



# Epigenetics?

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Breast cancer:  
Windows of Susceptibility  
NIH grant 1U01ES019480

## our MISSION

**TO PREVENT** the occurrence  
of BCa through **RESEARCH**  
and **EDUCATION**

**TO ENCOURAGE** and  
**SUPPORT** BCa survivors,  
friends and families.

### ENVIRONMENTAL IMPACT IN GROWTH AND DEVELOPMENT

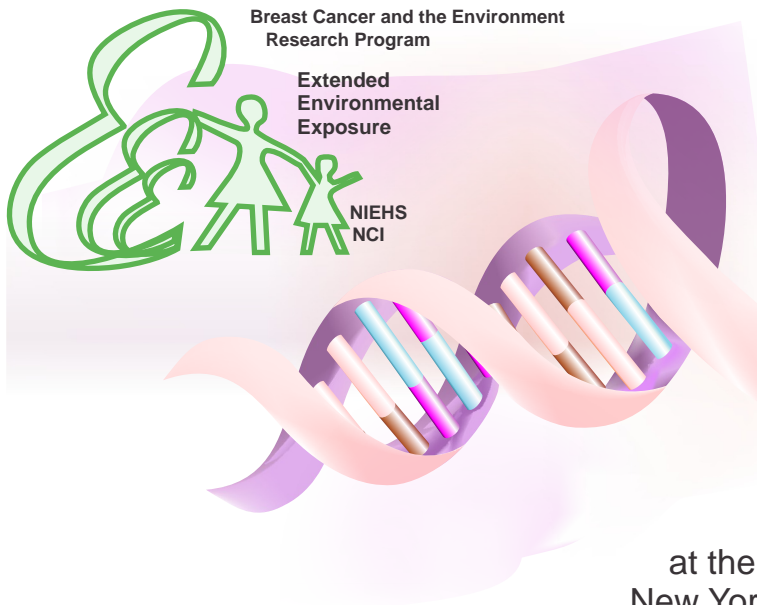
*Most organ systems develop early in gestation and do not become fully mature until weeks, months, or years after birth allowing ample opportunity for interaction with the environment.*

*Well known environmental encounters include hypoxia, malnutrition, infection, trauma, medical and recreational drugs, and the host of toxins that bombard us from natural and industrial sources.*

*The impact of exposure during critical periods in development depends upon what processes are critical at that moment -- and what systems are disrupted. Deleterious effects can lead to alterations in specific organs and organ systems, permanent damage to the DNA, or semi-permanent changes to the DNA, altering gene expression.*

*The latter are short term adaptive traits in attempt to establish phenotypes that meet the demands of the "current" environment. When changes match the predicted current and later-life demands, the individual will remain healthy, but there is a cost.*

*Today, more frequently than in past, the abundance of energy dense foods and less exercise, greatly influenced by our lifestyle choices, are in conflict with the programmed adaptive changes made during early development.*



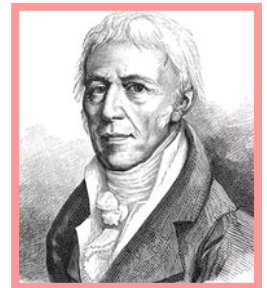
# RESEARCH PARTNERS

"The concept of epigenetics" an introduction...

The presentation by Dr. Ho, the research team of the BCa Windows of Susceptibility, and PRG

at the NIEHS conference in New York City, Nov 17-21, 2010

showed basic and interesting points about epigenetics. Some of these are presented here: The full powerpoint presentation can be accessed on the website <http://ehp.niehs.nih.gov/factmythchoices/Public-TalkNov2010.pptx>.

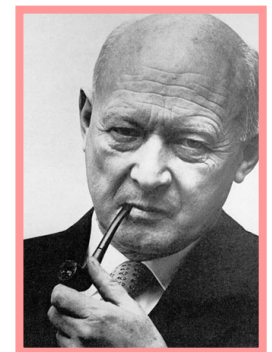


Concepts about nurture **changing** nature is thousands of years old (refs in Torah and Old Testament), but more recent thoughts (if 1800 is recent - LOL) come from Jean-Baptiste Lamarck (1744–1829) who proposed that if we have a human characteristic that is useful or "used" it is kept and/or improved. If a characteristic is useless, or even harmful, then that trait is "lost". This was called INHERITANCE OF ACQUIRED CHARACTERISTICS.

Charles Darwin (1809-1882) proposed that evolution occurred as tiny successive changes spread out over a long period of time. But, this concept doesn't account for "quick changes that occur within a generation." An example of this kind of rapid change is found in the increase incidence of breast cancer in Asian-American women in ONE generation after immigration to western countries.



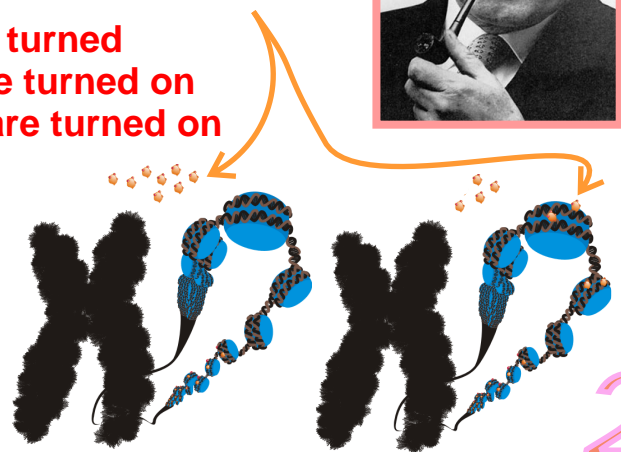
Permanent change to our DNA has traditionally been held responsible for most of our specific disease processes, but Conrad H. Waddington (1905-1975) showed that the environment (in this case, heat) can cause semi-permanent changes (in this case, wing vein pattern in *Drosophila*) in the genetic code. The concept becomes the premise of **epigenetics**.



