

Food is Medicine – Role of *Precision Nutrition* in Non- Communicable Diseases

V. Saroja Voruganti, PhD

Associate Professor, Department of Nutrition,

Associate Director for Clinical Research Services, Nutrition Research Institute,
University of North Carolina at Chapel Hill, North Carolina, USA

Topics to be covered

- Precision Nutrition and individual responses to diet/nutrients
- Precision Nutrition and NCDs
- Challenges in the practical implementation of precision nutrition

Non-communicable (chronic) diseases

- Noncommunicable diseases (NCDs) –
 - Obesity
 - Cardiovascular diseases
 - Diabetes
 - Some types of cancers
 - Chronic respiratory diseases
 - Neurodegenerative diseases

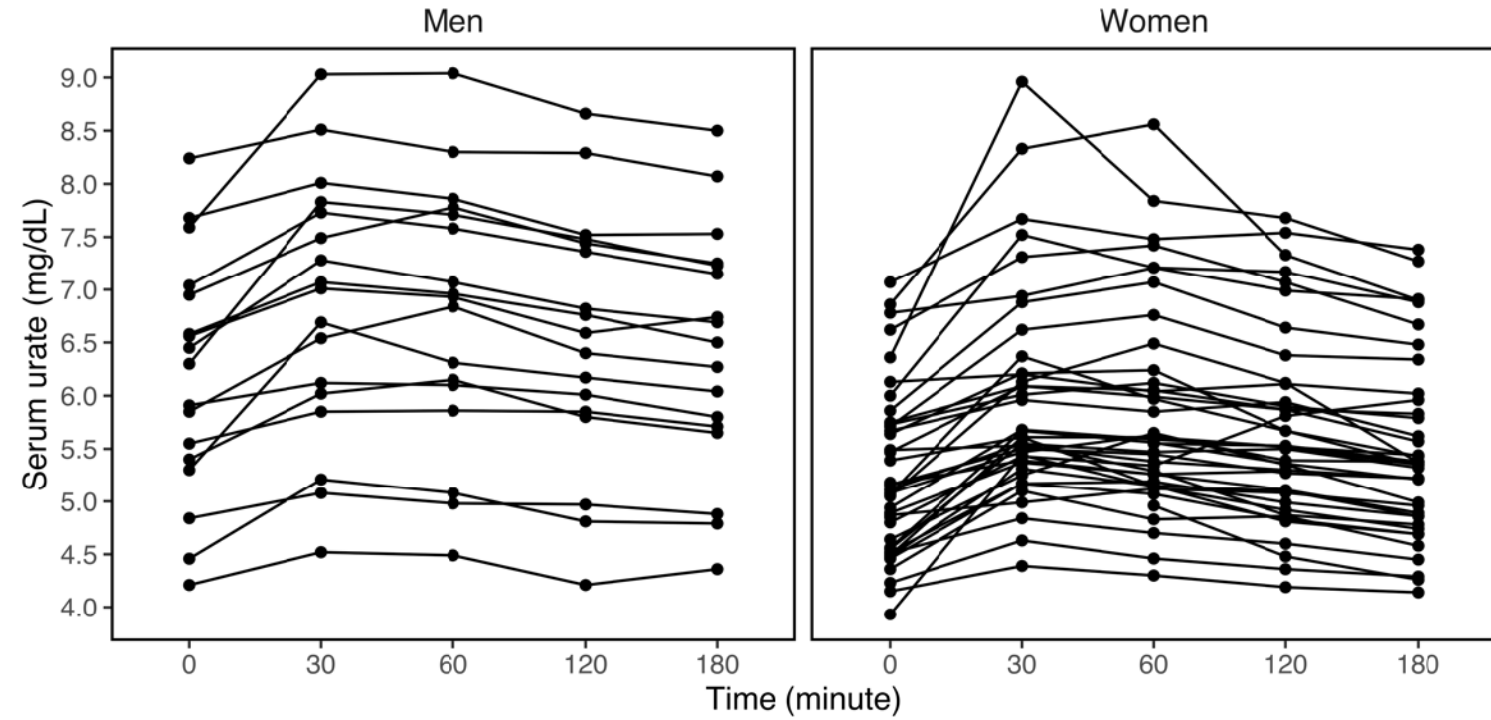
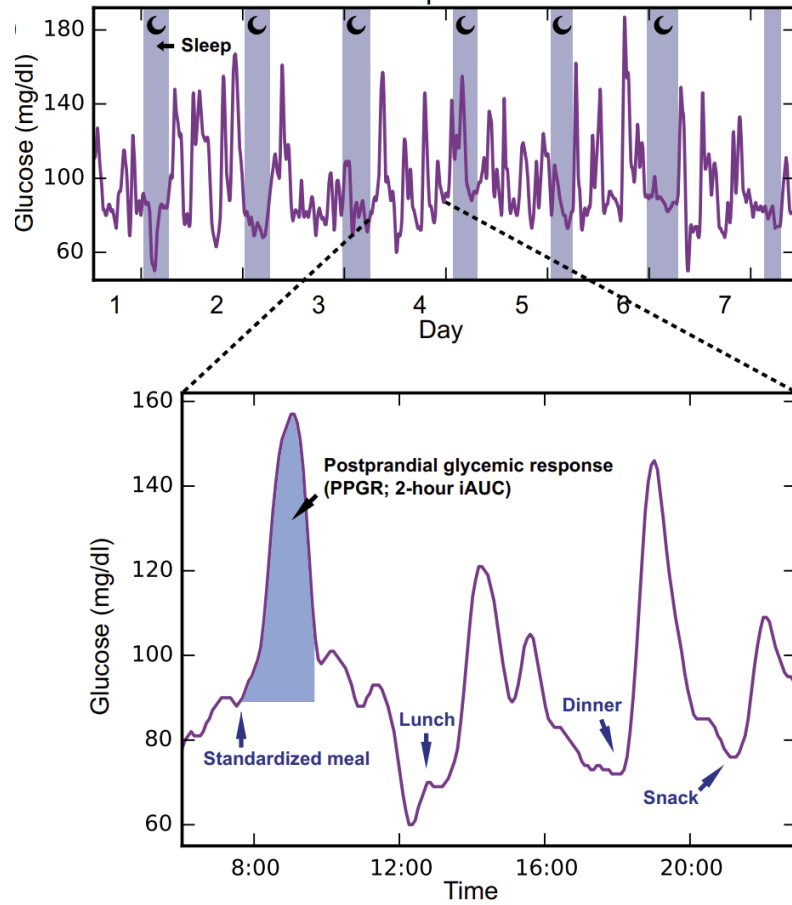
- Deaths from NCDs now exceed all communicable disease deaths combined (WHO).

