

Functional MRI Studies of Health Behaviors

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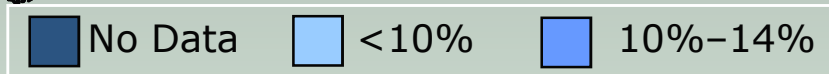
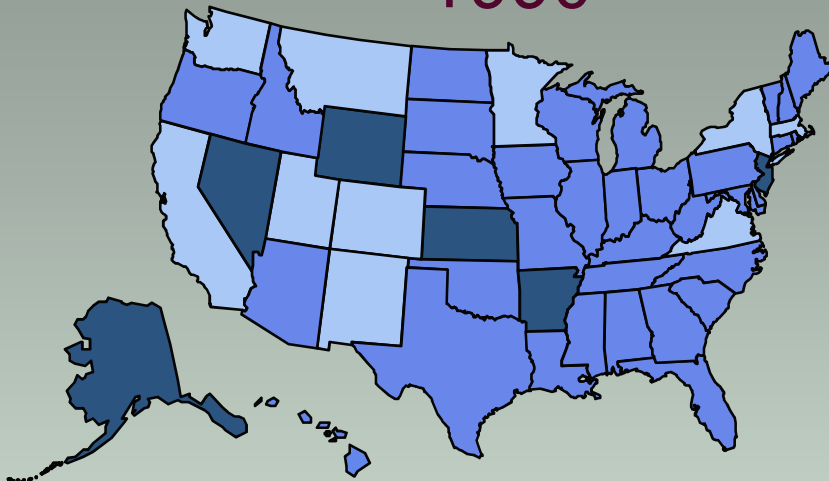


Health Behavior/Decision Making

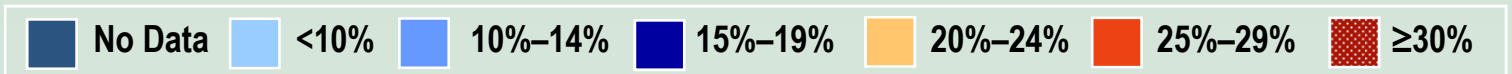
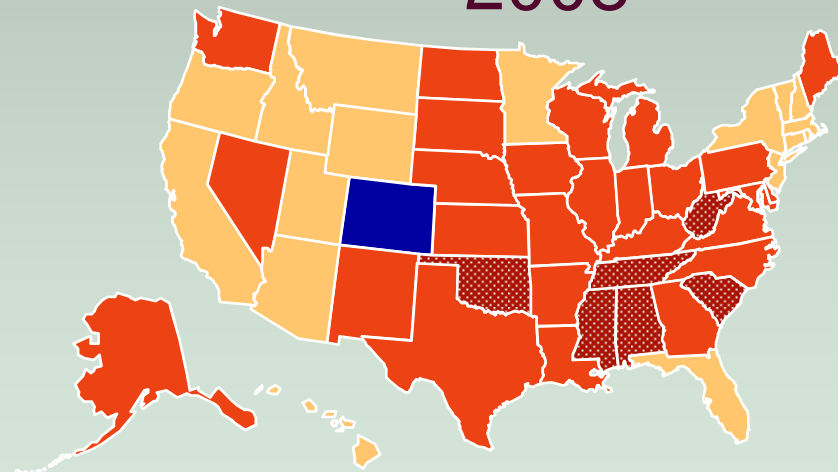
- People make hundreds of health-related decisions every day
 - What and how much to eat
 - Whether to exercise
 - Whether to use drugs (e.g., nicotine, alcohol)
 - If so, how much
- How does the brain regulate health behavior?

