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Dtect Onco Report for -

Customer	: -	Doctor	: -
Patient ID	: -	Facility	: -
Sample ID	: GFX0093501	Collection Date	: -
DOB	: -	Received Date	: -
Gender	: M	Report Date	: -

Test Indications

Family History: Not Available

Test Performed

Dtect Onco screens and reports genetic markers associated with inherited risk factors for cancers, identified in genome-wide association studies (GWAS).

With Dtect Onco, you can be better prepared to make lifestyle and dietary changes to mitigate your health risks, if necessary.

This report contains four sections:

Interpretation provides explanations of the scientific terms used in this report.

Limitations describes the characteristics and constraints of the information provided about an inherited disease/condition/trait, which you should understand.

Result Summary provides an overview of your results.

Detailed Results provides in-depth information about the genetic markers detected, and their associations with risk for a disease/condition/trait.

Interpretation

Genetic Relative Risk

Genetic Relative Risk describes the risk (chance) of an individual with specific genetic predisposing markers developing a disease/condition/trait compared to the average risk of the general population developing the same disease/condition/trait at any point in a lifetime. It takes into account the distribution of the predisposing markers in a population with the disease and in the general population.

In this report, only Genetic Relative Risks higher than 1.5x are reported. These Genetic Relative Risk scores may require further assessment by a qualified medical practitioner and may benefit from specific preventive actions such as surveillance using appropriate, regular pathology testing or imaging.

Genes

Genes are sections of DNA that contain codes for the production of specific proteins.

Single Nucleotide Polymorphism (SNP)

A Single Nucleotide Polymorphism (SNP) is a variance within the DNA sequence that occurs when a single nucleotide in the genome differs between members of the same biological species.

Limitations

Genetic screening can indicate whether an individual has a predisposition, or is at increased likelihood of having an inherited disease or disorder. However, it cannot indicate if the individual will show symptoms, how severe the symptoms will be, or whether the disease or disorder will progress over time.

A negative test result does not mean that an individual will not get the inherited disease or disorder because Dtect Onco is designed to detect only highly significant genetic variations which have been documented during medical research. Environmental and lifestyle factors also play a role in the development of inherited diseases and disorders.

Dtect Onco

Result Summary

5 Diseases with detected Genetic Relative Risk $\geq$ 2.00 (High Risk)

0 Diseases with detected Genetic Relative Risk within 1.50 - 1.99 (Moderate Risk)

Detailed Results

Increased Genetic Risk Summary

Significant Genetic Relative Risk (GRR) detected for		
No.	**Diseases**	**GRR**
1	Colorectal Cancer	3.21
2	Cervical Cancer*	2.62
3	Gallbladder Cancer	2.22
4	Osteosarcoma	2.04
5	Meningioma	2.01

*Despite having the genetic predisposition for breast, ovarian, cervical and/or endometrial cancer, a male individual cannot develop these cancers with the exception of male breast cancer which is very rare. However, it is advisable for his daughters and granddaughters to screen for genetic predispositions as there is a possibility they may have inherited genetic predispositions from him.

Detailed Results

Genetic markers associated with 32 cancers have been screened, and 5 cancers with Genetic Relative Risk (GRR) of 1.5x or higher have been reported below. If no cancer is reported, genetic markers that contribute to GRR of 1.5x or higher have not been found.

Colorectal Cancer

Your genetic relative risk for Colorectal Cancer is 3.21. This means you have 3.21x higher chance of getting this disease compared to the general population.

