AFRL
AIR FORCE RESEARCH LABORATORY

UNM STCC & AFRL Mentoring Program Handbook

Spring 2016

UNM | STEM Collaborative Center

The STEM Collaborative Center is funded through a U.S. Department of Education TITLE V grant, through 2019 (total anticipated funding $2.6 million).

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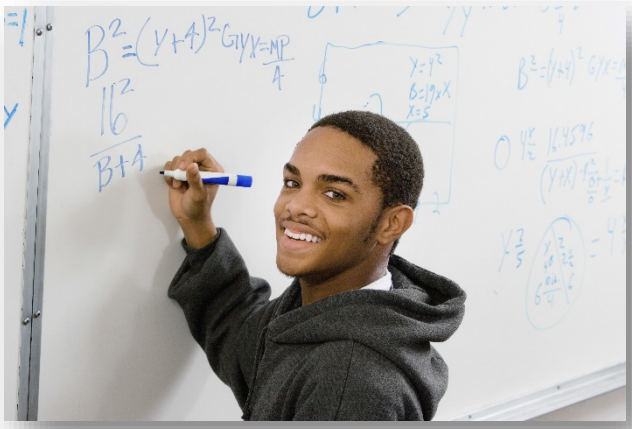
What is the UNM STCC & AFRL Mentoring Program?

The UNM & AFRL Mentoring Program helps early UNM STEM undergraduate students build a supportive relationship with an Air Force Research Laboratory (AFRL) scientist or engineer. Students in the program are matched with an AFRL mentor and the two of them collaborate on various informal activities to enhance their educational and career experiences. Mentors and mentees meet for 1-3 hours a week throughout the semester.

What does the STCC contribute?

During the program, the STCC will send occasional check-in emails, and host an introductory mixer, tour of AFRL laboratories, and an end-of-program celebration. STCC Staff is available to answer questions, brainstorm ideas for activities, and offer feedback. The best way to contact them is via email at stem@unm.edu, via phone at (505) 277-0878, or by visiting the STCC main Office on UNM's Main campus: Room #211 in the Education Classrooms Building (Number 67 on the campus map). You can also find general information about the STCC and its programs and events at our website stem.unm.edu.



To stay in touch with us via our weekly STEM Bulletin, sign up for our listserv. The STEM Bulletin contains information about events, programs, scholarships, job opportunities, and more for UNM STEM-interested students. To sign up, go to UNM Listserv Management at this link: http://it.unm.edu/email/listsignup.html and type "UNM_STEM-L" in the "List name" box.

Where can I find more information about mentoring?

If you would like more information on mentoring in general, the UNM Mentoring Institute has a vast array of online resources available at http://mentor.unm.edu/online-resources.

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How should this Handbook be used?

This Handbook is intended as a helpful guide for both AFRL mentors and UNM mentees as they navigate the Mentorship Program. It contains a Meeting Log for assistance in recording interactions, tips and advice on how to start successful mentoring relationships, and academic advice that may benefit students.

No activities listed in this Handbook are mandatory or required for participation in this program. They should be viewed only as suggestions for navigating different aspects of mentoring. The contents are divided into three areas: Building a Strong Mentoring Relationship, Academic Success, and Professional Development.

"Building a Strong Mentoring Relationship" includes advice for initial meetings, such as conversation starters and ideas for activities.

"Academic Success" includes strategies for mentees to excel in their coursework, including what to do in and out of class, as well as campus resources.

"Professional Development" includes ways that mentees can strengthen their future workplace skillsets under the guidance of the mentor.

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Required Documentation & Citizenship

Visiting AFRL:

The Air Force Research Laboratory is located on Kirtland Air Force Base and is considered federal property. As of January 10th, 2016, New Mexico driver's licenses are not considered valid identification for federal spaces. Because of these restrictions, any student interested in visiting AFRL with the STEM Collaborative must produce a U.S. Passport at least one month prior to the scheduled visit. Further directions regarding base access are provided closer to the scheduled tour dates.