Public Health Relevance: Obesity is an Epidemic

1990

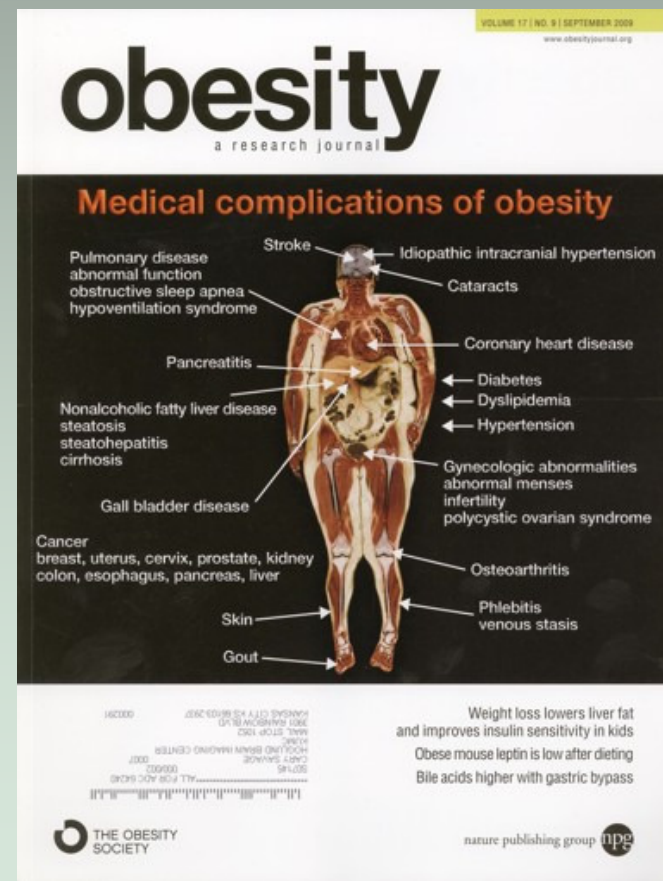


2008



Public Health Relevance: Health Impact of Obesity

- Obesity is associated with increased rates of
 - Type 2 diabetes - Insulin Resistance
 - Hypertension
 - Heart Disease
 - Hyperlipidemia
 - Stroke
 - Some types of cancer
 - Osteoarthritis
 - Sleep Apnea
 - Work Disability

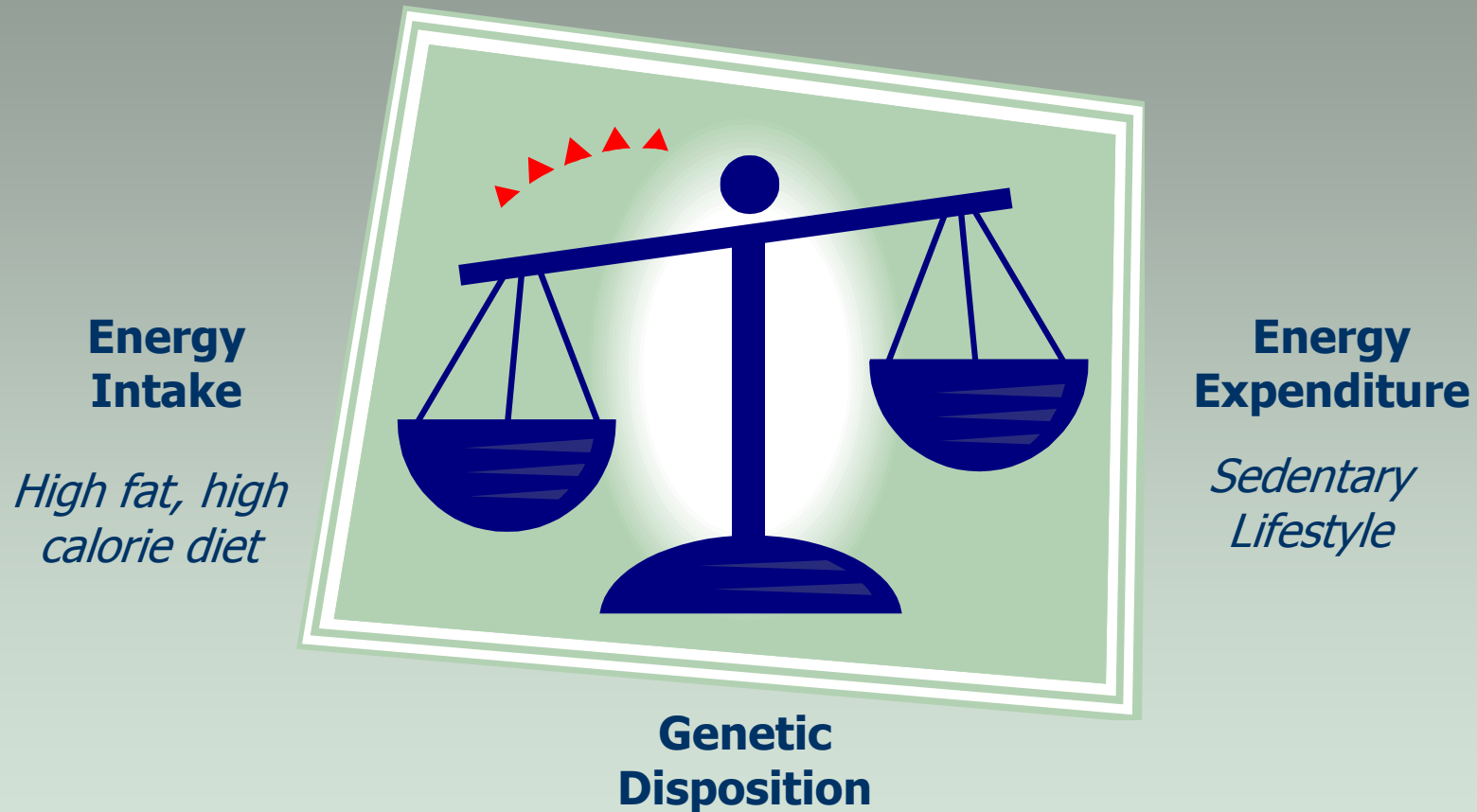


Public Health Relevance: Economic Impact of Obesity

- Total costs in U.S. estimated at \$147 Billion/year
Finkelstein et al., *Health Affairs*, 2009
- Obesity is number one preventable cause of rising health care costs
- In era of national health care debate, preventable risk factors of disease are central

