Göteborg, 2023

Hearing in advanced age

Epidemiological, pathophysiological, and diagnostic perspectives from the H70 Birth Cohort Studies

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Hörsal Arvid Carlsson, Medicinaregatan 3, den 17 november 2023, klockan 09:00.

av **Hanna Göthberg**

Fakultetsopponent:

Professor Bo Engdahl
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Avhandlingen baseras på följande delarbeten

I. Göthberg H, Rosenhall U, Tengstrand T, Rydberg Sterner T, Wetterberg H, Zettergren A, Skoog I, Sadeghi A. (2019). *Cross-sectional assessment of hearing acuity of an unscreened 85-year-old cohort - Including a 10-year longitudinal study of a sub-sample.* Hearing Research 382:107797.

II. Göthberg H, Rosenhall U, Tengstrand T, Rydén L, Wetterberg H, Skoog I, Sadeghi A. (2020). *Prevalence of hearing loss and need for aural rehabilitation in 85-year-olds: a birth cohort comparison, almost three decades apart.* International Journal of Audiology 60(7):539-548.

III. Göthberg H, Skoog I, Tengstrand T, Magnusson L, Hoff M, Rosenhall U, Sadeghi A. (2023). *Pathophysiological and Clinical Aspects of Hearing Loss Among 85-Year-Olds.* American Journal of Audiology 17:1-13.

IV. Göthberg H, Skoog J, Tengstrand T, Hoff M, Hadarsson Bodin, T, Rosenhall U, Skoog I, Sadeghi A. (2023). *Results from a simplified dichotic listening test in younger and older olds.* Manuscript.

SAHLGRENSKA AKADEMIN

GÖTEBORGS UNIVERSITET

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Abstract

Age-related hearing loss (ARHL) is a multifactorial condition and most older adults experience progressive and symmetrical hearing loss. ARHL leads to difficulties in hearing speech, especially in noisy conditions. Speech recognition relies on both peripheral (in the ear) and central auditory (in the brain) functions, as well as cognitive abilities. Central hearing loss leads to difficulties in speech perception and both peripheral and central hearing loss as well as cognition need to be considered in ARHL. This thesis addresses epidemiological, pathophysiological, and diagnostic perspectives of ARHL in 85-year-olds, born in 1930. The results are based on a prospective and epidemiological study, The Gothenburg H70 Birth Cohort Studies. Cross-sectional and longitudinal results from pure-tone audiometry are presented. The prevalence of ARHL in 85-year-olds is provided, including a birth cohort study, of which 85-year-olds born ~30 years apart are compared. Moreover, various functions in the auditory system, from the ear to the brain, are studied with the use of a comprehensive test-protocol, enhancing both behavioral and physiological measures. The results from Paper I show a considerable decline in hearing thresholds for both sexes between the ages of 75 and 85. Paper II displays a lower prevalence of disabling hearing loss (according to WHO criteria) in 85-year-old men born in 1930 than in 85-year-old men born in 1901-02. This cohort difference was not observed in women. Results in Paper III indicate that sensorineural hearing loss, specifically auditory sensory dysfunction, is the most common auditory pathology at the age of 85. However, one fifth had poorer speech recognition scores than expected based on the audiogram, of which only two were identified with auditory neural dysfunction. Central auditory hearing function was studied in Paper IV, using a Dichotic Speech Test. The test results show that it is challenging to separate a central auditory deficit from peripheral hearing loss and cognitive ability in advanced age. In summary, the observation of a significant decline in hearing with age, and a relative high proportion of older olds with abnormal speech recognition, emphasize the importance of early identification and thorough individual assessments. **Keywords:** Age-related hearing loss, Older adult, Hearing decline, Peripheral auditory function, Central auditory function, Audiological research

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