- NCDs kill 41 million people each year, equivalent to over 7 out of 10 deaths worldwide.

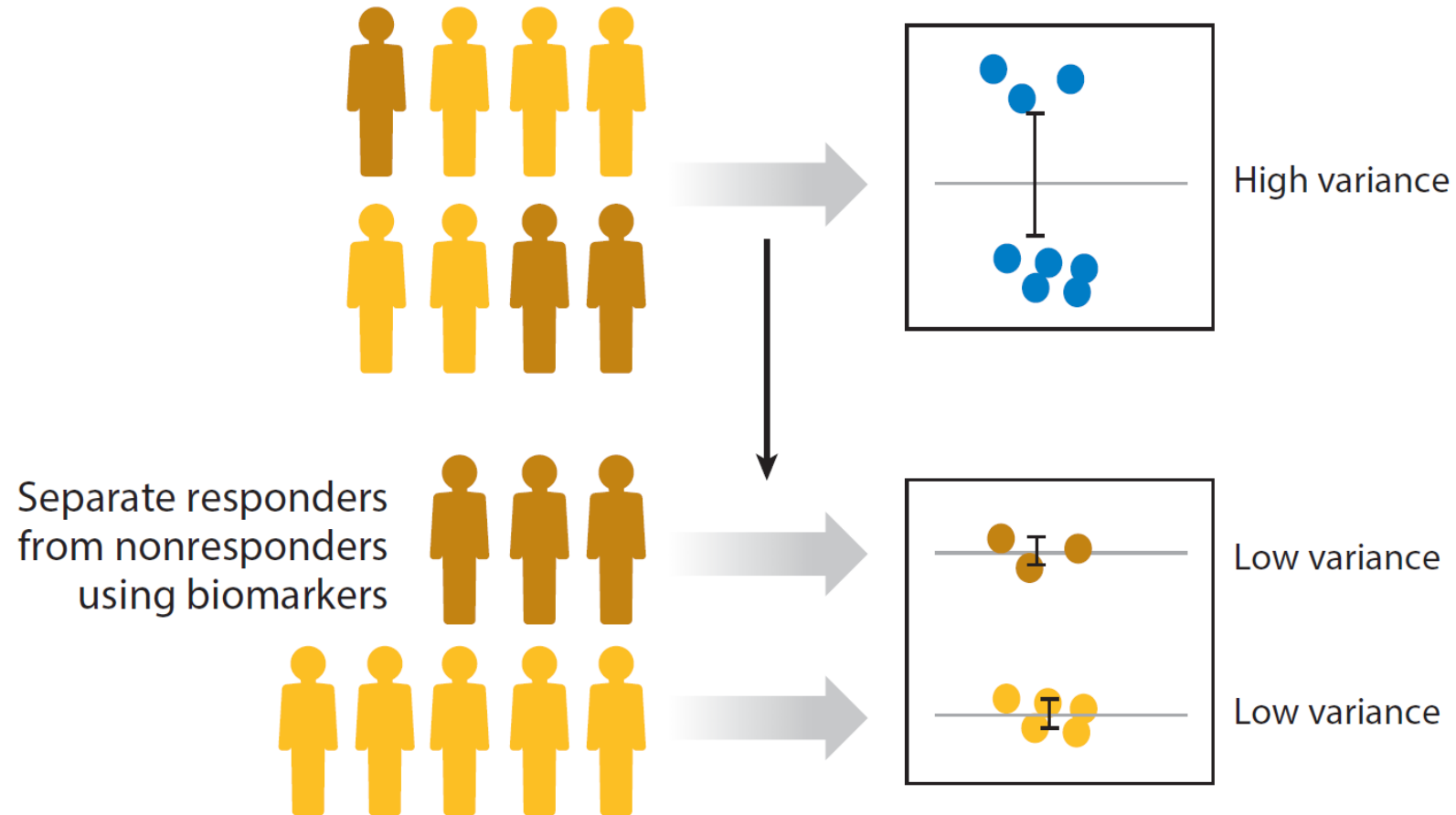
Nutrition in NCDs

- Unhealthy diets, undernutrition and malnutrition
- Changing dietary patterns around the world
- Recommendations include diets high in fiber, fruits and vegetables and low in salt/sodium, red and processed meat, refined starches or grains, sugary beverages and energy-dense and highly processed foods

