LIFESPAN VOICE DEVELOPMENT

PRENATAL ANATOMICAL VOICE DEVELOPMENT

Embryonic Period (First 8 Weeks)
- Development of rudimentary larynx begins at 4 weeks
- Trachea begins development at 5 weeks
- Diaphragm largely formed at 6 weeks
- Hiccups as early as 7 weeks

Fetal Period (8 weeks through Birth)
- Vocal ligaments at 9 weeks
- Lungs in place at 10 weeks (will continue to develop)
- Nose and lips completely formed at 11 weeks
- Tongue begins to develop at 14 weeks
- Inhaling/Exhaling amniotic fluid at 15 weeks
- Bronchial tree completely complete at 16 weeks
- Cartilage begins hardening to bone at 17 weeks
- Habitual swallowing at 20 weeks
- Loud noises heard in utero at 22 weeks
- Lungs more fully developed at 26 weeks
- Auditory system distinguishes between high and low sounds at 28 weeks
- Most physical development complete at 35 weeks
- Considered full term at 37+ weeks

AS BODIES GROW AND DECAY, VOICES GROW AND DECAY

Three Periods of Most Rapid Voice Change:
- Early Childhood, Adolescence, Older Age

CHILDHOOD VOICE DEVELOPMENT (0 Years to Puberty)

- Males and female larynges develop similarly at first
- Length of vocal fold at birth is about 2.5 mm (75% is vocal process); lengthens quickly
- Infant lamina propria has only one layer, no differentiated ligament
- Infant larynx is high (C3)
- Interlocking infant soft palate and epiglottis (permits simultaneous suckling & breathing)
- Small infant lungs (Newborns have ca 87 breaths per minute, adults 16-20 breaths)

Physiological voice range, span of 2.5 octaves, typically reached in first 3-4 yrs
Musical vocal range develops within physiological range about a 5th, then increases
Vocal fold length increases to 8 mm at 18 months and to 10 mm by 6 years
Two layers appear in lamina propria between 6-12 years of age
Children have softer laryngeal cartilages
Larynx begins descent
Childhood=Greatest incidence of vocal fold nodules among general population
ADOLESCENT VOICE DEVELOPMENT (Onset of Puberty to Adult laryngeal structure)

Driving Factor: Puberty (a biological/genetic phenomenon, not necessarily dependent upon chronological age; puberty=about 2 yrs preparing for reproduction & about 2 yrs completing the process necessary for reproduction; growth of larynx is according to biological not chronological age); menarche occurring earlier (ca. 11 yrs old)
Skeletal growth often first indicator; skeletal growth precedes muscular development
Larynx descent becomes almost complete (C6 at pubertal onset, C7 by age 20)
Marked growth in posterior region of vocal tract
Lamina propria develops 3 distinct layers/vocal folds thicken
Vocal folds lengthen: females 0.4 mm per year, males 0.7mm per year to eventual male length of about 17-22 mm, eventual female length of about 11-17 mm
At puberty male vocal range extends then drops about an octave; female vocal range lowered by about a third of an octave and upper limit extended by a few tones

Adult lung capacity achieved by 18-20 yrs of age
Adult laryngeal structure achieved by 22-25 yrs of age

Stages of Adolescent Voice Change/Growth
All persons experience each stage
But length of each stage varies among individuals
Male Stages (Cooksey)
Female Stages (Gackle)

Around 20% of adolescents today have some form of hearing loss (mild to severe)

OLDER ADULT VOICE DEVELOPMENT

Steady increase in elastin content of the lamina propria and thinning of superficial layer as we age
Steady ossification/hardening of laryngeal cartilages
Muscle atrophy including vocalis and other laryngeal muscles

Female Characteristics
Male Characteristics