Li-Fraumeni syndrome

Li-Fraumeni syndrome is a rare disorder that greatly increases the risk of developing several types of cancer, particularly in children and young adults.

The cancers most often associated with Li-Fraumeni syndrome include breast cancer, a form of bone cancer called osteosarcoma, and cancers of soft tissues (such as muscle) called soft tissue sarcomas. Other cancers commonly seen in this syndrome include brain tumors, cancers of blood-forming tissues (leukemias), and a cancer called adrenocortical carcinoma that affects the outer layer of the adrenal glands (small hormone-producing glands on top of each kidney). Several other types of cancer also occur more frequently in people with Li-Fraumeni syndrome.

A very similar condition called Li-Fraumeni-like syndrome shares many of the features of classic Li-Fraumeni syndrome. Both conditions significantly increase the chances of developing multiple cancers beginning in childhood; however, the pattern of specific cancers seen in affected family members is different.

Frequency

The exact prevalence of Li-Fraumeni is unknown. One U.S. registry of Li-Fraumeni syndrome patients suggests that about 400 people from 64 families have this disorder.

Genetic Changes

The *CHEK2* and *TP53* genes are associated with Li-Fraumeni syndrome.

More than half of all families with Li-Fraumeni syndrome have inherited mutations in the *TP53* gene. *TP53* is a tumor suppressor gene, which means that it normally helps control the growth and division of cells. Mutations in this gene can allow cells to divide in an uncontrolled way and form tumors. Other genetic and environmental factors are also likely to affect the risk of cancer in people with *TP53* mutations.

A few families with cancers characteristic of Li-Fraumeni syndrome and Li-Fraumeni-like syndrome do not have *TP53* mutations, but have mutations in the *CHEK2* gene. Like the *TP53* gene, *CHEK2* is a tumor suppressor gene. Researchers are uncertain whether *CHEK2* mutations actually cause these conditions or are merely associated with an increased risk of certain cancers (including breast cancer).

Inheritance Pattern

Li-Fraumeni syndrome is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to increase the risk of developing cancer. In most cases, an affected person has a parent and other family members with cancers characteristic of the condition.

Other Names for This Condition

- LFS
- Sarcoma family syndrome of Li and Fraumeni
- Sarcoma, breast, leukemia, and adrenal gland (SBLA) syndrome
- SBLA syndrome

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Li-Fraumeni syndrome
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0085390/
- Genetic Testing Registry: Li-Fraumeni syndrome 1
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C1835398/
- Genetic Testing Registry: Li-Fraumeni syndrome 2
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C1836482/

Other Diagnosis and Management Resources

- GeneReview: Li-Fraumeni Syndrome
  https://www.ncbi.nlm.nih.gov/books/NBK1311
- MedlinePlus Encyclopedia: Cancer
  https://medlineplus.gov/ency/article/001289.htm
- National Cancer Institute: Genetic Testing for Hereditary Cancer Syndromes
  https://www.cancer.gov/about-cancer/causes-prevention/genetics/genetic-testing-fact-sheet

General Information from MedlinePlus

- Diagnostic Tests
  https://medlineplus.gov/diagnostictests.html
- Drug Therapy
  https://medlineplus.gov/drugtherapy.html
- Genetic Counseling
  https://medlineplus.gov/geneticcounseling.html
- Palliative Care
  https://medlineplus.gov/palliativecare.html
- Surgery and Rehabilitation
  https://medlineplus.gov/surgeryandrehabilitation.html

Additional Information & Resources

MedlinePlus

- Encyclopedia: Cancer
  https://medlineplus.gov/ency/article/001289.htm
- Health Topic: Bone Cancer
  https://medlineplus.gov/bonecancer.html
- Health Topic: Breast Cancer
  https://medlineplus.gov/breastcancer.html
- Health Topic: Cancer
  https://medlineplus.gov/cancer.html
- Health Topic: Soft Tissue Sarcoma
  https://medlineplus.gov/softtissuesarcoma.html

