

National Cancer Institute

June 22, 2009

Transdisciplinary Research on Energetics and Cancer

Concept Renewal
Presentation

Division of Cancer Control and Population Sciences



U.S. DEPARTMENT
OF HEALTH AND
HUMAN SERVICES

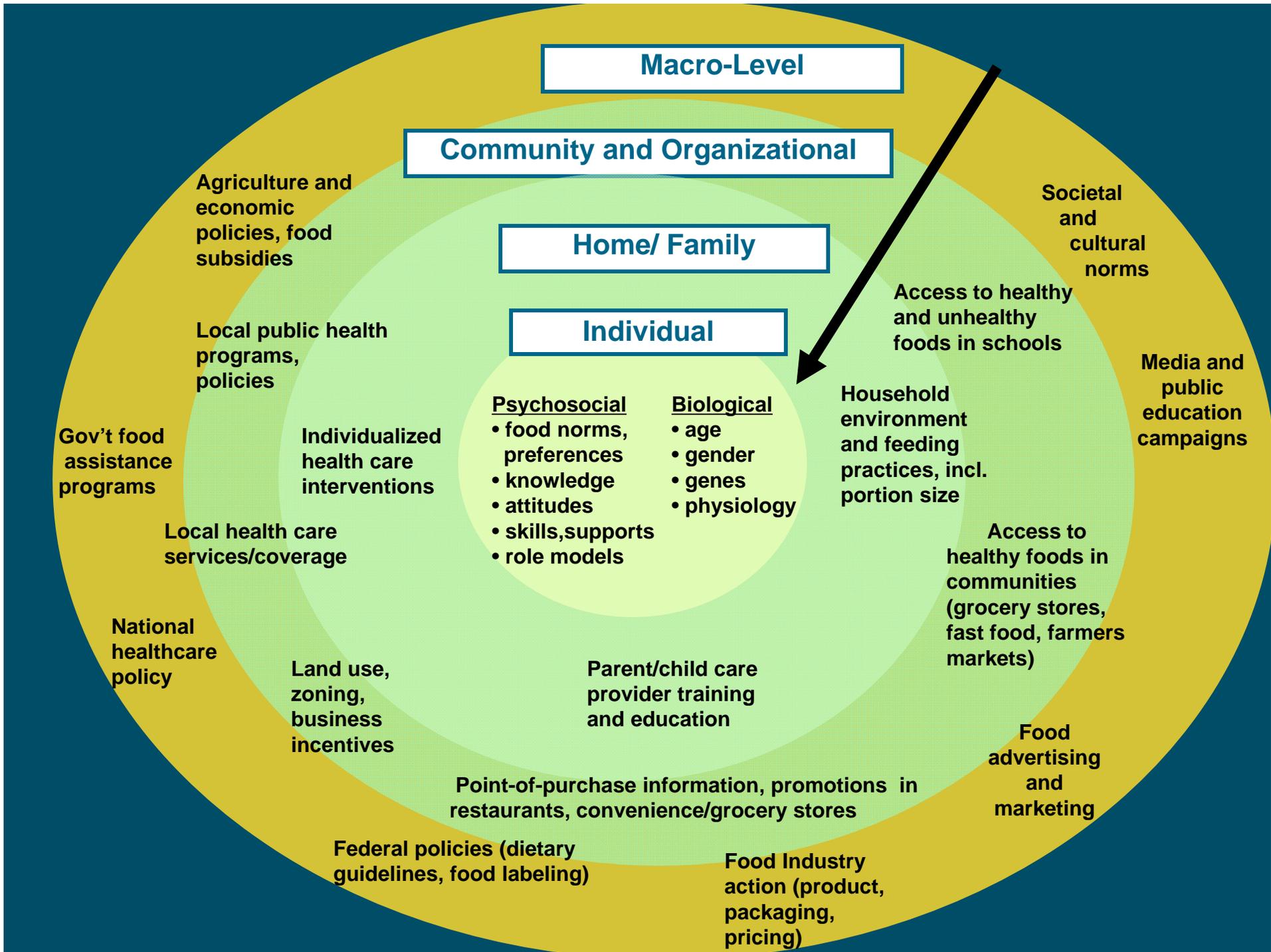
National Institutes
of Health



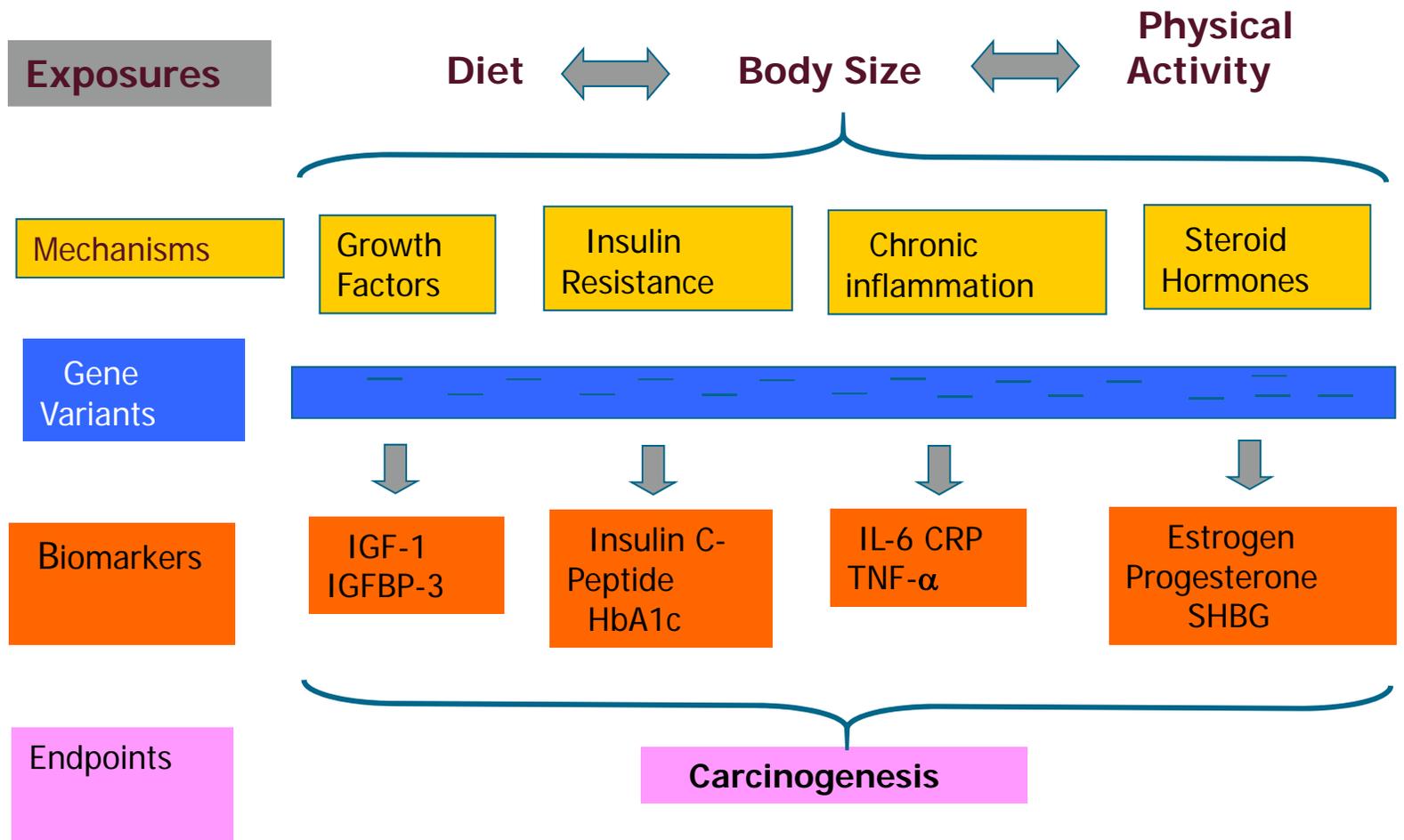
Outline

- **What we know.**
- **What has TREC accomplished.**
- **Where does TREC II go next?**
- **Questions**



