Journal Club at the Laboratory of Clinical Psychopharmacology of Addictions (LCPA) is a monthly gathering to discuss research papers with a focus on addiction.

Mission: to promote a better understanding of the research process and an improve ability to critically appraise research in addiction and related diseases (e.g. infectious, mental health, etc.).

Discussion topics and learning objectives include (but not limited by) the concepts of addiction, terminology used in the field, socio-cultural and biological risk factors, contemporary public health issues and policies, prevention, treatment and treatment systems.

Values:

- Learning
- Respect
- Collaboration
- Multidisciplinary
- Excellence

Please be open, flexible, realistic, and understanding!

Housekeeping notes

Video-recording

The meeting will be entirely video-recording and published on the Pavlov University website and YouTube, so if you wish not be in the recorded video, please make sure that your webcam off during the meeting.

Q&A

The seminar is interactive and we strongly encourage you to actively ask questions during the presentation but keep in mind that we have dedicated time at the end of the webinar (10 minutes) to group discussion and Q&A. Please raise your hand if you have any questions or comment. You also may use chat option to post your questions or comments.

Mic and Video

Please keep your mic mute during entire meeting unless you want to make a question or comment. We recommend keeping your camera on during the meeting.

Post-meeting survey

After the meeting we would like to send you the survey. Please make sure that we have your email.

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Differential Reward Response to Palatable Food Cues in Past and Current Dieters: A fMRI Study

Alice V. Ely, Anna Rose Childress, Kanchana Jagannathan and Michael R. Lowe

Presenter: Olga Belova,
4-year medical student.

1й Мед

ФГБОУ ВО ПСПбГМУ им. Павлова Минздрава России

FEATURED ARTICLE

Original Article
OBESITY BIOLOGY AND INTEGRATED PHYSIOLOGY

Obesity

Differential Reward Response to Palatable Food Cues in Past and Current Dieters: A fMRI Study

Alice V. Ely[1], Anna Rose Childress[2], Kanchana Jagannathan[2] and Michael R. Lowe[1]

Objective: Prior neuroimaging research has shown that restrained and unrestrained eaters demonstrate differential brain activation in response to food cues that parallels their food intake in lab studies. These findings were extended by comparing brain activation in response to food cues in normal weight nondieters, historical dieters, and current dieters under the conditions that mimicked past lab studies.

Methods: Participants (N = 30) were shown pictures of highly and moderately palatable food and neutral cues while being scanned in an fMRI BOLD paradigm following an 8-h fast and again after a liquid meal.

Results: In the Fed state, historical dieters showed elevated reward circuitry activation in response to highly palatable food, as compared to nondieters and current dieters. In contrast, current dieters did not show the same pattern of activation as historical dieters, despite their shared history of frequent weight-loss dieting.

Conclusions: The parallels between eating behavior and regional brain activation across groups suggest that (1) a neurophysiological response which could represent a vulnerability to overeat exists in some normal weight young women that may increase susceptibility to weight gain in the long term, and (2) current dieting temporarily reverses this vulnerability.

Obesity (2014) **22**, E38-E45. doi:10.1002/oby.20599

Impact factor: 3.614
H-index: 177

PROBLEM

Obesity epidemic and the difficulty of treating it successfully.

We need empirically based evidence of factors that predict and protect from weight gain in normal weight individuals. One of these factors is dietary restraint, which includes emotional eating and weight fluctuation.

STUDY OBJECTIVE

To explore and compare (with fMRI) brain activation in response to food cues in normal weight nondieters, historical dieters and current dieters under 2 conditions (fasting, fed).

Nondieters (ND) – never limited yourself to food

Historical dieters (HD) – had diet experience

Current dieters (CD) – on diet now

STUDY DESIGN

A fMRI study

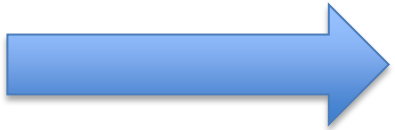
[Hamed Ekhtiari, Mehran Zare-Bidoky, Arshiya Sangchooli "Methodological Checklist for fMRI Drug Cue Reactivity Studies: Development and Expert Consensus" - October 20, 2020.]

