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Toward a further understanding of middle ear mechanism using otoreflectance

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Otoreflectance (OR) is a newly developed hearing-test instrument utilizing acoustic signals presented and recorded in the ear canal. It provides calibrated measurements over a frequency range from 0.25 to 8 kHz of the transfer functions as reflectance and admittance, and the power absorbed by the ear canal and middle ear. In the present study, acoustic impedance and reflectance measurements were performed in 20 subjects with a clinical acoustic immittance instrument (GSI 33 version 2) and an experimental OR system. Measurements are made over a frequency range of 226, 678 and 1,000 Hz with the GSI middle ear analyser and 250–8,000 Hz with the experimental OR system. The reflectance patterns across a wide frequency range at ambient ear-canal air pressure are analysed. Moreover, the tympanometric admittance obtained with the two systems is compared. Because the measurement of OR is simple, fast, objective, reproducible and non-invasive, and because energy reflectance and absorbed power are relatively insensitive to the position of the probe in the ear canal, the OR tympanometry instruments may have a great potential for use in the general audiological and screening utility for diagnosing middle-ear pathology.