Research in animal models of hearing indicated that after noise exposure, synaptic boutons connecting the inner hair cells to the auditory nerve, and not hair cells, were the first part of the auditory system to fail. This phenomenon, known as “synaptopathy”, was identified primarily with fibers sensitive to suprathreshold sounds, leaving fibers sensitive to the quietest sounds unaffected. Thus, thresholds were normal, but suprathreshold hearing might be abnormal. While synaptopathy has not been definitively observed in humans, patients with “normal hearing”, meaning normal detection thresholds, have often presented with complaints about understanding speech in noise and tinnitus. These problems are consistent with theoretical consequences of synaptopathy. Such problems have been called “hidden hearing loss”, because the “loss” is hidden to standard clinical diagnostics. Thus, new diagnostics are needed.

Speech understanding in noise is a highly clinically relevant ability that is sometimes poor in “normal hearing”, but rarely measured in the audiology clinic. In early studies exploring possible diagnostics, we found high correlations between speech understanding in noise, extended high frequency detection thresholds, and age. Additional assessments under investigation include middle ear reflex response and electrocochleography. Results from these tests and others could indicate a noise, or age related suprathreshold abnormalities in the absence of significant thresholds shifts. Careful selection of diagnostics could provide clues to possible causes of “hidden hearing loss”, which might be peripheral, central auditory, or cognitive.