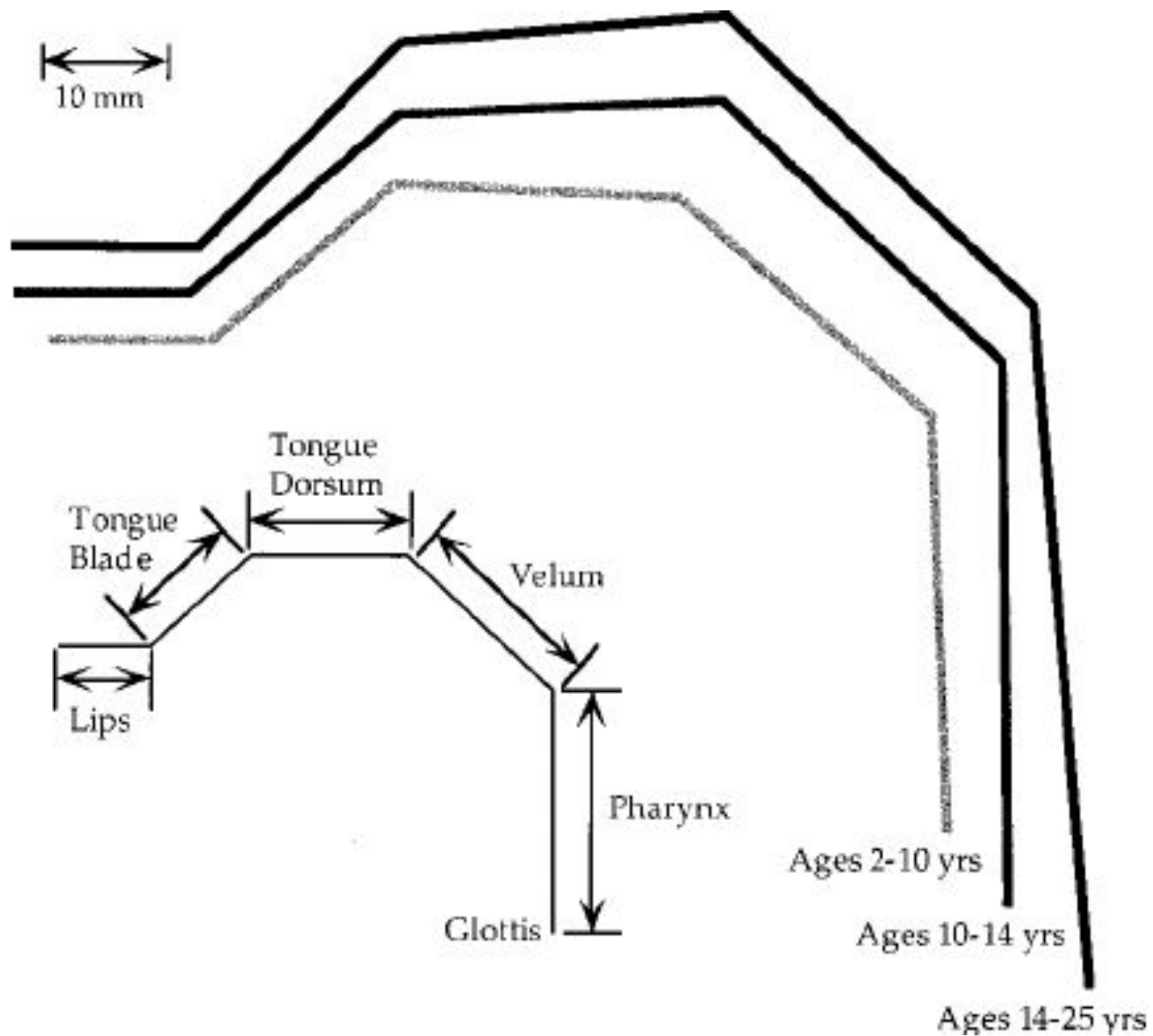
28+

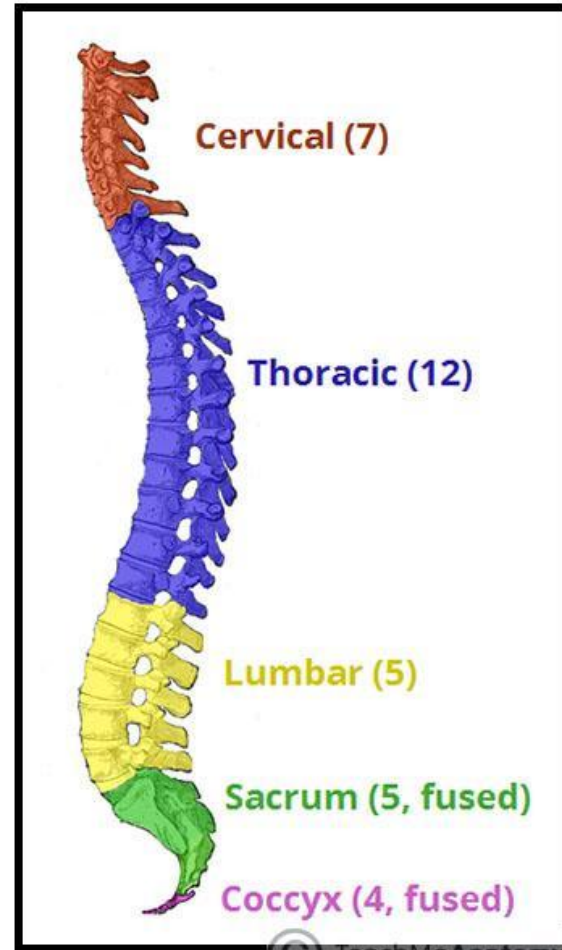
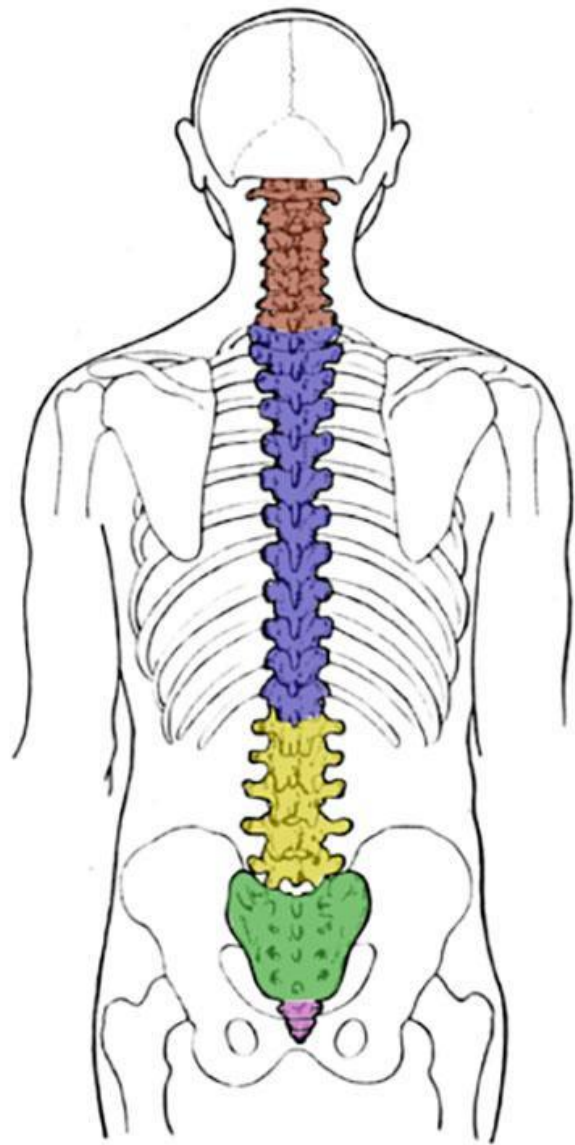
Proportions Change