Causes of Weight Gain

Energy Balance



Choices made in eating and physical activity
are the primary determinants of weight gain

Causes of Obesity Epidemic

- **Societal changes:** urban sprawl, dependence on automobile, loss of exercise programs in schools



Causes of Obesity Epidemic



Causes of Obesity Epidemic

- **Changes in eating habits:** availability of fast, calorie-dense foods, larger portion sizes



Photo by: Julie Sofer

FAT AUDIENCES

Some food may not be suitable for children

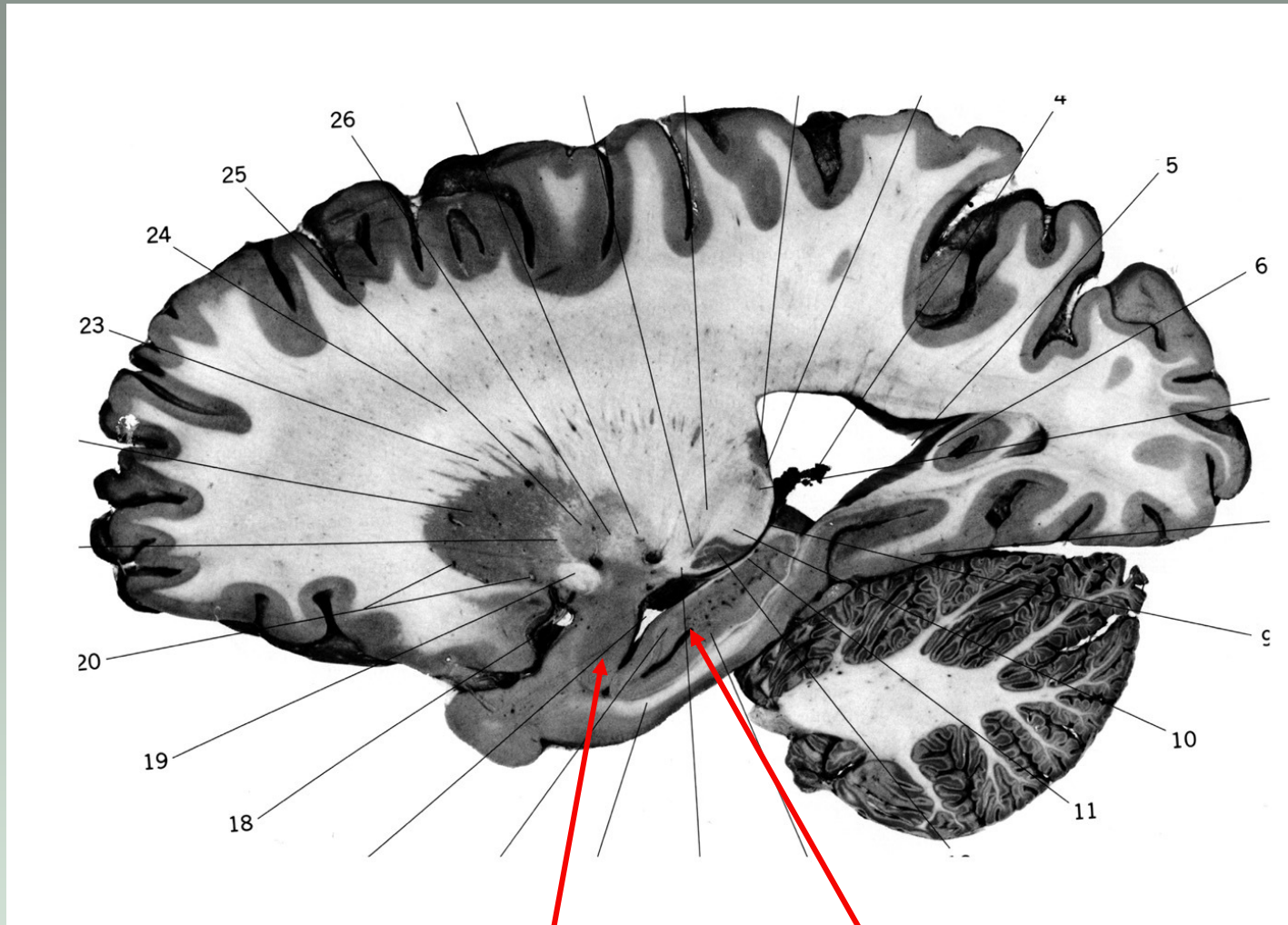


The “Secret of Weight Loss”

