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Health Connections

LINKING NUTRITION RESEARCH TO PRACTICE

THE DOWN-AGING OF CHRONIC DISEASE:

The Importance of Early Lifestyle Habits

Introduction

Nutrition research shows that optimal health and health habits – or the lack thereof – originate early in life. Conditions such as osteoporosis, hypertension, cardiovascular disease, type 2 diabetes and obesity – all traditionally associated with adulthood – are "down aging," appearing in early childhood and adolescence. This issue of *Health Connections* summarizes research connecting lifestyle and diet to future chronic disease risk, and outlines ways that health professionals can intervene and facilitate health-promoting habits early in life. Such action is critical if we are to avoid a potential medical meltdown of health care resources as chronic diseases take their toll earlier in life.

With Change Comes Challenges

Changes in our professional knowledge base challenge us to be flexible in helping clients identify specific risks and develop highly individualized approaches to mitigate these pediatric antecedents of adult disease. Research now substantiates highly specific and stronger links between diet, lifestyle and disease. Factors manifested as early as *in utero* can impact a child or adolescent's health status. Some animal research even links the health status of offspring to dietary factors two generations back.[1] In addition, nutritional genomics and nutritional genetics provide molecular and mechanistic information that can help guide decisions about the intervention and treatment of future disease.[2]

Eating for Two Revisited: Impact Beyond the First Generation

Within the context of setting the stage for risk of chronic disease, the conventional wisdom that pregnant women eat for two takes on additional meaning. For example:

- Maternal calcium intake has been linked to lower blood pressure in children, potentially helping to prevent hypertension in the next generation.[3]
- Twin offspring of mothers supplemented with calcium had lower cardiovascular risk factors (triacylglycerol, total cholesterol and LDL cholesterol) at age 9 years than other children.[4]
- Calcium's (and vitamin D's) role in bone health and the development of osteoporosis later in life is well known. Optimizing bone deposition before age 18 is especially important in females.
- Maternal overweight and obesity not only contribute to complications during pregnancy, but also increase the risk of obesity in infants. Research on children born to overweight mothers showed that by age 4, weight, body mass index (BMI) and lean body mass were significantly greater and by age 6, weight and fat mass were greater than those born to lean mothers.[5]

Childhood Obesity and Type 2 Diabetes

Over the past 30 years, the prevalence of obesity has more than doubled for preschool-aged children and adolescents aged 12-19, and it has more than tripled for children aged 6-11.[6] This evolving childhood obesity epidemic is linked to increased

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Mary Jo Feeney specializes in nutrition communications and marketing. With over 30 years experience in public health nutrition and education, she currently is a leading consultant to the food, agriculture and health care industries. A charter Fellow of the American Dietetic Association, Mary Jo served on the Board of Directors of both the American Dietetic Association (ADA) and its Foundation (ADAF) and received the association's Medallion Award in 1996.

risk of type 2 diabetes. In the past referred to as "adult-onset," type 2 diabetes now commonly occurs in the adolescent and teen years; cases in children as young as 4 have even occurred.[7] One study found that for each adolescent diagnosed with type 2 diabetes, there were 10 others with impaired fasting glucose.[8] Researchers expect pre-pubescent type 2 diabetes rates to soar as the population becomes increasingly overweight. African American, Hispanic/Latino and American Indian children who are obese and have a family history of type 2 diabetes are at especially high risk.

Population-wide Increase in Blood Pressure in Children and Youth

Blood pressure has increased steadily in children over the past decade, across all age and race/ethnic groups and in both genders.[9] Clinical guidelines for ranges in blood pressure in children now include a "pre-hypertensive" range mirroring the revised categories for hypertension in adults.[10] Diets rich in fruits and vegetables and low-fat dairy products such as the Dietary Approaches to Stop Hypertension (DASH) diet have had positive effects on blood pressure in adults – and research indicates a beneficial effect during childhood. Children who ate 4 or more daily servings of fruits and vegetables or 2 or more daily servings of dairy products during preschool years had smaller yearly gains in systolic blood pressure during childhood and by early adolescence had a 7 mm Hg lower systolic blood pressure.[11]

The Early Beginnings of Atherosclerosis

Atherosclerosis begins in childhood with the deposition of cholesterol and its esters, referred to as fatty streaks, in the vascular system. Almost every North American child over the age of 3 years has some degree of aortic fatty streaks.[12] In some individuals these streaks may manifest subsequently as a fibrous plaque and advanced lesions. Several new risk factors of atherosclerosis in children and young adults are being investigated such as level of lipoprotein(a), procoagulant state, hyperhomocysteinemia, low birth weight and adverse *in utero* environment, and inflammatory markers.[13] The establishment of healthy nutritional habits early in life may prevent the development of advancement of fatty streaks into more advanced atherosclerotic lesions.

The Need for Action

The down-aging of chronic diseases and the identification of "pre-conditions" are relatively new phenomena. The impact on children, their family's quality of life, and on our health care system is still to be felt. As health professionals we need to take a more proactive approach through early screening, intervention and referral when necessary to other disciplines to prevent these consequences.