Participating in the AFRL Mentoring Program:

Students who wish to participate in the AFRL Mentoring Program must be U.S. citizens. Students do not need to produce proof of citizenship for the Mentoring Program. A U.S. passport is only necessary if the student wishes to visit AFRL. However, students should know that not possessing a U.S. passport may limit their options for visitation with their mentor.

Exceptions:

If you believe that you are eligible for an exception to any of the above rules, please email the STCC staff a short description of your situation at stem@unm.edu.

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Tentative Spring 2016 Schedule

Match Meeting with AFRL Mentors (mentor only event)

Thursday, January 28th, 12 PM
Location: AFRL, Room TBA

Match Introductions

Provided by email Friday, January 29th

Introductory Mixer (all mentors and mentees)

Thursday, February 4th, 4:00 – 6:00 p.m.
Location: STEM Collaborative Center (STCC) Offices
Light refreshments will be served

STCC is located on UNM's Main campus in the Education Classroom Building, number 67 on the UNM Campus Map. It is just north of the SUB (and north of the big blue fountain). Our offices are in Room 211 and are signed as "STEM Collaborative."

UNM Campus Map: https://iss.unm.edu/PCD/SM/doc/VisitorMapCentral_Numeric.pdf
Directions to the STCC: http://stem.unm.edu/contact-us.html

AFRL Tour (open to all UNM undergraduates)

Deadline to sign up for tour on stemuniversity.unm.edu: Thursday, February 18th, midnight
Deadline for students to provide US Passport documentation: Thursday, March 3rd, 5 PM
AFRL Tour: Thursday, March 31st, 12:45 PM – 5:00 PM
Arrive at STCC Offices 12:45 PM
Tour is from 2:00 – 4:00 p.m.
Return to campus before 5 PM

Students will need to provide official documentation of US Passport for security check ahead of time. Details on this process forthcoming.

End of Program Celebration (open to all UNM and AFRL)

Thursday, April 28th, 4:00 – 6:00 p.m.
Location: TBA
Registration will be required, instructions TBA
Light refreshments will be served

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UNM STCC & AFRL Mentoring Meeting Log

	Date and Time	Brief Description of Activities
1		
2		
3		
4		
5		
6		
7		
8		

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Part I. Building a Strong Mentoring Relationship

Conversation Starters

Sometimes it's hard to know where to begin. Good relationships can take time, so cover some basics to get to know each other better. Here are some questions to get the conversation going:

For Mentors to Ask

- What classes are you taking this semester?
- Why did you arrange your schedule the way you did?
- Who is your favorite and least favorite professor? Why?
- What class are you enjoying the most so far? Why?
- What is your favorite subject that you are taking or looking forward to taking?
- Why did you pick UNM for your degree?

For Mentees to Ask

- Why did you pick AFRL as a place to work?
- Who was your favorite professor when you were in school?
- Was there a professor you hated in school that you've come to appreciate now?
- If you weren't a scientist/engineer, what job do you think you would be doing instead?

For Both

- What do you do when you have free time?
- Where do you see yourself 5 years from now?
- What is the best piece of advice you've received? What is the worst?
- Do you have any goals you want to achieve before the year is over? Or next year?
- Where have you traveled? Where would you want to travel if money or time was no object?
- What is one thing you would change about the college system, if you could?

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Ideas for Activities

If the conversations have been going well, but now it's time to tackle some projects, here are a few ideas that can be productive practice for undergraduates:

Create a Mentoring Syllabus or Contract

The way to a successful mentoring relationships lies with meeting expectations. Working together on a "syllabus" or "contract" can be a great relationship-building project. Some questions to address could include:

- Have either of you been a mentor before? If so, what worked and what didn't in your experience?
- How often will you meet? Where and for how long?
- What is the best way to communicate with each other?
- What would each of you like to get out of this program?
- Mentees, do you want more guidance from your mentor on academics or professional development?

Informational Interview

This is the process in which students interview a professional for information related to their career. Mentees come up with a list of questions to ask their mentor about their career path and discuss the answers.

- How did they get started in that career?
- What kind of changes occurred along the way?
- What were the high and low points of getting to the career?
- What's your best day at work like?
- What's your worst day at work like?