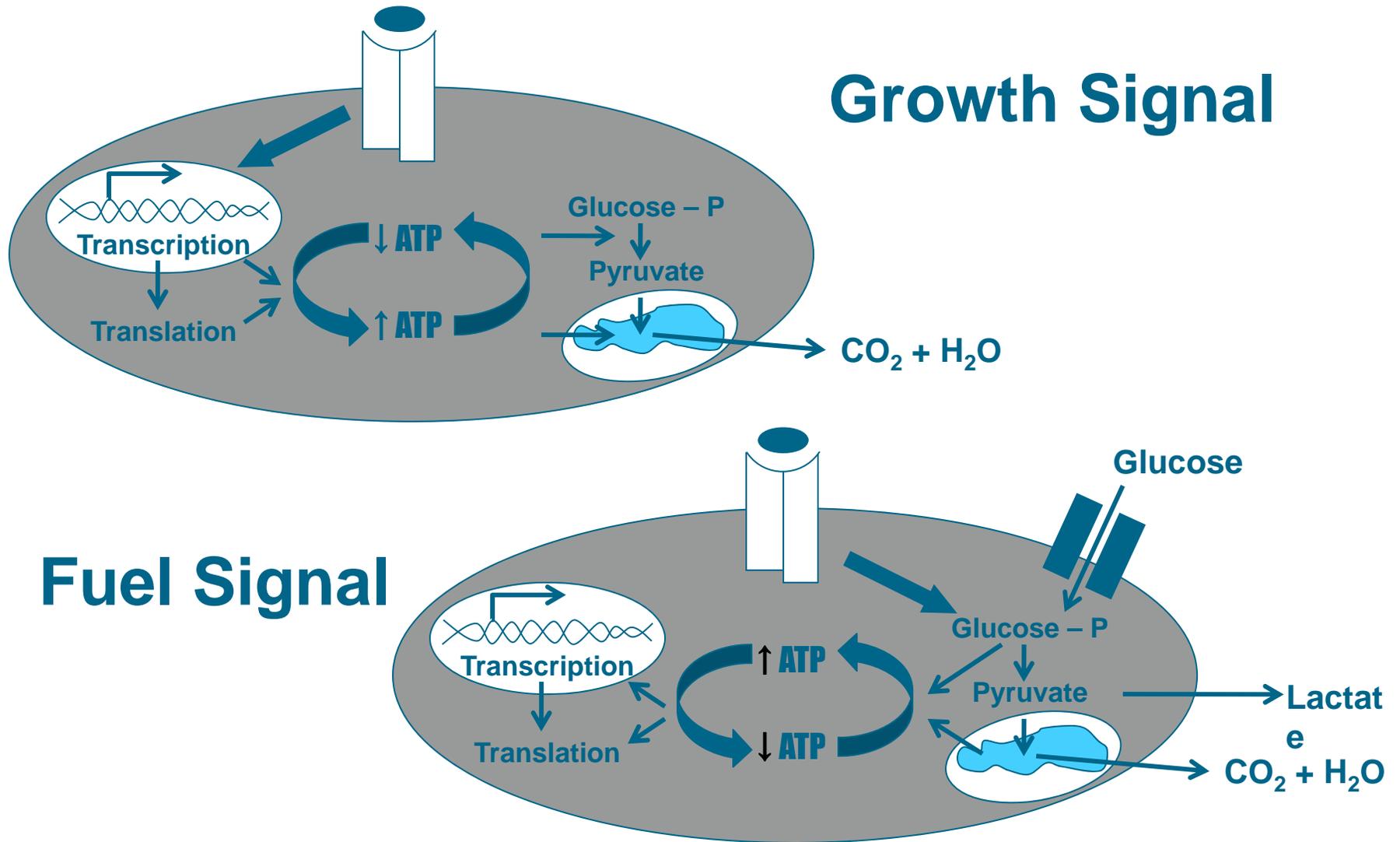


Proposed Mechanisms that Link Energy Balance and Carcinogenesis

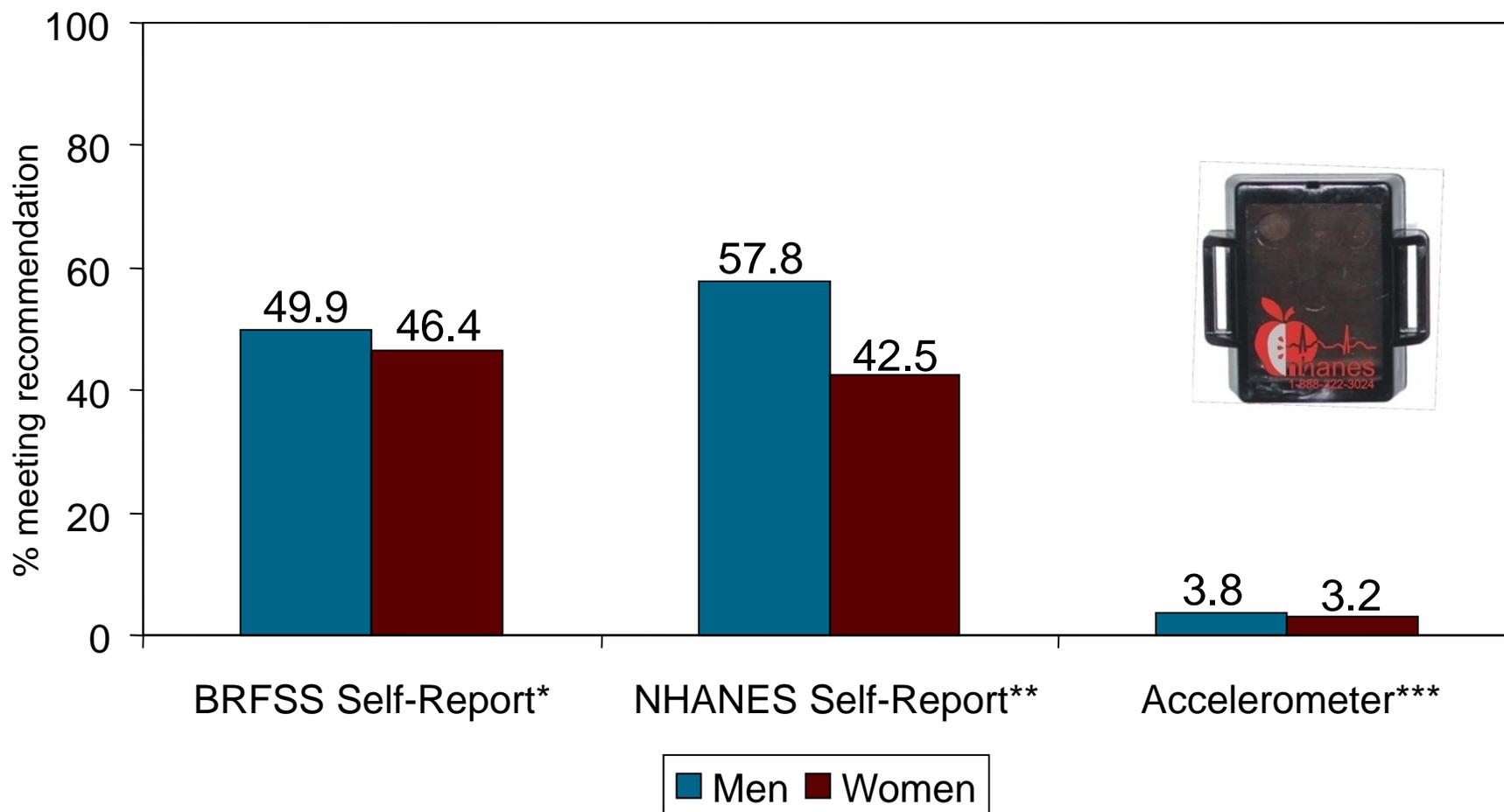


(Gunter MJ et al. 2006)

Metabolic Syndrome & Obesity: Influence on Cancer Cell Metabolism and Growth



Percentage of U.S. Adults Meeting Physical Activity Recommendations



*BRFSS 2005 (30 min x 5d mod or 20 min x 3 d vig)

** NHANES 2003-2004 (150 min/week)

*** NHANES 2003-2004, 20-59 y (Troiano et al., 2008) 30 min x 5d mod or greater



What Has TREC Accomplished?





