THE UNIVERSITY OF UTAH

Department of Human Genetics

Dr. Lisa D. Urness earned her Ph.D. in 1995 and is currently a research associate studying **embryonic ear development** in the laboratory of Dr. Suzanne Mansour at the University of Utah.

The inner ear is a highly organized sensory organ with many specialized cell types that are responsible for both hearing and balance. Despite its complexity, all the cells that make up the inner ear are derived from a relatively simple patch of cells, referred to as the otic placode, which is located on the surface of the embryonic head. Small signaling molecules, termed Fibroblast Growth Factors (FGFs), function as molecular triggers to activate gene cascades within this region, specifying the cells that will go on to form the ear.

Dr. Suzanne Mansour and her colleagues at the University of Utah have shown that FGF3 and FGF10 are key regulators of ear development. Knock-out mice that lack both of these factors fail to initiate otic placode or ear development of any kind, suggesting that these trigger molecules play critical roles at the top of a genetic hierarchy to activate a constellation of "inner ear-specific" genes.

The protein products of these genes, many of which have not yet been discovered, are ultimately responsible for building the specific components of the ear. They transform the thin layer of placode cells into a sphere, which then continues to undergo complex reorganization to form the elaborate cochlear and vestibular structures.

By comparing the genetic profile of mice lacking FGF3/10 with normal mice, Dr. Urness has begun to pinpoint genes that are regulated by FGF3/10, research that is in its second year of funding by the DRF. Some of the genes identified so far have been shown to play roles in ear development in animal model systems such as the frog and fish.

It will be very interesting to determine their respective roles in the development of the mammalian ear. The genes that have been identified will be studied with various functional methodologies to uncover their specific role in ear development. These studies will ultimately contribute to our understanding of the genetic "blueprint" for 'building an ear.' Moreover, it is anticipated that many of these genes may be implicated in congenital hearing or balance disorders and that their discovery may suggest potential therapeutic interventions.

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