

Prevention *matters*

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OVARIAN CANCER GENETICS: Many genes, many tests

ANDREA FORMAN, MS, LCGC



The National Comprehensive Cancer Network (NCCN) considers genetic testing of the *BRCA1* and *BRCA2* genes appropriate for any woman with a personal history of ovarian, fallopian tube, or primary peritoneal (the membrane that lines the

abdominal and pelvic cavities) cancer. While most women develop ovarian cancer due to a combination of age, environment, lifestyle, and hormonal factors, it is estimated that about fifteen percent of ovarian cancer patients are born with a gene mutation that increases their chances of getting ovarian cancer.

Genetic risk can be even higher if there is other family history of certain cancers. Most genetic risk for breast and ovarian cancer is found in the *BRCA* genes. The second most common genetic risk for ovarian cancer is found in the genes related to Lynch syndrome. Lynch syndrome increases the chances of developing ovarian, colon, uterine and other cancers.

Recently, the ability to complete genetic testing quickly and for less money has led to the discovery of more genes related to ovarian cancer. A study published in 2011 looked at 360 women newly diagnosed with ovarian, fallopian tube, or primary peritoneal cancer. Eighteen percent of women tested carried a mutation in the *BRCA* genes, and six percent carried mutations in other genes, such as *TP53*, *RAD51C*, *RAD50*, *PALB2*, *NBN*, *MSH6*,

MRE11A, *CHEK2*, *BRIP1*, and *BARD1*. Thirty percent of positive women had no other family history of breast or ovarian cancer and over thirty-five percent were diagnosed after age 65.

This and other studies support the idea of testing all women with ovarian cancer for mutations in the *BRCA* genes, but also suggests thinking about testing through larger, multigene panels that include many genes in addition to *BRCA1* and *BRCA2*. Lower costs have made multigene panel testing no more expensive than *BRCA* testing alone and it gives us the chance to discover genetic risks that would have been missed in the past.

More research is needed to clarify the specific ovarian cancer risks linked with these newer cancer genes. Sometimes medical recommendations are still not clear, even for gene positive women. Any decision to have genetic testing, for specific genes or a multigene panel, should be discussed with a genetic counselor, your doctor, or nurse. For more information about genetic testing for ovarian cancer risk at Fox Chase Cancer Center, call 1-877-627-9684 to schedule an appointment.



Fox Chase Cancer Center
Risk Assessment Program
Celebrating 25 Years
1991-2016

Save the Date

Department of Clinical Genetics
Risk Assessment Program

25th Anniversary Celebration

Thursday, April 14, 2016, 6 pm
Knowlton Mansion, Philadelphia, PA



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PHILADELPHIA BREAST CANCER FAMILY REGISTRY (PBCFR) UPDATE

We are very excited to share our ongoing research with you. Thank you for your continued participation. Below are links to recent papers by Dr. Mary Daly and the BCFR team:

Tamoxifen and Risk of Contralateral Breast Cancer for BRCA1 and BRCA2 Mutation Carriers

This article, from *Journal of Clinical Oncology* in 2013, looks at whether treatment with tamoxifen, for breast cancer, is associated with reduced contralateral breast cancer (a tumor in the opposite breast) risk for *BRCA1* and/or *BRCA2* mutation carriers. This study provides data that adjuvant (additional cancer treatment given after the primary treatment to lower the risk the cancer will come back) tamoxifen use is associated with a reduction in contralateral breast cancer risk for *BRCA1* and *BRCA2* mutation carriers.

www.ncbi.nlm.nih.gov/pmc/articles/PMC3753701/

Total Energy Intake and Breast Cancer Risk in Sisters: the Breast Cancer Family Registry

Published in *Breast Cancer Research & Treatment* in 2013, this article looks at the link between total energy intake (total number of calories taken in daily) jointly with physical activity and body mass index (BMI), and the risk of breast cancer among women diagnosed with breast cancer and their unaffected sisters. The researchers found a link between total energy intake and breast cancer risk across different levels of physical activity and BMI. The results suggest that within sisters, high energy intake may increase the risk of breast cancer independent from physical activity and body size. This link was limited to pre-menopausal women or women with hormone receptor positive cancers. These findings suggest that reductions in total energy intake may help lower breast cancer risk.

www.ncbi.nlm.nih.gov/pmc/articles/PMC4032289/

Oral Contraceptive and Reproductive Risk Factors for Ovarian Cancer within Sisters in the Breast Cancer Family Registry

The researchers looked at oral contraceptive use and whether it is linked with a reduced risk of ovarian cancer in high risk women from cancer families, in this 2014 article published in the *British Journal of Cancer*. Oral contraceptive use has been consistently linked with a reduced risk of ovarian cancer in unrelated, average risk women. The researchers looked at data from the Breast Cancer Family Registry and they saw a decreased risk of ovarian cancer with oral contraceptive use. This link was previously seen in unrelated women, and is now extended to related women at higher risk.