Francine R. Kaufman, MD

*In this interview, **Francine R. Kaufman MD,** sheds some light on the increasing incidence of type 2 diabetes in children, and future implications of what may become an epidemic in the United States. Dr. Kaufman is a pediatric endocrinologist at Children's Hospital Los Angeles, past president of the American Diabetes Association and author of DIABESITY: The Obesity-Diabetes Epidemic that Threatens America and What We Must Do to Stop It (2005 Bantam).*

Q. What do you see as the biggest modifiable threat to our health?

A. We have created an environment that is so far out of balance and on a collision course with our genes – threatening our survival. For decades, many people across the globe faced relative austerity and had to expend considerable energy to survive – which we no longer have to do. Advances in agriculture, transportation and the development of a complex food delivery and marketing system now provide a consistent and ubiquitous food supply for many people worldwide. We must redefine what "progress" means for the future. Is it more energy-saving devices and energy-dense food? Or is "progress" seizing the opportunity to get us back into balance with appropriate, healthy food in appropriate portions coupled with appropriate levels of physical activity? We had hoped research would find a magic bullet but we aren't even close to manipulating our basic genetic and metabolic mechanisms. The only way to achieve energy balance is through appropriate food choices and activity. We must make changes in our communities, worksites and schools to enable us to get in energy balance, but we cannot afford to wait for all the needed changes to take place.

Q. What, then, can health professionals do now to help establish this balance?

A. Clients are not going to go from 0-60 in improving their lifestyle. Most people cannot make radical changes. It sounds simple, but

they need to make gradual changes in how they live their lives. Discover what your clients do now with regards to food and activity. Help them identify small changes they can sustain over time and that they can continue to improve upon. Small steps can reap big rewards. For instance, if a child drinks one to two liters a day of energy-dense, nutrient-poor beverages, could he or she cut back to 8 to 12 ounces and improve the nutrient quality of the diet by including fruits, vegetables, whole grains and low-fat dairy products? Very few of us have an extra hour a day to "exercise" – safely, or even at all. Physical activity doesn't explicitly entail "exercise." Encourage and incentivize work sites and schools to create an environment in which activity is accessible – offering pedometers, and safe places to walk, for example.

Q. What are some of the health implications for overweight children at risk for type 2 diabetes?

A. These children risk the same coexisting disorders that we see in adults - dyslipidemia, sleep apnea, abnormal liver tests and even gall bladder disease. Girls may have polycystic ovarian syndrome. Some children can weigh as much as 200 to 400 pounds and often require medication – often more than one type – to manage these conditions. The outcome does not look good for their long term health.

Q. How can health professionals support clients and families in their efforts to implement lifestyle change without adding undue pressure?

A. It is difficult to get a child to eat well or be active if the parent isn't mirroring the habits. Children may or may not listen to what parents/caregivers say, but they will watch what they do. Family "activity" should be just that – active – walking in parks, museums, riding bikes, hiking, etc. These activities also allow parents the opportunity to have meaningful conversations with their children. Being active together helps minimize the child's using food to get attention, and the parent/caregiver's use of food as reward or punishment in other situations.

Empower adults to help children self-regulate their food intake. Teach portion control. An adult usually puts on a plate what the adult would eat. An appropriate portion size for a child is closer to what the child could hold in the hand. Help parents/caregivers in cultures in which an overweight child is a "healthy" child understand that thinner children can be healthy too. When possible encourage breastfeeding, which enables the infant to regulate intake and reduces the risk of future obesity, type 1 and type 2 diabetes.

PRACTICE POINTS FOR THE HEALTH PROFESSIONAL

- Intervene early when indicated. Use and interpret biomarkers and family history. Pediatricians are urged to begin screening a child's blood pressure at age three.[11] Early adoption of the DASH Diet – rich in fruits, vegetables and low-fat dairy products – can reduce the chance of developing high blood pressure in children and adolescents and can form the basis for a healthful diet throughout life.
- Emphasize nutritious choices and diet quality for all life stages. Women benefit from a nutrient-dense diet for their own health every day and in the future, not only when pregnant. And as gatekeepers for the home food environment, women help improve the food choices for families as well.
- Routinely monitor height, weight and BMI in childhood and intervene when these exceed established "healthy" ranges. Because weight in childhood tends to track into adolescence and then into adulthood, maintaining weight and growth at an appropriate trajectory is critical.[14] Keeping weight in check throughout childhood and adolescence also can minimize risk of obesity-related diseases such as diabetes and hypertension.
- Monitor blood pressure and serum cholesterol levels at annual physical examinations. Plot these on standard percentile grids in the child's permanent medical record to identify those at risk for future development of atherosclerosis and heart disease. Behavior modification for diet, activity and smoking is warranted in those with persistently elevated levels of blood pressure and/or serum LDL-C, and more aggressive intervention if this is unsuccessful.
- Regularly assess and ensure adequate intake of calcium and vitamin D throughout childhood and adolescence to optimize bone health and prevent fractures and osteoporosis in adulthood.
- Consider the whole patient/client. Use information on family situations, history, social and economic conditions to identify and implement appropriate diet and lifestyle factors for change.

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