Detected genetic markers for Colorectal Cancer					Genetic Relative Risk - 3.21
Gene	**Effect**	**SNP**	**Alleles**	**Risk Allele**	**Reference**
-	Slightly increased risk of colorectal cancer	rs10795668	GG	G	[1, 2, 3, 4]
-	Slightly increased risk of colorectal cancer	rs16892766	TT	T	[1, 5]
MLH1	Increased risk of colorectal cancer	rs1800734	TT	T	[6, 7, 8]
C11orf93	Increased risk of colorectal cancer	rs3802842	CC	C	[9, 2]
-	Slightly increased risk of colorectal cancer	rs4444235	AG	G	[10, 11, 12]
-	Slightly increased risk of colorectal cancer	rs4779584	TT	T	[13, 1, 4]
-	Slightly increased risk of colorectal cancer	rs6983267	GG	G	[2, 14, 5]
-	Increased risk of colorectal cancer	rs7014346	TC	T	[15, 16, 17]

Colorectal cancer (CRC) is also known as colon cancer. It affects over one million people worldwide each year and it is the third most common malignancy. The average incidence of colorectal cancer in the general population is estimated at around 3.9/10,000 (0.039%) per year. It is also the fourth most common cause of cancer-related mortality in the world. The overall burden of the disease is likely to increase as Asian and African populations adopt more Western diets. The lifetime risk of developing colorectal cancer is currently 6% globally.

CRC originates from the cells located in the colon and rectum. It usually starts as a non-malignant growth (polyp), and it might take up to 10 - 15 years before it becomes cancerous.

Major risk factors include:

- Older age (>50 years)
- Family history of CRC
- Hereditary conditions: Hereditary non-polyposis colon cancer (HNPCC), Turcot syndrome, and Peutz-Jeghers syndrome
- Type 2 diabetes
- Low fiber diet
- Heavy alcohol consumption
- Sedentary lifestyle
- Obesity

This cancer has a good prognosis if it is detected early with a 5-year survival rate for early stages between 60% - 75%.

Symptoms

The following are the symptoms to watch for in order to detect the disease early:

- A change in bowel habits, such as diarrhea, constipation, or narrowing of the stool, that lasts for more than a few days
- A feeling that you need to have a bowel movement that is not relieved by doing so
- Rectal bleeding, dark stools, or blood in the stool (often, though, the stool will look normal)
- Cramping or abdominal (belly) pain
- Weakness and fatigue
- Unintended weight loss

Detailed Results

Prevention

You may mitigate the risk of colorectal cancer by:

- Performing a colonoscopy, if you are above 50 and show signs of the disease

Detailed Results

Cervical Cancer

Your genetic relative risk for Cervical Cancer is 2.62. This means you have 2.62x higher chance of getting this disease compared to the general population.

Detected genetic markers for Cervical Cancer				Genetic Relative Risk - 2.62	
Gene	**Effect**	**SNP**	**Alleles**	**Risk Allele**	**Reference**
SLIT3	Slightly increased risk of cervical cancer	rs11134527	TT	T	[18, 19]
IL6, LOC541472	Increased risk of cervical cancer	rs1800795	GG	G	[20, 21]
IL12B	Increased risk of cervical cancer	rs3212227	GG	G	[22]
-	Increased risk of cervical cancer	rs4282438	TG	G	[23, 24]
IL12A	Slightly increased risk of cervical cancer	rs568408	TC	T	[22]
-	Increased risk of cervical cancer	rs8067378	TC	C	[23]

Men cannot develop cervical cancer, but they can pass down the risk to their daughters. If a male individual tests positive for cervical cancer risk markers, it is advisable for his daughters and granddaughters to check for genetic predispositions, as there is a possibility they may have inherited genetic predispositions from him.

Prevention

Your female descendants may mitigate the risk of cervical cancer by practicing the following advice:

- Get the HPV vaccine
- Practice safe sex
- Perform Pap smear tests regularly (at least every second year)

Detailed Results

Gallbladder Cancer

Your genetic relative risk for Gallbladder Cancer is 2.22. This means you have 2.22x higher chance of getting this disease compared to the general population.