- Eat less
 - Exercise more
-
- **So, why do we find it so difficult?**

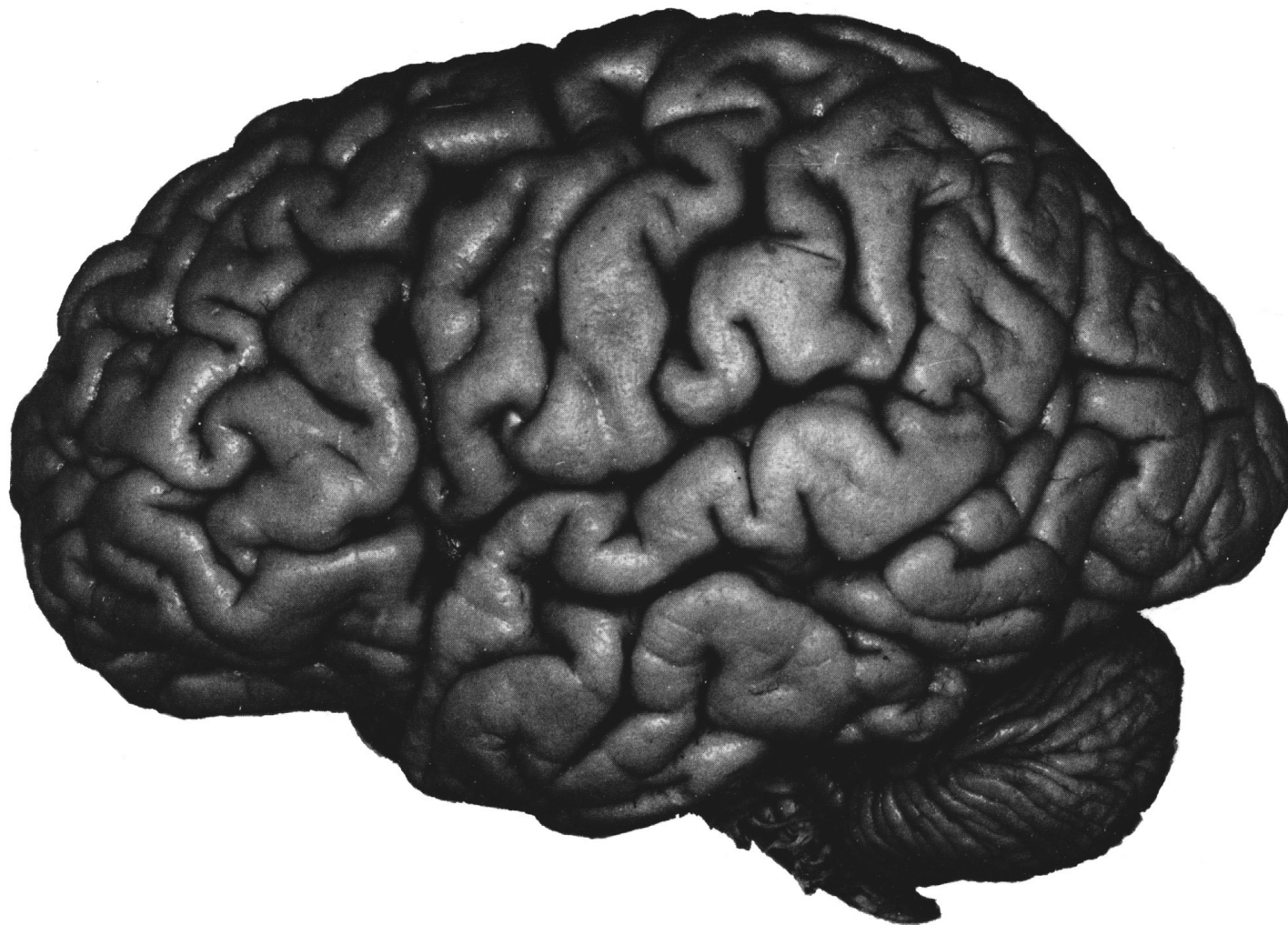
Obesity and the Brain

- Balance between “drive” and “control” processes in the brain
 - The ability to delay immediate gratification and make choices based on anticipation of long-term consequences
 - Impacts behavioral choices such as eating and exercise



Amygdala

Hippocampus



fMRI Paradigm

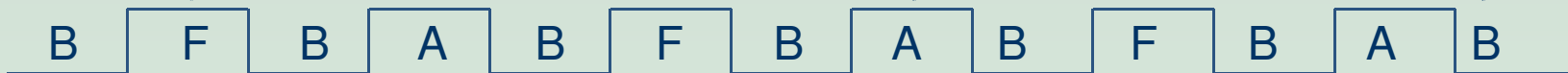
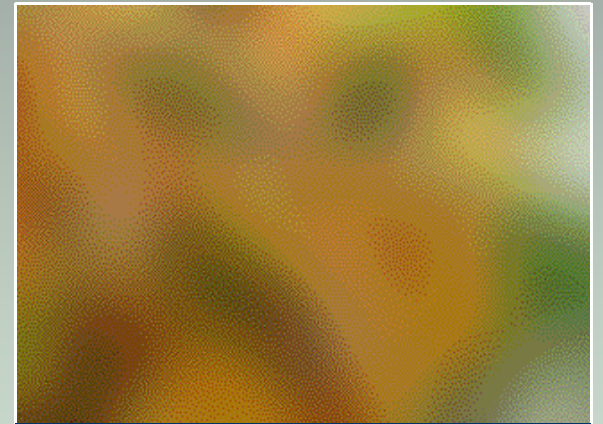
Food



