ASPM Gene

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abnormal spindle microtubule assembly

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1. Normal Function

The *ASPM* gene provides instructions for making a protein that is involved in cell division. This protein is found in cells and tissues throughout the body; however, it appears to be particularly important for the division of cells in the developing brain. Studies suggest that the ASPM protein helps maintain the orderly division of early brain cells called neural progenitor cells, which ultimately give rise to mature nerve cells (neurons). By promoting the division of neural progenitor cells during early brain development, the ASPM protein helps determine the total number of neurons and the overall size of the brain.

2. Health Conditions Related to Genetic Changes

2.1. Autosomal Recessive Primary Microcephaly

Mutations in the *ASPM* gene are the most common cause of autosomal recessive primary microcephaly (often shortened to MCPH, which stands for "microcephaly primary hereditary"). This condition is characterized by an abnormally small head and brain, intellectual disability, and delayed development. More than 80 mutations in the *ASPM* gene have been found to cause MCPH.

Almost all of the *ASPM* gene mutations responsible for MCPH reduce production of the ASPM protein. The protein that is produced is shorter than normal and is thought to be partly or wholly nonfunctional. A shortage of functional ASPM protein impairs cell division, especially in neural progenitor cells in the developing brain. As a result, fewer mature neurons are produced, and affected individuals are born with an unusually small brain. Small head size, intellectual disability, and delayed development are all consequences of the small brain size.

Because the ASPM protein is found in cells throughout the body, it is unclear why *ASPM* gene mutations affect neural progenitor cells more severely than other cell types. Some researchers believe that neural progenitor cells are more sensitive than other types of cells to a shortage of the ASPM protein. Other researchers have suggested that another protein may be able to compensate for the loss of the ASPM protein in cells outside the brain.

2.2. Age-related Macular Degeneration

Age-related macular degeneration

2.3. Cancers

The *ASPM* gene is upregulated in several types of cancer, which means that it produces more of the ASPM protein than usual in cancer cells. In particular, upregulation of the *ASPM* gene has been studied in brain tumors called gliomas and liver tumors called hepatocellular carcinomas. It is unclear why the *ASPM* gene is abnormally active in these cancers or what effects the extra ASPM protein may have in cancer cells. However, studies suggest that unusually high activity of the *ASPM* gene is related to cancer progression, spread to other parts of the body (metastasis), and recurrence.

3. Other Names for This Gene

- abnormal spindle-like microcephaly-associated protein
- ASP

- asp (abnormal spindle) homolog, microcephaly associated (Drosophila)
- ASPM_HUMAN
- Calmbp1
- FLJ10517
- FLJ10549
- FLJ43117
- MCPH5

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