For more information on informational interviewing and example questions, visit Career Services at: http://www.career.unm.edu/common/pdfs/informationalinterviewhandout.pdf

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Ideas for Activities, continued

Time Management Exercise

College is a time of multiple commitments ranging from school, employment, family, and friends. Effective time management is one key to success in college, but it is a skill that needs practice.

- It is recommended that students should spend three hours outside of the classroom reading, completing homework, or studying per credit hour. For example, if a biology class is three credit hours, you should study for that class for 9 hours per week.
- Determine the number of credit hours that mentees are taking and work together plan out a schedule for the week that includes these supplemental hours for classes.

- Include class time, homework time, and extracurricular activities such as work, exercise, etc.
- UNM's Center for Academic Program Support (CAPS) offers more assistance on time management and other academic skills through their Learning Strategies program at: http://caps.unm.edu/programs/learningstrategies

Discuss Interpersonal Skills

- For both mentors and mentees, what types of people do you find most enjoyable to work with and why? Least enjoyable? Can you give examples?
- Mentors, what are some strategies you have developed for more effective interactions?

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Ideas for Activities, continued

Team Up and Network Together

- Find a guest lecture, informational session, or networking event on campus or in the community that you can both attend together.
- Set goals for attending the session such as, I want to talk to two people and get their business cards, I want to ask one person about their company's internship program, etc.
- Debrief afterwards: What did each of you like or dislike about the event? How will you follow up with the people that you met?
- STCC puts events for UNM STEM–interested students in their weekly bulletin. To sign up, go to UNM Listserv Management at this link: http://it.unm.edu/email/listsignup.html and type "UNM_STEM-L" in the "List name" box.

Resume & Cover Letter Review

- With the mentor's assistance, mentees should find an internship, job, or research position posting that he or she would be interested in applying for. Write a resume and cover letter for that posting.
- The mentee should show the posting, resume, and cover letter to the mentor for potential edits and revisions.
- Mentors can also share their resume/CV with mentee as an example.
- Mentees might want to seek help from Career Services before seeking feedback from their Mentor. Career Services can talk with students about how to find job postings, how to write resumes and cover letters, and how to tailor materials to a job postings. They also host helpful handouts about these processes on their website. You can find this information at this link: http://www.career.unm.edu/students-alumni/resumes--cover%20letters.html

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Part II. Academic Success

Things to Do Inside Class:

- Arrive to class on time.
- Complete the readings and review assignments before class so that you can deepen your understanding and ask questions about content during class.
- Sit toward the front of the classroom to help you stay focused.
- People learn best by studying during multiple short sessions over a long period of time. Review for your classes periodically rather than cramming before a test.
- People learn best in social and supportive environments. Form a learning group with other students in your class.
- Gather telephone numbers or email addresses of other students in your classes to contact in case you are absent.
- Online resources such as Khan Academy (https://www.khanacademy.org), Lynda (http://www.lynda.com), and even Pinterest (https://www.pinterest.com) have study guides, practice homework and tests, and many ways to connect with other students around the world.

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Part II. Academic Success

Things to Do Outside of Class:

- Develop career and educational goals.
    - Complete My Goals Worksheet and/or Planning to Achieve Your Dream worksheet included on page 23-24 of this Handbook.
    - Career Services meets individually with students to develop career goals and plans. Set up an appointment by calling 505-277-2531 or view walk-in hours at career.unm.edu.
- Meet with your academic advisor and plan your program of study so that you can achieve your goals.
    - You can start the process of making an appointment with your advisor at http://ucollege.unm.edu/advisement/
- Establish a connection with your instructors and maintain ongoing communication with them.
    - Complete How to Write a Professional Email in the activities section of this handbook.
- Organize for success.
    - Use calendars and "To Do" lists.
    - Transfer due dates from your syllabi to your calendar.
    - Break down large projects/assignments into more manageable tasks; schedule each work session on your calendar.
    - Complete the projects and assignments, including printing the final documents, before the due date so they are turned in on time.

*adapted from Guilford Technical Community College

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Part II. Academic Success

Campus Resources

UNM had over 20,000 undergraduates in 2014! Students have an abundance of resources available to them, but the choices can often be overwhelming. Here are some of the most used departments and organizations on campus.

