

Stem Cells and Drugs: Preventing and Treating Hearing Loss
Josef M. Miller, PhD^{1,2}
University of Michigan, Ann Arbor, MI, USA
Karolinska Institute, Stockholm, Sweden

Drugs now offer the opportunity and promise of prevention and treatment of hearing disorders. This promise will be realized within the next few years and rapidly expanded in range of disorders that will be treated and efficacy of treatment with coming new technologies being developed using nanoparticles, biopolymers, and (stem) cell based technologies for local and target treatment and tissue engineering of selected inner ear tissues. This presentation will highlight some of the recent milestones achieved in the development of these technologies, those soon to be achieved and the opportunities now before us for the prevention and treatment of hearing impairment.

At a pre-clinical level the use of stem cells, both exogenous and endogenous, provides the potential to treat deafness by replacing lost hair cells or lost auditory nerve. At a clinical and translational level, with a new understanding of the key role of metabolic and vascular factors in stress-induced inner ear pathology and hearing loss from noise, drugs, surgery, and perhaps age-related, agents that can modulate cell energetics, free radical formation and blood flow to the inner ear offer safe and effective interventions to prevent hearing loss. The path to translation is clear, although not without hurdles, largely bureaucratic, many financial and some cultural. Some of the 'agonies and ecstasies' associated with translational efforts in academia as well as the experience of dipping ones toe in the ocean of business only to lose a leg to sharks will be discussed.

¹ This work was supported by the Ruth and Lynn Townsend Professorship in Communication Disorders, General Motors, and the NIDCD

² Josef Miller is a shareholder in the company Hearing Health Science currently developing the micronutrient formulation (SoundbitesTM) to prevent noise-induced hearing loss. The University Of Michigan Board Of Regents has established a conflict of interest management plan.