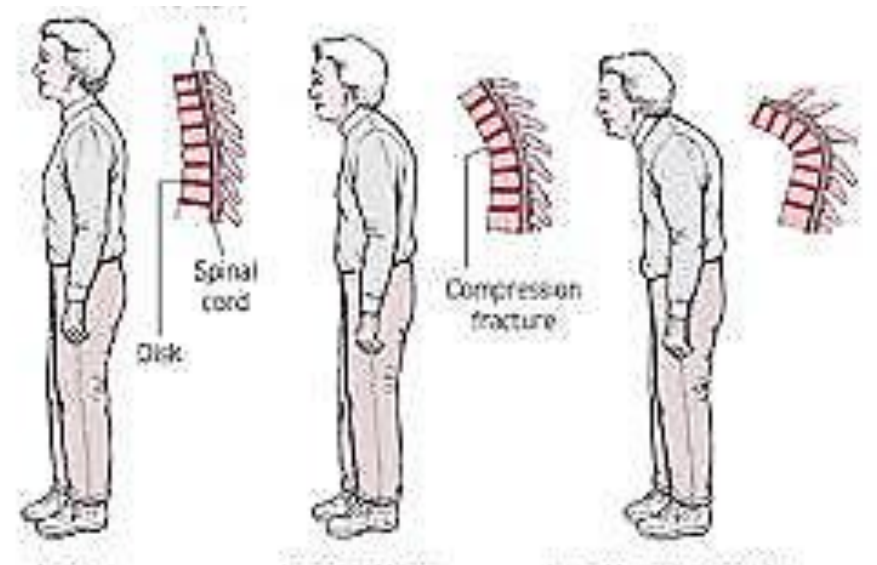


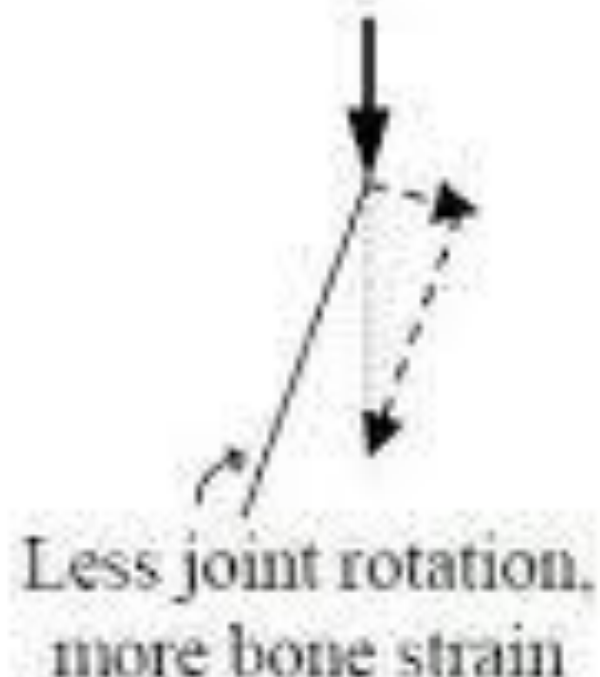
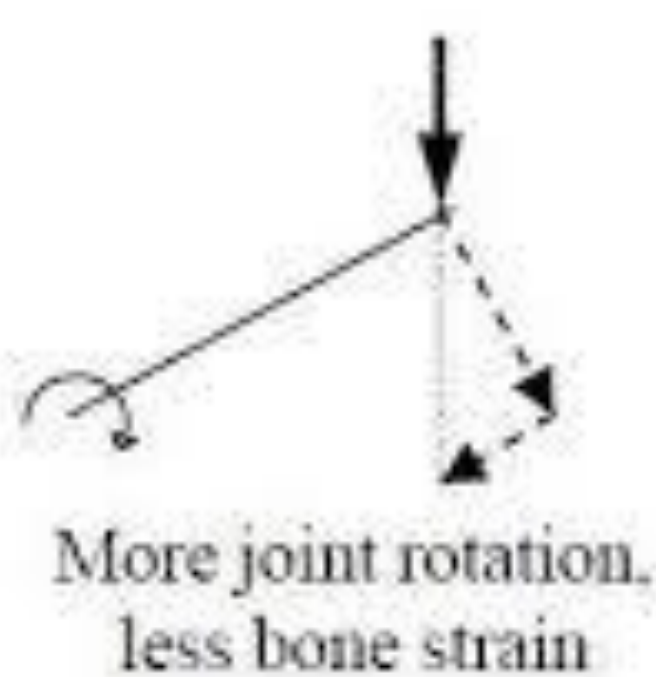
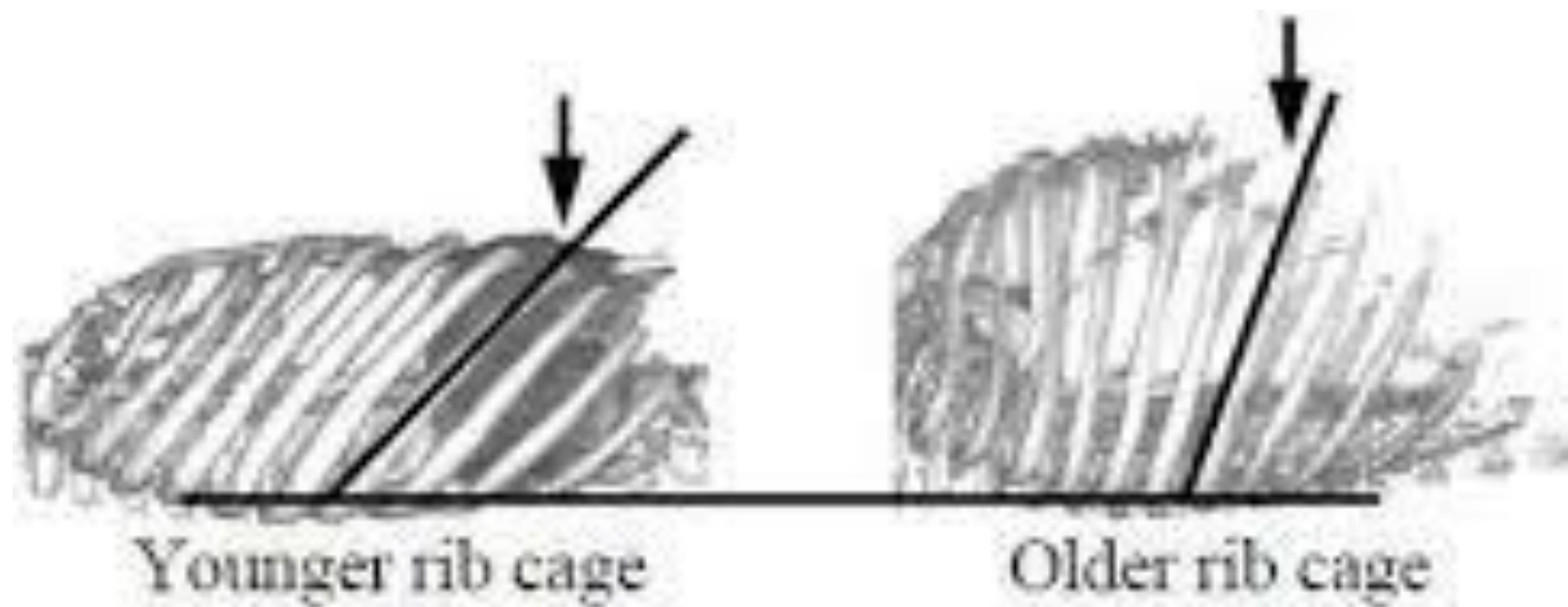