CASE

CASE COMPREHENSIVE CANCER CENTER
Case Western Reserve University
School of Medicine

**FRED HUTCHINSON
CANCER RESEARCH CENTER**

A LIFE OF SCIENCE



UNIVERSITY OF MINNESOTA

USC

UNIVERSITY
OF SOUTHERN
CALIFORNIA

National Cancer Institute

March 2009

Transdisciplinary Research on Energetics and Cancer

39th Regular Meeting of the
Board of Scientific Advisors

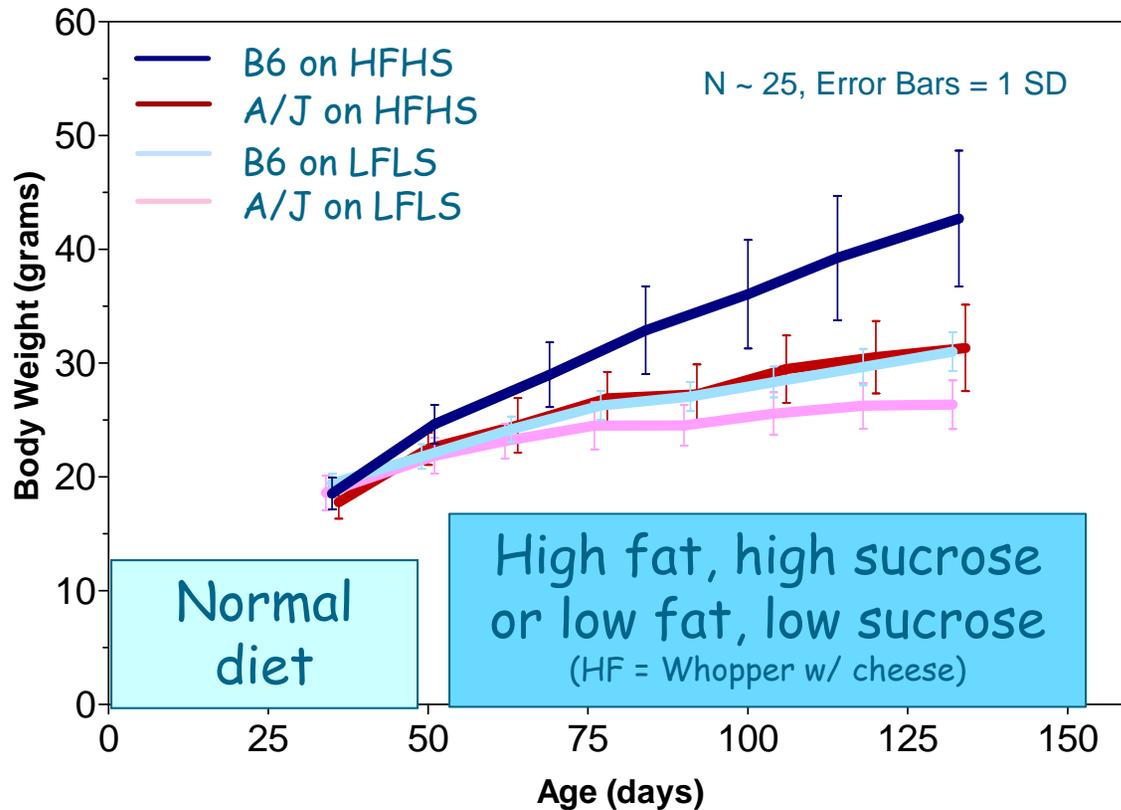
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Diet-induced obesity: Gene - diet interactions



B6 is obese only with a HFHS diet

A/J is lean regardless of diet



Metabolic Syndrome, NASH, HCC

On High Fat, High Sucrose Diet:	 B6	 A/J
<i>Obesity</i>	✓	X
<i>Hypertension</i>	✓	X
<i>Insulin Resistance</i>	✓	X
<i>Cardiovascular Disease Risk</i>	✓	X
<i>Non-alcoholic steatohepatitis</i>	✓	X
<i>Hepatocellular carcinoma</i>	✓	X
	Genetics of disease	Genetics of health