Where: USA, Pennsylvania, Philadelphia.

PARTICIPANTS, N=30

Female participants from a large urban university

Inclusion criteria:
-right handed
-18-25 years of age
-BMI 19-25



3 groups: nondieters (ND), historical dieters (HD), current dieters (CD).

Exclusion criteria:
-diagnosed eating disorder
-taking any medication known to affect weight and appetite within the prior 6 months
-currently smoking

MEASURES

- Demographic information (age, ethnicity, weight, height, smoking, status, current medications)
- Dieting and weight history questionnaire (weight suppression, history of weight loss dieting, current dieting status, eating disorder)
- Hunger questionnaire

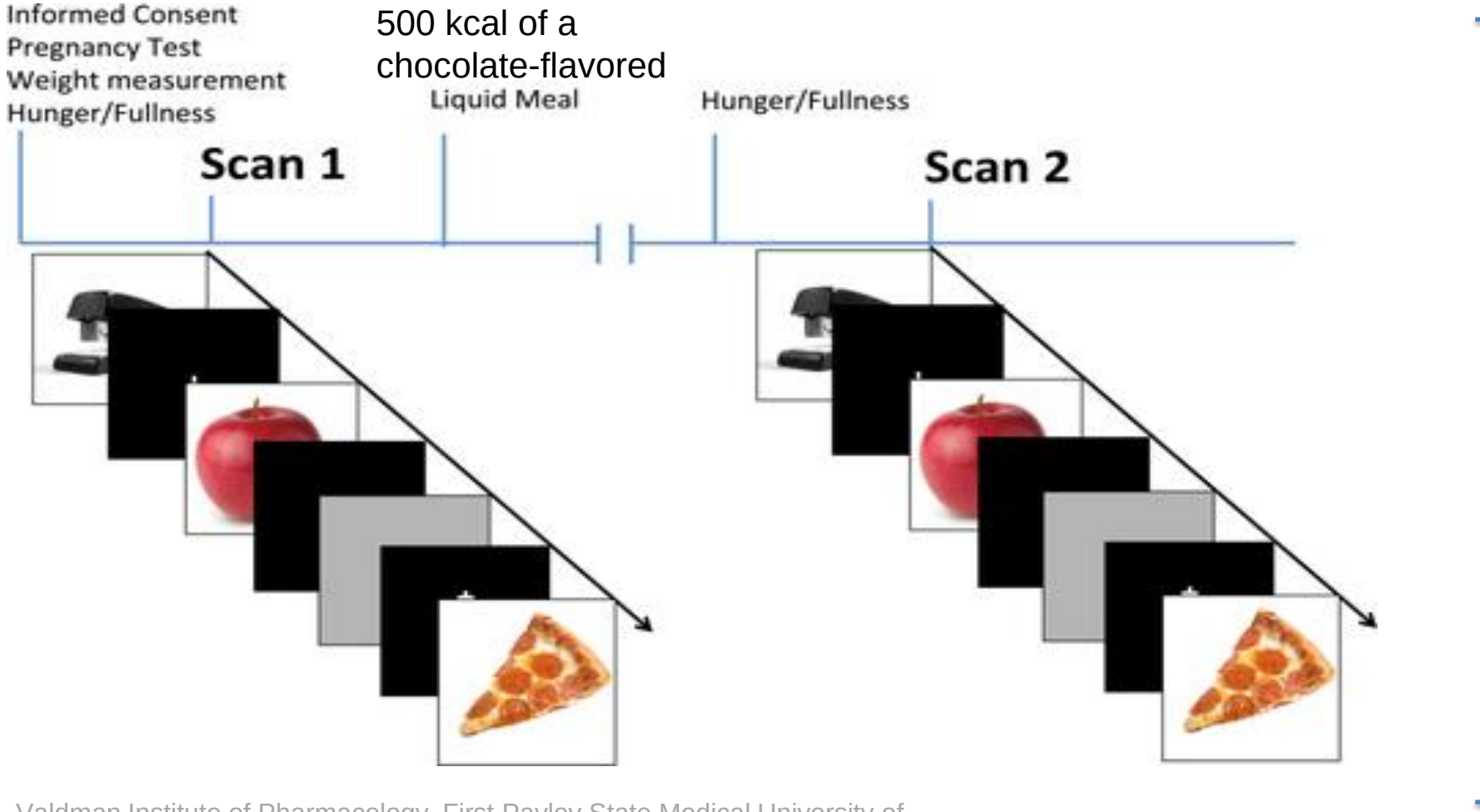
[G Gericke, D Labadarios, JH Nel "HUNGER SCALE QUESTIONNAIRE: A MEASURE OF HUNGER" - 2001, p.636-662]