www.ncbi.nlm.nih.gov/pmc/articles/PMC3929882/





IN THE NEWS

NEW RESEARCH STUDY: AWARE



Michael Hall, MD, MS

Michael Hall, MD, MS, Director of Gastrointestinal Cancer Risk Assessment at Fox Chase Cancer Center is inviting patients who will be having a cancer surgery at Fox Chase to join a study. The AWARE (A

dvancing Web-based Medical Record Access and Risk Evaluation for Cancer Patients) study offers access to a patient-friendly summary of their surgical pathology report and personal and family cancer history on the MyFoxChase website. The purpose of the study is to examine patients' awareness and understanding of their possible genetic risk for cancer.

For more information or to participate, please contact Yana Chertock at 215-214-3216 or Yana.Chertock@fcc.edu.



**Fox Chase Cancer Center
Risk Assessment Program
Celebrating 25 Years
1991-2016**

25 YEARS OF THE RISK ASSESSMENT PROGRAM

In celebration of the 25th Anniversary of the Fox Chase Cancer Center Risk Assessment Program (RAP), there will be a special event at the Knowlton Mansion in Philadelphia on Thursday evening, April 14, 2016. The event will bring together RAP participants, alumni, and staff for an evening of celebration, information and shared experiences.

"We are extremely proud of how far we've come in the last 25 years. We could not have achieved any of it without our families, who are the heart and foundation of the program," said Mary Daly, MD, PhD, Chair of the Fox Chase Department of Clinical Genetics and the Founding Director of the Risk Assessment Program. "This is our opportunity to celebrate with our families, thank our colleagues, and look forward to the future. Researchers and clinicians will continue to study the relationships between genetic, environmental and behavioral factors in preventing, diagnosing, and treating cancer," said Dr. Daly.

For more information visit:
www.foxchase.org/rapcelebration.



REFER A FRIEND OR RELATIVE WITH A FAMILY HISTORY OF CANCER

Please cut out and give to a friend or relative who may be interested in a Cancer Risk Consultation.

Fox Chase Cancer Center, Risk Assessment Program
1-877-627-9684 or rapinfo@fcc.edu

“My recent mammogram report said I have dense breast tissue. Do I need additional screening?”

Mammograms remain the gold standard for detecting breast cancer, but they're less reliable in many women with dense breast tissue. Breasts are made up of glandular tissue, connective tissue and fat tissue. Breasts are considered dense on mammogram if there is more breast glandular and connective tissue compared to fat tissue. Having dense breast tissue is associated with an increased risk of breast cancer.

Many states, including Pennsylvania, have passed laws that require female patients to be notified if a mammogram detects that she has dense breast tissue. The laws are meant to encourage women with dense breast tissue to be aware of their mammogram findings and discuss them with their doctors. Currently there are no special recommendations or additional screening guidelines for women with dense breast tissue. Although some women with dense breast tissue appear to be at higher risk of breast cancer, it is not clear that lowering breast density will decrease breast cancer risk. For example, getting older and gaining weight after menopause are both linked to a decrease in breast density, but are also linked to an increase in breast cancer risk.

It is important that patients speak with their doctors about breast density and other risk factors, such as family history, to determine their risk for breast cancer.

Ovarian cancer is rare in the US. And, when diagnosed in late stages, it has only a five-year survival rate of 43.8%.

Bilateral Salpingo-Oophorectomy (BSO) is the surgical removal of the fallopian tubes and ovaries. It is a proven ovarian cancer prevention method and has become the standard of care in women with an inherited risk of ovarian cancer. The evidence from 10 large studies shows that BSO lessens the risk of ovarian cancer in high-risk women by greater than 80%.

Removal of the ovaries and fallopian tubes in women before menopause puts them into instant surgical menopause. This can affect their quality of life, with short-term side effects including hot flashes, night sweats and mood swings, and potential long-term side effects including increased risk for heart and bone disease.

Recent clinical data suggests that precancerous cells linked to ovarian cancer may arise in the fallopian tubes rather than in the ovaries, as was previously thought. Dr. Daly and colleagues, in a review published in the journal, *Cancer Prevention Research*, stated that 10% to 15% of the fallopian tubes in women with a *BRCA1* or *BRCA2* mutation who removed ovaries and fallopian tubes had precancerous or invasive cancer cells. Also, 60% of women with sporadic (not caused by family history) ovarian cancer also had precancerous cells in their fallopian tubes. If a large proportion of ovarian cancers actually start in the fallopian tubes, it may make sense to remove the fallopian tubes first, before natural menopause, and then remove the ovaries at an age closer to menopause to prolong the protection that female hormones provide the heart and bones. However, women who might choose this approach may risk the chance that ovarian cancer could still arise out of the ovaries before they are removed.

