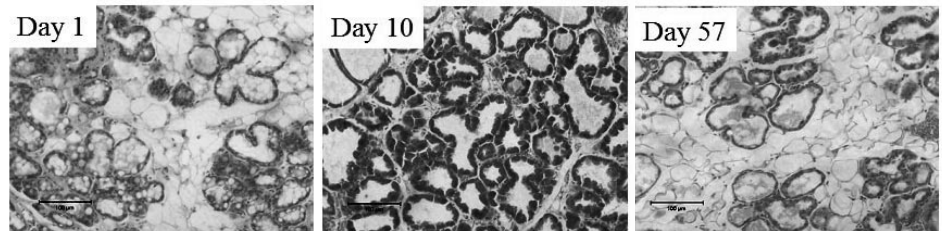


## UNDERSTANDING BREASTFEEDING AT THE CELLULAR LEVEL

**B**reastfeeding provides many health benefits to both mother and child. These benefits occur in a dose-response relationship. That is, the longer a child is breastfed, the lower his or her risk for a variety of illnesses including severe diarrhea, pneumonia, asthma, ear infections. While most mothers hope to breastfeed according to current recommendations (6 months of exclusive breastfeeding and breastfeeding combined with solid foods until 12 months or longer), the majority do not achieve their goals. Health care providers and lactation consultants advise mothers that extra breastfeeding or pumping will increase their milk production and prolong lactation. Neither they nor the scientific community really understand why this does not always work.

Dr. Darryl Hadsell, a research scientist at the USDA/ARS Children's Nutrition Research Center, is working to understand how milk production is regulated at the cellular level using



Stained tissue sections of the lactation mammary gland during early (day 1), mid (day 10) and prolonged (day 57) lactation. During early lactation the number of milk producing epithelial cells increases while the number of fat cells decreases. With prolonged lactation, the reverse occurs—milk producing cells decrease and fat cells increase.

mice mammary cells. Ultimately, this research will provide medical professionals with more information on which to base advice to breastfeeding mothers who need to increase their milk production or reverse an unexplained decrease in milk volume.

Changes occur when mouse lactation is “rescued”—that is when lactation is extended past the time when those cells tend to stop producing milk. In mice, as in people, lactation can be extended or “rescued” by continuing to remove milk from the gland after the baby is weaned. Even under these conditions, there is an

eventual decrease in milk production—and Dr. Hadsell has shown that this decrease is associated with a corresponding decrease in the number of milk producing cells in the mammary gland. Some of the cells just slowly die—even though the milk is still being removed.

Whatever the control mechanisms, Dr. Hadsell is particularly struck by the fact that the cellular processes of early rapid growth, aging, and death that occur slowly throughout the body seem to be occurring in fast forward during each cycle of early and prolonged lactation. This makes it even more important to understand the mechanisms involved and suggests that these results may have implications not just for lactating women, but for other aspects of human health such as aging.

More about Dr. Hadsell's research can be found in the April 2006 issue of *Experimental Gerontology* or on the CNRC website [www.kidsnutrition.org/faculty/hadsell.htm](http://www.kidsnutrition.org/faculty/hadsell.htm). ♦

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## THE CONFOCAL MICROSCOPY AND IMAGE ANALYSIS LABORATORY AT CNRC

**E**very organ in our body is made up of diverse populations of cells. Scientists who want to learn more about how cell interaction relates to organ function can use confocal microscopy to study these different populations. “Confocal microscopy” is an imaging technique which can reconstruct three-dimensional images at the cellular level. At the USDA/ARS Children's Nutrition Research Center's Confocal Microscopy and Image Analysis Laboratory, scientists view and analyze both fluorescence and bright-field images from preserved samples of tissue or

cells, or from living cells maintained in a culture dish. Computer analysis of the images provide data that describes in numerical terms how the different cell populations within an organ change in response to dietary and/or other environmental conditions.

The core laboratory facility has been in existence for only 2 years, yet the potential impact on the future of child nutrition is great. CNRC's scientists have already used the laboratory to measure specific cell types within the lactating mammary gland (see figure above), within the small intestine and within muscle.

(Continued on page 4)



# 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.

## **NEW** KIDS' CHOICE TOO

4 and 5 year old children are needed for a study of children's food preferences and intake patterns. The children must like macaroni and cheese. Both children and parents must be fluent in English and families must not have participated in previous Supertaster studies. Stipend. Call Marilyn, 713-798-7002.