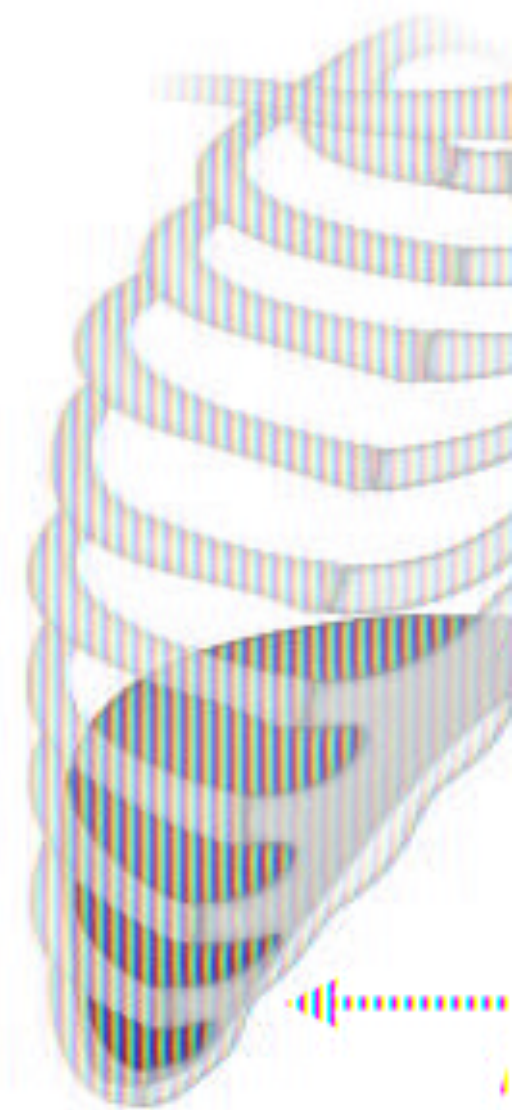
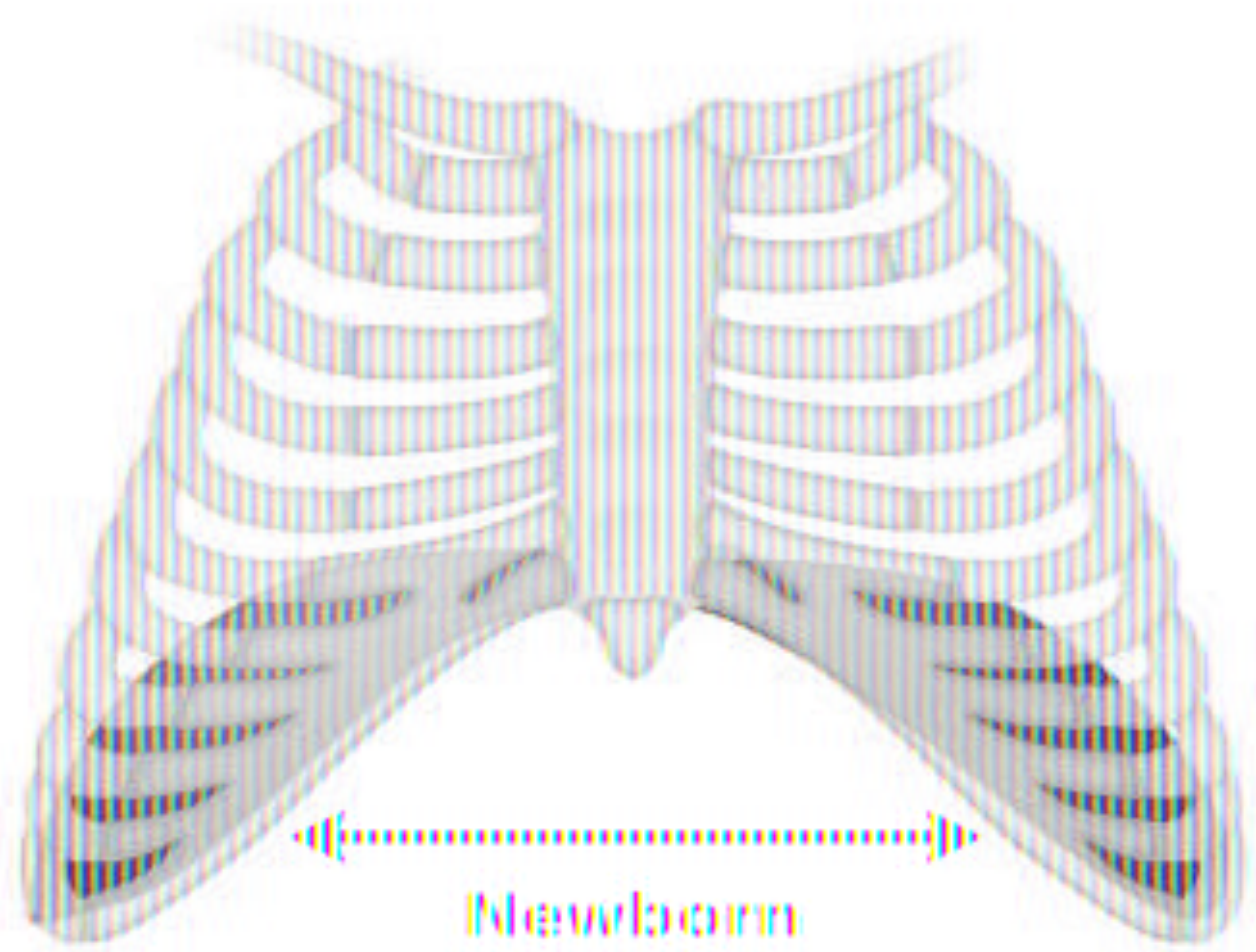