Post-nutrient intake responses

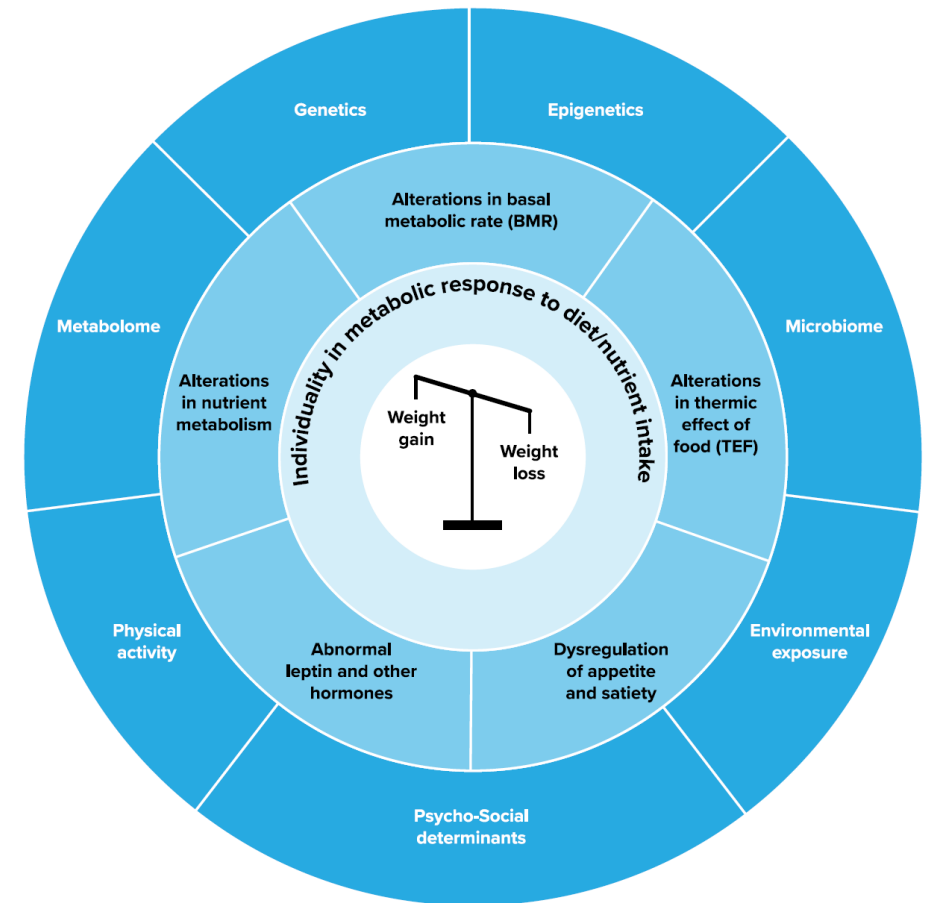


Individual variation in responses to diet/nutrients

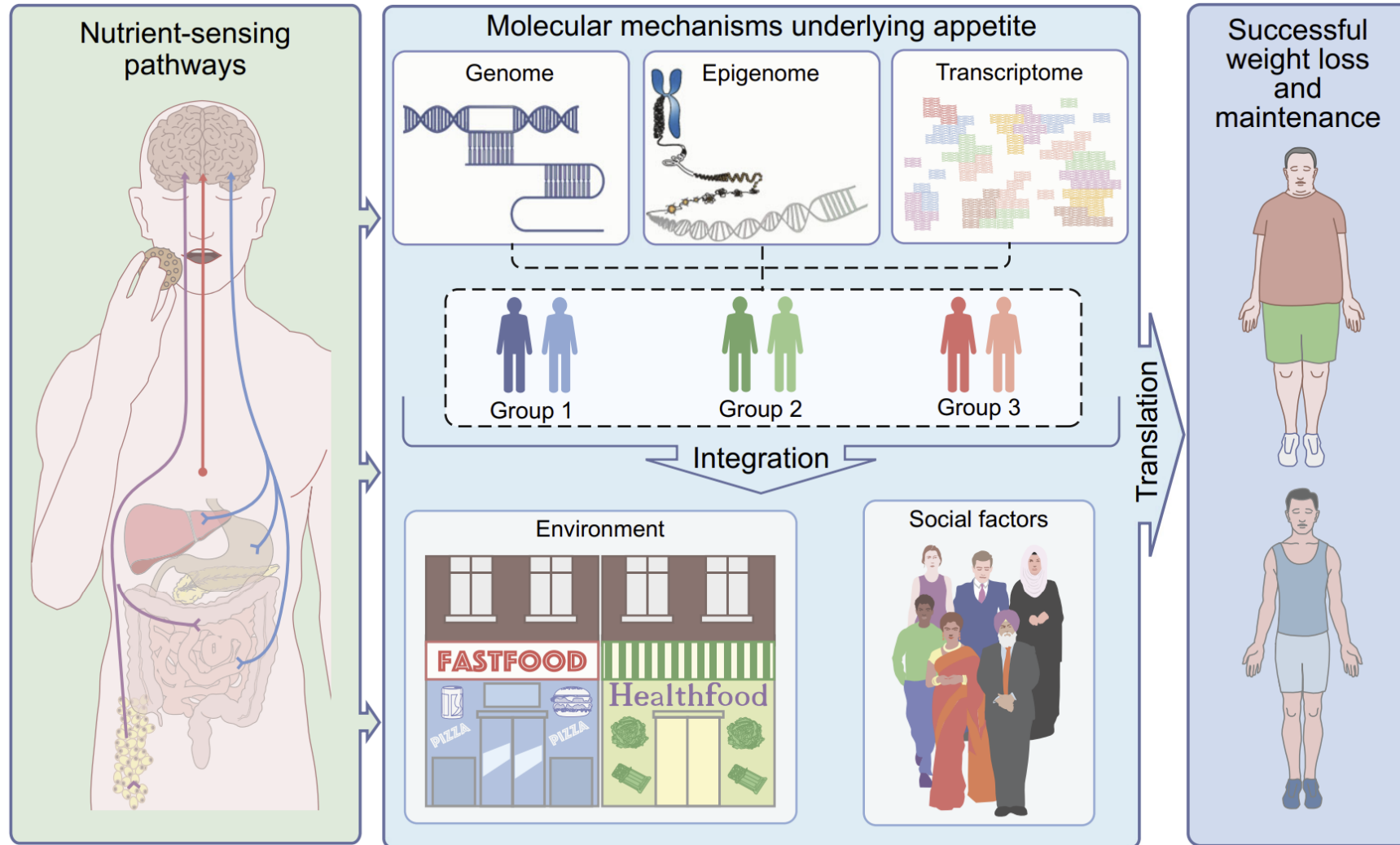


Obesity

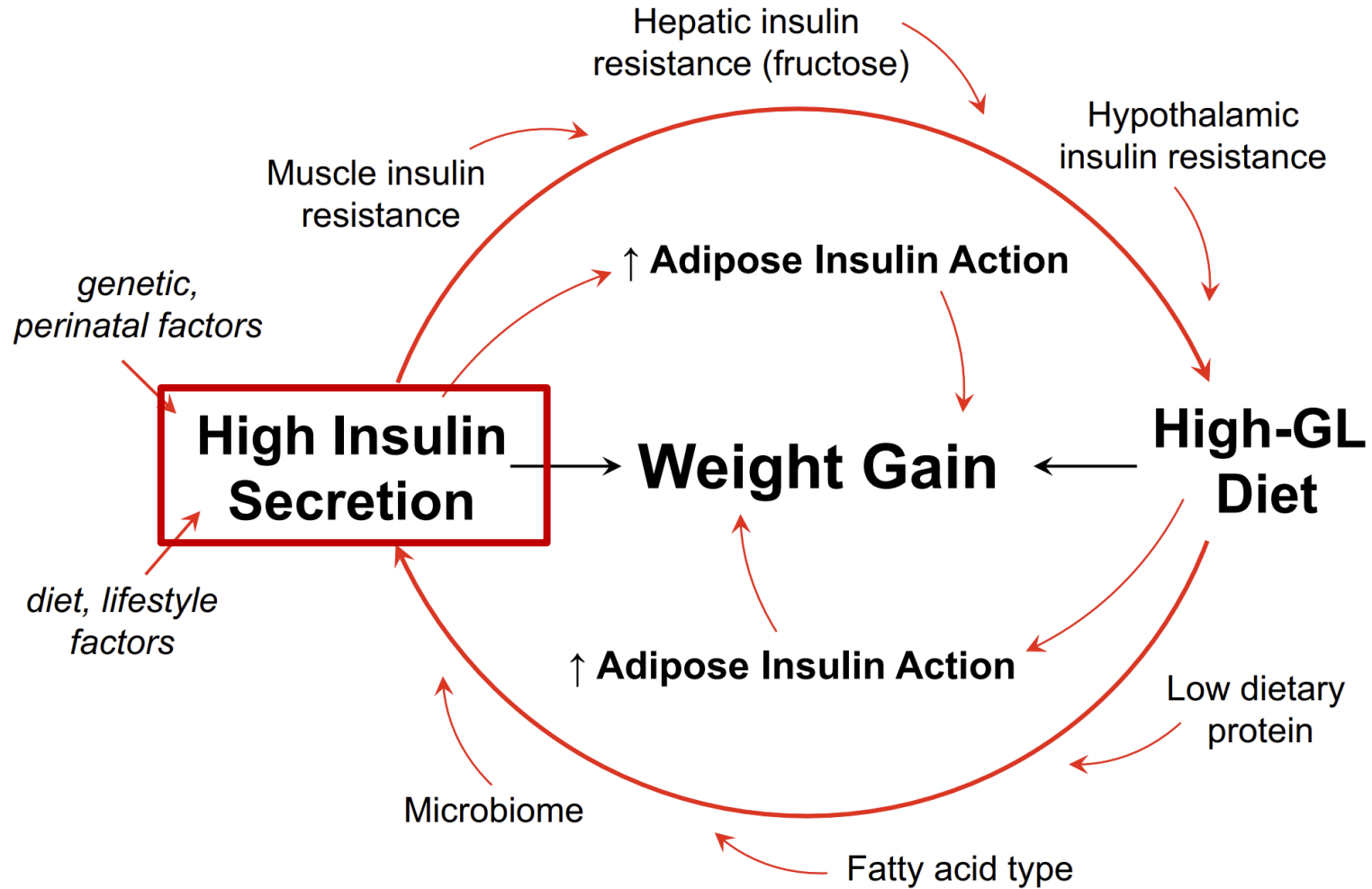
- Global epidemic with > 70 % of world population being overweight/obese
- Associated with many health problems, CVD, type 2 diabetes, non-alcoholic fatty liver disease, some types of cancer