Preventive removal of fallopian tubes may also be an option for women at average risk for ovarian cancer, who are undergoing non-cancer related gynecologic surgeries such as hysterectomies (surgical removal of the uterus). “This is a real breakthrough in understanding the origin of ovarian cancer, but it is still too early for this surgical option to become a standard practice”, said Dr. Daly. More data needs to be collected so that questions about this procedure can be answered.

See also: <http://www.ncbi.nlm.nih.gov/pubmed/25586903>



MAN 2 MAN



GENETIC COUNSELING AND TESTING FOR MEN

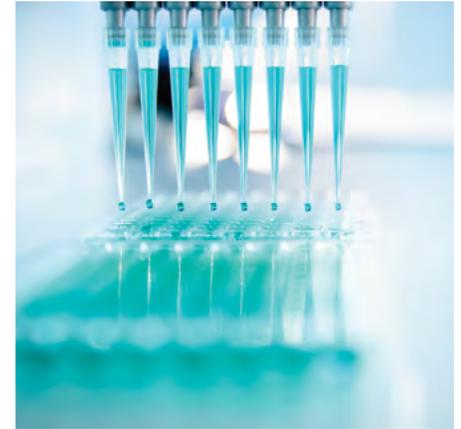
Elias Obeid, MD, MPH

Families might think that genetic testing only applies to women, but in some families it may be a man who is the best person to have testing. Genetic counseling and testing may be helpful for you and for your family members. Men with a family history of cancer at a young age or a history of multiple family members with cancer may be advised to have genetic testing.

Why Genetic Testing May Be Helpful For You:

- It may give you an answer about why cancer occurred in you or your family
- It may help with your cancer screening recommendations
- Your genetic test results may benefit your children and other relatives

If you carry a genetic change (mutation), each of your children, brothers and sisters has a 50% chance of carrying that same mutation. Our Risk Assessment Program at Fox Chase offers genetic counseling and testing for you and your family. We are happy to help you with any questions or to make an appointment with our genetic counselors.



HEALTHY RECIPES

Tilapia with Chunky Tomato Sauce

Tilapia provides lean protein, and vitamin B12. Tomatoes are very rich in lycopene, a phytochemical that has shown promising protection against prostate cancer.

- 2 (14-oz.) cans no salt added diced tomatoes, drained
- 1/4 cup chopped green onions, including green stems
- 1/2 tsp. sugar (optional)
- 1 Tbsp. finely chopped fresh basil (or 2 tsp. dried)
- 2-3 cloves garlic, minced
- 2 tsp. fresh lemon juice
- Salt and freshly ground pepper to taste
- 1/4 tsp. crushed red pepper (or to taste)
- 1 Tbsp. olive oil
- 1 lb. tilapia fillets
- 2 Tbsp. chopped fresh parsley

Place all ingredients, except oil, fish and parsley in a bowl and gently combine well.

In skillet, heat oil over medium high heat. Place fish in skillet. Top with tomato mixture, cover and simmer over medium low heat for 8-10 minutes or until fish is cooked. Garnish with parsley.

Per serving: 175 calories, 6 g total fat (1 g saturated fat), 10 g carbohydrate, 22 g protein, 2 g dietary fiber, 102 mg sodium.

Makes 4 servings.

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NOVEMBER IS LUNG CANCER AWARENESS MONTH

QUICK FACTS ABOUT LUNG CANCER

- **Lung cancer is the leading cancer killer in both men and women in the U.S.** Lung cancer causes more deaths than colorectal, breast and prostate cancers combined.
- **An estimated 158,040 Americans are expected to die from lung cancer in 2015**, accounting for approximately 27 percent of all cancer deaths.
- **When a person breathes in secondhand smoke, it is like he or she is smoking.** In the United States, about 7,300 people who never smoked die from lung cancer due to secondhand smoke every year.
- **Smoking can cause cancer almost anywhere in the body:** in the lung, mouth, nose, throat, voice box (larynx), esophagus, liver, bladder, kidney, pancreas, colon, rectum, cervix, stomach, blood, and bone marrow.

WAYS TO REDUCE YOUR RISK OF LUNG CANCER

- **Don't smoke.** Smoking, a main cause of small cell and non-small cell lung cancer, contributes to 80 percent of lung cancer deaths in women and 90 percent of lung cancer deaths in men.
- **Avoid secondhand smoke.** Smoke from other people's cigarettes, cigars, or pipes is called secondhand smoke. Make your home, workplace, and car smoke-free.
- **Get your home tested for radon.** The U.S. Environmental Protection Agency recommends that all homes be tested for radon. The second leading cause of lung cancer is radon, a naturally occurring gas that comes from rocks and dirt and can get trapped in houses and buildings.
- **Be careful at work.** Health and safety guidelines in the workplace can help workers avoid carcinogens—things that can cause cancer.

