

Future Promise: Inner Ear Hair Cell Regeneration

Brenda Ryals, Ph.D., James Madison University, Harrisonburg, VA

In 1989 fewer than 5 articles were published on the topic of hair cell regeneration. Today a quick literature search reveals more than 500 relevant articles on the Pub Med database. In the first part of this presentation I will talk about the multiple forces that occurred leading to this important discovery. Like many unexpected discoveries, serendipity played a major role, as did the “perfect storm” of advances in genetics, inner ear development, molecular biology and auditory neuroscience. Twenty-five years later we essentially have a new branch of auditory neuroscience devoted to understanding the genetic and molecular signals controlling development, homeostasis and repair in the inner ear. But history has shown us that we don’t need to have a complete understanding of the theoretical underpinnings of a discovery in order to put that discovery into therapeutic practice. The cochlear implant is an excellent example. The second part of this presentation will highlight current challenges to innovative and translational efforts. These challenges include consistent funding, the opportunity to fail, and purposeful cross disciplinary collaboration. Of course, advances across other disciplines and economic factors can expedite or impede progress. The final portion of the presentation will provide examples of successful strategies (e.g. stem cells, gene therapy) and discuss the potential barriers to their future advancement. The ultimate success of hair cell regeneration as a treatment for hearing loss will most certainly be influenced by our ability to identify appropriate candidates. The inner ear pathology and its underlying etiology will determine whether restoration of hair cells will successfully restore hearing. Specificity of audiometric and genetic tests, biologic material development and imaging resolution are just a few of the areas where targeted research will be necessary for translation of this basic discovery to future clinical practice.

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