Non-food

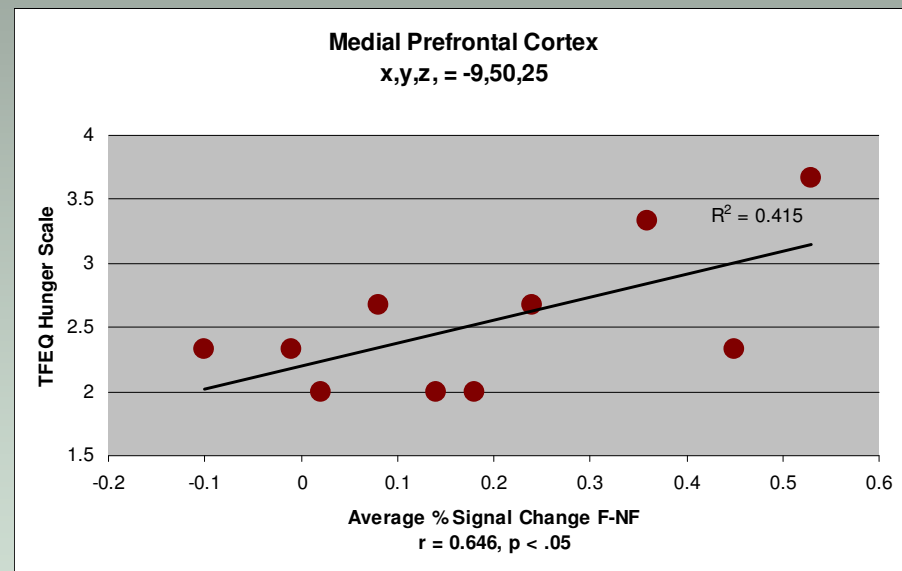
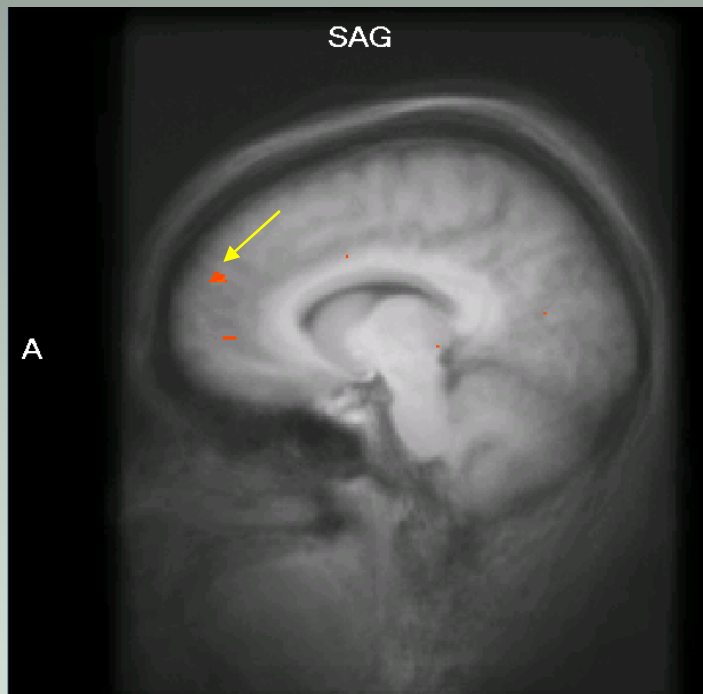