Precision Nutrition in Obesity



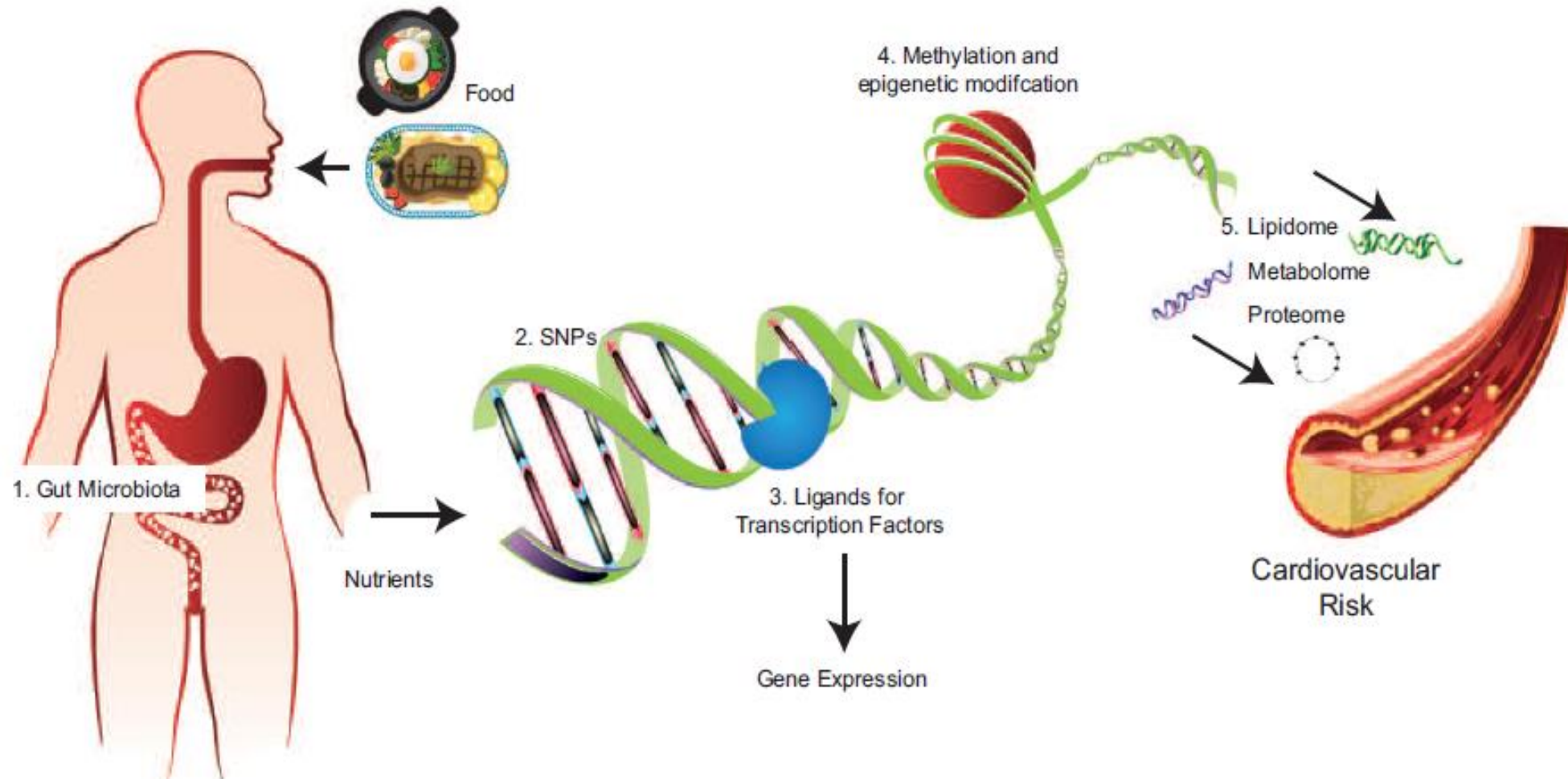
Precision Nutrition in Diabetes



Cardiovascular diseases

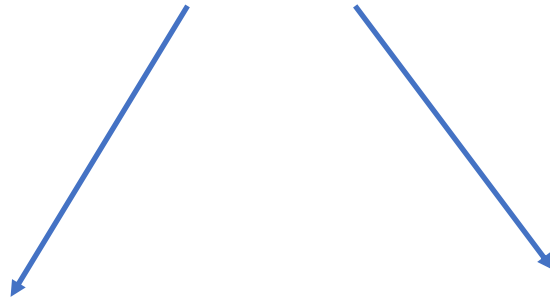
- Refers to conditions that involved narrowed or blocked blood vessels that can lead to chest pain, heart attack or stroke.
- Leading cause of death in the United States (US) and worldwide
- Accounts for 25% and 31% of deaths in the US and worldwide, respectively
- Varies by race and ethnicity – Non-Hispanic Whites and Blacks (~24%) is the leading cause of mortality

