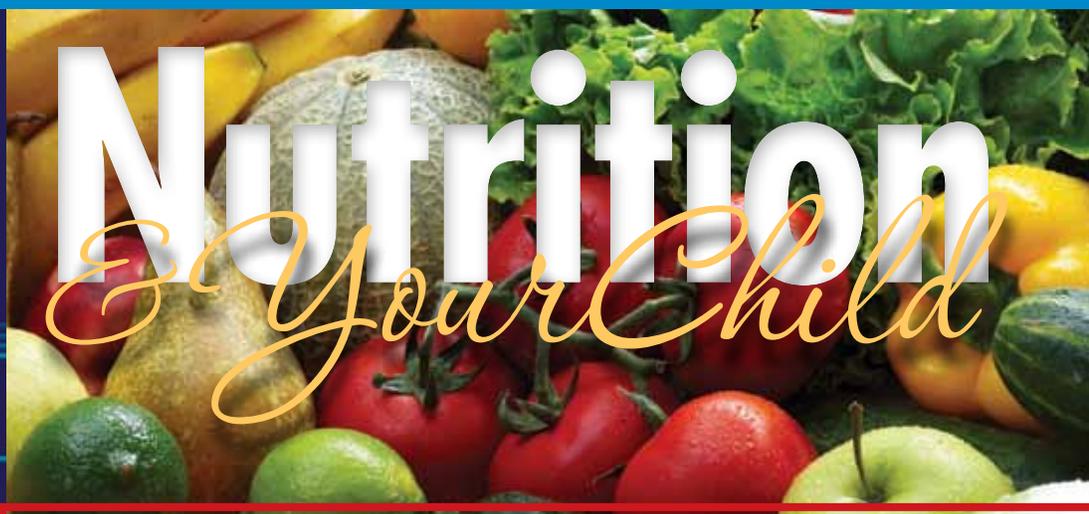


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The role of parenting practices
IN CHILDREN'S FRUIT AND VEGETABLE CONSUMPTION

Getting children to eat enough fruits and vegetables is an issue that many parents struggle with all over the world. Dr. Teresia O'Connor, assistant professor of pediatrics at the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine, and colleagues sought to find out what health care professionals in six countries believed were the most effective ways for parents to promote greater fruit and vegetable consumption among preschool children. The report was published in the *Journal of the American Dietetic Association*.

O'Connor and colleagues developed an Internet survey for health care and nutrition professionals in the United States, Mexico, Australia, Spain, Chile and the United Kingdom to complete. Using existing parenting research, they defined three types of fruit and vegetable intake parenting practices: those that provided structure for the children's eating environment, those that were responsive to children and those that tried to control children's fruit and vegetable intake.

They found that of the 39 practices, 25 were considered effective and 14 were considered ineffective by health care professionals in the six countries. Practices that were considered effective provided structure, non-directive control and were responsive to the child.

"Things that parents can do to provide structure include making fruits and vegetables more available by serving them daily, having them at home ready to eat and in easy reach of the children and themselves role modeling fruit and vegetable consumption," said O'Connor.

Non-directive control is a type of control in which parents set an expectation of fruit and vegetable consumption and involves their child in achieving this expectation. This includes letting children serve themselves the fruit or vegetable, going to the grocery store and having the child pick out fruits and vegetables, letting the child choose what produce is going to be served for a meal or snack and helping prepare it.

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CNRC expert provides input
ON NEW CALCIUM AND VITAMIN D RECOMMENDATIONS

Calcium and vitamin D are essential nutrients needed for proper bone growth and development. To determine if adults and children are consuming acceptable levels of these nutrients, Dietary Reference Intake values are used as measurable guidelines. Recently, the Institute of Medicine, a national organization whose mission is to improve health, released a new report on these values for adults and children. Dr. Steven Abrams, professor of pediatrics at the USDA/ARS Children's Nutrition Research Center at Baylor College of

Medicine, served on the panel that released this report.

After reviewing national surveys on blood levels, the committee found that although the majority of Americans and Canadians are getting enough vitamin D and calcium, adolescent girls are not getting enough calcium. Those who are not getting enough vitamin D or calcium should increase their intake of foods containing these nutrients, such as milk, yogurt

(Continued on page 2)

RESEARCHERS DEVELOP NEW METHOD FOR MEASURING ENERGY EXPENDITURE

Understanding the energy needs of individuals or populations of people is dependent on knowing their energy expenditure, and while there are methods for predicting expenditure, they are not without limitations. A recent study by researchers from the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine was conducted to validate a new method to assess energy expenditure using a specialized device that measures heart rate and physical activity.

