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Development of Frequency Selectivity Map (FSMap) depiction system for hearing impairment

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An audiological assessment of hearing impairment and the fitting of hearing aids require an accurate measurement of auditory profiles of hearing-impaired listeners, since sensorineural hearing loss shows several perceptual changes such as loudness recruitment, reduced frequency selectivity and reduced temporal resolution. It is known that frequency selectivity can be expressed as the bandwidth of auditory filters. For investigating the reduced frequency selectivity, a system that could measure an individual auditory filter of hearing impairment for 3 minutes was developed. The measured auditory filters are depicted as Frequency Selectivity Map (FSMap) which is drawn with colored gradation. This system calculates the ratio between Equivalent Rectangular Bandwidth (ERB) of an individual hearing-impaired listener and that of normal-hearing listeners. Data of auditory filters for several frequencies and sensation levels were employed to draw a FSMap. In this study, FSMaps of thirty subjects with sensorineural hearing loss using this system were evaluated. Results showed that frequency selectivity of sensorineural hearing loss was reduced as comparing with that of the normal hearing. Different degrees of frequency selectivity for individuals who had the similar contour in audiogram were further obtained in FSMap. Consequently, reduced frequency selectivity, i.e. how much is your frequency selectivity poorer than normal hearings, is quantitatively and intuitively and showed with the FSMap. Results of this study suggested that FSMap had a potential to be a new practical auditory profile.