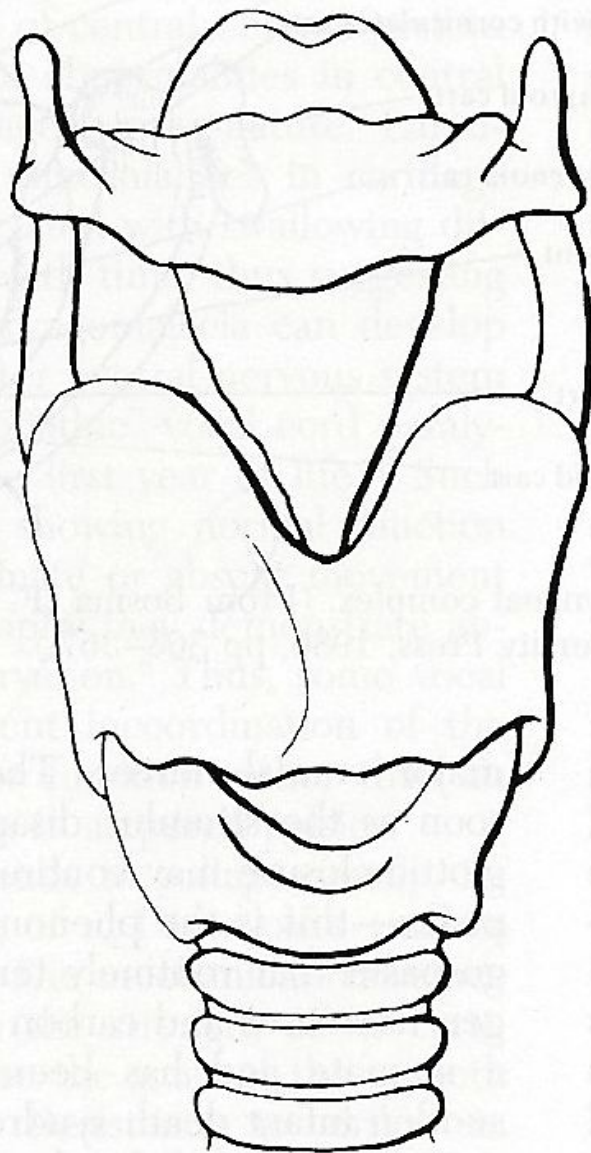
© TeachMeAnatomy



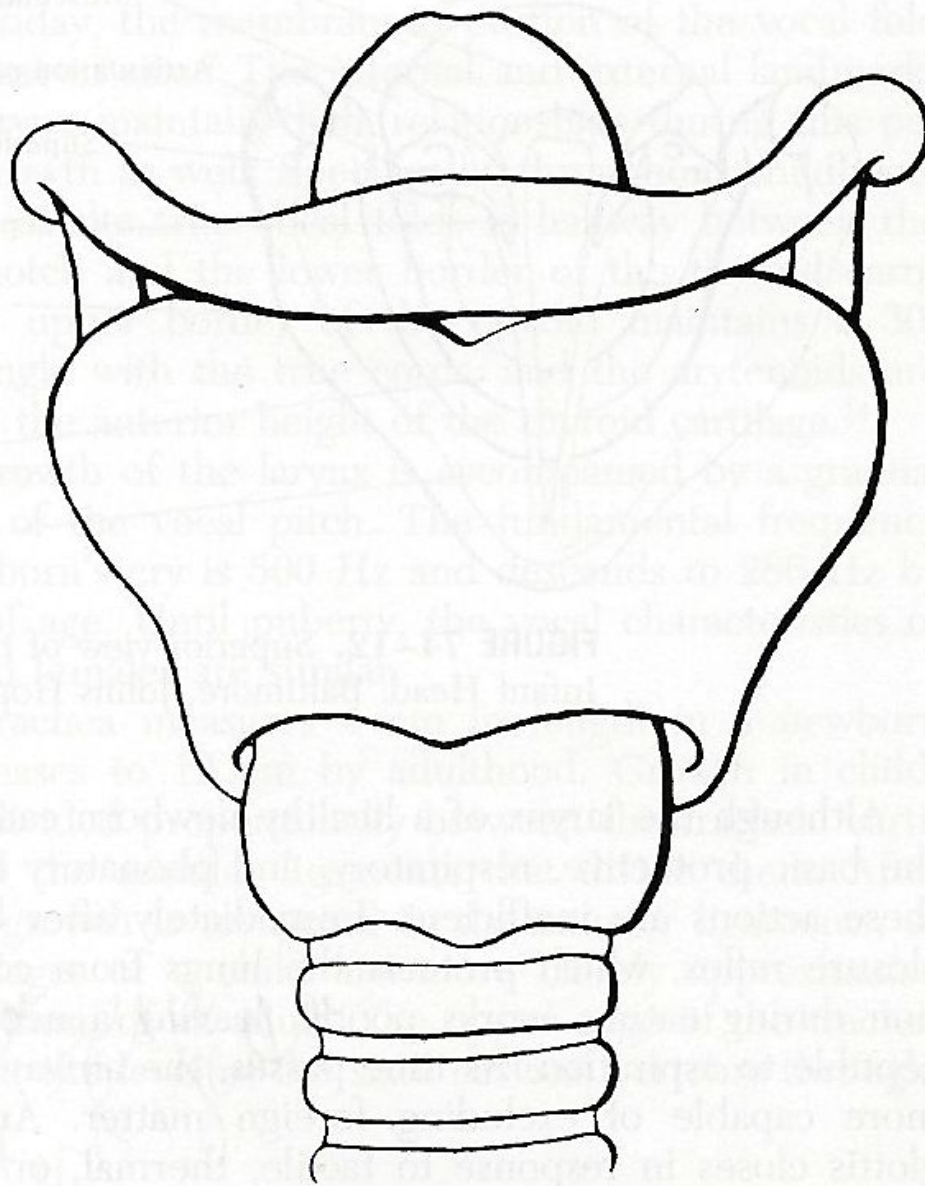




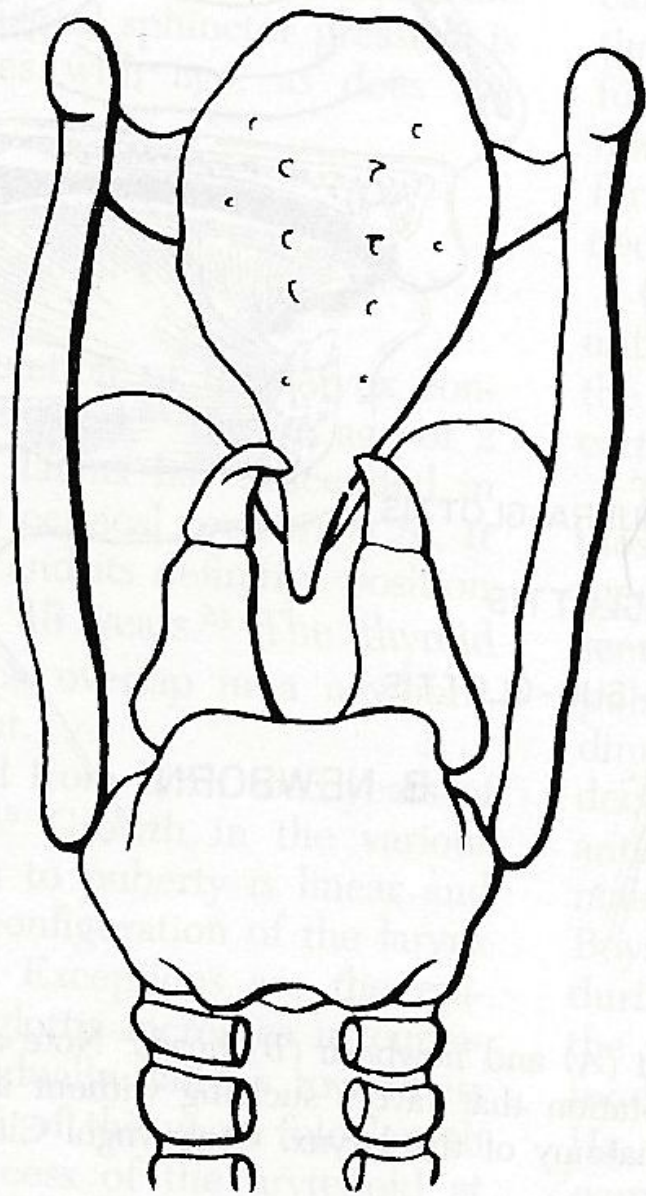
