



**USDA/ARS  
Children's Nutrition Research Center  
at Baylor College of Medicine**

*Studying Nutrition Today for the Health of Future Generations*

### **Mission**

The Children's Nutrition Research Center (CNRC) is dedicated to defining the nutrient needs of children, from conception through adolescence, and the needs of pregnant women and nursing mothers. Since 1978, CNRC research has helped form the foundation of national nutrition policies and clinical nutrition practices that have improved the health mothers and children of all ages.

### **Research**

The CNRC is the largest federally funded children's nutrition research center in the country, with more than 50 full-time faculty members and approximately 200 technical and support personnel. One of six USDA Human Nutrition Research Centers, the CNRC is operated by Baylor College of Medicine in cooperation with the USDA's Agricultural Research Service and Texas Children's Hospital. This unique public/private partnership gives Center scientists access to the resources of the USDA, two of the nation's leading pediatric research institutions and the world's largest medical center.

Lead by Center Director Dr. Dennis Bier, the CNRC takes an interdisciplinary team approach to nutrition research, with scientists trained in disciplines ranging from biochemistry, cellular and molecular biology, human genetics, physiology, nutrition, plant biology, animal science, physics, statistics, epidemiology, behavioral science, and psychology working closely with physicians trained in a variety of pediatric subspecialties. This scientific synergy has fostered research collaborations across disciplines and at all scientific levels, from plant and animal studies at the molecular/cellular level to human nutrition studies at the clinical level, with the single goal of improving the nutritional well being of children.

Housing an Energy Metabolism and Exercise Laboratory with indirect room calorimetry, an advanced Body Composition Laboratory, a Behavioral Studies Unit and Children's Eating Laboratory, a Research Greenhouse, small and large animal facilities, and extensive Stable Isotope and Substrate/Hormone Core Laboratories, the 11-story CNRC facility is designed specifically for the unique needs of nutrition research. These facilities enable Center scientists to conduct some of the world's most advanced nutritional studies, which in turn have earned the CNRC an international reputation for research excellence.

### **Research Highlights**

- ▶ Developed national reference data for body composition, bone density, energy intake and expenditure for pre-term infants and children of all ages and major U.S. ethnic groups.
- ▶ Defined energy requirements in pregnancy and lactation.
- ▶ Showed that bone deposition and calcium absorption peak during early puberty, a finding that influenced recent increases in calcium recommendations for children 9 to 18 years of age.
- ▶ Developed an early feeding strategy using human milk that reduced post-delivery hospitalization of premature infants by an average of three days.
- ▶ Proved that human infants can synthesize DHA, a long-chain polyunsaturated fatty acid needed for neurodevelopment, from the essential fatty acid alpha-linolenic acid. This finding has important implications for infant feeding and the care of premature infants.
- ▶ Developed the doubly labeled water method, which is now the gold standard for determining energy expenditure in the free-living environment.
- ▶ Developed safe, non-invasive methods for measuring body composition in children.

### **Education and Training**

The CNRC offers a post-doctoral research training program designed to prepare individuals with an M.D. or a Ph.D. degree for active research careers in maternal, infant and/or childhood nutrition.

## Research Programs

**Nutritional Regulation of Cell Growth, Differentiation and Development:** One of the overarching and interdisciplinary themes of CNRC research is to describe how dietary components help determine organ growth, development and function throughout fetal life, infancy, childhood, and adolescence.

**Nutrient-gene Interactions:** This research examines how genes affect the absorption and utilization of nutrients, which in turn affects nutrient requirements, and how nutrients themselves alter gene expression, which is a crucial "personal" link in the development of nutrition-related diseases like obesity, diabetes, heart disease and cancer.

**Absorption and Metabolism of Essential Mineral Nutrients:** These studies investigate the metabolic, hormonal and dietary factors that affect the body's absorption and utilization of calcium and zinc and other essential mineral nutrients in children. Poor calcium intake in childhood can predispose children, especially females, to fractures and osteoporosis later in life.

**Childhood Obesity: Regulation of Energy Balance and Body Composition:** This research involves identifying genetic, physiological, and environmental factors, including physical activity, that contribute to the accumulation of excess body fat in children of different ethnic origins.

**Childhood Eating Behaviors: Prevention of Childhood Obesity and Chronic Diseases.** These studies involve identifying factors that influence the development of children's eating habits, and how to best help children and families adopt healthier habits to avoid long-term health problems linked to poor nutrition, including obesity, cardiovascular disease, hypertension, diabetes, stroke and osteoporosis.

**Nutrition During Pregnancy, Lactation, Infancy and Childhood:** This research defines the optimal dietary energy, protein, and mineral requirements during pregnancy, lactation, infancy, and childhood.

**Developmental Origins of Obesity, Cardiovascular Disease, and other Chronic Diseases of Nutritional Lineage:** These studies address our understanding of how an inadequate intake of nutrients like folic acid, Vitamin A, protein, and cholesterol during critical periods of development can permanent effects on a child – such as preventing adequate brain development – and on an individual's health later in adulthood by possibly increasing their risk for obesity, heart disease, cancer, and osteoporosis.

**Phytonutrient Biochemistry, Physiology and Transport:** This research explores how plants regulate the absorption and accumulation of minerals like calcium, iron, and zinc and how to improvement both the essential-mineral content of plants and the bioavailability of these minerals from plant foods consumed by children.

## Outreach

The CNRC produces *Nutrition & Your Child*, an award-winning quarterly consumer-oriented newsletter, and a web site that has earned an "Among the Best" rating from Tuft's Nutrition Navigator. In addition to conducting some of world's most advanced studies in maternal and child nutrition, CNRC scientists serve as a valuable source of research-based nutrition information for parents and others responsible for the care and feeding of children, as well as consumer and professional organizations, and local and national media.

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