## Relational growth of vocal tract structures with vocal tract length during the first two decades of life as visualized from MRI and CT studies. H.K. Vorperian, R.D. Kent, S. Wang, M.K. Chung, L.R. Gentry

The decreased variability in acoustic and physiologic measures of speech production as age increases has been interpreted to reflect neural maturation of the speech motor control system. However, concurrent with neural maturation, the anatomy of the speech production system is developing markedly whereby different structures have different growth patterns with sex specific growth rates. This study uses r-squared curves to assess the relational growth of the various vocal tract (VT) structures with vocal tract length (VTL) during the first two decades of life. Quantitative measurements of the various soft, cartilaginous and bony structures in the oral and pharyngeal regions were secured from 645 imaging studies (MRI & CT). Structures measured include: Lip-thickness, hard- and soft-palate length, tongue-length, mandibular-length and depth, oro-naso-pharyngeal length, distance/descent of the larynx and hyoid bone from the posterior nasal spine, length of the oral/horizontal and pharyngeal/vertical portions of the VT, and VTL. Results show differences in the relational growth of the different VT structures with VTL including sex specific prepubertal and pubertal differences. Also, comparison of relational growth curves reflects coordinated growth of select structures. An important implication is the need to incorporate information on developmental anatomy in the understanding of speech motor control development.