Energy expenditure is fundamental to many areas of nutrition research, but it is especially critical in obesity research, said Dr. Nancy Butte, professor of pediatrics at BCM and lead author of the study, which was published in the *Journal of Nutrition*.

"There's a huge interest among researchers as well as in our society in general in trying to get our obesity epidemic under control," Butte said.

At the CNRC, researchers use special rooms called calorimeters that measure a child's oxygen consumption and carbon dioxide production in order to predict energy expenditure. Research participants spend 24 hours in these rooms doing normal activities like sleeping, playing and exercising. The use of these calorimeters is considered the gold standard for measuring energy expenditure because of their high level of accuracy and precision.

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and eggs, and consider taking a supplement.

Recently, a number of reports and articles have suggested that based on serum measures of Vitamin D, many individuals may have a deficiency of Vitamin D. The committee carefully reviewed the methodology and significance of serum Vitamin D measurements and issued guidelines for acceptable and upper tolerable limits for these measures. These levels will be useful to clinicians as they consider management of patients under their care. Ultimately, the committee concluded that the prevalence of vitamin D inadequacy in North America has been overestimated.

The report recommended Americans and Canadians up to age 70 need no more than 600 international units of vitamin D per day to maintain health, and those over the age of 70 may need as much as 800 international units per day.

The report also affirms the American Academy of Pediatrics' recommendation that infants who are breast-fed need 400 international units of vitamin D per day through over-the-counter drops and that sunshine cannot be used in place of these drops.

"We should not count on sunshine exposure to provide vitamin D to infants" said Abrams.

The committee also set upper limits for the amount of vitamin D intake per day. These upper limits are critical because there is a risk of these nutrients being harmful if consumed above certain levels. The report sets the upper limit for supplementation for healthy children at 1,000 to 4,000 international units per day, depending on age, and sets the upper limit for adults at 4,000 international units per day.

Although vitamin D is a safe nutrient, very high intakes may pose risks associated with too much calcium in the blood (hypercalcemia) or kidney stones, said Abrams.

With regard to calcium, the committee reported that 700 milligrams per day is sufficient for children between the ages of 1 and 3 and 1,000 milligrams per day sufficient for children ages 4 through 8. Adolescents between the ages of 9 and 18 need no more than 1,300 grams per day. Adults 19 through 50 and men up to age 71 need about 1,000 milligrams of calcium per day, but women over the age of 50 and both men and women over the age of 70 need no more than 1,200 milligrams per day. The committee set the upper limits for calcium as follows: 2,500 milligrams per day from age 1 through 8; 3,000 milligrams per day from age 9 to 18; 2,500 milligrams per day from age 19 through 50 and 2,000 milligrams per day for all other age groups.

Measuring Energy Expenditure (continued from page 1)

But researchers also want to be able to measure children's energy expenditure in "free-living" environments, outside of the laboratory. For this, the gold standard has been a stable isotope method called doubly-labeled water. This process is accurate, safe and easy to administer. However, it is expensive and requires sophisticated equipment for isotope analysis, Butte said.

Other methods to measure free-living energy expenditure are heart-rate monitoring and accelerometry, which measures physical activity. These two methods provide satisfactory data for groups of people are less accurate on an individual level.

Butte's recent study combines these two methods using a specialized device that measures both accelerometry and heart rate. The new method offered very good results, Butte said.

The study included 60 healthy male and female participants, ages 5 to 18, both normal weight and overweight. Each participant first spent 24 hours in the calorimeter to measure their energy expenditure. Then in the free-living environment, they wore the heart rate recorder/accelerometer for seven days and also were administered the doubly-labeled water.

Using these measurements, energy expenditure was predicted through sophisticated statistical modeling techniques that Butte and her research colleagues had previously developed.

"Our equations to predict energy expenditure were acceptable across ages, genders and in lean or obese body types. We were very pleased that on an individual level, we got a high level of accuracy in predicting individuals' total energy expenditure."

Butte emphasized however, that this new method has only been validated in healthy children and adolescents.

Another study testing the new method in preschool-aged children is currently under way. Parents who are interested in their child participating can contact Marilyn at 713-798-7002.