Precision Nutrition and CVD risk



Neurological disorders

- Diseases of the central and peripheral nervous system (the brain, spinal cord, cranial nerves, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction, and muscles)

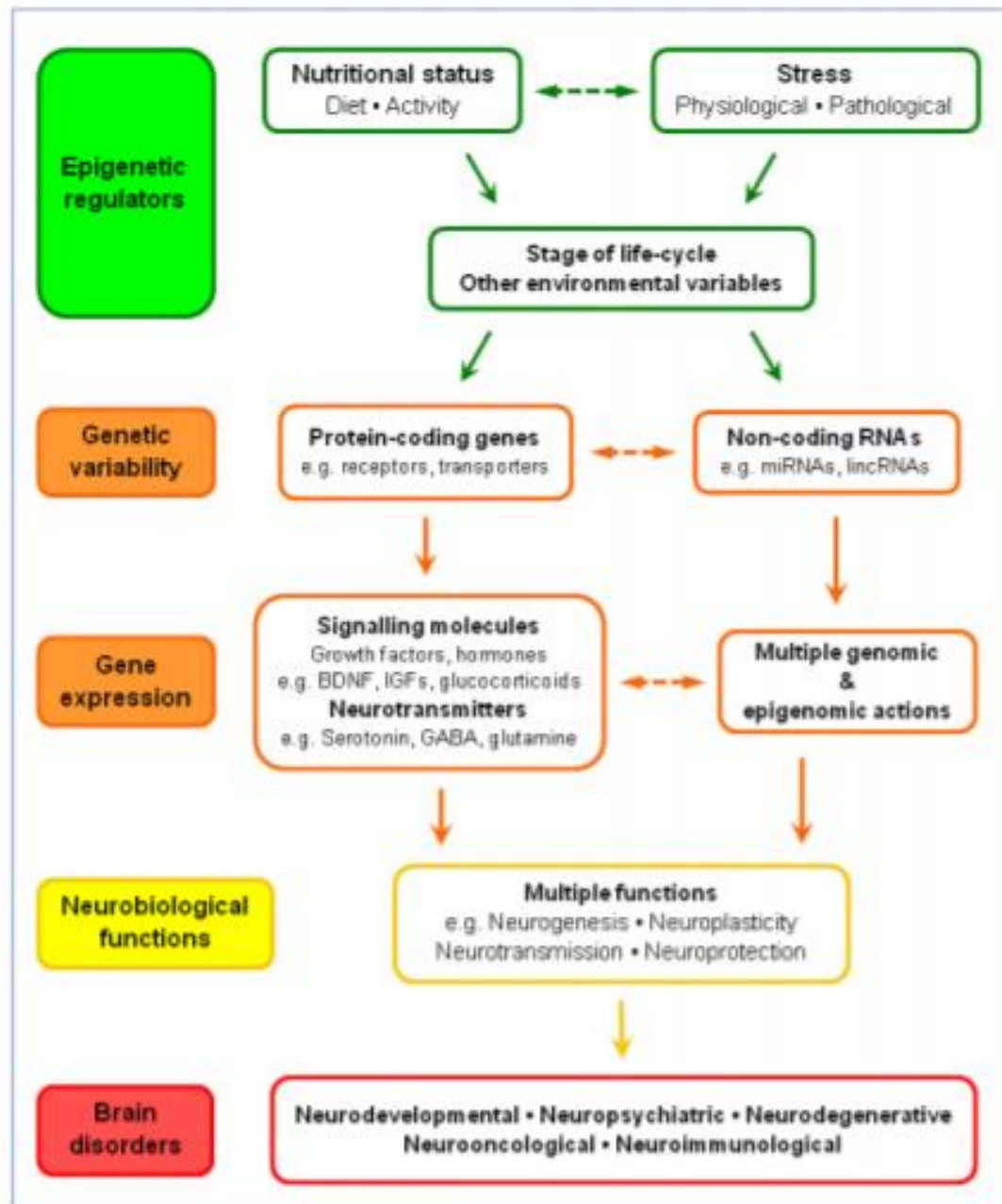


Neurodevelopmental

