All patients diagnosed with a pheo or para should talk to their doctor about genetic testing. If you have a genetic mutation, your children have a 50/50 chance of inheriting it. Even if your children inherit the gene, they may not develop a tumor.

WHY IS TESTING IMPORTANT?

Recent research suggests that people who know they have a genetic mutation, have less metastatic disease, lower likelihood of complications and better overall health outcomes because of better follow-up and screening. (1)

So for those with a known genetic mutation, regular screening using blood or urine tests together with whole body imaging can catch tumors early. Knowing your genetic mutation will also help to determine the frequency and types of screening and a course of treatment, if needed.

I CARRY A MUTATION, NOW WHAT?

If you carry a genetic mutation, regardless of whether you have tumors or symptoms, it is important to be seen by a doctor(s) who has pheo para experience.

Regular screening using the urine or blood tests together with whole body imaging can catch tumors before you have symptomats. The frequency of screening depends upon your genetic mutation and medical history.

MEN2

MEN2 is caused by mutations in the RET gene. It is estimated that about 1/30,000 have MEN2A and MEN2B. Both involve higher risk for development of medullary thyroid cancer and an increased risk for pheo.

NF1

NF1 affects approximately 1/3,000. People with NF1 can have multiple café -au-lait skin spots, neurofibromas on or under the skin, freckling in the armpits or groin, learning challenges, and scoliosis. The illness is usually diagnosed in childhood. Most people with NF1 will never develop malignant pheo para. (5)

More Genes

These genes increase the risk of pheo para: TMEM127, MAX, FH, EPAS1 (orHIF2A), SDHAF2, PHD2 and KIF1Bβ Little is known about these genes and research is ongoing. Some are not widely tested for because they have only recently been discovered.

All educational information is vetted by our Medical Advisory Board. We also utilize current guidelines and relevant research. Some research used to create this publication is cited below. For more detailed info go to pheopara.org. Printed 3/2020.

1.https://www.ncbi.nlm.nih.gov/pubmed/30698717
2.ncbi.nlm.nih.gov/books/NBK1548/
3.https://erc.bioscientifica.com/view/journals/erc/24/7/143.xml
4.vhl.org
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A GUIDE TO

PHEOCHROMOCYTOMA & PARAGANGLIOMA

Genetics

Approximately 30-40% of pheos and paras are hereditary.

It is important to have genetic testing to identify current pheo para mutations and to advance research to discover new mutations.

WHICH MUTATIONS ARE IMPORTANT?

Patients with the following mutations are at a higher risk for developing pheo para. The information presented here is based on the most current research available, but new findings are constantly emerging. You can stay up to date on the latest research through reputable sources like the Pheo Para Alliance website.

SDHx

Hereditary Pheo Para Syndrome is the result of mutations in the Succinate Dehydrogenase Subunit Genes (SDHx). Patients with a SDHx mutation are at increased risk for pheo para and related conditions, such as GIST, renal cell carcinoma and kidney cancer. See the chart below for further information. The SDH genes include SDHB, SDHD, SDHA & SDHC.

DIFFERENCES BETWEEN SDHx MUTATIONS

	SDHB	SDHD*	SDHC	SDHA
Common Tumor Location	para > pheo	para H/N > pheo	para H/N/chest	para
Single/Multiple Tumors	multiple	multiple	single	single
Family History of Pheo/Para	medium	high	low	low
Risk of Malignancy	med/high	low/med	low/med	med/high

*When inherited from the father.
H/N = head and neck

SDHB

Mutations in SDHB are one of the most common causes of familial pheo para, and are more likely to be metastatic. There is also an increased risk of cancerous tumors in the kidney and GI tract. SDHB carriers who do not currently have a tumor have ~20-40% chance of developing one by the age of 60. (2)

@_pheopara

connecting with others who have the same genetic mutation can be comforting.

SDHD

This mutation is passed down through families by paternal inheritance. If you have SDHD, your child will have a 50% chance of inheriting the mutation, but the risk for developing pheo para is increased only if it is inherited from the father. If the mutation is inherited from the mother those children are not at higher risk of developing pheo para, but they can still pass on the mutation to their children. Someone who carries a mutation in the SDHD gene inherited by their father, but does not currently have a tumor has ~40% chance of developing one by the age of 60.

SDHA

SDHA mutations are common in the general population, but the development of tumors is rare. There is only a small chance that someone who carries this mutation will have a tumor. Because of this, tumors and SDHA mutations are often found incidentally. In the unlikely event that a tumor occurs, current research suggests that these tumors may behave aggressively. (3)

SDHC

SDHC is extremely rare, and much research still needs to be done. Tumors associated with this mutation often present in the head, neck and chest. It is unlikely that someone who carries an SDHC mutation but does not currently have a tumor will develop one by the age of 60.

VHL

Von Hippel Lindau (VHL) affects 1/36,000 and is characterized by tumors in up to ten areas of the body. With careful monitoring, early detection, and appropriate treatment, the most harmful consequences can be greatly reduced or completely prevented. Approximately 20% of patients will develop pheochromocytoma. (4)