J. Nadeau and E. Topol, Nat. Genet. 2006; Shao et al. PNAS; JHN in press.

The FHCRC Transdisciplinary Research on Energetics and Cancer Center

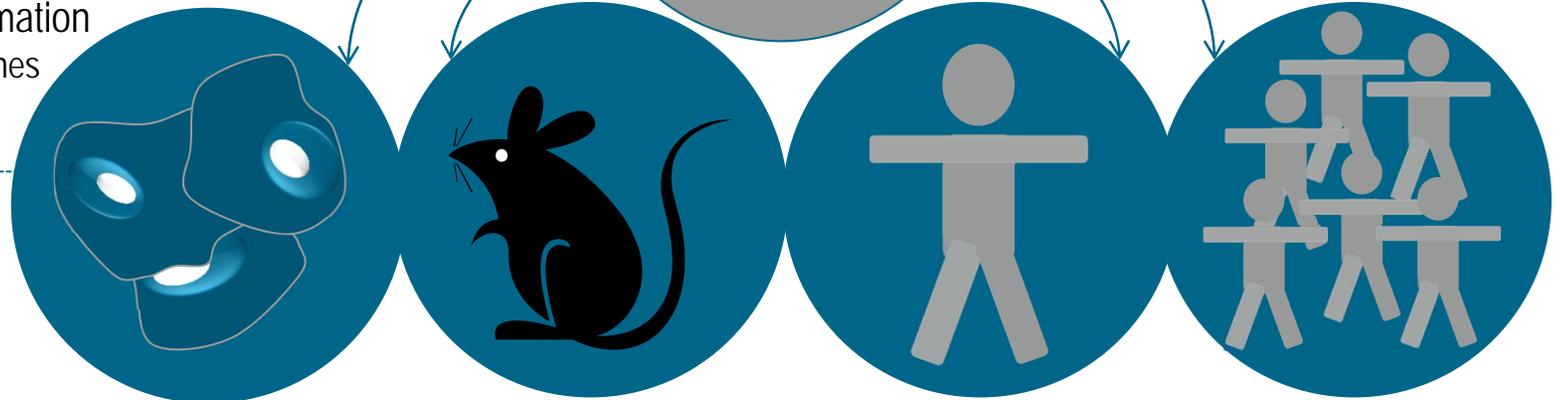
Exposures

Diet
Obesity
Physical Activity

Intermediate Biology

Glucose Inflammation
Insulin Adipokines
IGF

Models



Cells

Animals

Humans

Populations

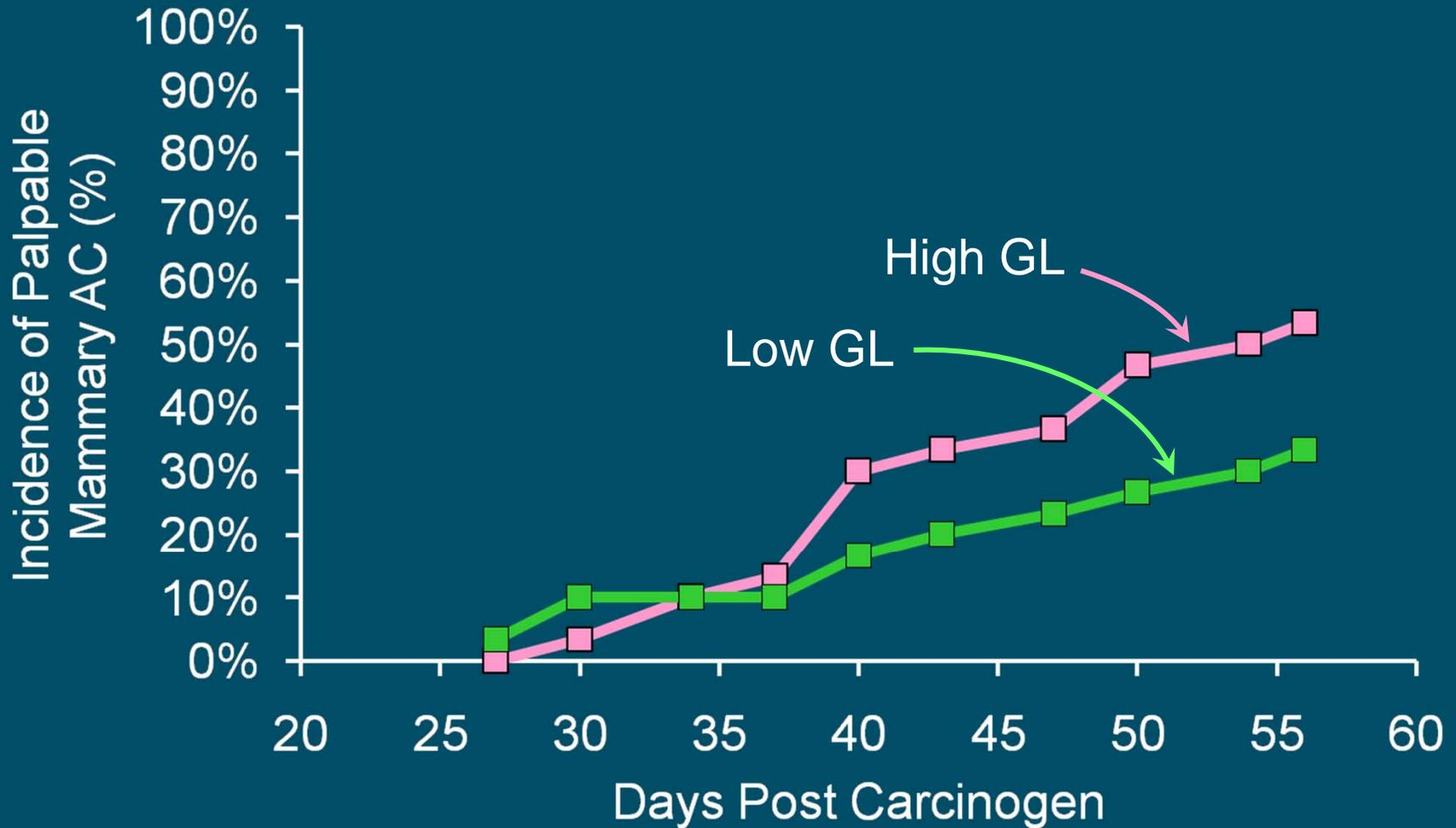
Outcomes

Growth
Proliferation
Apoptosis

Tumorigenesis
Tissue
Angiogenesis

Biomarkers of
carcinogenesis

Glycemic Load (GL) Effects of Diet on Cancer Incidence



Sleep Disturbance and Metabolic Effects

- Increased cortisol, insulin resistance
- Inflammatory cytokines
- Sympathetic nervous system over activity
 - Vascular effects (hypertension)
- Abnormalities in appetite regulatory hormones
 - Decrease Leptin; Increase Ghrelin

TREC Midcourse Accomplishments

- Rate of Progress
- Collaboration Ethos
- Career Development (73 New Investigators)
- Developmental Projects (n=96)
- New NIH Grants (n=13)
- Outreach
 - Publications, Presentations, Workshops