- Dietary restraint scale (higher scores indicate greater cognitive restraint)

[Eric Stice, Robyn Sysko, Christina A. Roberto, and Shelley Allison "Are Dietary Restraint Scales Valid Measures of Dietary Restriction? Additional Objective Behavioral and Biological Data Suggest Not"/Appetite. 2010 Apr; 54(2): 331–339]

PROCEDURE

Not to eat or drink for 8 h prior to study visit



1 h.

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STIMULI

- Jittered stimuli were presented for 500 ms, with an interstimulus interval (ISI) of 1.5 s
- 16 cues (twelve times in both the fasted and fed scanning blocks)

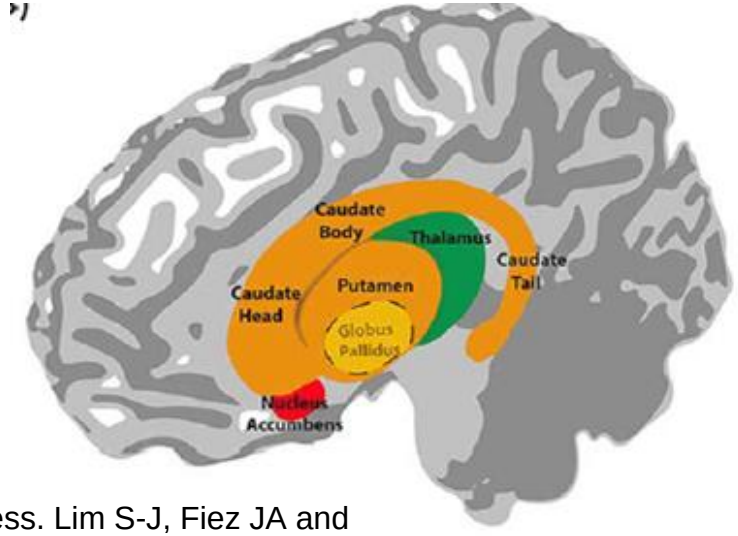
Highly palatable cues: french fries, pizza, chocolate cake, ice cream.

Moderately palatable cues: an apple, a slice of white bread, carrots, a plain baked potato.