Others who took part in this study include Dr. William Wong, Anne Adolph, Maurice Puyau, and Firoz Vohra, all from the CNRC, and Dr. Issa Zakeri, formerly with the CNRC and now with Drexel University in Philadelphia.

Funding for this study came from the National Institutes of Health and the USDA/ARS.

Childhood and Adolescent Growth and Development Studies

Volunteers

Houston-area residents are invited to participate in the following nutrition research projects designed to help CNRC scientists learn more about the nutritional needs of children. Free transportation and parking are available.



LI'L CAL: A CALORIE AND PHYSICAL ACTIVITY STUDY FOR PRESCHOOLERS

Healthy 3- to 5-year-old children are needed for a study on the caloric needs and physical activity of preschoolers while resting and playing. The study includes two visits to the Children's Nutrition Research Center. Call Marilyn, 713-798-7002.

STOMACH PAIN

We are seeking female children between the ages of 7 and 12 for a study to understand why some children get stomach pain often while others rarely do. Your child must either be currently experiencing frequent stomach pain or never have stomach pain. Contact Erica Baimbridge, 713-798-0381 or baimbrid@bcm.edu.

EXERCISE STUDIES

13- to 17-year-old overweight Hispanic teens who are not involved in any school or after school sports are needed for a study on the effects of a 12-week exercise or exercise plus diet program. Call Marilyn, 713-798-7002.

GIRLS ONLY

5- to 17-year-old healthy girls are needed to participate in a research project on female hormones. Free physical exam, labs and stipend provided. Call Betty, 832-824-1257 or e-mail baw@bcm.edu.

FAMILY EATS

African-American families with children between 8 and 12 years of age are needed for an 8-week Internet program on healthy eating. Must

PRENATAL NUTRITION PERMANENTLY IMPACTS HUMAN EPIGENOME

Epigenetics, which is the study of the cellular mechanisms that can persistently change the expression of our genes without changing the DNA sequence, is fundamental to development and enables each type of cell (liver cells, brain cells, etc) to stably express the genes appropriate for that cell type. Research from the USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine has shown that, in humans as in animal models, maternal nutrition permanently affects epigenetics in the offspring.

Human studies were based in rural Gambia where seasonal variation in mothers' nutrition causes infants born during the food-scarce rainy season to weigh 200 to 300 grams (7 to 10.5 ounces) less than babies born at other times of the year, said researchers from the CNRC and the London School of Hygiene and Tropical Medicine, who reported their findings in a recent issue of the open access journal *PLoS Genetics*.

Dr. Robert Waterland, an assistant professor of pediatrics at the CNRC, and his colleagues found that this seasonal variation permanently changed a child's epigenome, which controls how genes are expressed.

The seasonal effect occurred in specific parts of the genome (DNA) that are briefly unstable during an embryo's development. During this period—just before fetal development, when early cells differentiate into the various tissues—the potential for genes in these regions to be expressed is switched on or off by chemical marks on the DNA.

"Once these marks are set, they are maintained for life," said Waterland. During fetal development the original chemical marks at these regions, called metastable epialleles, are carried on throughout the body.

Waterland collaborated with Dr. Andrew M. Prentice of the London School of Hygiene and Tropical Medicine. They used a special human genome-scale screening approach to look for variations in DNA methylation—an epigenetic event in which adding a certain molecule to a gene turns it off. They looked for these in research participant's blood and hair follicles and identified areas of the genome where variation among individuals is similar in both tissues.

To test whether this epigenetic variation is influenced by nutrition, the researchers evaluated these sites in blood drawn from Gambian

children, comparing those conceived during the rainy season to those conceived in the dry season over four different years. At all five metastable epialleles, they found more methylation in the children conceived during the rainy season. The season of a child's conception was the only variable that predicted the methylation or epigenetic change that the researchers found.

"The biggest contribution of this research," said Waterland, "is that we have identified an approach for finding metastable epialleles in humans by simultaneously screening multiple tissues for methylation differences among individuals." This removes a major roadblock to studying the role of epigenetics in human diseases by identifying easily accessible tissues, i.e., blood and hair follicles, that can be sampled to study the human epigenome.