## **NEW** GIRL TALK

9 to 12 year old girls, fluent in English, are needed to watch commercials about healthy choices and participate in an interview about them. Stipend. Call Rinku, 713-798-0506.

## NEWBORN NUTRITION STUDY

Babies taking formula and less than 10 weeks of age are needed for a study in newborn nutrition. Formula and stipend provided. Call Marilyn, 713-7908-7002.

## BREAST-FEEDING STUDIES

New mothers, 18 to 35 years old, healthy, non-obese, not taking any medications (including birth control) and exclusively breastfeeding infants less than 10 weeks of age are needed for two studies investigating metabolic factors that affect breast milk production. Participants should not have parents or siblings with diabetes. Stipend. Call Marilyn, 713-798-7002.

## ONLINE-WORLDWIDE, PARENTING STYLES

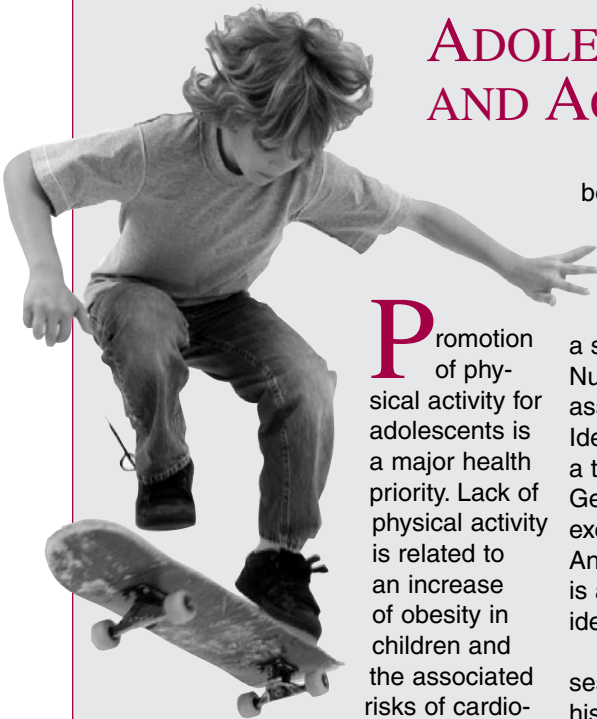
Parents and their 10 to 14 year old child, English or Spanish speakers, are needed to log into a secure website to answer some questions about how parents influence what their child eats. Stipend for interview. To sign in go to [www.cnrcparentsurvey.com](http://www.cnrcparentsurvey.com). **Volunteers worldwide are encouraged to participate.**

## CARBOHYDRATE AND SUGAR METABOLISM

Normal weight and overweight Hispanic teens, ages 13 to 17 years, are needed for metabolism studies. The teens should be healthy, not on medications, nor have a diabetic parent or sibling. The teens should not be enrolled in sports nor currently trying to diet or lose weight. Study includes 12 weeks of supervised exercise with an exercise physiologist. Stipend. Call Marilyn, 713-798-7002.

## PROBLEM SOLVERS NEEDED

14 to 17 year olds, fluent in English, are needed to fill out questionnaires about physical activity and problem solving. Stipend. Call Rinku, 713-798-0506. ❖



## ADOLESCENT ACTIVITY IDENTITY AND ACTIVITY

**P**romotion of physical activity for adolescents is a major health priority. Lack of physical activity is related to an increase of obesity in children and the associated risks of cardiovascular disease, diabetes, cancer and others.

In order to develop effective behavioral interventions to promote physical activity for adolescents, an understanding of the factors that encourages physical activity is crucial. Dr. Cheryl Anderson, a scientist at the USDA/ARS Children's Nutrition Research Center and her associates, have developed an Athletic Identity Questionnaire (AIQ) based on a theoretical model supported in adults. Generally the term "athletic" includes exercise, sport and physical activity. Dr Anderson states, "Although not everyone is an athlete, everyone has an athletic identity".

The 40 item questionnaire assesses the adolescent's perception of his/her personal athletic identity. The questionnaire is divided into 4 dimensions of self knowledge:

athletic appearance, importance of exercise/sport/physical activity, the adolescents' perceived competence to perform the activities, and the encouragement from others to perform (or not perform). Since family, friends, teachers and other adults all influence adolescents, the encouragement questions were further subdivided.

Examples of some of the questions are shown below:

### APPEARANCE

"I look like a person who is physically fit."

### IMPORTANCE

"I love to play active sports".

### COMPETANCE

"I have skill in several sports or physical activities."

