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# MEDELLA

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***Microbiome Plays an Important Role in Human Health***

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RESEARCH

# *Your lifespan may depend on what your grandfather ate*

The idea that food functions as one of the pillars of health has been around since Hippocrates instructed us to "Let food be thy medicine". Only in the last two decades have scientists started to unwind the complicated relationship between food and our genes as it applies to modern disease. An interesting study from 2002, nicknamed the "Grandparent's Study", helped shed light on this aspect of the emerging scientific discipline called epigenetics.

In the Grandparent's Study, Swedish researchers looked at the role of nutrition on the risk of mortality from cardiovascular and diabetes in the isolated community of Överkalix in northern Sweden. Using historical records from the early 20th century, the researchers looked at food availability during an important developmental stage called the Slow Growth Period (SGP), which is the few years prior to the onset of puberty. They followed the family line of 239 families for three generations. Data were collected by following three cohorts born in 1890, 1905 and 1920 up until their death or 1995.

The study participants were selected based on the availability of a cause of death. The researchers determined the availability of food in the area during the times in which the study participants had lived by using regional harvest statistics, grain prices, and general historical facts.

Researchers found that when the paternal grandfather experienced a famine during his SGP, his grandchildren were protected against cardiovascular and diabetes mellitus causes of death, and when a grandfather had access to an abundance of food, his grandchildren were four times as likely to die from diabetes. Interestingly, the transgenerational impact of food availability was only apparent down the male line for risk specifically associated with cardiovascular disease and diabetes. The researchers have used this finding to confirm speculation that genes which increase susceptibility to diabetes are expressed from the male's genetic pool.

Other studies, such as the Dutch Famine Birth Cohort Study, a historical birth cohort study of the longer reproductive effects of starvation *in utero* among a cohort of women born in Amsterdam before, during, and after the Dutch Hunger Winter -- a war-induced famine -- examined the effects of maternal intrauterine undernutrition on offspring birth weights in a cohort of women born between August 1944 and April 1946 in Amsterdam. The study found preliminary evidence that grand-maternal exposure to famine for a brief period during gestation is associated with poorer health in the grand-offspring. Undernutrition was defined separately for each trimester of pregnancy as an average supply of less than 1,000 calories per day from government food rations. "These findings constitute the first direct evidence in humans that the detrimental effects of poor maternal nutrition during gestation on health in later life pass down to subsequent generations," the researchers wrote.

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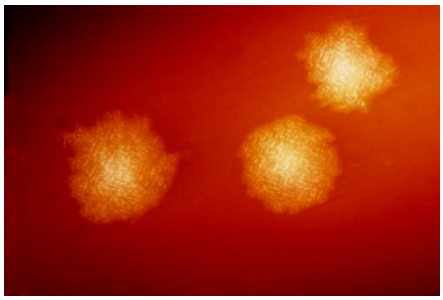
**FEATURED STORY**

## *Gut microbiome plays an important role in human health*

The human body serves as a host to numerous microbial communities found at multiple body sites, including nasal passages, oral cavities, and the skin, urogenital, and gastrointestinal tract. These microbial communities are commonly referred to as microbiomes. To look for correlations between changes in the microbiome and human health,

researchers from the National Institutes of Health's Human Microbiome Project aim to collect data and develop tools for studying the role of microbes in human health and disease.



The gastrointestinal tract is a popular site for novel microbiome research. The gut microbiome refers to microorganisms that colonize our gastrointestinal tract and influence absorption of nutrients, synthesis of vitamins and defense against disease. From birth, it is thought to influence our predisposition to many non-communicable diseases, including obesity, diabetes, allergies, eczema, celiac disease and inflammatory bowel diseases.

Researchers observed that infants born to mothers on farms or in developing countries are less likely to develop these non-communicable diseases. This observation led them to think that environment -- and thus, modifiable factors -- may influence the development of such diseases. It is thought that the population of "good" and "bad" bacteria in individuals may affect the likelihood of developing chronic illnesses later in life.

Bacteria are present as early as in the first bowel movement of a newborn infant. From this observation, it is thought the microflora of the gut begins to establish itself before birth and therefore may be influenced by maternal factors. If the composition of the maternal microbiome influences the child, ensuring that a mother has a healthy composition of bacteria represents one target for preventive medicine intervention.

Factors that have the potential to alter the microbiome are: the use of antibiotics during pregnancy and within the first year of life, gastrointestinal illnesses, travelling through the birth canal versus Caesarian section, and breastfeeding. It is well-established that breastfeeding provides protective immunity against many diseases. In addition to protective antibodies, maternal microflora exists within the breast milk ducts and may be passed to the infant. This leads us to think that if we can identify a protective microflora and re-introduce it to the mother, it may have beneficial effects on the infant's health, creating protective effects in the first years of life when many of these diseases initially present.