Mature



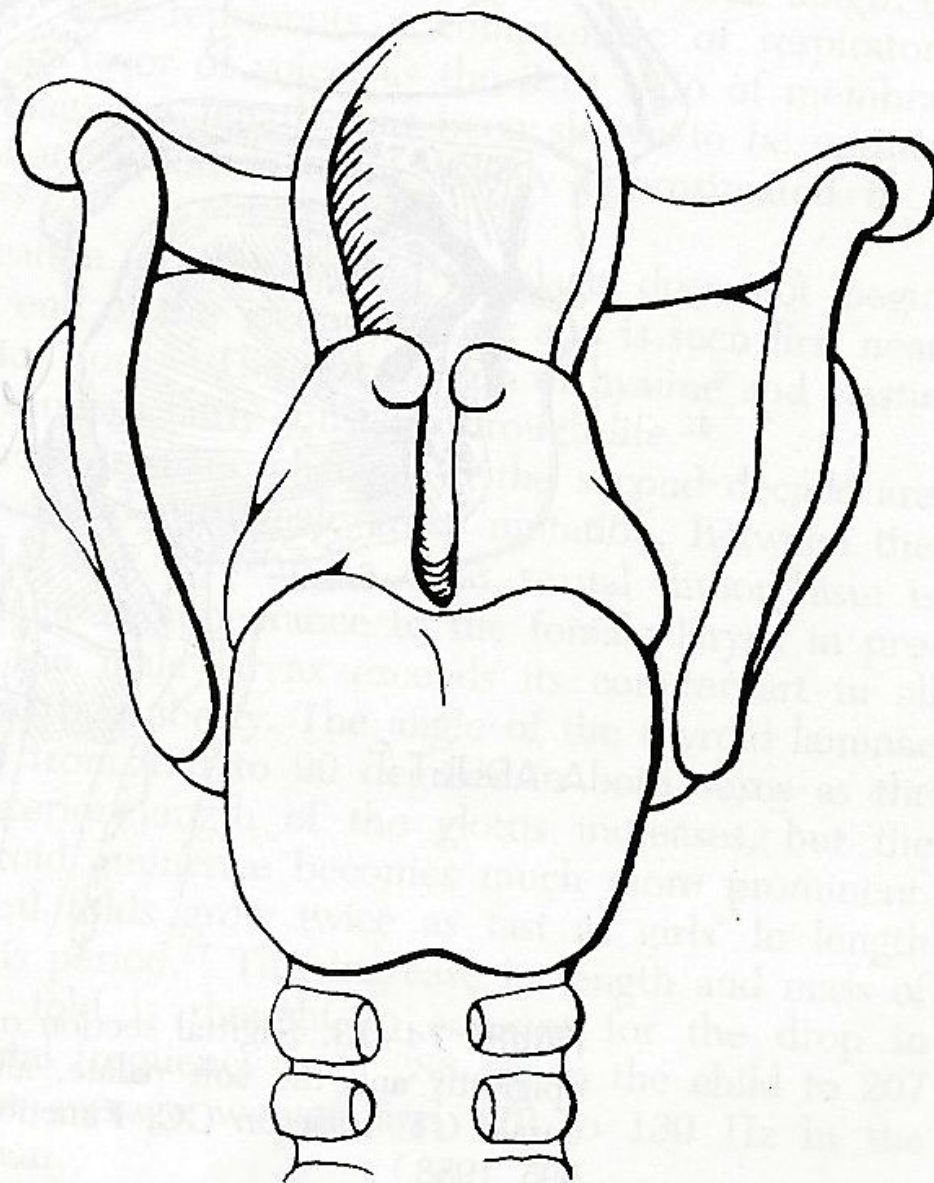
Infant

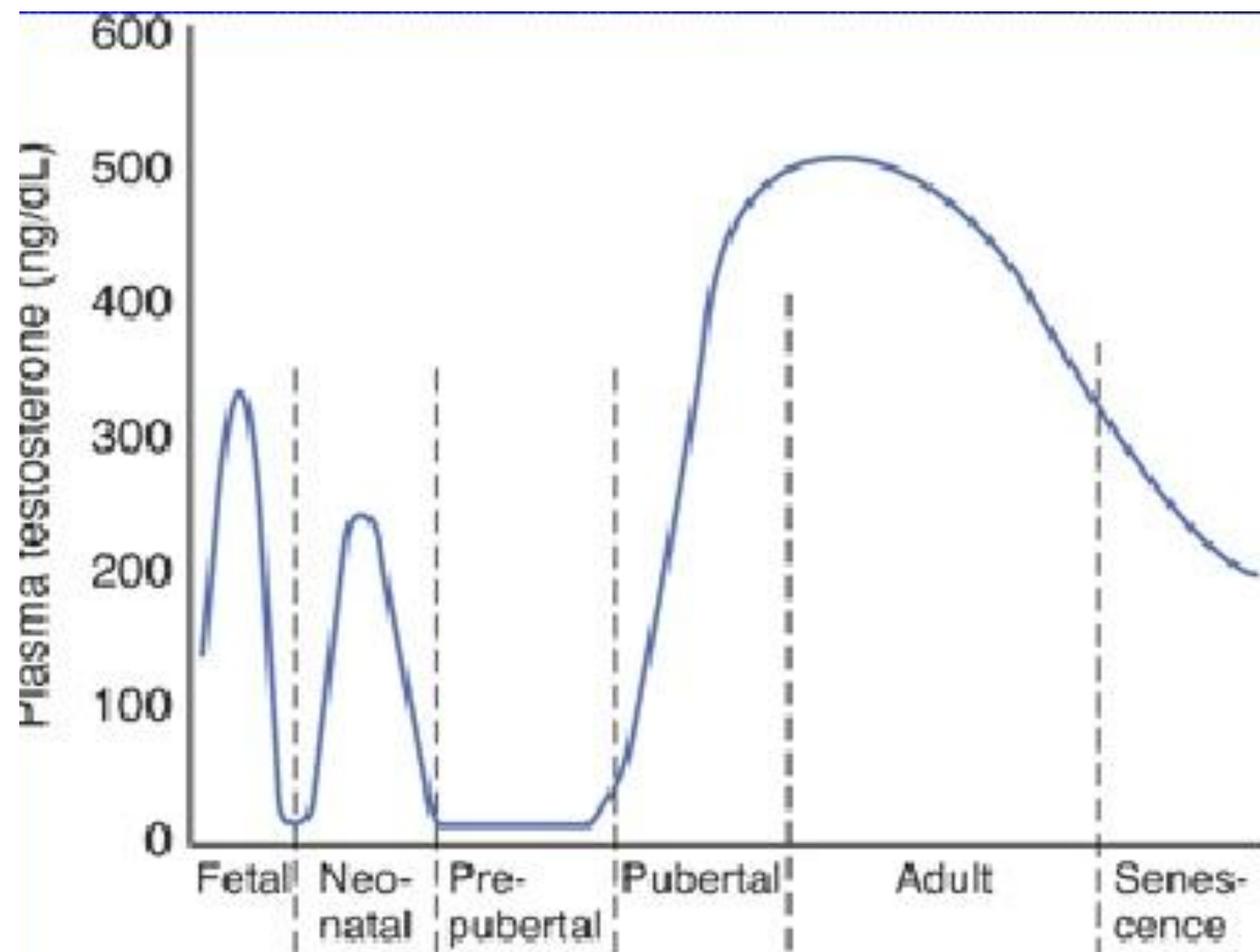


Mature



Infant

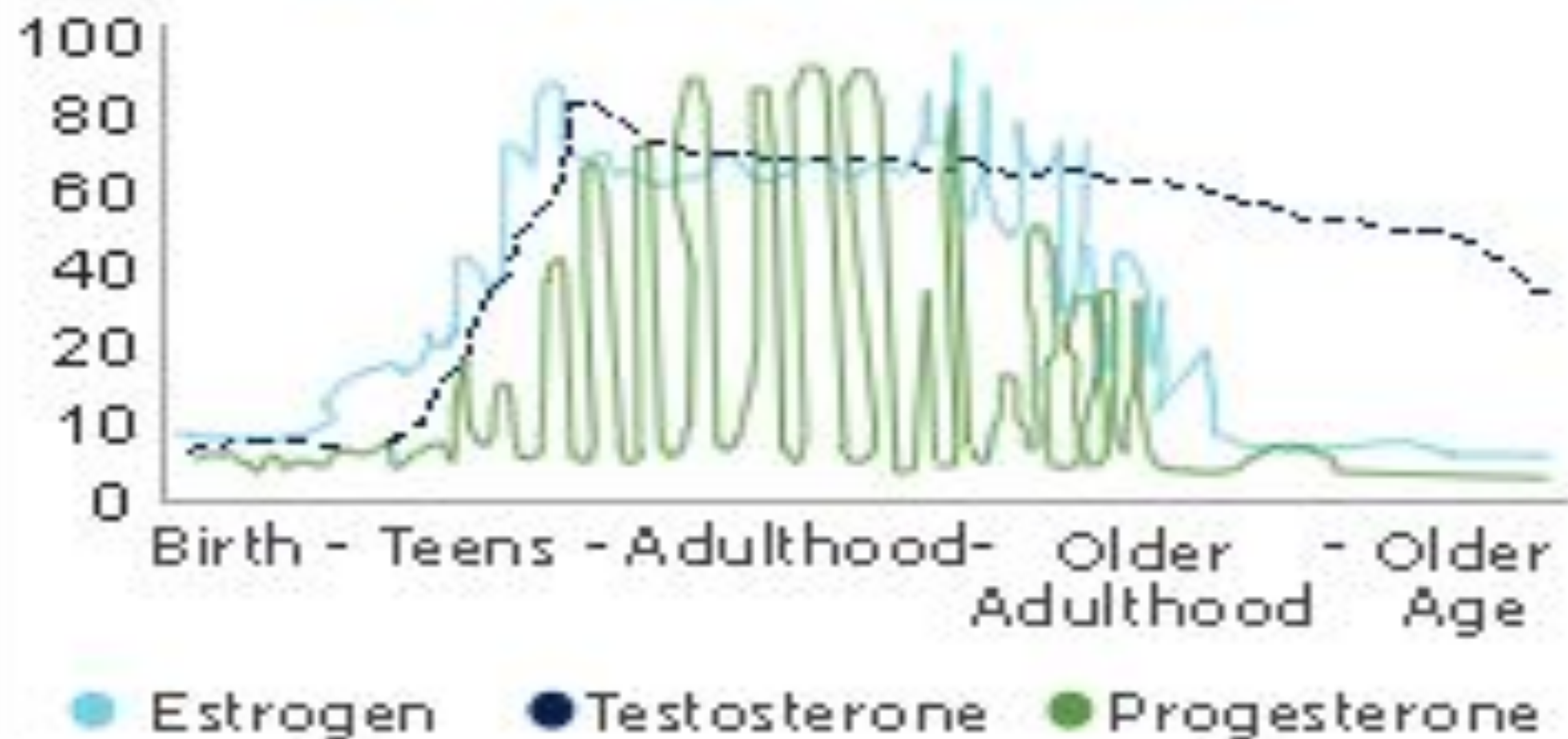




Source: Barrett KE, Barman SM, Boitano S, Brooks H; *Ganong's Review of Medical Physiology, 23rd Edition*; <http://www.accessmedicine.com>