*(Continued on page 4)*

## eHEALTH: NEW OPPORTUNITIES FOR PROMOTING HEALTH

**T**oday's youth are surrounded by easily accessible computer technology including electronic devices and the Internet. Current technology permits seamless integration of entertainment and behavior change principles into fun programs likely to attract and maintain attention.

eHealth is the use of communication technology (e.g., Internet, computers, personal digital assistants, CD-ROMs, DVDs, kiosks) to help people lead healthy lives. Examples include Internet-based comics and video games that promote healthy behaviors.

Dr. Deborah Thompson, an ARS scientist at the USDA/ARS Children's Nutrition Research Center, is a pioneer in eHealth. In a recent paper (November, 2006) in *Evaluation and Program Planning*, she highlights the importance of promotion and outreach to increase participation in eHealth programs. Dr. Thompson states, "Recruitment is critical to any program's success. If potential participants cannot be reached and given an opportunity to enroll in the program, even the most theoretically elegant behavior intervention program will not be successful."

She believes that program developers or intervention agents can work effectively with the media to increase participation in nutrition intervention and eHealth programs if they utilize a few key guidelines:

- ◆ Have a clear, concise message and make it interesting (e.g., speak in "sound bites").
- ◆ Provide visuals if possible.
- ◆ In addition to news broadcasts, remember local radio and television programming that focus on topics of community interest.

Additional information about Dr. Thompson's research can be found at [www.kidsnutrition.org/faculty/thompson.htm](http://www.kidsnutrition.org/faculty/thompson.htm). ◆



## PORTION SIZE IMPACTS MEALTIME CALORIES

**T**he eating environment is an important factor influencing the amount of food and calories a child consumes. Research suggests that an eating environment that provides convenient access to large portions of palatable, energy-dense food may lead to overeating and perhaps obesity in children.

Scientists have debated the age at which children become susceptible to overeating large portions. Dr. Jennifer Fisher, a scientist at the USDA/ARS Children's Nutrition Research Center, has conducted research showing effects of large food portions on children's mealtime energy intake. Her study, published in the journal *Obesity* in February 2007, provides insight.

Children ranging in age between 2 and 9 years were either given an age-appropriate entrée at the dinner meal, a portion-size twice as large as the age-appropriate portion or the opportunity to serve themselves. Dr. Fisher shares the following key findings from her research.

- ◆ The larger portion entrée led to increased calorie intake for all children including children as young as two years.
- ◆ The larger portion entrée led to an average 13% higher energy intake at the meal.
- ◆ Children took similar numbers of bites regardless of the portion size, but ate bigger bites when served the larger portion.
- ◆ Children who were most affected by the larger portions ate less when allowed to serve themselves than when the large portion was served to them.

Dr Fisher concludes, "The results of this study demonstrate that serving large portion entrées at meals promotes children's energy intake at meals, even among toddlers. The potential protective effect of allowing children to self-determine portion size needs further study."

Additional information can be found on the CNRC website at [www.kidsnutrition.org/faculty/fisher.htm](http://www.kidsnutrition.org/faculty/fisher.htm).

## Confocal Microscopy *(Continued from page 1)*

**Mammary gland:** Measuring changes in specialized cells (myo-epithelial cells) that are required for milk ejection or letdown.

**Small intestine:** Studying how diet affects the survival of cells known as enterocytes.

**Muscle:** Studying the impact of limited protein intake on satellite cells, a type of cell found in muscles which governs muscle growth.

According to Dr. Darryl Hadsell, director of the laboratory and associate professor at the Baylor College of Medicine, "All of these studies are aimed at improving children's nutrition by providing scientists with a better understanding of how the nutrients in the food we consume influence our body organs. A better understanding of cellular biology can open new horizons in the role of nutrition and organ function." ❖

## Adolescent Activity *(Continued from page 2)*

### ENCOURAGEMENT

- **Parents/Family:** "I have parents/family who give me words of confidence concerning sports or exercise."
- **Friends:** "My best friends are proud of me when I exercise."
- **Teacher or other adult:** "I have a teacher or another adult outside my family who has spent time teaching me how to play a sport or do a physical activity."

Additional information about the development and validation of the Athletic Identity Questionnaire can be found in the January, 2007 issue of *Medicine & Science in Sports & Exercise*, the official journal of the American College of Sports Medicine or on the CNRC website at [www.kidsnutrition.org/faculty/anderson.htm](http://www.kidsnutrition.org/faculty/anderson.htm). ❖

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