Detected genetic markers for Gallbladder Cancer					Genetic Relative Risk - 2.22
Gene	**Effect**	**SNP**	**Alleles**	**Risk Allele**	**Reference**
TP53	Increased risk of gallbladder cancer	rs1042522	GC	C	[25, 26]
ABCG5, ABCG8	Increased risk of gallbladder cancer	rs11887534	GG	G	[27, 28]

Gallbladder cancer originates from the cells lining the gallbladder and biliary tract: cystic hepatic, and common bile ducts, and ampulla of Vater. Most tumors are adenocarcinomas, with a small percentage being squamous cell carcinomas, depending on the cell types it arises from. Adenocarcinomas are the most common gallbladder cancers and are characterized by slow growth, which makes them difficult to diagnose in early stages. Advanced gallbladder cancer commonly spreads to the liver, bile duct, stomach, and the duodenum. Due to insidious growth the tumor is likely to have metastasized by the time it is detected, which explains the high mortality rates for all gallbladder cancers. The average five-year survival rate is less than 5%.

Major risk factors include:

- Genetic predispositions
- Gallstones
- Calcium deposits in the gallbladder wall (porcelain gallbladder)
- Older age (above the age of 60 years)
- Being female (women are more affected than men)
- Being obese
- Salmonella infection
- Inflammation of the gallbladder and bile ducts

Symptoms

The following are the symptoms to watch for in order to detect the disease early:

- Abdominal pain, particularly in the upper right portion of the abdomen
- Abdominal bloating
- Itchiness
- Fever
- Loss of appetite
- Unexpected weight loss
- Nausea
- Yellowing of the skin and whites of the eyes (jaundice)

Prevention

You may mitigate the risk of gallbladder cancer by:

- Treating underlying diseases e.g. gallstones and salmonella infections
- Maintaining a healthy body weight
- Checking for genetic predispositions

Detailed Results

Osteosarcoma

Your genetic relative risk for Osteosarcoma is 2.04. This means you have 2.04x higher chance of getting this disease compared to the general population.

Detected genetic markers for Osteosarcoma					Genetic Relative Risk - 2.04
Gene	**Effect**	**SNP**	**Alleles**	**Risk Allele**	**Reference**
ADAMTS6	Increased risk ofosteosarcoma cancer	rs17206779	GG	G	[29]
GRM4	Increased risk of osteosarcoma cancer	rs1906953	AA	A	[29, 30]

Osteosarcoma is the most common primary malignant tumor of bone. This cancer is most prevalent in children and young adults, but it can occur at any age. It originates from primitive osteoblasts and pluripotent mesenchymal cells. The disease is characterized by uncontrollable growth of bone that is weak, and as a result, prone to fractures. Usually, it starts as a solitary tumor within the fastest growing areas of the long bones. The top three affected areas are the distal femur (thighbone), the proximal tibia (shinbone), and the proximal humerus (upper arm). However, other bones can be affected too, especially in older age e.g. scapula (shoulder blade) and jawbone.

Osteosarcoma is divided into 3 subgroups based on the histopathological characterization: low grade, intermediate grade and high grade. This division is helpful in assessing the tumor's aggressiveness and for treatment planning. High grade osteosarcoma represents the most aggressive form of the disease, with fast growth and early metastases, mostly to the lungs.

Five-year survival is the highest for low and intermediate grades, where, 60% to 80% of the patients live longer than 5 years and are often cured. High grade osteosarcoma has a survival rate of 10% to 15% at 5 years.

Causes

The disease is caused by defective DNA that can either be inherited from the parents or acquired in life from exposure to external carcinogenic factors such as radiation. Osteosarcoma is very often associated with other hereditary syndromes that predispose the individual to cancers.

Risk (Trigger) Factors

- Age (teenagers have the highest risk)
- Gender (girls are more prone to develop osteosarcoma)
- Height (taller people have higher risk)
- Certain bone diseases such as Paget disease and hereditary multiple osteochondromas
- Inherited cancer syndromes such as retinoblastoma (mutations in RB1 gene), Li-Fraumeni syndrome (mutations in TP53 gene) and Rothmund-Thomson syndrome (mutations in REQL4 gene)

Detailed Results

Symptoms

The overgrowth of bone tissue and abnormal mineralization can give rise to the following symptoms and signs:

- Pain and swelling over the affected areas of the bones
- Incidental fractures caused by low mineralization of the newly formed bone mass

Tests

Imaging tests are routinely used to elucidate pathological changes to the bones (x-ray, MRI and computed tomography). Histopathological examination of the affected bones is used to confirm the diagnosis and the stage of the tumor.