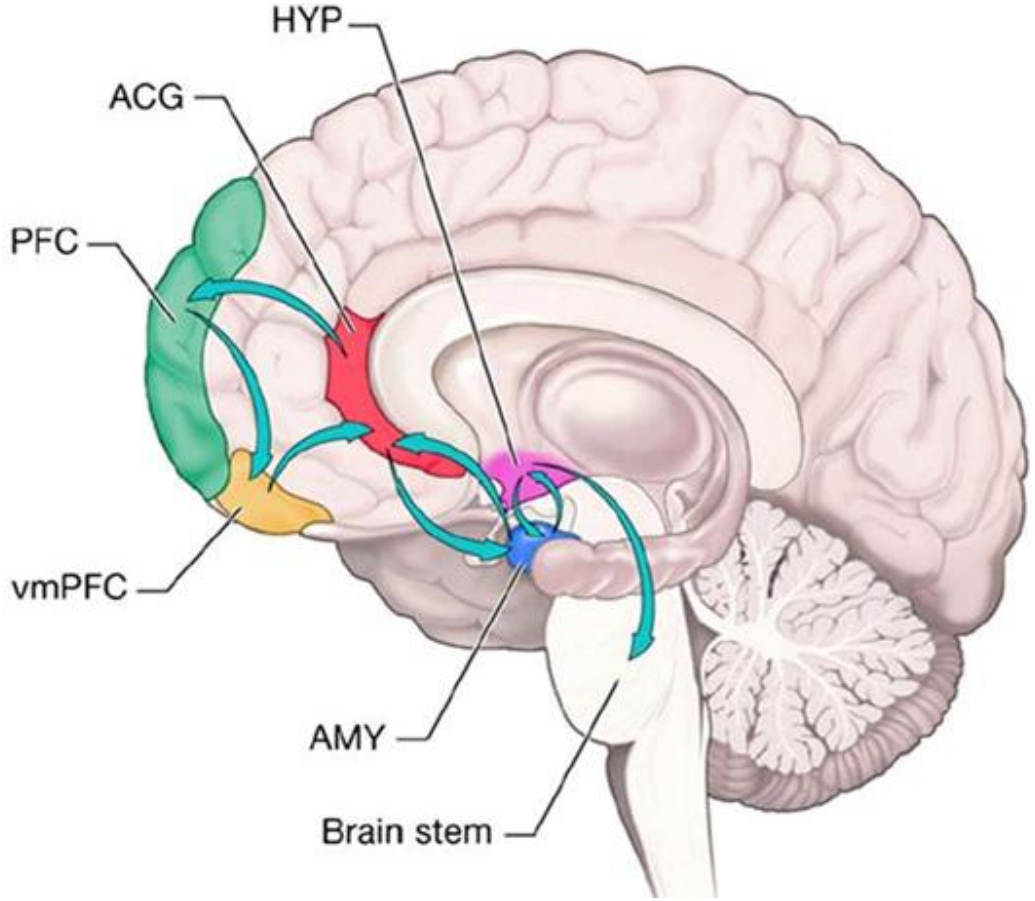
Neutral cues: a car, stapler, tree and bowling ball.

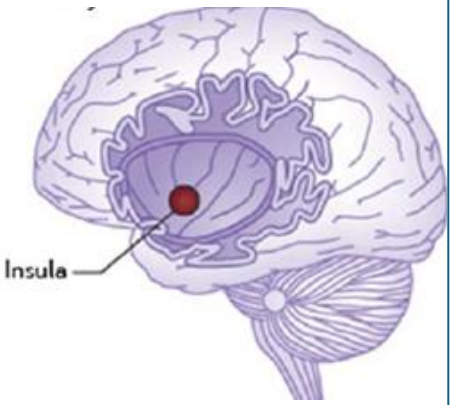
A PRIORI REGIONS OF INTEREST (ROI)

- Amygdala
- Insula
- Striato-pallidal complex
- Medial orbitofrontal cortex
- Anterior cingulate cortex
- Prefrontal cortex



[Open Access. Lim S-J, Fiez JA and Holt LL (2014) How may the basal ganglia contribute to auditory categorization and speech perception? Front. Neurosci. 8:230]





[**Fundamentals** of Cognitive Neuroscience. A Beginner's Guide. Book • Second Edition • 2019. Authors: **Nicole M. Gage** and Bernard J. Baars]

RESULTS: PARTICIPANTS` CHARACTERISTICS

TABLE 1 Descriptive variables

	Nondieters	Historical dieters	Current dieters
N	10	10	10
Age (year)	21.1 (±2.08)	19.3 (±1.16)	20.4 (ya2.41)
BMI (kg/m^2)	22.04 (±1.60)	21.11 (±0.66)	21.96 (±1.73)
Weight supression (1bs)	0.65 (±3.38)	6.0 (±5.10)[a]	6.1(±5.61)[a]
Number of past diets	0	5 (±2.0)[a]	3.5 (±2.6)[a]
TFEQ—restraint score	3.1 (±1.1)	6.1 (±1.2)[a]	7.7 (±1.4)[a]

[a]$P < 0.05$.