Accessibility Resource Center (as2.unm.edu)
(505) 277-3506
Located on the second floor of Mesa Vista Hall room 2021 at the University of new Mexico. ARC provides a variety of services to self-identified UNM students on main campus as well as branch campuses across the state.

Admissions Office (admissions.unm.edu)
(505) 277-8900
TOLL FREE: 1-800-CALL-UNM ext. 1

African American Student Services (afro.unm.edu)
(505) 277-5645
The African American Student Services program at UNM provides culturally relevant programs designed to assist primarily African American students in making a confident transition and successful adjustment to UNM.

American Indian Student Services (aiss.unm.edu)
(505) 277-6343
American Indian Student Services provides cultural and academic programming for American Indian students attending UNM in an effort to ensure their academic achievement and assist in the development of personal, cultural, and social success.

Agora Crisis Center (www.unm.edu/~agora)
(505) 277-3013 or 1-866-HELP-1-NM (1-866-3246-1-55)
Agora is New Mexico's free and confidential hotline that specializes in compassionate listening services for anyone who is experiencing a crisis in their life.

Bursar's Office (www.unm.edu/~bursar)
(505) 277-5363
Student Accounting and the Cashier Department

Campus Office of Substance Abuse Prevention (COSAP) (www.unm.edu/~cosap)
(505) 277-2795
UNM on-campus program that supports students with a wide array of substance abuse prevention strategies, services, and information to ensure the safety, success, and well-being of UNM students.

Career Services (www.career.unm.edu)
(505) 277-2531
The office provides professional career advisement as well as UNM alumni and community members. The office holds walk-in hours and takes appointments M-F. Services include help preparing resumes, cover letters, letters of intent, interview techniques, job searches, etc.

Center for Academic Program Support (CAPS) (caps.unm.edu)
(505) 277-7208
CAPS is UNM's learning center, which focuses on providing opportunities for academic conversations in which students engage CAPS peer tutors and UNM faculty in critical thinking exercises..

College Enrichment Program (CEP) (cep.unm.edu/)
(505) 277-5321
Provides guidance and counseling to students in all areas relevant to their persistence and eventual success on campus. This includes overall adjustment to college, transition to UNM, academic support, career selection, and financial aid.

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Campus Resources, continued

El Centro de la Raza (elcentro.unm.edu)
(505) 277-5020
El Centro provides a large variety of services to mainly Hispanic and Latino/Latina students, including tools for self-determination, personal responsibility, resiliency, and advocacy.

LGBTQ Resource Center (lgbtqrc.unm.edu)
(505) 277-5428
The Resource Center serves as a physical environment from which LGBTQ visibility on the UNM campus can grow.

STEM Gateway (stemgateway.unm.edu)
STEM Gateway has a broad mission empowering more Hispanic and low-income students to achieve their STEM career goals. Most relevant to students' daily experiences are workshops, activities, resources, and blog posts.

Student Affairs (studentaffairs.unm.edu)
(505) 277-0952
The primary student services for UNM's diverse student population. They provide support services for students from all backgrounds, including first generation and non-traditional.

Student Employment (stuemp.unm.edu)
Phone: (505) 277-3511
Information on how to gain student employment, payroll and other services pertaining to student employment at UNM.

Student Health Center (shac.unm.edu)
Information, Appointments and Counseling Services: (505) 277-3136
Pharmacy: (505) 277-6306
Located on Main Campus north of Johnson Center to provide quality health and counseling services to all UNM students to foster student success.

University College Advisement Center (UCAC) (ucollege.unm.edu/advisement)
(505) 277-0122
The UCAC's primary mission is the professional and personalized academic advisement of students.

UNM IT (it.unm.edu)
Help Desk: (505) 277-5757
For all your information technologies problems or questions.

University Libraries (library.unm.edu)
(505) 277-9100
Information on the locations and hours of the various libraries that are on campus as well as research resources and study room bookings.

Veterans Resource Center (VRC) (vrc.unm.edu)
(505) 277-0111
The VRC department at UNM is run by Veterans for Veterans. It is a centralized resource department, easily accessible and widely available to all veterans; active duty, reserve guard, separated, retired and their dependents who would like to explore the possibility of attending UNM and/or any other Higher Educational Institute.