Baseline



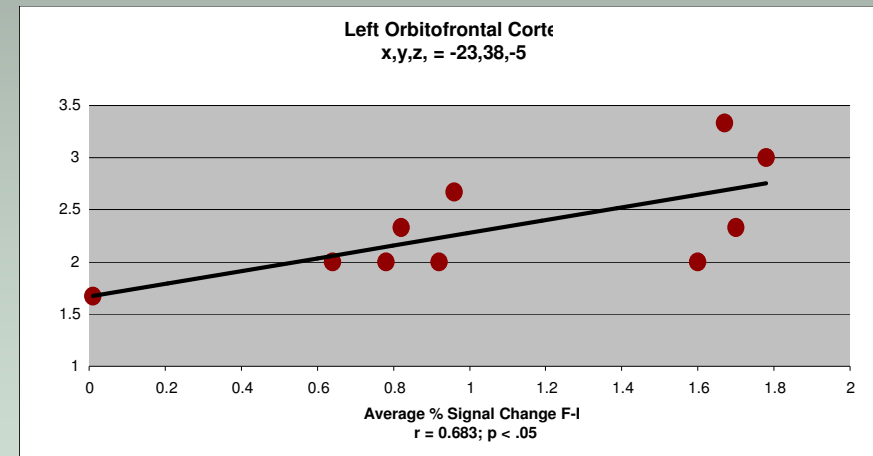
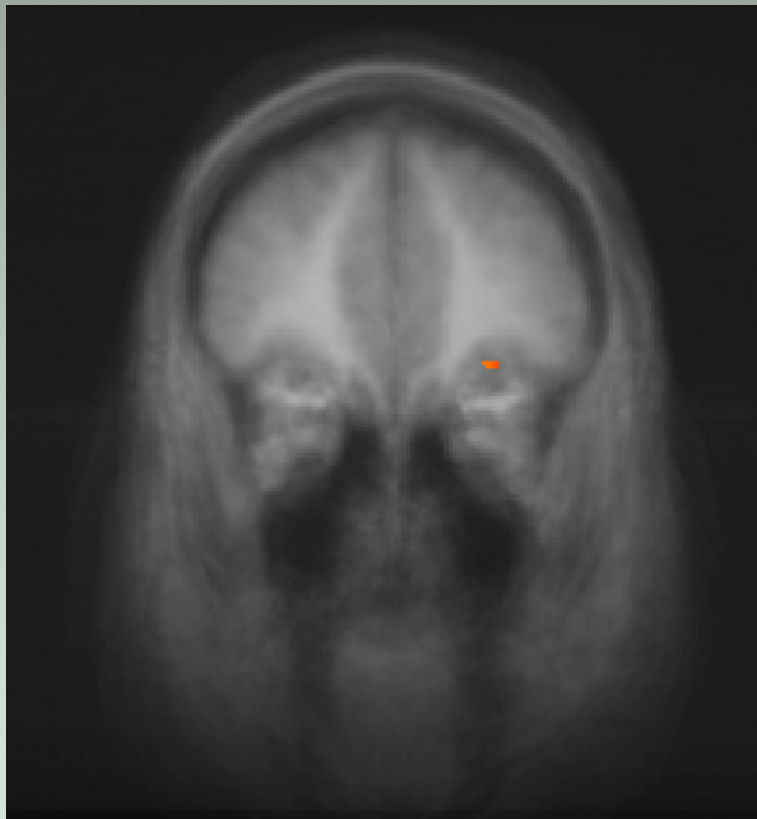
Hyperactivation in Obese Adults