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Life Cycle of Hormones



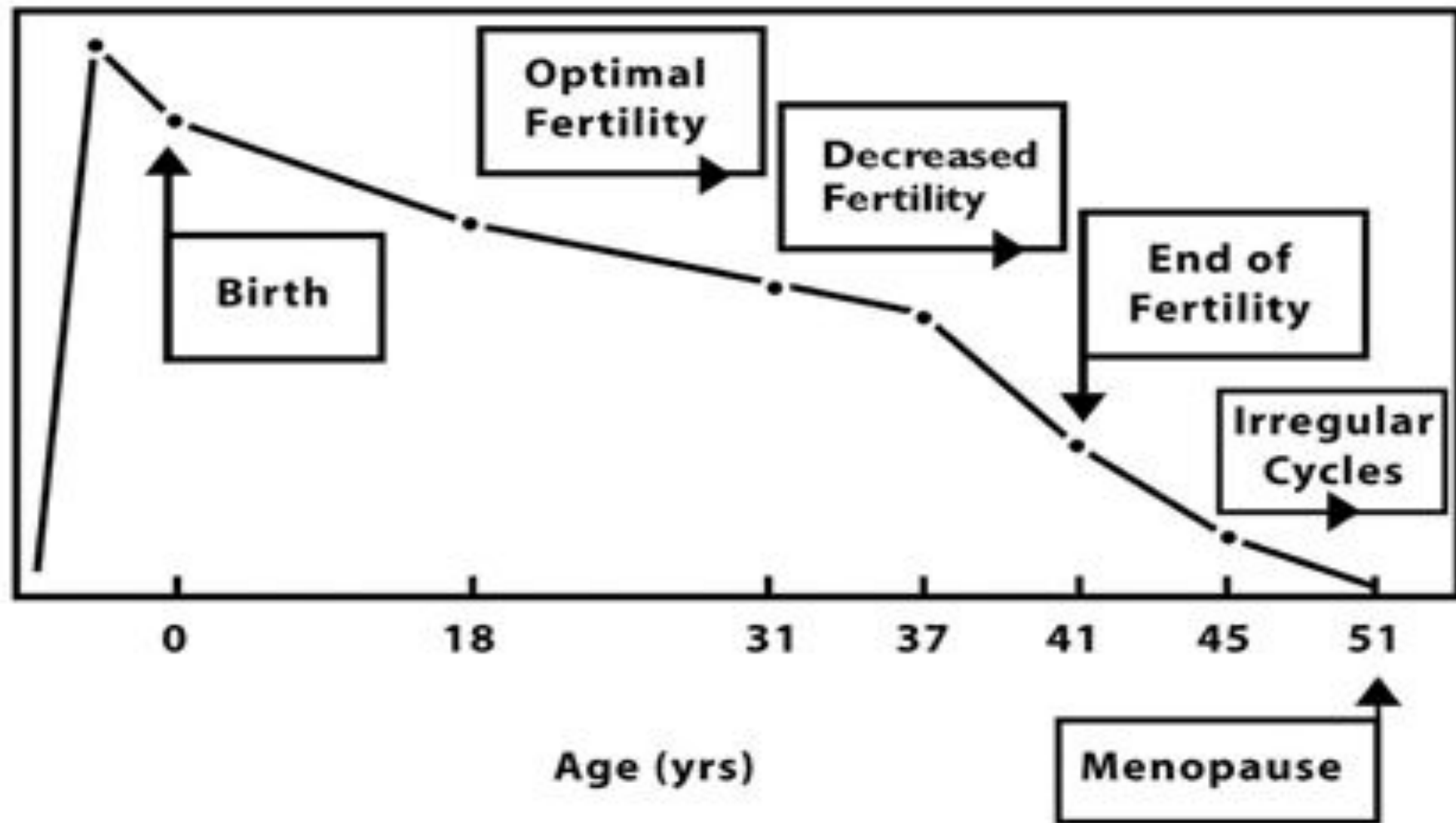
Follicle
Number

1,000,000

100,000

10,000

1,000



E.R. TE VELDE ET AL., 1998

Fact-based Life Span Perspective

- Nonuniform growth
- Nonlinear growth

Cartilage - ossification

• **Bones:**

- Appositional growth – add layers on the outside
- Interstitial growth – from the inside of the bone

• **Soft Tissue:** muscles, tendons, ligaments, fascia, etc.

- Atrophy - wasting away
- Dystrophy - malfunction
- Edema - swelling
- Hyaluronic Acid - retain water, keep tissue well lubricated, shock absorber, viscoelastic

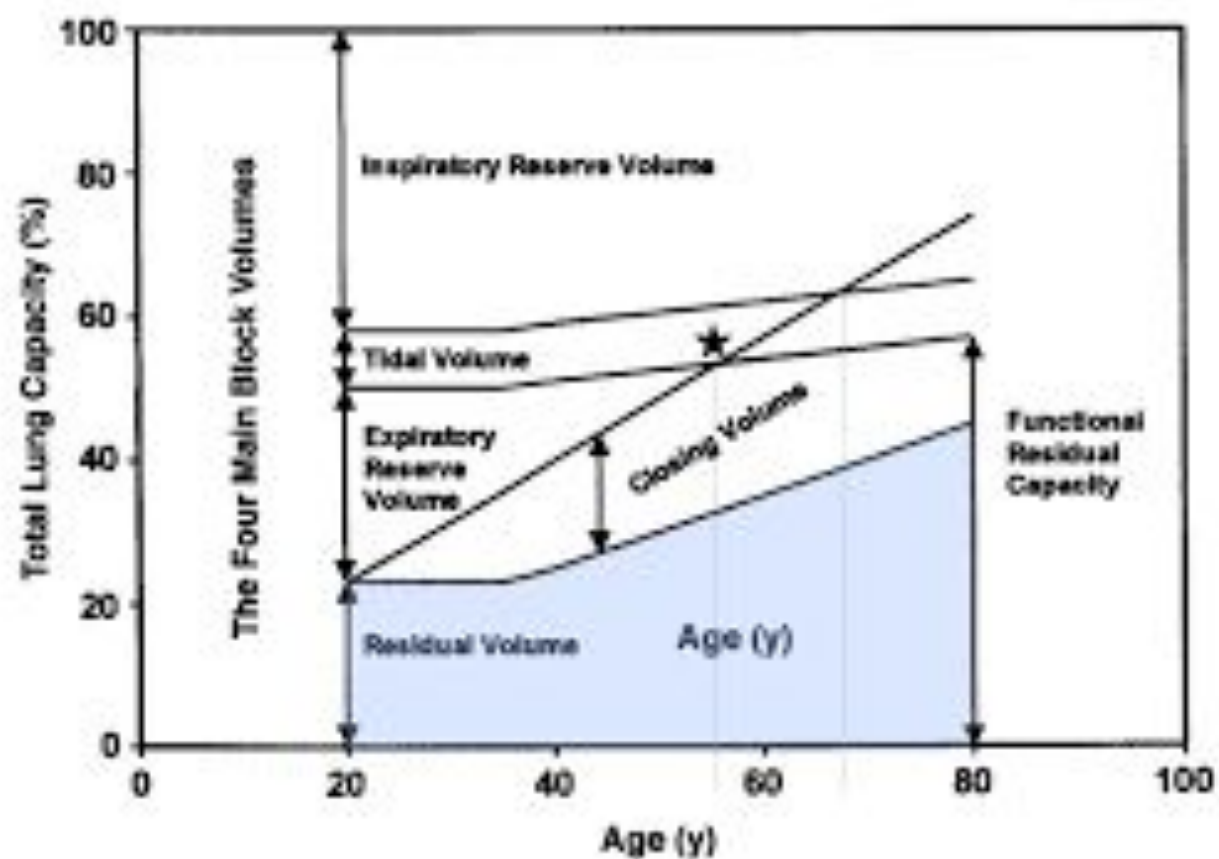
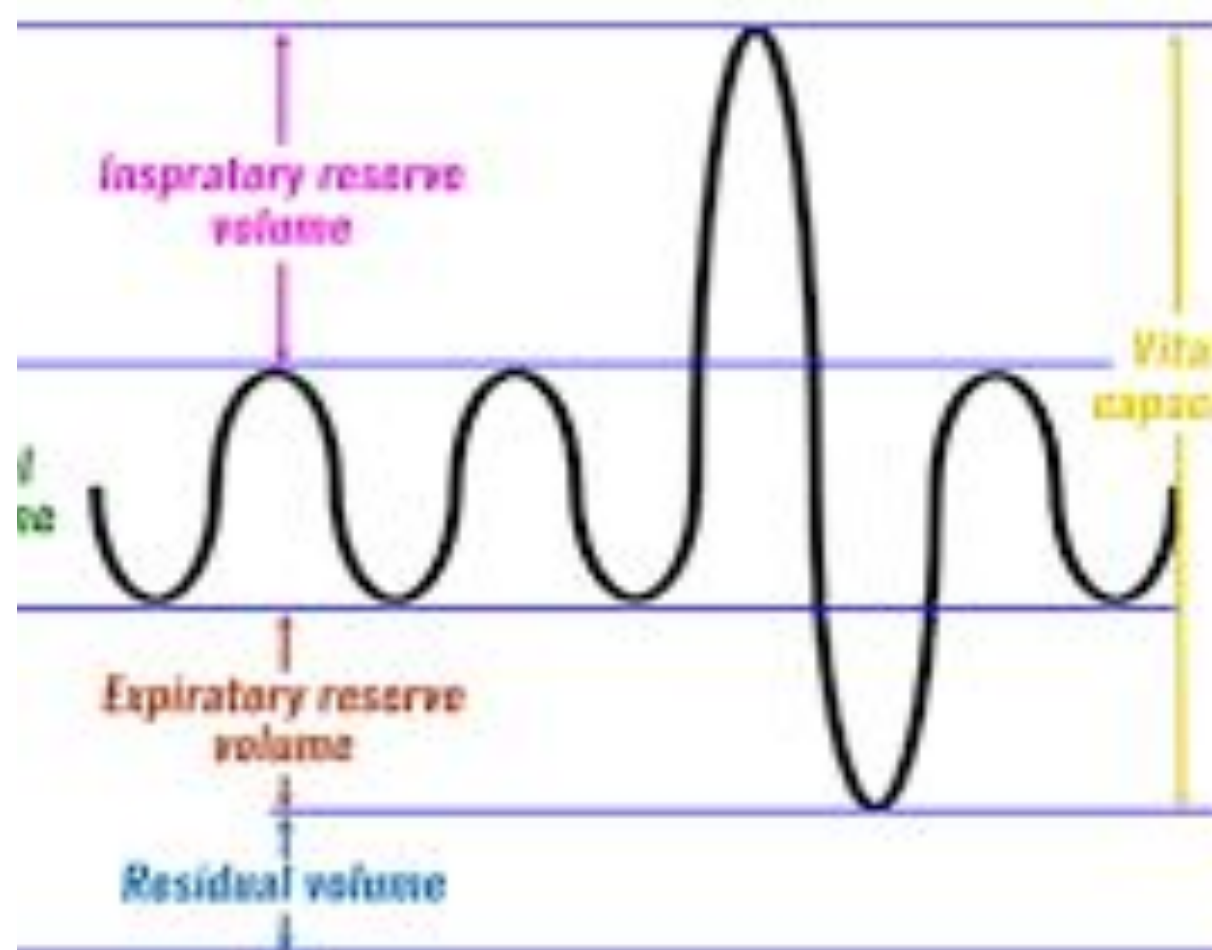
• **Somatic** – steady in vertical plane until maturity: Jaw, teeth, hyoid bone, face, laryngeal descent

