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“Assessment of innervation in supernumerary hair cells induced by Wnt pathway activation in zebrafish”

Hearing loss is a major public health concern affecting more than 37 million adults in the United States alone. The sense of hearing is mediated by delicate sensory cells called hair cells located within the inner ear. In humans these cells are not replenished following damage or destruction due to loud noises, certain drug treatments, and aging, resulting in permanent hearing loss. Regenerative therapies to restore lost hair cells are a promising avenue to restoring hearing. We use the zebrafish as a model to study hair cell development and regeneration; fishes, unlike humans, can naturally regrow lost hair cells. We and others have found that activating the Wnt/wingless signaling pathway can induce the production of extra “supernumerary” hair cells in zebrafish as well as the mammalian ear. However, it remains unclear whether these cells are connected to the central nervous system, which is required for them to send signals to the brain that are interpreted as sound. In this proposal we aim to determine whether supernumerary hair cells induced by the Wnt pathway agonist WAY-262611 form synapses with neurons, allowing them to communicate with the brain. This work will contribute to the development of new regenerative therapies for hearing loss.