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**CLASS**

# *Learn Reiki at two upcoming workshops*

**Reiki First Degree Training. January 10th, 2015, 10 am to 5 pm at the GW Center for Integrative Medicine, www.gwcim.com. Cost: $150.**

If you are interested in deepening your awareness of the energy body, GWCIM offers a day-long introduction to the Japanese healing art of Reiki. By the end of this session, participants will become beginning level Reiki practitioners, and will be able to use their hands to heal themselves and others. You will learn the history of Reiki; the three pillars of Reiki; and the five Reiki principles. We will go through and practice the self-treatment protocol, as well as the hand positions for sharing Reiki with others. Most importantly, you will be attuned to the Reiki energy, without which Reiki will not flow.

Reiki Masters Yael Flusberg and Luann Jacobs will also teach Japanese Reiki techniques and touch on the differences between Reiki as it is practiced in Japan and elsewhere. Homework will include 21 days of self-healing, and three documented sessions on others, after which you will receive your certificate.

Highly recommended: Having received a Reiki session at the GWCIM, or with any other Reiki practitioner. Please register at www.gwcim.com.

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**Reiki Second Degree Training. November 22nd, 2014, 10 am to 5 pm. Cost: $150.**

The second degree of Reiki deepens your connection to universal source, connects you to a greater volume of Reiki energy, and strengthens your ability to channel the energy. You will be introduced to three sacred symbols, which serve specific healing functions: 1)

powering up the Reiki energy, 2) healing at the mental and emotional level, and 3) healing across time and space. A large part of the training will be centered on the understanding and application of these symbols, along with supervised hands-on practice of advanced Reiki techniques on yourself and others. We will also discuss the ethics of treating others, and local resources for volunteering. You will receive two attunements at this level. Homework will include 21 days of self-healing, and ten documented sessions on others, after which you will receive your certificate. Prerequisite: Certificate from your Reiki 1 Training. Please register at www.gwcim.com.

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## *Continued: Gut microbiome...*

One way to re-introduce "good" bacteria is through probiotics. Probiotics are capsules or food-containing active microorganisms that contain the "good" bacteria. Probiotics are sometimes recommended to improve digestive and feminine health, protect against gastrointestinal illnesses, as well as for pregnant women. Less commonly known is the term prebiotics. Prebiotics provide the fertilizer for the "good" bacteria in the colon. They are easily tolerated and feed the microorganisms that already exist within your colon. Examples of prebiotics include fructo-oligosaccharides and inulin. For more information, visit your healthcare provider to learn how probiotics or prebiotics may benefit you.

Analysis of healthy microbiomes found that each person's microbiome is unique. Two healthy people may have very different microbial communities but still be healthy. Although unique, certain microbial communities across varying body sites could be used to predict such characteristics as whether a person was breastfed as an infant, and even the level of education. The analysis also showed that microbial communities from varying body sites on the same individual correlate with one another. For example, gut communities could be predicted by examining the oral community. Future studies can begin to use microbial communities as a basis for creating personalized therapies and possibly to assess the risk for certain diseases.

The 5th International Human Microbiome Congress will be held March 31-April 2, 2015 in Luxembourg.

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- *National Institutes of Health. The Common Fund. Human Microbiome Project. http://commonfund.nih.gov/hmp/index*

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## *Continued: Grandparents...*

In both of these studies, the timing of the food scarcity was critical to the transgenerational impact. These results raised the obvious question of the relationship between food availability and its effect on future generations. The answer lies in the mysteries surrounding epigenetics.

Epigenetics explains how environmental factors such as access to food or exposure to chemicals impact the way our genes are expressed. If our genes are the typed words in our grandmother's favorite cookbook, our epigenetics are the hand written notes that she added which make the dish taste like hers. Thus, our genes provide the pool of possible directions but our epigenetics choose which directions to execute and as a result have a huge impact on our state of health.

The good news is that nutritional epigenetics has come a long way in helping us understand how food interacts with our genes and which nutrients support positive epigenetic function. Coincidently, the foods that we know to be health-promoting such as broccoli, kale, salmon, and red wine (to name only a few) are high in the nutrients that researchers have found to be involved in the beneficial expression of our genes. For example, folate is involved in a process that determines which genes are open for reading and which are closed. This function is especially important during the first trimester of pregnancy. Deficiency of folate in early pregnancy is associated with increased neural tube defects in humans and has been linked with obesity in adult offspring in animal studies. The best sources of dietary folate include leafy green vegetables (think foliage!), asparagus, lentils, beets, and liver.

Research such as the Grandparent's Study has helped us understand that it is not only our genes that are passed down to subsequent generations but also our epigenetic specifications. Furthermore, the environmental and social influences of our grandparents' lives are important as they may affect how our genes are expressed today. The patterns of shortage followed by a surplus of food may lead to different changes in DNA that could be correlated with an increased risk of cardiovascular disease or diabetes.

So this begs the question, what kind of epigenetic information are you passing down to your grandkids?! Choosing a health-promoting lifestyle

that includes healthy food, adequate exercise and sleep, effective stress management techniques, as well as many laughs is the best way to optimize your health as well as the health of your grandchildren.

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***GWCIM warmly thanks the contributors to this issue of Medella: Julie Wendt, GWCIM Nutrition Educator, Lyndsay O'Brecht, MD Candidate (2015) at GWU School of Medicine and Health Sciences, and Shivani Shah, MD Candidate (2017) at GWU School of Medicine.***



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