• **Neural** – fast, early in horizontal plane: Cranium, hard palate

• **Lymphoid** – tonsils and adenoids early and fast and then atrophies by 18 years

• **Combinations of neural and somatic:** Vocal tract, tongue (doubles)

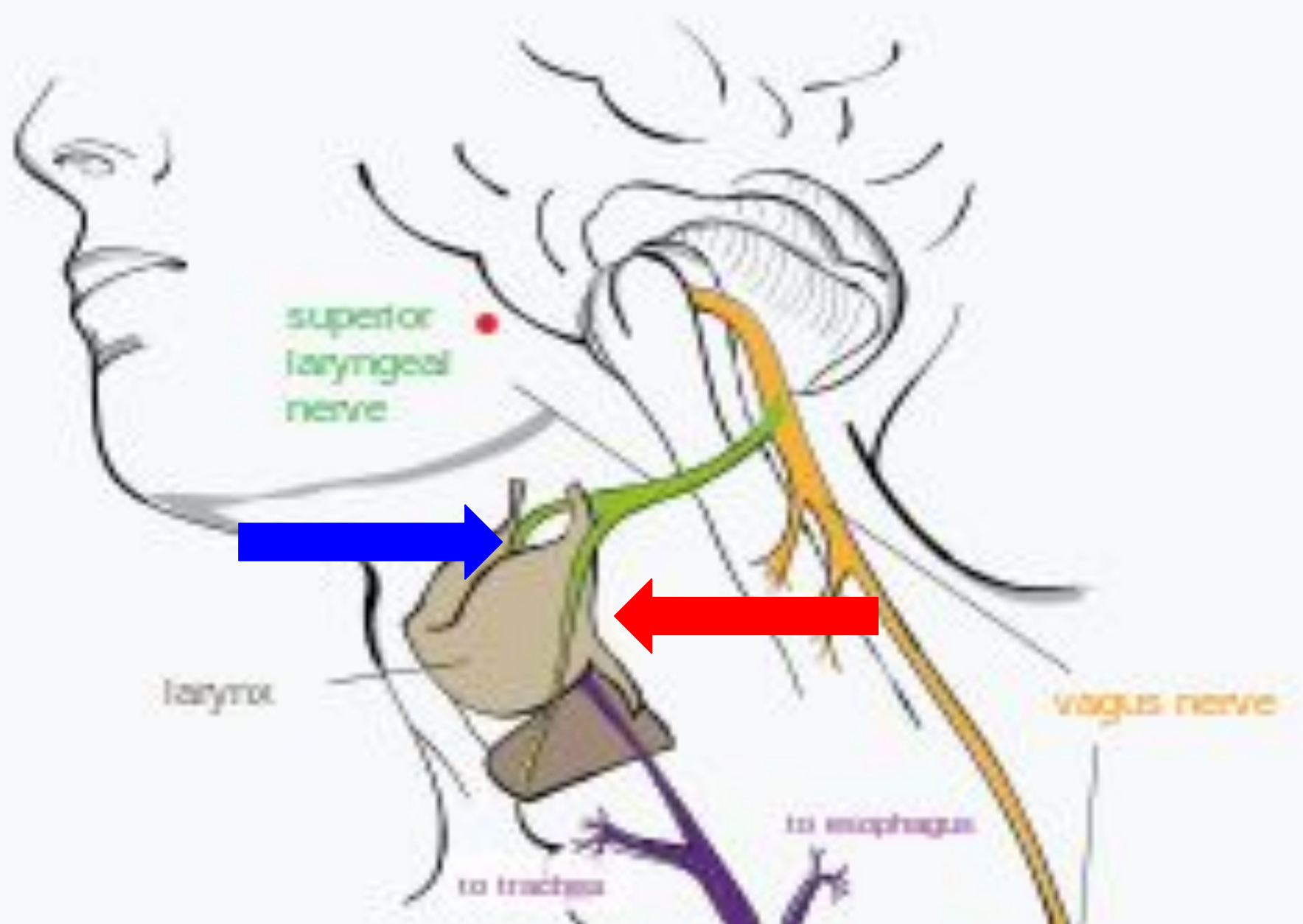
Reproductive - hormonal influence on the larynx



Normal Respiratory Rates..... (Table1)

Age	Respiratory rate
Infant (birth–1 year)	30-60
Toddler (1–3 years)	24-40
Preschooler (3–6 years)	22-34
School-age (6–12 years)	18-30
Adolescent (12–18 years)	12-16





Young Female



Old Female



