Gap-junctional channel and hemichannel activity of two recently identified connexin 26 mutants associated with deafness

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Gap-junction channels (GJCs) are formed by head-to-head association of two hemichannels (HCs, connexin hexamers). HCs and GJCs are permeable to ions and hydrophilic molecules of up to Mr ~1 kDa. Hearing impairment of genetic origin is common, and mutations of connexin 26 (Cx26) are its major cause. We recently identified two novel Cx26 mutations in hearing-impaired subjects, L10P and G109V. L10P forms functional GJCs with slightly altered voltage dependence and HCs with decrease ATP/cationic dye selectivity. G109V does not form functional GJCs, but forms functional HCs with enhanced extracellular Ca2+ sensitivity and subtle alterations in voltage dependence and ATP/cationic dye selectivity. Deafness associated with G109V could result from decreased GJCs activity, whereas deafness associated to L10P may have a more complex mechanism that involves changes in HC permeability.

Connexins

Deafness

Gap-junction channels

Hemichannels

Ion channel

Mutation

adenosine triphosphate

connexin 26

dye

gap junction channel

gap junction protein

hemichannel

mutant protein

unclassified drug

adenosine triphosphate

calcium

DFNA3 protein, human

gap junction protein

animal cell

Article

channel gating

controlled study

electric potential

extracellular calcium

fluorescence analysis

gap junction

gene mutation

hearing impairment

human

human cell

ion current

ion permeability

membrane electrophysiology

missense mutation

molecular dynamics

nonhuman

priority journal

voltage dependence

Western blotting

wild type

Xenopus laevis

action potential

animal

channel gating

chemistry

genetics

hearing impairment

HeLa cell line

metabolism

mutation

Xenopus

Action Potentials

Adenosine Triphosphate

Animals

Calcium

Connexins

Deafness

HeLa Cells

Humans

Ion Channel Gating

Mutation

Xenopus