Tianying Ren, M.D., M.S.

presently is a Professor at the Oregon Hearing Research Center at the Oregon Health & Science University. He completed his medical and graduate education at Xi'an Medical University in China. Following his residency, he was a World Health Organization fellow and a research investigator at the Kresge Hearing Research Institute (1990-1995).

During his fellowship and postdoctoral training at the Krege Hearing Research Institute, he studied control mechanism of the cochlear blood flow under the supervision of Drs. Alfred Nuttall, Josef Miller, and David Dolan. He developed a reversible cochlear ischemia animal model which has been widely used since for studying ischemia-induced sensorineural hearing loss. After joining the Oregon Hearing Research Center in 1996, he established a strong independent research program to study cochlear mechanics which has been funded by NIH for almost twenty years. He developed a scanning heterodyne laser interferometer and made the first direct measurement of the basilar membrane traveling wave in living animal cochleae in 2002. He discovered that cochlea-generated distortion products propagate along the basilar membrane as a forward traveling wave and not - as commonly expected – a backward traveling wave. This surprising finding challenged established theories and provoked a long-lasting debate in the cochlear mechanics field.

More recently, Dr. Ren developed a scanning heterodyne low-coherence interferometer to study cochlear micromechanics in living animals. He and his collaborators determined that the outer hair cell-driving reticular lamina vibrates significantly more than the basilar membrane not only at the best frequency but also at frequencies far below the best frequency. The reticular lamina and basilar membrane move in opposite directions at low frequencies and in phase at the best frequency. These data indicated that the outer hair cell-generated force may not effectively amplify the basilar membrane vibration at the force-generation location through a local feedback mechanism; the coordinative movements of the reticular lamina and basilar membrane over a broad region along the cochlea, however, reveal a global hydromechanical mechanism for a cochlear active process.

Dr. Ren's lab currently studies micromechanical mechanisms responsible for cochlear amplification and the generation of otoacoustic emissions. The results from these projects will be crucial for advancing our knowledge on hearing and for improving applications of otoacoustic emissions as a non-invasive tool for diagnosing auditory disorders in humans.