Epigenetics can alter---**when sets of genes are turned on**  
**where sets of genes are turned on**  
**what cell types genes are turned on**

This is accomplished by attaching methyl groups to especially important sites in the DNA. The BCaWOS research group are investigating this relating to diet during particularly sensitive times in development.

methyl groups



# COMMUNITY PARTNERS

A forum for information and support

The observation that our lifestyle has a clear impact on **OUR** health, and the health of **OUR CHILDREN**, and **GRANDCHILDREN** to the third and fourth generation, the basic concept of epigenetics, as is nature (our DNA) can be modified by nurture (the environment) is an old one, newly revived with solid scientific backing.



**YOU**

The exciting thing is that it allows us to see a world wherein we can choose to exert a positive impact on how the "cards", that is the four cards A, D, G, C of our genetic code (the deck) are stacked in our deck and how they are played. Its a choice we make each day,-- to influence our health, and well being and that of our children and grandchildren.

**HER  
BABY**

Diet, next to smoking, is the most important effector of epigenetic change currently known. Both **WHAT** and **HOW** much we eat are important! The impact of what you eat lasts longer than one generation.

**YOUR  
BABY**

You can take charge of some aspects of your own health, the health of your children and their children by paying close attention to diets, especially FAD diets which suggest, among other things, "that you remove protein" or "only eat protein", "remove all fat", or "only eat fat", or "remove all carbohydrates", or "just eat grapefruit". (YOU GET THE IDEA).

Think about the wisdom of "all things in moderation" and the "bounty of diversity" in diet and make it your routine.



## Slides for presentation, Dec., 2010

### **FACT:**

**Breast cancer incidence varies greatly by country and the USA ranks poorly.**

### **MYTH:**

**I am less apt to get breast cancer because I live in a western country.**

### **QUESTION**

**...what is the reason for that difference in BCa incidence?**

### **CHOICES**

**Its not known exactly, but may relate to affluence, and high fat intake: choose to lower your dietary fat!**

## FACT:

Deep breathing lowers the level of stress hormones in our bodies

## MYTH:

I cannot change the levels of stress in my life!!!

## QUESTION

...how does deep breathing reduce my stress ????

## CHOICES

.....through the sympathetic nervous system. Practice breathing DEEPLY and meditating.

# COMMUNITY PARTNERS

## DECEMBER'S RECIPE

### Banana Bread

1 1/2 cups of all-purpose flour (unbleached)  
1/2 cup wheat bran  
1/3 cup granulated sugar (sometimes I use 1/4 cup sugar  
and then add about 2 tbsp of honey or decrease sugar amount)  
1/4 cup ground flaxseed or flaxmeal  
1 tsp baking soda  
1 tsp baking powder  
3 tsp cinnamon  
1/4 tsp salt  
1 1/2 cups of mashed ripe bananas  
3/4 cup plain yogurt (I use Stoneyfield fat-free vanilla)  
2 eggs  
2 tbsp butter, melted  
3 tsp vanilla,  
1/2 cup finely chopped walnuts (or I will also use pecans or almonds)  
1/3 cup mini semi-sweet chocolate chips

Preheat oven to 350 degrees. Spray a 9 x 5 loaf pan lightly with cooking spray and set aside. In a large bowl, combine flour, wheat bran, sugar, ground flax, baking soda, baking powder, cinnamon and salt.

In a medium bowl, whisk together bananas, yogurt, eggs, butter, and vanilla. Add wet ingredients to dry ingredients and stir just until moistened. Fold in nuts and chocolate chips. being careful not to overmix the batter.

Spoon batter into prepared pan. Bake for about 55-60 minutes, or until wooden skewer inserted into center of loaf comes out clean. Cool loaf in pan on a wire rack for about 10 minutes. Remove loaf from pan and cool completely on rack. Slice and serve.

Have a Happy New Year.  
Banita



## SOMETHING SWEET

# FOLLOWUP

**Don't be afraid life will end  
..be afraid it won't begin**

ANONYMOUS

6



# COMMUNITY PARTNERS

A forum for information and support

Epigenetics is an old, but newly revived concept of how nature can be modified by nurture.

## One-Ball of yarn Scarf

Lion Brand® PolarSpun yarn or similar variegated  
Knitting needles size 10 (WHY NOT USE PINK)

### GAUGE:

13 stitches and 18 rows = 4 inches (10 cm) in Garter stitch (k every row) using Size 10.5 (6.5 mm) knitting needles

**BE SURE TO CHECK YOUR GAUGE.** When you match the gauge in a pattern, your project will be the size specified in the pattern and the materials specified in the pattern will be sufficient. If it takes you fewer stitches and rows to make a 4 in. [10 cm] square, try using a smaller size needles; if more stitches and rows, try a larger size hook or needles.

### SCARF

Cast on 16 stitches (almost 5 inches wide). Knit every row until piece measures 46 inches or desired length. Bind off loosely using a larger needle.