- The average age: 20.27 years
- 26.7% Asian American, 6.7% African American, 3.3% Hispanic, 60% Caucasian, and 3.3% Other
- BMI differences are not significant

RESULTS

- Three factor eating questionnaire (TFEQ) restraint subscale scores differed: HD and CD were greater than ND, CDs scored higher than HDs
- Weight suppression differed: NDs are lower than others

TABLE 2 Mean hunger/fullness ratings by group

Question	ND	HD	CD
Fasted			
How hungry do you feel right now?	4.5 (±1.35)	5.0 (±1.56)	5.4 (±1.71)
How strong is uour desire to eat right now?	4.0 (±1.33)	5.6 (±1.58)	5.8 (±2.15)
How much food do you think you could eat right now?	4.4 (±1.07)	5.3 (±1.34)	5.4 (±1.84)
How full does your stomach feel right now?	2.9 (±0.99)	2.4 (±0.84)	2.3 (±2.95)
Fed			
How hungry do you feel right now?	1.9 (±0.57)	2.6 (±1.78)	2.2 (±0.92)
How strong is uour desire to eat right now?	1.8 (±0.63)	2.9 (±1.91)	2.3 (±0.67)
How much food do you think you could eat right now?	2.3 (±0.48)	3.4 (±1.90)	3.0 (±1.25)
How full does your stomach feel right now?	6.4 (±1.58)	5.6 (±2.07)	5.8 (±1.93)

ND, nondieters; HD, historical dieters; Cd, current dieters.

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IMAGING RESULTS

- Proof of probe:

Highly palatable food (High) cues indeed produced a robust activation of brain reward circuitry (including the ventral tegmental area=brainstem) in all three experimental groups.

