Pediatric Tumor Panel

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Hereditary Pediatric Tumors

Genetic testing with the Pediatric Tumor Panel may be appropriate if you or your child's personal and/or family history is suggestive of a hereditary predisposition to cancer and/or tumors. **This includes:**

- A personal or family history of cancer diagnosed at a particularly young age (such as rhabdomyosarcoma diagnosed under 3 years of age or thyroid cancer diagnosed in childhood)
- Multiple cancers in one person, either of the same origin (such as multiple brain tumors or bilateral renal tumors) or of different origins (such as medulloblastoma and basal cell carcinoma or adrenocortical carcinoma and sarcoma) with at least one diagnosis in childhood
- A personal or family history of certain cancers and/or benign tumors which are highly associated with a hereditary pediatric tumor syndrome (such as certain pediatric renal tumors or central nervous system tumors)
- Multiple relatives diagnosed with the same or related cancers (see table below) on the same side of the family and spanning multiple generations

Your healthcare provider will determine if genetic testing is medically necessary for you.

Genes Included on the Pediatric Tumor Panel are Listed in the Table Below

High-Risk Genes — Well-studied • Greater than 4-fold risk of developing one or more cancers • Can cause a moderate risk for other cancers • National or expert opinion guidelines for screening and prevention are established

Newer Genes — Not as well-studied • Precise lifetime risks and tumor spectrum not yet determined • Guidelines for screening and prevention are limited or not available

	Gene	Lifetime Cancer and/or Tumor Risks*
High-Risk Genes	*ALK*	Neuroblastic tumors (up to 57%)
	APC	Colorectal (up to 93%), Duodenal or periampullary (4-12%), Gastric, Thyroid (up to 3%), Pancreatic, Brain-medulloblastoma, Liver-hepatoblastoma, Desmoid tumors, Gastrointestinal polyps
	CDC73	Hyperparathyroidism, Parathyroid cancer and tumors, Jaw tumors-ossifying fibromas, Renal tumors, Uterine tumors
	EPCAM, MLH1, MSH2, MSH6, PMS2	Colorectal (11-80%), Endometrial (12-71%), Ovarian (1-24%), Gastric (<1-20%), Urinary tract (1-20%), Pancreatic, Biliary tract, Small bowel, Brain, Sebaceous tumors, Prostate For CMMR-D (two pathogenic/Likely Pathogenic variants in the same gene): Brain, Hematologic malignancies, Colon, Small bowel Tumor spectrum is representative of Lynch syndrome; data are limited with regard to the association of certain cancers with pathogenic variants in *MSH6, PMS2* and *EPCAM*
	MEN1	Hyperparathyroidism, Parathyroid tumors (95%), Neuroendocrine tumors of the gastro-entero-pancreatic (GEP) tract (up to 80%), Anterior pituitary tumors (20-65%), Carcinoid tumors, Adrenal tumors (pheochromocytomas and adrenocortical), and other tumors
	NF1	Neurofibromas, Optic nerve gliomas (15%), Pheochromocytomas (1-13%), Malignant peripheral nerve sheath tumors (6-16%), Brain tumors (2-3%), Female breast (up to 26%), Gastrointestinal stromal tumor (GIST)
	NF2	Schwannomas-vestibular (greater than 90%) and other cranial nerves (24-51%), Central nervous system tumors-spinal tumors (60-90%) and meningioma (50-80%)
	PHOX2B	Neuroblastic tumors (up to 50%) including: neuroblastoma; ganglioneuroblastoma; ganglioneuroma
	PRKAR1A	Myxomas-cardiac (20-40%) and cutaneous, Testicular tumors-large-cell calcifying Sertoli cell tumors, Pituitary tumors (10-20%), Thyroid (10%), Schwannomas-psammomatous melanotic (up to 10%), Primary pigmented nodular adrenocortical disease (25-60%)
	PTCH1	Basal cell carcinoma (up to 90%), Brain-medulloblastoma (~2%), Fibromas-cardiac and ovarian, Jaw tumors-odontogenic keratocysts, Meningioma
	PTEN	Female breast (25-85%), Thyroid (3-38%), Endometrial (5-28%), Colorectal, Renal, Melanoma, Gastrointestinal polyps, Lhermitte-Duclos disease
	RB1	Retinoblastoma (greater than 90%), Brain-pineoblastoma (5-10%), Soft tissue sarcoma-leiomyosarcoma and rhabdomyosarcoma, Osteosarcoma, Melanoma, Retinoma, Bladder cancer, Lung cancer
	RET	Thyroid-medullary (greater than 90%), Pheochromocytoma (up to 50%), Hyperparathyroidism (up to 30%)
	STK11	Female breast (up to 54%), Colorectal (39%), Pancreatic (11-36%), Gastric (29%), Ovarian tumors (21%), Lung (7-17%), Small bowel (13%), Cervical (10%), Testicular tumors (9%), Endometrial (9%), Gastrointestinal polyps
	TP53	Female breast (85%), Soft tissue sarcoma, Osteosarcoma, Brain, Hematologic malignancies-Acute leukemias among others, Adrenocortical carcinoma, among others. Overall risk for cancer:up to 95% in females, 88% in males