1. Eating disorders
2. Autism
3. Schizophrenia

Neurodegenerative

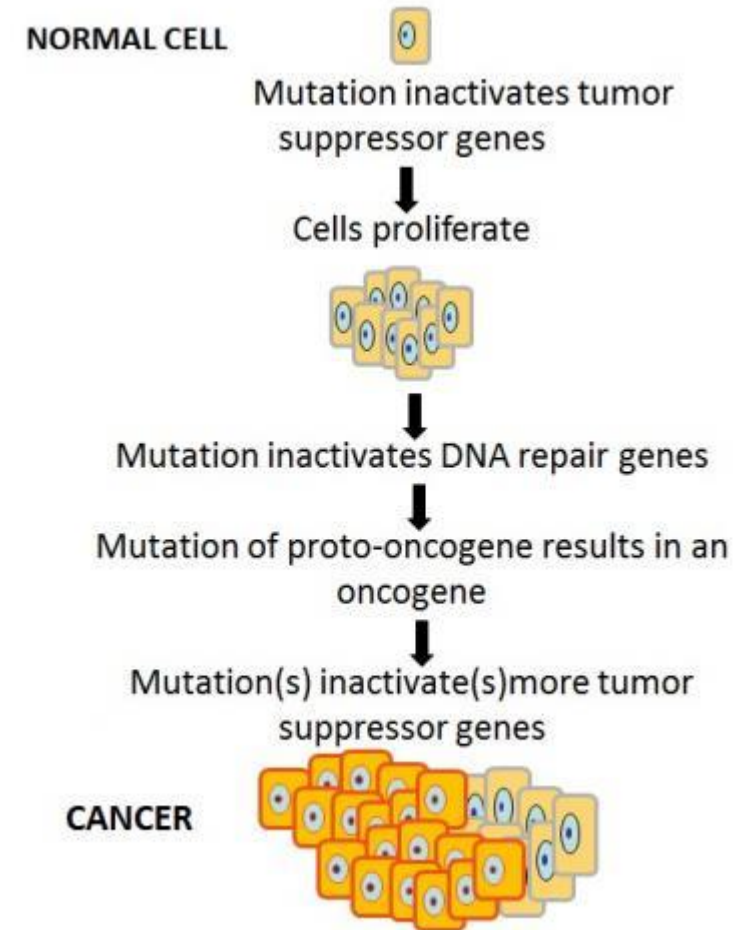
1. Cognitive decline
2. Dementia
3. Alzheimer's disease
4. Parkinson's disease



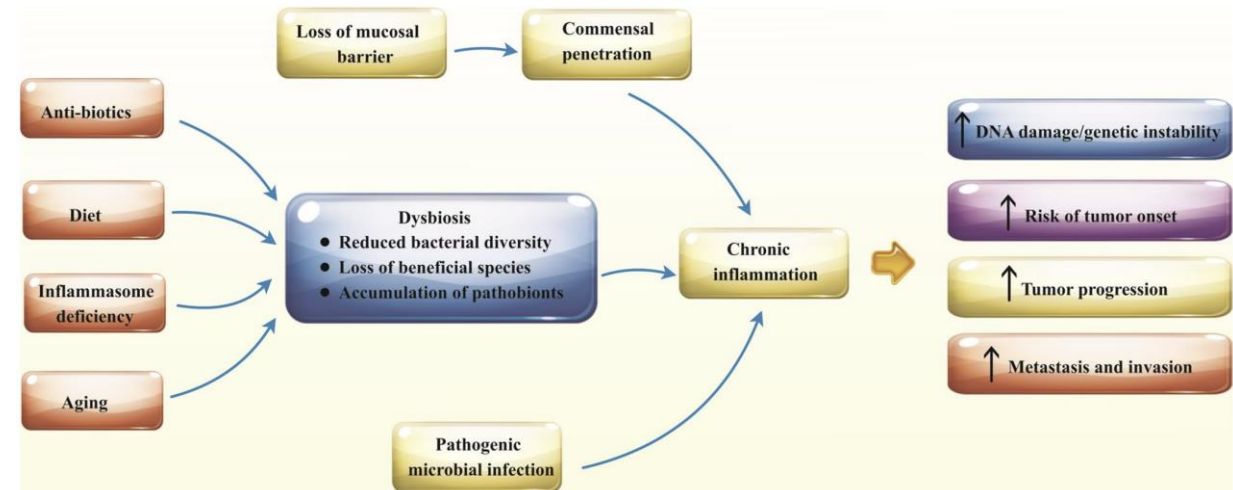
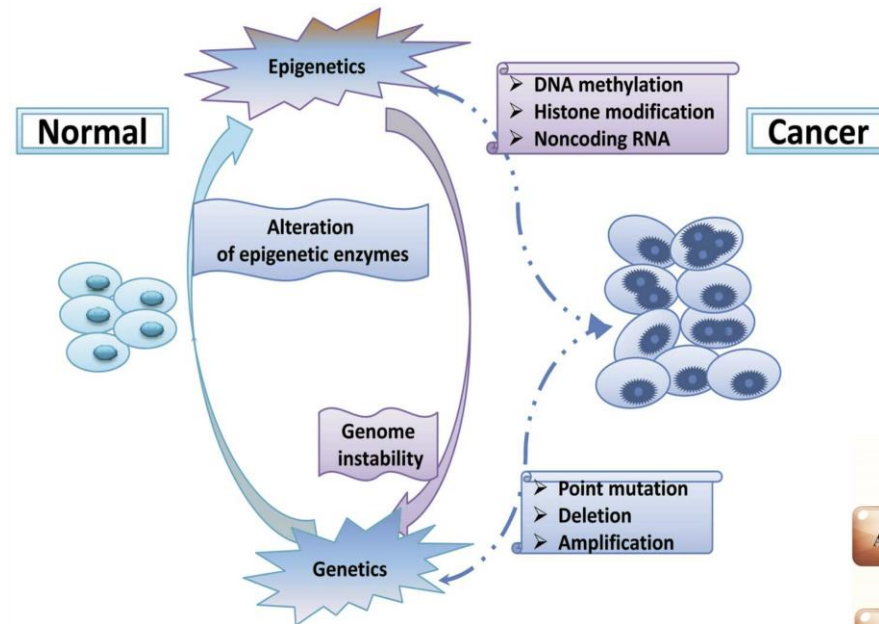
Cancer

