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MOTILE CILIA – FROM ULTRASTRUCTURE TO FUNCTION

Summary

Cilia are highly evolutionarily conserved structures, assembled by most of the eukaryotic cells. Because of the differences in the ultrastructure and function, cilia are divided into two categories: immotile primary cilia that function as antennae and receive signals from the environment and transmit them into the cell, and motile cilia, which enable motility of the single cell. In multicellular organisms including humans the coordinated beating of motile cilia shifts fluids or particles along the surface of the cell in the respiratory tracks, Fallopian tube or brain ventricles. Both primary and motile cilia are supported by a microtubular skeleton, the axoneme, composed of nine peripheral microtubule doublets. Additionally, motile cilia have a pair of central microtubules with their appendages, the so-called central pair (CP) complex, and macrocomplexes that are periodically attached to the microtubules of the peripheral doublets forming a specific pattern along the microtubules that repeats every 96 nm. The 96-nm repeat contains 4 outer and 7 inner dynein arms, 3 radial spokes, a single nexin-dynein regulatory complex and a modifier of inner arms as well as other minor complexes. The coordinated action of these macrocomplexes is indispensable for proper cilia beating.

Key words: cilia, dynein, central pair complex, radial spokes