	Gene	Lifetime Cancer and/or Tumor Risks*
High-Risk Genes	*TSC1*	Renal cancer (5%) and tumors, Benign central nervous system tumors-subependymal nodules and subependymal giant astrocytomas, Hamartomatous tumors-cardiac rhabdomyomas and angiomyolipomas
	TSC2	Renal cancer (5%) and tumors, Benign central nervous system tumors-subependymal nodules and subependymal giant astrocytomas, Hamartomatous tumors-cardiac rhabdomyomas and angiomyolipomas
	VHL	Renal-clear cell (up to 69%), Hemangioblastomas-retinal and central nervous system (50-80%), Pheochromocytomas (11-19%), Pancreatic neuroendocrine tumors (8-17%), Endolymphatic sac tumors (up to 10%)
	WT1	Wilms tumor (up to 74%)
Newer Genes	*DICER1*	Lung tumors-pleuropulmonary blastoma, Thyroid tumors-multinodular thyroid goiter and cancer, Renal tumors-cystic nephroma, Ovarian tumors-Sertoli-Leydig, Embryonal rhabdomyosarcoma-cervix, Pituitary blastoma, Pineoblastoma
	SMARCA4	Malignant rhabdoid tumors-atypical teratoid/rhabdoid tumor of the brain and malignant rhabdoid tumors of the kidney, Ovarian-small cell carcinoma of the ovary, hypercalcemic type
	SMARCB1	Malignant rhabdoid tumors-atypical teratoid/rhabdoid tumor of the brain and malignant rhabdoid tumors of the kidney, Schwannomas, Meningiomas
	SUFU	Brain-medulloblastoma, Basal cell carcinoma, Meningioma

*Most commonly associated cancer/tumors listed; lifetime risks provided when available. Risks relate to carriers of a single pathogenic variant.

Possible Outcomes of Genetic Testing

Positive

- Pathogenic or likely pathogenic variant identified
- Medical management recommendations may be available
- Family member testing may be recommended

Negative

- No significant genetic changes identified
- Medical management based on personal and/or family history

Variant of Uncertain Significance (VUS)

- A genetic change identified, but its association with disease is unclear
- Medical management based on personal and/or family history

Medical Management Based on Genetic Test Results

Clinical guidelines may be available which provide options and recommendations for patients who have a positive (pathogenic or likely pathogenic variant) test result indicating an increased risk for cancer and/or tumors. Guidelines and recommendations for early detection and/or risk reduction are specific to the gene in which the pathogenic variant was found.

Recommendations may include:

- Clinical exams, such as dental, skin, hearing or eye exams
- Blood or urine analysis
- Imaging exams, such as a MRI, CT and/or ultrasound
- Screening procedures, such as a colonoscopy or endoscopy
- Risk-reducing surgery

In some cases, guidelines for screening and prevention are limited or not available for a positive result. Once your test results are available, a discussion with your healthcare provider is recommended to determine the most appropriate medical management options for you and your family.

Resources

General
American Cancer Society
www.cancer.org

GeneDx
www.genedx.com/oncology

National Cancer Institute
www.cancer.gov

Pediatric Resources
Children's Oncology Group
www.childrensoncologygroup.org

Pancreatic Cancer Alliance
www.pancreaticalliance.org

Find a Genetic Counselor
Canadian Association of Genetic Counsellors
www.cagc-accg.ca

National Society of Genetic Counselors
www.nsgc.org

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