Genetic and Rare Diseases Information Center

- Li-Fraumeni syndrome
  https://rarediseases.info.nih.gov/diseases/6902/li-fraumeni-syndrome

Additional NIH Resources

- National Cancer Institute: Childhood Cancers
  https://www.cancer.gov/types/childhood-cancers
- National Cancer Institute: Genetics of Breast and Ovarian Cancer
  https://www.cancer.gov/types/breast/hp/breast-ovarian-genetics-pdq

Educational Resources

- Disease InfoSearch: Li-Fraumeni syndrome 1
  http://www.diseaseinfosearch.org/Li-Fraumeni+syndrome+1/8745
- Disease InfoSearch: Li-Fraumeni syndrome 2
  http://www.diseaseinfosearch.org/Li-Fraumeni+syndrome+2/8746
- MalaCards: li-fraumeni syndrome
  http://www.malacards.org/card/li_fraumeni_syndrome
- Orphanet: Li-Fraumeni syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=524
- Stanford Cancer Center
  https://stanfordhealthcare.org/medical-conditions/cancer/li-fraumeni-syndrome.html

Patient Support and Advocacy Resources

- American Cancer Society
  https://www.cancer.org/
- CureSearch (the Children's Oncology Group and the National Childhood Cancer Foundation)
  https://curesearch.org/
- National Coalition for Cancer Survivorship
  https://www.canceradvocacy.org/

GeneReviews

- Li-Fraumeni Syndrome
  https://www.ncbi.nlm.nih.gov/books/NBK1311

ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22Li-Fraumeni+syndrome%22

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Li-Fraumeni+Syndrome%5BMAJR%5D%29+AND+%28Li-Fraumeni+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D

OMIM

- LI-FRAUMENI SYNDROME
  http://omim.org/entry/151623
- LI-FRAUMENI SYNDROME 2
  http://omim.org/entry/609265

Sources for This Summary

- Chompret A. The Li-Fraumeni syndrome. Biochimie. 2002 Jan;84(1):75-82.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11900879
- Melean G, Sestini R, Ammannati F, Papi L. Genetic insights into familial tumors of the nervous system. Am J Med Genet C Semin Med Genet. 2004 Aug 15;129C(1):74-84. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15264275
- Moule RN, Jhavar SG, Eeles RA. Genotype phenotype correlation in Li-Fraumeni syndrome kindreds and its implications for management. Fam Cancer. 2006;5(2):129-33. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16736281

- Olivier M, Goldgar DE, Sodha N, Ohgaki H, Kleihues P, Hainaut P, Eeles RA. Li-Fraumeni and related syndromes: correlation between tumor type, family structure, and TP53 genotype. Cancer Res. 2003 Oct 15;63(20):6643-50.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14583457
- Strong LC. General keynote: hereditary cancer: lessons from Li-Fraumeni syndrome. Gynecol Oncol. 2003 Jan;88(1 Pt 2):S4-7; discussion S11-3. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12586075
- Varley J. TP53, hChk2, and the Li-Fraumeni syndrome. Methods Mol Biol. 2003;222:117-29. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12710683
- Varley JM. Germline TP53 mutations and Li-Fraumeni syndrome. Hum Mutat. 2003 Mar;21(3): 313-20. Review. Erratum in: Hum Mutat. 2003 May;21(5):551.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12619118
- Wong P, Verselis SJ, Garber JE, Schneider K, DiGianni L, Stockwell DH, Li FP, Syngal S. Prevalence of early onset colorectal cancer in 397 patients with classic Li-Fraumeni syndrome. Gastroenterology. 2006 Jan;130(1):73-9.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16401470
- de Jong MM, Nolte IM, te Meerman GJ, van der Graaf WT, Oosterwijk JC, Kleibeuker JH, Schaapveld M, de Vries EG. Genes other than BRCA1 and BRCA2 involved in breast cancer susceptibility. J Med Genet. 2002 Apr;39(4):225-42. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11950848
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1735082/

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https://ghr.nlm.nih.gov/condition/li-fraumeni-syndrome

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