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Cross-references to UniProt

Pendrin, Homo sapiens (Human): O43511

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We are reminded regularly of how fragile life is and how easily the subtle balance of our molecular make-up can be shifted and cause devastating effects. Deafness is one. Deafness can be brought about by a number of incidents. It can occur following an illness or an accident for example. Or it can be congenital. Pendred Syndrome afflicts one out of two thousand human beings and is characterised not only by deafness in both ears but also – though not always – by a swelling in the thyroid gland, otherwise known as goitre. The symptoms of Pendred Syndrome have been known for over a century, but scientists are only just beginning to understand what it is that can leave a human-being deprived of a sense which is so vital. One of the culprits is known as Pendrin – a protein which acts as an ion transporter.

Pendred syndrome (PS) was first described in 1896 by an English general practitioner, Dr Vaughan Pendred, who had listened patiently to an Irish mother’s account of hearing deficiency which had run through her progeny composed of ten children, all of whom were almost completely deaf and mute. Some of them had also developed goitre, at an early or later age. Following the practitioner’s description, further occurrences of goitre coupled with deafness were confirmed, although, with time, it became increasingly obvious that patients afflicted with Pendred Syndrome did not necessarily also suffer from goitre. Thus making the diagnosis of PS a little tricky…

Today, far more is known both on the molecular and the physiological front, and Pendred Syndrome can be diagnosed more easily, and hence faster. The affliction is genetic and causes part of the inner ear of a developing embryo to be malformed. The result is a loss of hearing at birth. The genetic component involved in the syndrome was tracked down in the 1990s, almost exactly a century after Dr Pendred had sent the account of his findings to The Lancet at the end of the 19th century.

The gene involved in PS encodes a transmembrane protein which has been called “pendrin”. Pendrin is about 800 amino acids long and is found in the cell membranes of three different tissues: the thyroid gland, the inner ear and the kidney – which would explain the occasional dual occurrence of goitre and deafness when something goes wrong. So far, however, there seems to be no apparent harm caused to kidneys in the event of Pendred Syndrome.

Under normal circumstances, pendrin is a transmembrane ion transporter. When malformed, it could well be that the protein is unsteady, perhaps even wobbly, within a cell’s membrane thus causing ion transport to be either faulty or even non-existent. Within the inner ear, pendrin malfunction seems to tamper with endolymph homeostasis – the fluid that flows through part of the inner ear, bathing sensory cells which are so crucial to proper...
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Vivienne Baillie Gerritsen

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