Women's Resource Center (women.unm.edu)
(505) 277-3716
The WRC works in partnership with academic units to enhance the UNM experience. The WRC is dedicated to offering a variety of learning opportunities through its programming and services.

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Part II. Academic Success

UNM's Colleges and Schools

Anderson School of Management
(www.mgt.unm.edu)
(505)277-6471

Architecture and Planning (saap.unm.edu)
(505)277-3133

Arts and Sciences (www.unm.edu/artsci)
(505)277-3046
Advisement: (505) 277-4621

Education (coe.unm.edu)
(505)277-2231

Engineering:

- Chemical and Nuclear
  (505) 277-5431
- Civil Engineering
  (505) 272-2722
- Computer Science
  (505) 277-3112
- Electrical and Computer
  (505) 277-2436
- Mechanical
  (505) 277-1325
- Engineering Student Services
  (505) 277-4354

Fine Arts (finearts.unm.edu)
(505)277-4817

Nursing (nursing.unm.edu)
1-800-690-0934

Pharmacy (hsc.unm.edu/pharmacy)
(505)272-3241

Law (lawschool.unm.edu)
(505) 277-2146

Medicine (hsc.unm.edu/som)
somadmin@salud.unm.edu

Public Administration (spa.unm.edu)
(505) 277-1092

University College (www.unm.edu/~ucollege)
(505) 277-2631

For a complete list of STEM majors served by the STCC, please visit stem.unm.edu/about-stcc/what-is-stem.html

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Part II. Academic Success

Joining a student or professional organization is an awesome way to stay connected and improve your chances of success at UNM. There are many organizations for undergraduates to choose from. Some great choices are SACNAS (Society for the Advancement of Chicanos and Native Americans in Science), SWE (Society for Women Engineers), and BUGS (Biology Undergraduate Society of UNM).

UNM's Student Activities Center updates their list of active organizations annually. You can find it by going to their website at http://sac.unm.edu/ and choosing "Student Organizations" from the sidebar.

There are also several fraternities and sororities at UNM. To see the complete list, go to http://greeks.unm.edu.

STCC also maintains a list of active STEM-focused campus organizations that they update regularly. To find out more, contact us at stem@unm.edu or 505-277-0878.

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Part II. Academic Success

The AFRL Summer Scholars Program

Program Overview

The Air Force Research Laboratory (AFRL) Scholars Program offers stipend-paid summer internship opportunities to undergraduate and graduate level university students pursuing STEM degrees, as well as upper-level high school students; select locations also offer internships to university students pursuing education-related degrees and K-12 professional educators. The selected interns gain valuable hands-on experiences working with full-time AFRL scientists and engineers on cutting-edge research and technology and are able to contribute to unique, research-based projects. Graduate interns are able to collaborate with AFRL on current research and incorporate the research into their graduate work.

Eligibility

- A grade point average of at least 3.0 on a 4.0 scale is highly encouraged for all applicants
- Must be a US Citizen; program is not open to non-Citizens, Permanent Residents, or Dual Citizens
- Must be enrolled or accepted at an educational institution taking at least half-time academic course load leading to a degree or certificate for semester immediately preceding internship session; must also be able to provide proof of enrollment or acceptance for semester immediately following internship session. Note: This does not apply to professional educators.
- Must be in good academic standing
- Must be at least 16 years of age and have a valid driver's license
- Must be available to work full-time (40 hours per week)
- Must be willing to temporarily relocate to physical work location
- Must be able to take personal responsibility for arranging transportation to and from worksite each day. Note: Scholars should not rely on transportation from anyone who does not already have base access. Program administration will not be responsible for making additional arrangements on a scholar's behalf to provide suitable transportation.
- Must be able to pass a background check, potentially resulting in a Secret Security Clearance

For more information on the AFRL Scholars Program, visit their website at: afrlscholars.usra.edu or email questions to afrlscholars@epo.usra.edu.

