

Research at The Children's Nutrition Research Center

The Children's Nutrition Research Center (CNRC) is one of six USDA human nutrition research centers conducting scientific investigations designed to provide Americans with a clear understanding of the role of nutrition in maintaining a healthy, active life.

As the first federal nutrition research center to investigate the nutritional needs of pregnant and nursing women and children from conception through adolescence, the CNRC conducts research that helps define guidelines for maternal, infant and childhood nutrition.

Located in the Texas Medical Center, the CNRC is operated by Baylor College of Medicine in cooperation with Texas Children's Hospital and the Agricultural Research Service of the U.S. Department of Agriculture (USDA/ARS). The Center has approximately 50 faculty members conducting nutrition-related research and a total staff of more than 200.

Since its establishment in 1978, Center research has generated almost 2,000 scientific publications and continues to provide valuable information for improving the nutritional health of today's children and that of future generations.

Currently, research efforts of the CNRC faculty cover eight broad areas. Each of these areas, faculty involved in each and the title of each participating faculty member's research are listed below. CNRC faculty members who also are members of the training faculty of the Postdoctoral Training Program are indicated by an asterisk (*). Note that some CNRC faculty members are not members of the training faculty and that the training faculty includes some individuals who are not CNRC faculty.

1. Nutritional Regulation of Cell and Organ Growth, Differentiation & Development

One of the overarching and interdisciplinary themes of CNRC research, this area of research currently concerns how dietary components help determine organ growth, development and function throughout gestation, infancy, childhood, and adolescence.

*Douglas Burrin, Ph.D. Intestinal essential amino acid requirements in neonates

*Teresa A. Davis, Ph.D. Nutritional regulation of tissue anabolism in neonates

*Marta Fiorotto, Ph.D. Consequences of perinatal undernutrition for satellite cell function and skeletal muscle growth

*Karen Hirschi, Ph.D. Nutrient regulation of blood and blood vessel formation

*Carlos Lifschitz, M.D. Effect of glutamine supplementation on morbidity in low birth weight infants

Robert Schwartz, Ph.D. Role of Nkx3-2 in patterning the gastrointestinal tract

*Robert Shulman, M.D. Nutritional influences on gastrointestinal function

2. Nutrient - Gene Interactions

This area of research examines how genes affect the absorption and utilization of nutrients (which in turn affects nutrient requirements) as well as how nutrients alter the expression of an individual's genes, which is a crucial "personal" link to the development of nutrition-related diseases like obesity, cancer and heart disease.

*David Moore, Ph.D. Natural products and nuclear receptors: PPARs

*Buford Nichols, M.D. Maltase-glucoamylase, regulator of starch digestion

3. 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.

*Steven Abrams, M.D. Evaluation of the absorption and utilization of minerals in the diets of toddlers and small children

*Ian Griffin, M.D. Physiological and molecular consequences of mild and moderate zinc deficiency

*Gerard Karsenty, M.D., Ph.D. Molecular elucidation of leptin regulation of bone formation

4. Childhood Obesity: Regulation of Energy Balance and Body Composition

Research comprising this area involves identifying genetic, physiological and environmental factors, including physical activity, that influence the

accumulation and net gain of lean tissues (such as muscle mass), body fat, and bone mineral content in children. Understanding the environmental and genetic factors that contribute to the accumulation of excess body fat may allow early screening of individuals at risk for obesity during childhood.

*Nancy Butte, Ph.D. Genetic and environmental factors contributing to childhood obesity

*Kenneth Ellis, Ph.D. Biological diversity of human growth: Body composition reference standards for children

John Foreyt, Ph.D. Prevention of overweight in children

*C. Wayne Smith, M.D. Nutritional influences on innate immunity

*Agneta Sunehag, M.D., Ph.D. Effects of ethnicity, exercise and obesity on glucose metabolism and insulin sensitivity in healthy adolescents

*William Wong, Ph.D. An after-school physical activity program to prevent obesity among Hispanic children

5. Childhood Eating Behaviors: Prevention of Childhood Obesity and Chronic Diseases

Studies in this area involve identifying factors that influence the development of children's eating habits and how to best help children and families adopt healthier habits and, hence, avoid or lessen long-term health problems linked to poor nutrition.

Cheryl Anderson, Ph.D. A longitudinal study of athletic self-concept and physical activity behavior in children and adolescents

*Tom Baranowski, Ph.D. Biological influences on children's diet and physical activity

*Karen Cullen, Ph.D. The development and testing of interventions to promote healthy dietary behavior among youth for chronic disease prevention

*Jennifer Orlet Fisher, Ph.D. Family influences on the development of food intake regulation

Judy Hopkinson, Ph.D. Relationships between infant feeding patterns and the development of risk factors for obesity, cardiovascular disease and diabetes in early childhood

*Theresa Nicklas, Dr.P.H. Investigation of dietary intakes of children

Janice Stuff, Ph.D. Dietary and genetic interactions of isothiocyanates

Issa Zakeri, Ph.D. Statistical analysis of food purchase data

6. Nutrition During Pregnancy, Lactation, Infancy and Childhood

This area of research includes studies that define the optimal dietary energy, protein, and mineral intakes for maternal health during pregnancy and lactation as well as for the wellbeing of infants and children.

Orla Conneely, Ph.D. Physiological role of lactoferrin in neonatal development and host defense

*Darryl Hadsell, Ph.D. Insulin and IGF signaling in lactogenesis

*Peter Haney, M.D., Ph.D. Lactose synthesis regulation: Role of glucose transport

*Morey Haymond, M.D. Maternal adaptation to lactation and regulation of human milk production

*William Heird, M.D. Utilization of dietary protein during early infancy

*Farook Jahoor, Ph.D. Relationship between maternal nutritional status and pregnancy outcome

Mark Manary, Ph.D. Nutritional pathogenesis, treatment and prevention of childhood malnutrition

Monique Rijnkel, Ph.D. Functional genomics of the casein gene cluster region

7. Developmental Origins of Obesity, Cardiovascular Disease, and other Chronic Diseases of Nutritional Lineage

These CNRC research studies address the mechanism(s) by which an inadequate intake of dietary nutrients like folic acid, Vitamin A, protein, and cholesterol during critical periods of development exert permanent effects on development of specific organs (e.g., brain) as well as health risks (e.g., increased risk for obesity, heart disease, cancer, and osteoporosis in adulthood).

*Heidi Karpen, Ph.D. The role of cholesterol in regulation of the Hedgehog developmental pathway

Ronald McNeel, Ph.D. The role of PPARs in PUFA regulation of lipid metabolism in adipocytes

*Qiang Tong, Ph.D. The role of GATA protein complexes in adipocyte differentiation

*I. Van den Veyver, M.D. Nutritional influences on epigenetic gene regulation during development

*Robert Waterland, Ph.D. Early nutritional influences on mammalian epigenetics

8. Phytonutrient Biochemistry, Physiology, and Transport

This research area explores how plants regulate the absorption and accumulation of minerals like calcium, iron, and zinc and how to improve both the essential-mineral content of plants and the bioavailability of these minerals from plant foods.

*Michael Grusak, Ph.D. Understanding the plant nutrient transport to improve crop nutritional quality and to assess Phytonutrient bioavailability

*Kendal Hirschi, Ph.D. Genetic engineering of vacuolar H⁺/metal antiport activity

*Paul Nakata, Ph.D. Investigations into calcium oxalate formation in plants