Kansas Nutrition Project
2003-2004

- Study of the relationship between nutrition, genetics, wellness and disease

- Funding by State of Kansas Attorney General’s Settlement Fund

- Participating population of four Kansan Mennonite Churches, many of whom participated in the 1980 studies sponsored by the University of Kansas

- Purpose of this presentation today is to explore the possibility of extending this study to the Nebraskan Mennonite populations
Nutrition is a primary environmental factor influencing our health, with its affects beginning before we are born and continuing throughout our lifetime.

Dietary manipulation remains an integral part of the healing arts -- a first line of defense against many chronic diseases.
However

- Recommendations for dietary changes may be made arbitrarily, without understanding of individual and population susceptibility or potential side effects.

- Research in the area of human nutrition is very difficult to complete.

AND

- Results are often confusing and conflicting.
Guidelines keep changing

Nutrition & the Food Pyramid

by John
Current Food Pyramid
One size does NOT fit all

- Despite the ability to personalize current recommendations, this pyramid is done without understanding of individual genetic makeup and disease susceptibility.
Nature and Nurture
Genes and environment

- Genes influence:
  - nutrient absorption
  - nutrient metabolism
  - taste perception
  - satiation – fullness

- Nutrients influence:
  - gene expression

- Nutrigenetics:
  - the study of gene-by-nutrient interaction
Purpose of our study

To profile the dietary habits of Kansas farming communities

To examine the relationship of these dietary habits with prevalence of chronic disease

To identify genes and dietary habits that affect the prevalence of dyslipidemia in this population
Participants of the well-defined community

Located in Goessel and Meridian in central Kansas

1) unique immigrant history

2) extensive written genealogy

3) complex, extended families providing numerous family relationships to study heritability and linkage

4) genetic, environmentally, and culturally homogenous population thought to decrease background “noise” when studying genetic effects
Unique Community

1) Active rural and agricultural lifestyle
2) Close social support system
3) No smoking
4) No drinking
5) Above average life expectancy
6) Cardiovascular diseases leading cause of morbidity and mortality
Data Collection

- Genealogies: to determine the genetic components
- Anthropometrics: skinfolds, height, weight
- Serum lipids, fasting insulin, leptin, adiponectin
- Genotyping: APOE, B, A-1, C-3 and LPL (RFLPs)
- Medical histories
- Nutritional profiles:
  - 3 - 24hour intake diaries
  - food frequency -- 11 categories, 90 foods
- Activity pattern: 3-24 hour non consecutive records
Nutritional Profiles

- **Food Diaries**
  - 3-24-hour records on non-consecutive days of EVERYTHING
  - to eat or drink
  - estimated amounts
  - recipe, brand names
  - daily exercise records

- **Food Frequencies**
  - listing of the daily and weekly amounts eaten of specific food groups
  - May include questions as to how this differs from 20 years ago
  - Gives a long-term overview of food patterns

- Give short-term, in-depth picture of food patterns
Determination of nutritional profiles

- Dietary data from food diaries are entered into NutriBase Software.
- Nutritional profiles are compiled and compared to current recommended (RDA) guidelines.
- Nutritional status is furnished to participants.
Participants

- Total Participants
- Males 97
  (ages 20-86, \( u = 51 \))
  (BMI 18-40, \( u = 26.7 \))
- Females 105
  (ages 16-90, \( u = 56 \))
  (BMI 17-39, \( u = 25.2 \))
- 206 total

- Responses – dietary information
- Males 76 (78%)
  (age 22-86)
  (BMI 21-40)
- Females 84 (80%)
  (ages 22-90)
  (BMI 17-36)
- 160 dietary profiles
  78% response
Essentially no difference between males and females in KNP
Cholesterol and Fat intake

- 46% of males and 73% of females report cholesterol intake below recommended 300mg/day.

- No statistical differences between males and females in % fatty acid intake. Both are higher in Saturated Fatty Acid intake (SFA)

- Recommended 10%SFA, 10%MUFA, 8% PUFA
Omega 6-3 Ratio

- Omega-6 and Omega-3 Polyunsaturated Fatty acids are both ESSENTIAL (EFAs)
  
  Our bodies cannot synthesize them

- These two fatty acids are precursors to hormones which produce opposing functions in inflammation responses, blood clotting, vascular constriction and pain response
  
  Serve to check and balance in homeostasis

- The recommended ratio is 4 to 1
  
  US diet ranges from 14-1 to 24-1

- KNP findings
  
  males 13-1 and females 12-1
There is a difference

Some evidence that male and female response to carbohydrate intake and plant sterols may differ in its effects on cholesterol levels.
Some evidence in the Kansas group of specific differences between the sexes in the relationship of genotype to plasma cholesterol subfractions HDL, LDL, and atherogenic profiles
Nutrition and Telomeres

- There is evidence of a relationship between nutrition and telomere length.

- There is also evidence of gender specific effects in this relationship.
Application of this research
Nutrigenetics

- To tailor dietary recommendations directly for individuals
- Effectiveness
- Medications
Thank you

- I would greatly welcome your input and discussion as to the possibility of completing similar studies in Nebraska

- Thank you for this opportunity

MJ