Martin et al. Obesity 2009



Hyperactivation in Obese Children

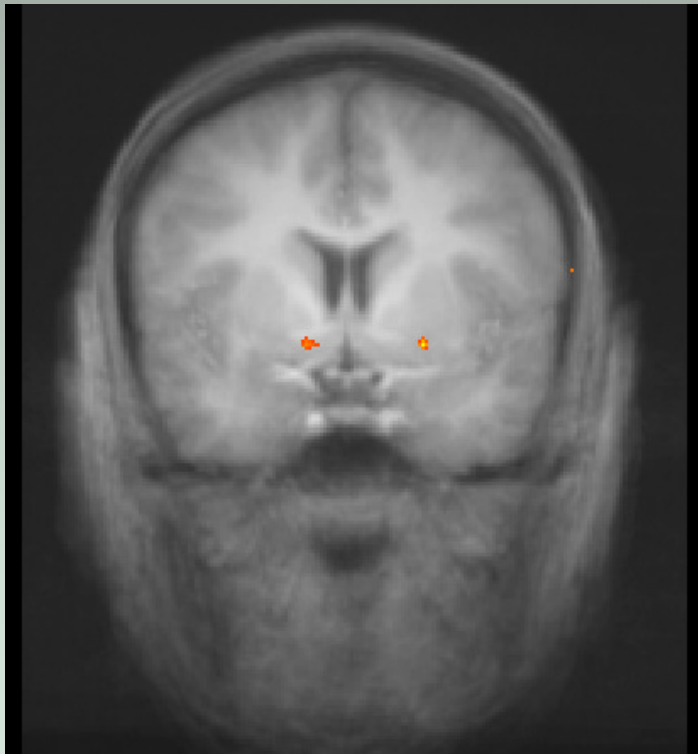
Bruce et al., under review



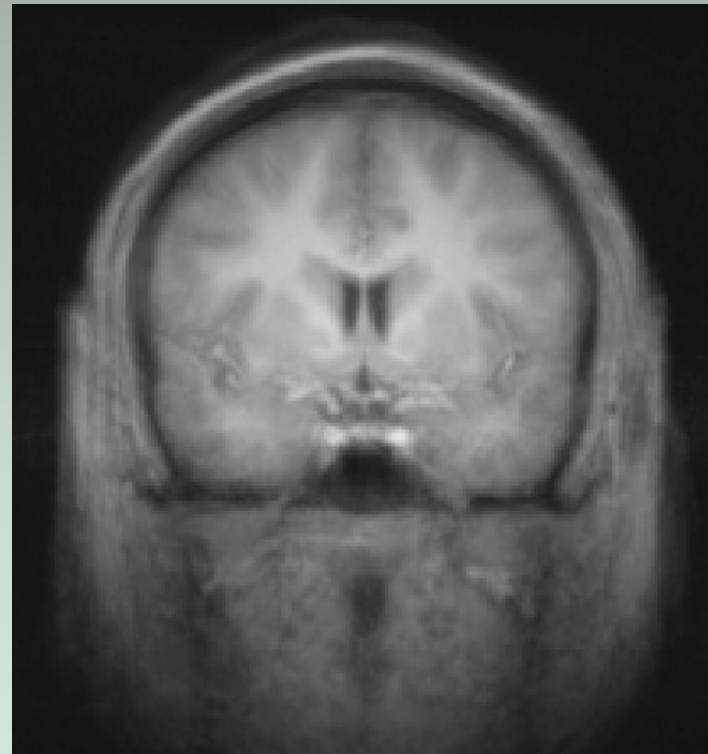
Failure to Normalize Post-Meal in Obese Children

Bruce et al., under review

Healthy Weight



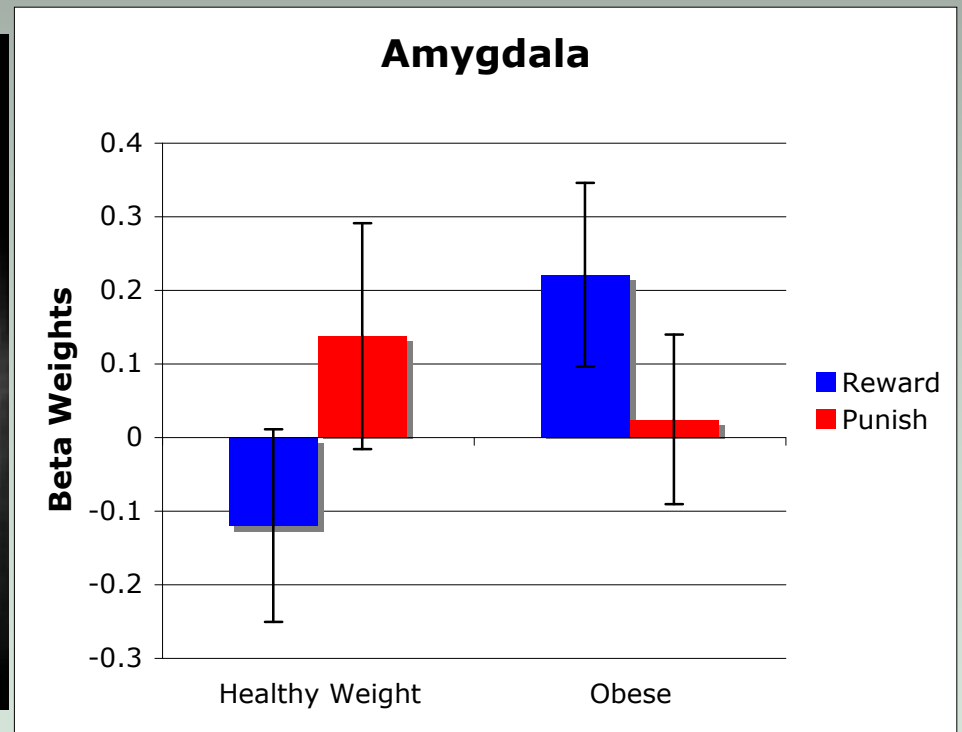
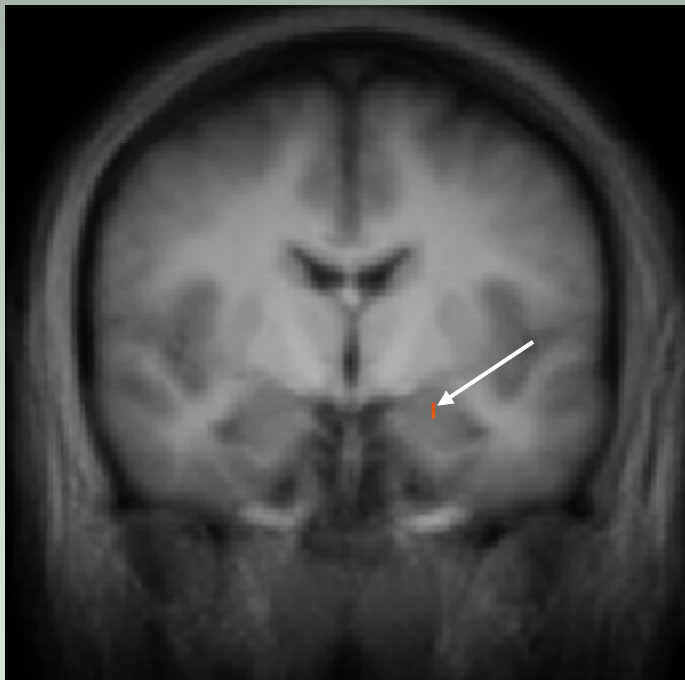
Obese