LUNG CANCER SCREENING

- **Talk to your doctor about whether you qualify for yearly CT (Computed Tomography) screening.** For individuals at high risk for lung cancer, Fox Chase Cancer Center offers lung cancer screening to detect the signs of lung cancer. The early screening can help to find a lung cancer before you have any symptoms, and the tumor might still be treatable and possibly curable. Lung cancer screening is recommended only for adults who have no symptoms but who are at high risk for developing the disease because of their smoking history and age. The U.S. Preventive Services Task Force recommends yearly lung cancer screening with LDCT (low dose computed tomography) for people who:
 - **Have a history of heavy smoking (30 pack years or more; a pack year is smoking an average of one pack of cigarettes per day for one year), and**
 - **Smoke now or have quit within the past 15 years, and**
 - **Are between 55 and 80 years old.**



Recently, The Centers for Medicare & Medicaid Services (CMS) has approved annual screening for lung cancer with low dose computed tomography (LDCT), as an additional preventive service benefit under the Medicare program for those who meet the criteria listed above. New patients can request an appointment by calling 888-FOX-CHASE.

EXERCISE FOR CANCER PREVENTION

Studies show that cancer cases decrease with more exercise. There is a great deal of proof that exercise is linked to a lower risk of breast, colon, prostate, lung and uterine cancer. Recent studies show that more than 50 percent of Americans do not get enough exercise, and over the past few decades, time spent sitting has increased. Exercise is one of the most important things you can do to help prevent cancer and other diseases such as diabetes and heart disease.

The Physical Activity Guidelines for Americans recommend that adults get at least 150 minutes of moderate intensity aerobic physical activity or 75 minutes of high intensity physical activity, or a combination each week. Exercise is called moderate intensity if your heart beats a little faster, and if you breathe a little more deeply. You should be able to talk, but not sing. High intensity exercise means you should be sweating and out of breath.

Yoga is an example of moderate intensity exercise. It is a great exercise and stress reliever that involves stretching, breathing exercises, and mental relaxation (meditation). Walking is a great way to get exercise and it does not require any special skills. Examples of high intensity exercise are running, swimming laps, or riding a bike. To get started with an exercise program, consider your personality type. Do you like to exercise alone, in a group or with a partner? The answer might help you choose an activity that will keep you motivated to continue with your new routine.

Want to learn more? Check out the Physical Activity section of the CDC website at <http://www.cdc.gov/physicalactivity/index.html>



ASK A GENETIC COUNSELOR

with Michelle Savage, MS, LCGC

“I am a 45 year old woman with no personal or family history of cancer. Should I get tested for cancer-causing BRCA gene mutations because of my Ashkenazi Jewish ancestry?”

Men and women of Ashkenazi Jewish (Central or Eastern European) ancestry have a 1 in 40 chance of carrying a *BRCA1* or *BRCA2* gene mutation. This is at least a ten times greater chance than that of non-Jewish people. People of Ashkenazi Jewish ancestry should consider genetic risk assessment for BRCA testing if you or a family member has had a diagnosis of cancer linked with the mutations, such as breast, ovarian or pancreatic cancer.

Testing is most useful when a family member with a cancer history has genetic testing first. If no family members with cancer are available for testing, testing can be considered in those family members without a history of cancer. A genetic counselor can meet with you to help find the best person for genetic testing in the family.

It is important to know that most breast cancers are unrelated to the BRCA genes. Whether or not you are of Ashkenazi Jewish ancestry, you can take steps to help reduce your risk of cancer by keeping a healthy weight and exercising regularly.

Have a question for the genetic counselor? Send your questions to rapinfo@fcc.edu. We cannot answer personal medical questions through this feature. You may request an appointment with a genetic counselor by calling 877-627-9684.



The Department of Clinical Genetics offers the most comprehensive risk assessment program in the Philadelphia region. It encompasses all of Fox Chase Cancer Center's clinical services for people at risk for cancer, as well as innovative research in the areas of cancer prevention and genetics.

CONTACT THE RISK ASSESSMENT PROGRAM:

1-877-627-9684 | rap-info.fccc.edu

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MARK YOUR CALENDAR



OCTOBER

Breast Cancer Awareness month

October 17, 2015

Making Strides Against Breast Cancer
www.makingstrideswalk.org

October 18, 2015

Paws for the Cause, Fox Chase Cancer Center
www.fccc.edu/information/calendar/special-events/paws/

NOVEMBER

Lung Cancer Awareness month

November 1, 2015

Free to Breathe Run/Walk
www.freetobreathe.org

Pancreatic Cancer Awareness month

November 7, 2015

Pancreatic Cancer Action Network
PurpleStride 5K run/walk
www.purplestride.org/philadelphia

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