"The Gambian findings were icing on the cake," he said. "Amazingly, these samples were collected from children around 9 years old, who have lived through several seasonal cycles but were still left with this epigenetic mark throughout their bodies that was linked only to the season of their conception. That gives an insight to explain how early nutritional exposure in the human can lead to long-term changes in health status."

The next step is to find out what this means to the children's health in later life.

The full article can be found at <http://www.plosgenetics.org/article/info%3Adoi%2F10.1371%2Fjournal.pgen.1001252>.

Others who took part in this work include Richard Kellermayer, Eleonora Laritsky, R. Alan Harris, Wenjuan Zhang, Maria S. Torskaya, Lanlan Shen and Mark J. Manary of BCM, Pura Rayco-Solon of the London School of Hygiene and Tropical Medicine, Michael Travisano of the University of Minnesota and Jiexin Zhang of The University of Texas MD Anderson Cancer Center.

Funding for this research came from the March of Dimes Foundation, the NIH, the U.S. Department of Agriculture, and the Curtis and Doris K. Hankamer Foundation.

New Dietary Guidelines for Americans

The 2010 Dietary Guidelines for Americans, the federal government's evidence-based nutritional guidance to promote health, reduce the risk of chronic diseases, and reduce the prevalence of overweight and obesity through improved nutrition and physical activity, were released on Jan. 31, 2011.

Because more than one-third of children and more than two-thirds of adults in the United States are overweight or obese, the 7th edition of Dietary Guidelines for Americans places stronger emphasis on reducing calorie consumption and increasing physical activity.

To learn more go to www.dietaryguidelines.gov.

have Internet access. Call Mamie, 713-798-0501 or e-mail mawhite@bcm.edu.

TEEN CHOICE: FOOD AND FITNESS

12 to 17 year old boys and girls are needed for an 8 week web-based program on healthy eating and physical activity. Must have internet access. Compensation provided. Call Mamie 713-798-0501, or email mawhite@bcm.edu.

LACTATION STUDY

Healthy pregnant mothers, 13 to 35 years of age, who will exclusively breastfeed for the first two months and who will deliver at St. Luke's or Ben Taub Hospital are needed for a research study investigating factors that affect breast milk production. Call Marilyn, 713-798-7002.

SUGAR AND FAT METABOLISM

Normal weight 13- to 17-year-old Hispanic females are needed for a study on sugar and fat metabolism. Participants must have a sedentary lifestyle and must not have a parent or sibling with diabetes or high blood sugar. Contact Marilyn, 713-798-7002.

Parenting Practices *(continued from page 1)*

The responsive practices were those in which parents communicated with the child in a warm and nurturing way and encouraged them to eat fruits and vegetables. An example would be when parents, in a positive tone, tell the child the benefits of eating fruits and vegetables, said O'Connor.

"Practices that fell into these three groups were all felt to be effective parenting practices to get children to eat fruit and vegetables according to the health care and nutrition professionals," said O'Connor.

The practices that health care and nutrition professionals in the six countries felt were ineffective or counterproductive were practices in which parents used external control, meaning they were reactive in getting children to eat fruits and vegetables. This included bribing children, punishing them for not eating fruits and vegetables or making them feel guilty for not eating them.

"It may be that this type of external control will work during one meal, but it

is probably not effective in getting children to eat fruits and vegetables long term," said O'Connor. "The health and nutrition professionals perceived the non-directive control, structure and responsive practices would be more likely to engage children to eat fruits and vegetables over a long period of time. The goal is to have the child internalize these behaviors so that they keep doing it outside of just one meal."

Others who took part in this study include Dr. Kathy Watson, Dr. Sheryl Hughes, Alicia Beltran, Janice Baranowski, Dr. Theresa Nicklas and Dr. Tom Baranowski, all with the USDA/ARS Children's Nutrition Research Center at BCM, Dr. Melanie Hingle of the University of Arizona, Dr. Karen Campbell of Deakin University in Australia, Dr. Dolors Canal of Girona University in Spain, Ana Lizaur of the Department of Health in Mexico, Isabel Zacarías of Chile University in Chile and Daniela González of the University of the Americas in Chile.

Funding for this study came from the USDA/ARS.

Nutrition & Your Child is published quarterly by Baylor College of Medicine as a research and information update for the general public and Center volunteers and supporters.

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The Children's Nutrition Research Center is operated by Baylor College of Medicine, in cooperation with Texas Children's Hospital, for the Agricultural Research Service of the United States Department of Agriculture.