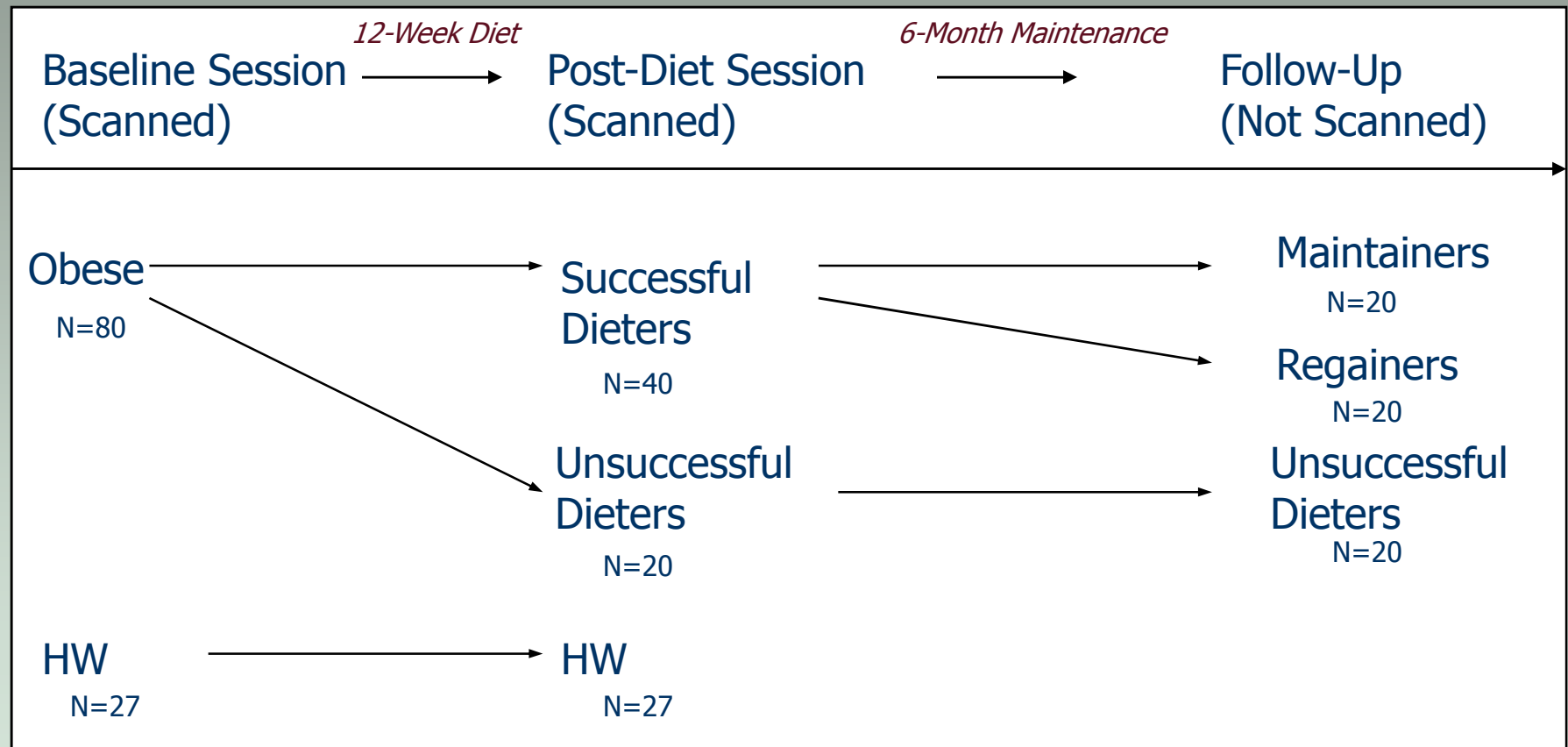
Anticipation of Monetary Reward Obese vs HW Adults

Martin et al., preliminary results

x,y,z = -21, -7, -14



Predictors and Outcome of Weight Loss and Maintenance



Support

- Hall Family Foundation
- Hoglund Pilot Imaging Fund
- Heartland Genetics and Newborn Screening Collaborative (HRSA U22MC03962)
- NIH R01 DK080090
- NIH R01 DK085605

Taco Bell

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