- a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body
- Proto-oncogenes
- Tumor suppressor genes
- DNA repair genes

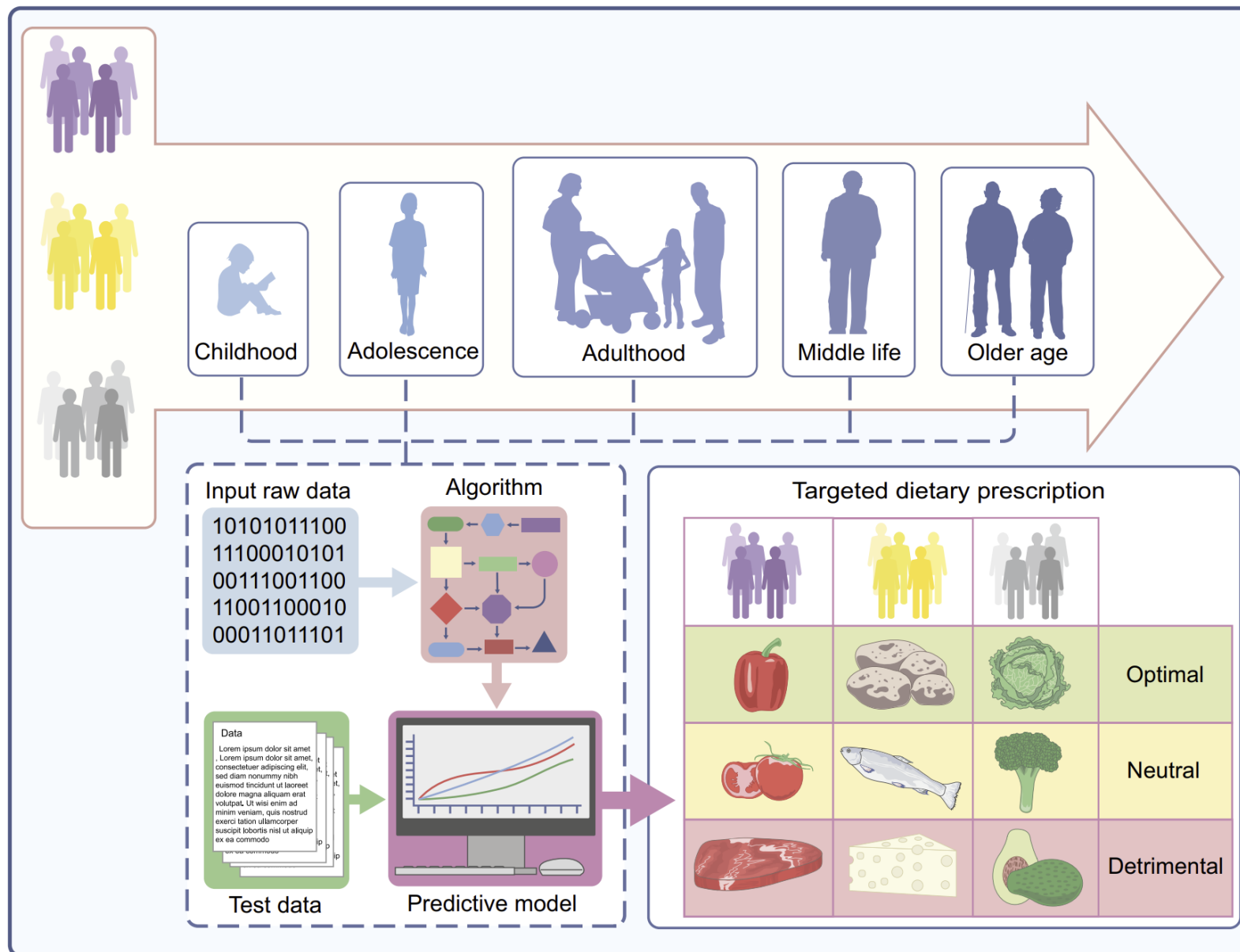
- Somatic vs. germline mutations



Precision Nutrition in Cancer



Precision Nutrition in practice



Key challenges/gaps

- estimates of dietary intake
- analytical methods to integrate 'Omics' and dietary intake data
- approaches to disseminate the information to the end user

Other challenges

➤ Benefits

- better therapeutic targets
- better understanding of health and dealing with diseases
- personal diet plans
- make healthy food choices

➤ Risks

- transform an enjoyable activity like eating into health hazard
- impede individuals autonomy associated with food choices
- excessive burden on individuals
- stigmatize/discriminate against specific people

➤ Actions

- Limiting exposure to genetic/other information
- patients and clients need proper nutrition guidance
- privacy need to be ensured

Summary

- Heterogeneity in response to nutrient intake.
- Genetic variation, epigenetics, microbiome, dietary intake and other lifestyle factors.
- Understanding the basis of these differences can help better estimate individuals' requirements and develop nutritional recommendation.
- Individual or group-based nutritional recommendations can be the first line therapy for NCDs.

*Thank
you!*