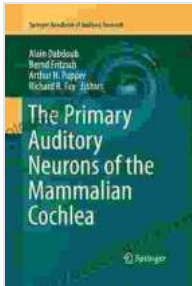


The Primary Auditory Neurons of the Mammalian Cochlea



The Primary Auditory Neurons of the Mammalian Cochlea (Springer Handbook of Auditory Research 52)

by David Michael King

★★★★★ 5 out of 5

Language : English
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The mammalian cochlea is a highly specialized organ responsible for hearing. It is a snail-shaped structure that is located in the inner ear. The cochlea contains sensory hair cells that convert sound waves into electrical signals, which are then transmitted to the brain by the primary auditory neurons.

The Structure of the Cochlea

The cochlea is divided into three main chambers: the scala vestibuli, the scala tympani, and the scala media. The scala vestibuli is filled with perilymph, a fluid that is similar to cerebrospinal fluid. The scala tympani is also filled with perilymph, but it is separated from the scala vestibuli by the basilar membrane. The scala media is filled with endolymph, a fluid that is rich in potassium ions.

The basilar membrane is a thin, flexible membrane that separates the scala vestibuli from the scala tympani. It is responsible for the frequency selectivity of the cochlea. The basilar membrane is wider and more flexible at the apex of the cochlea, and it becomes narrower and stiffer at the base. This means that low-frequency sounds cause the basilar membrane to vibrate at the apex, while high-frequency sounds cause it to vibrate at the base.

The Sensory Hair Cells

The sensory hair cells are located on the basilar membrane. They are arranged in four rows: the inner hair cells, the outer hair cells, the marginal cells, and the pillar cells. The inner hair cells are the primary auditory receptors. They are responsible for converting sound waves into electrical signals.

The outer hair cells are thought to play a role in the cochlea's frequency selectivity. They can amplify or dampen the vibrations of the basilar membrane, which helps to sharpen the cochlea's tuning.

The Primary Auditory Neurons

The primary auditory neurons are the nerve cells that transmit the electrical signals from the hair cells to the brain. They are located in the spiral ganglion, which is a small structure that is located at the base of the cochlea.

Each primary auditory neuron innervates a single inner hair cell. The electrical signals from the hair cells cause the primary auditory neurons to fire action potentials, which are then transmitted to the brain.

The Central Auditory System

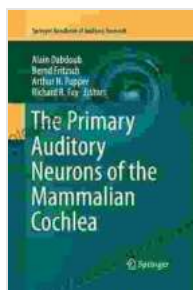
The primary auditory neurons send their signals to the cochlear nucleus, which is located in the brainstem. The cochlear nucleus is responsible for processing the sound information and sending it to the auditory cortex, which is located in the temporal lobes of the brain.

The auditory cortex is responsible for interpreting the sound information and creating our perception of hearing.

The primary auditory neurons are essential for hearing. They convert sound waves into electrical signals, which are then transmitted to the brain. The brain uses these signals to create our perception of hearing.

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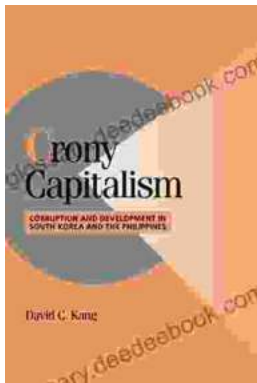
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