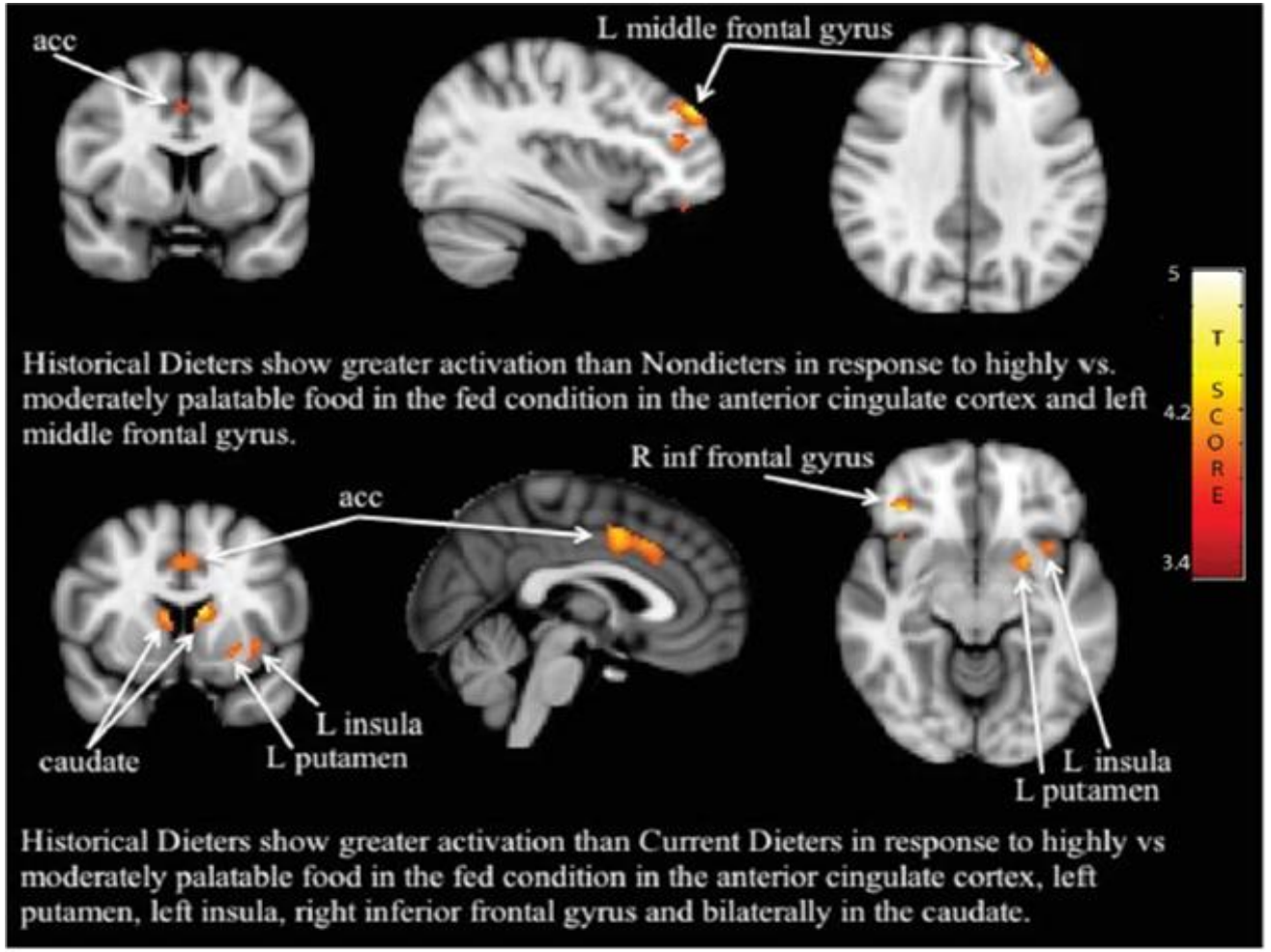

FIGURE 2 Contrast maps comparing historical dieters' response to highly versus moderately palatable food with that of nondieters and of current dieters.

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IMAGING RESULTS

- A priori comparisons

In a fasted state: no significant differences in ROIs between HDs and NDs; between HDs and CDs

In fed state: HDs demonstrated greater activation than NDs in the right anterior cingulate and the left middle frontal gyrus of the PFC. HDs showed greater activation than CDs in the right middle frontal gyrus of the prefrontal cortex and bilaterally in the dorsal ACC, insula, caudate, and pallidum.

TABLE 3 Brain regions that differed by group in Fasted and Fed states when viewing Highly v. Moderately palatable food cues

Fasted							Fed						
	Peak voxel							Peak voxel					
Region of Interest	x	y	z	Cluster size	t	p	Region of Interest	x	y	z	Cluster size	t	p
HD > ND							HD > ND						
NS							Anterior Cingulate	4	2	46	36	3.5	0.001
							Middle Frontal Gyrus	−36	46	34	115	4.4	<0.001
								−32	40	14	51	4.3	<0.001
ND > HD							ND > HD						
NS							NS						
HD > ND							HD > ND						
NS							Dorsal Anterior Cingulate	0	4	42	385	3.4	<0.001
							Amygdala	−22	4	−12	10	3.4	0.002
							Insula	−34	12	−6	57	3.5	0.001
								30	26	−2	49	3.3	0.002
							Middle Frontal Gyrusn	38	34	−12	53	4.3	<0.001
							Caudate	−8	8	14	83	4.3	<0.001
								10	8	12	39	3.8	0.001
							Pallidum	−24	6	−10	61	3.6	0.001
CD > HD							CD > HD						
NS							NS						

ND: Nondieters, HD: Historical Dieters, CD: Current Dieters
NS: Nonsignificant at the $p = 0.003$ level

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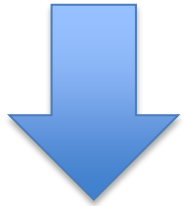
IMAGING RESULTS

- Post hoc comparisons:

(between–groups comparisons were made for moderately palatable food VS neutral cues)



In a fasted state:

NDs>HDs

PFC

In fed state:

NDs=HDs=CDs

CONCLUSIONS

•Individuals with past dieting differed from those who had no history of dieting when viewing highly palatable food cues in a fed state

•HDs showed no significant difference in activation compared with NDs

or CDs in ROIs when fasted; when fed, HDs demonstrated greater activity in a number of brain regions associated with *hedonic value*, *anticipated food reward*, *desirability of food*, *and craving*

•Dieting in young women is a proxy of reaction to susceptibility

to weight gain, not a cause of such weight gain and it may temporarily slow but it rarely prevents eventual weight gain in the long term.

The evidence of susceptibility to overeating in normal weight individuals has implications for obesity prevention.

DISCUSSION

- Why did researchers compare only between NDs VS HDs and CDs VS HDs?
- What factors determined a person as a historical dieter (HD)? What is a rational of inclusion?
- Let`s think about limitations of this study.

LIMITATIONS

- Only college-aged females were included
- Small number of participants
- Palatability of food cues was not confirmed in the current sample
- The order effects of having participants undergo scans fasted and then fed may have had an influence on the results
- Stage of menstrual cycle was not controlled