Complications

Fractures are the most common complications of osteosarcoma.

Treatment

The management of osteosarcoma involves 3 modalities:

- Surgery
- Chemotherapy
- Radiotherapy

Prevention

Prevention of osteosarcoma is focused mainly on avoiding irradiation, and doing genetic tests that which would can help in early detection and treatment of the disease.

Detailed Results

Meningioma

Your genetic relative risk for Meningioma is 2.01. This means you have 2.01x higher chance of getting this disease compared to the general population.

Detected genetic markers for Meningioma					Genetic Relative Risk - 2.01
Gene	**Effect**	**SNP**	**Alleles**	**Risk Allele**	**Reference**
MTRR	Slightly increased risk of meningioma	rs1801394	GG	G	[31]
BRIP1	Increased risk for Meningioma	rs4968451	CC	C	[32]

The average incidence of meningioma in the general population is estimated at around 0.65/10,000 (0.006%) per year. Meningiomas account for up to 37% of all primary tumors of the central nervous system that comprises of brain and spinal cord.

Meningiomas originate from the membranes covering the brain and spinal cord. They usually occur in adulthood with an average age of diagnosis between 35 and 45 years, and affect women about twice as often as it affects men. Meningiomas are not considered to be malignant tumors as they do not spread to nearby tissues and do not metastasize. They are characterized by slow growth affecting surrounding tissues by exerting pressure, and as a result damaging them.

Persons with inherited nervous system disorders, such as neurofibromatosis, Von Hippel-Lindau disease, and Li-Fraumeni syndrome, have increased risk of developing meningiomas. Exposure to radiation and strong electromagnetic fields has also been found to be a risk factor to meningiomas.

Although meningiomas are not malignant, they can cause substantial damage to surrounding tissues and can lead to complications and considerable loss of health.

Symptoms

The following are the symptoms to watch for in order to detect the disease early:

- Headaches
- Nausea
- Vomiting
- Blurred vision
- Balance problems
- Personality or behavior changes
- Seizures
- Drowsiness

Prevention

You may mitigate the risk of meningioma by:

- Avoiding overexposure to radiation
- Reducing the usage of cellphones
- Avoiding areas with high voltage electric lines

Detailed Results

Other Diseases/Traits

Significant genetic genetic relative risk were not detected in the following diseases.

No significant genetic relative risk detected for	
No.	**Diseases/Traits**
1	Acute Lymphoblastic Leukemia
2	Basal Cell Carcinoma
3	Bladder Cancer
4	Breast Cancer*
5	Chronic Lymphocytic Leukemia
6	Endometrial Cancer*
7	Esophageal Cancer
8	Esophageal Squamous Cell Carcinoma
9	Follicular Lymphoma
10	Glioma Development
11	Hepatocellular Carcinoma
12	Hodgkin's Lymphoma
13	Kidney Cancer
14	Larynx Cancer
15	Lung Adenocarcinoma
16	Lung Cancer
17	Melanoma
18	Nasopharyngeal Cancer
19	Non-Hodgkin's Lymphoma
20	Oral and Throat Cancers
21	Ovarian Cancer*
22	Pancreatic Cancer
23	Prostate Cancer
24	Squamous Cell Carcinoma (SCC)
25	Stomach Cancer
26	Testicular Germ-cell Tumor
27	Thyroid Cancer

*Despite having the genetic predisposition for breast, ovarian, cervical and/or endometrial cancer, a male individual cannot develop these cancers with the exception of male breast cancer which is very rare. However, it is advisable for his daughters and granddaughters to screen for genetic predispositions as there is a possibility they may have inherited genetic predispositions from him.

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