Basic

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Translational

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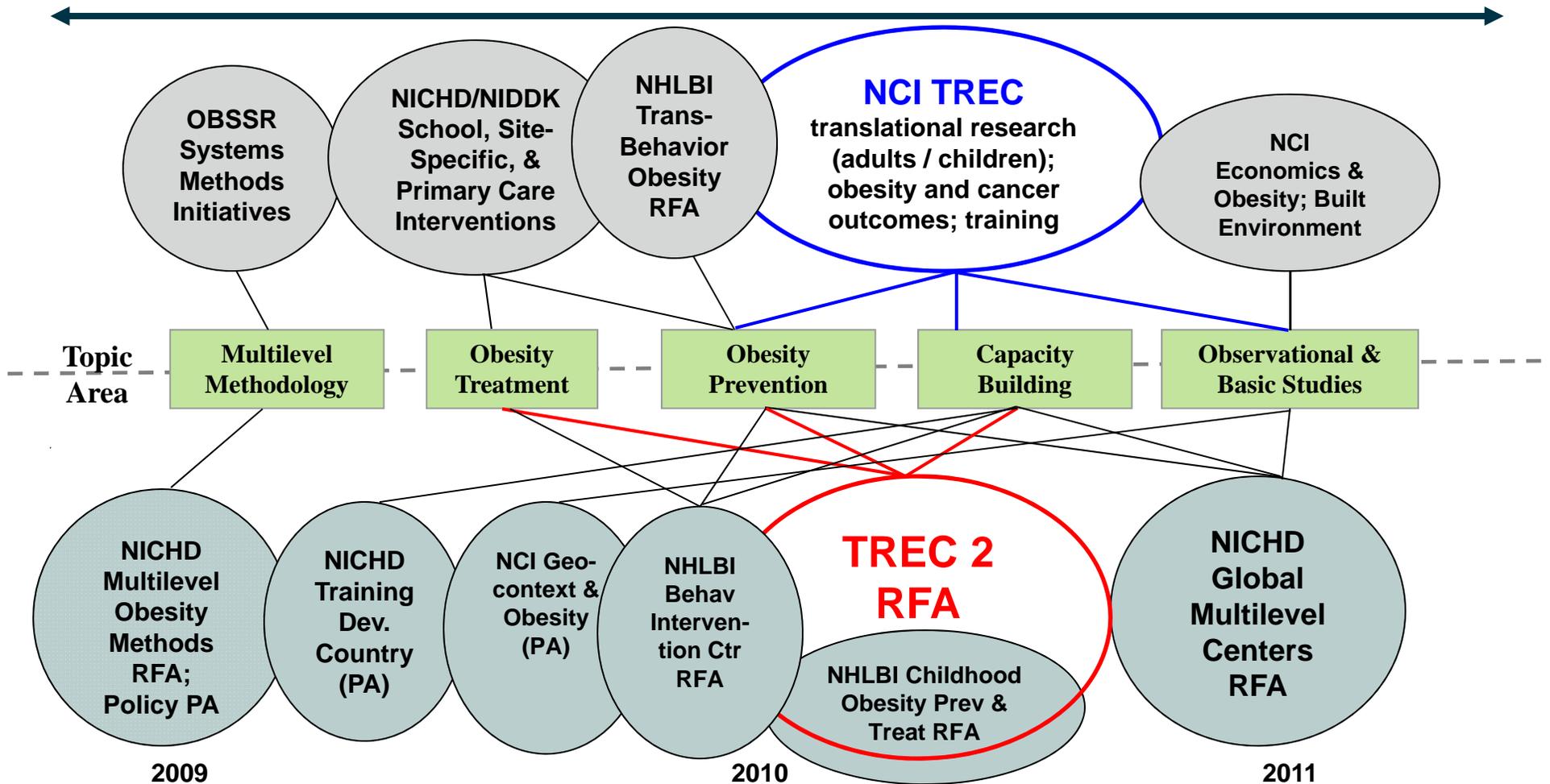
Behavioral

- Heinberg, L. J., Kutchman, E. M., Lawhun, S. A., Berger, N. A., Seabrook, R. C., Cuttler, L., et al. (2009). **Parent Involvement Is Associated With Early Success in Obesity Treatment.** *Clin Pediatr (Phila)*, 1, 1.
- French, S. A., Shimotsu, S. T., Wall, M., & Gerlach, A. F. (2008). Capturing the spectrum of household food and beverage purchasing behavior: a review. *J Am Diet Assoc*, 108(12), 2051-2058.
- Fulkerson, J. A., Nelson, M. C., Lytle, L., Moe, S., Heitzler, C., & Pasch, K. E. (2008). **The validation of a home food inventory.** *Int J Behav Nutr Phys Act*, 5(55), 55.
- Davis, J. N., Tung, A., Chak, S. S., Ventura, E. E., Byrd-Williams, C. E., Alexander, K. E., et al. (in press). Aerobic and strength training reduces adiposity in overweight Latina adolescents.
- Lytle, L. A., Pasch, K., & Farbaksh, K. (in press). The Relationship Between Sleep and Weight in a Sample of Adolescents.



Trans-NIH Initiatives Related to Multilevel Obesity Research

NIH Active Initiatives



NIH Upcoming Initiatives

Where Does TREC Go Next?

TREC II



Recommendations – TREC II

- Elucidate underlying biological mechanisms of obesity and cancer, explore new biomarkers
- Explore potential for genetics/genomics to advance individualized treatment
- Expand translational research focus, particular emphasis on cancer survivors
- Strengthen use and integration of theoretical constructs



Recommendations – TREC II

- Establish Expert Consultants Committee
- Establish virtual and technical cores
- Expand career development
- Continue developmental projects
- Broaden network outside of TREC
- Actively synthesize and disseminate findings



Evaluation Plan

- Success establishing transdisciplinary collaborative research
- Success/impact of training
- Quantity/quality of publications and impact
- Level of utilization of shared resources
- Success obtaining new funding
- Long-term impact on policy and health



TREC II Renewal

- U54/U01 – Competitive Renewal
- \$1.5 M/yr direct cost for 6 sites
 - Two new sites added
- Coordination Center - \$1 M/yr direct cost for one award
 - External expert committee added



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