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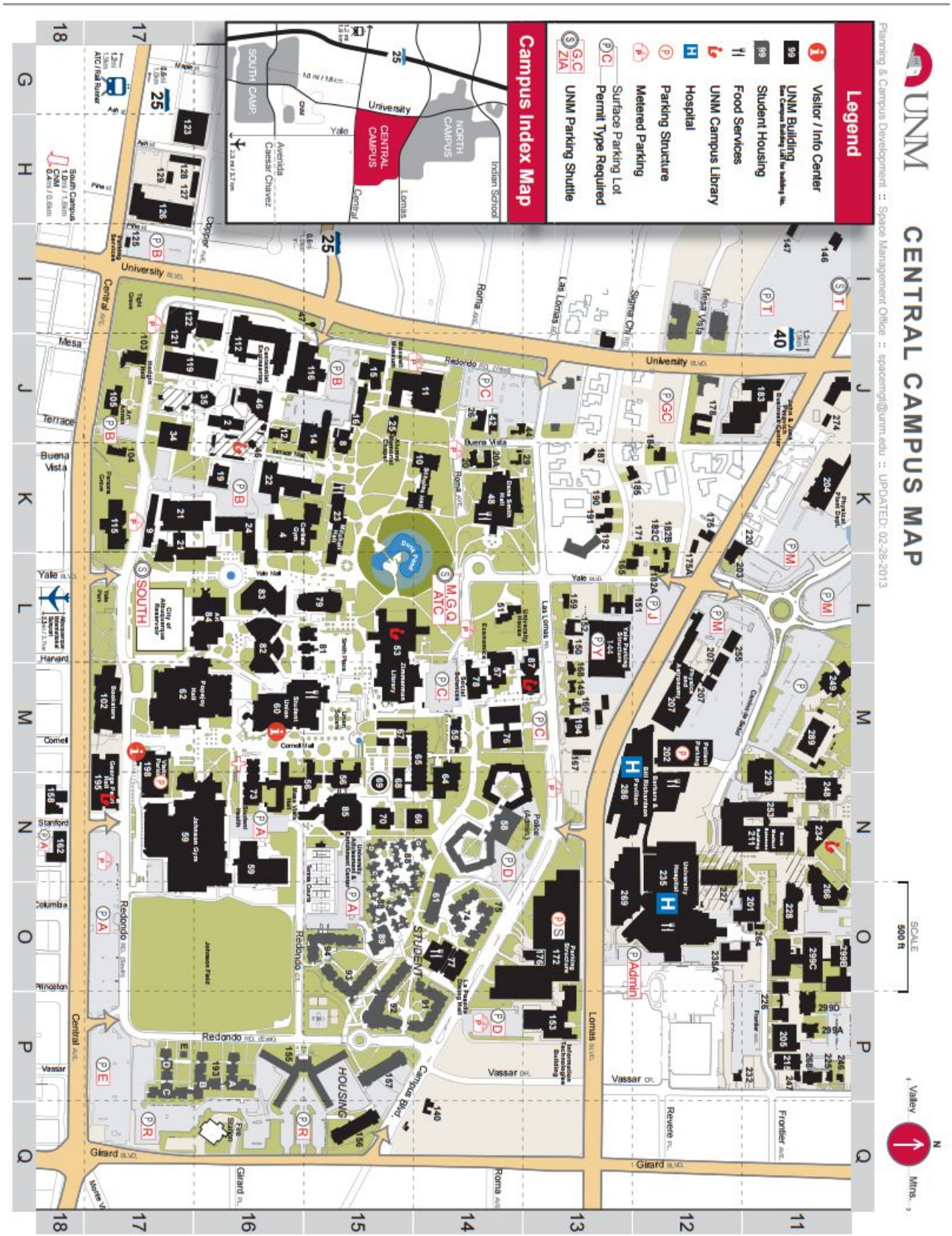
Part II. Academic Success



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THE UNIVERSITY of NEW MEXICO

CENTRAL CAMPUS MAP LEGEND

BY BUILDING NUMBER

Bldg #	BUILDING NAME	GRID
2	ENGINEERING AND SCIENCE COMPUTER POD (ESCP)	J-16
4	ELIZABETH WATERS CENTER FOR DANCE AT CARLISLE GYMNASIUM (CARL)	K-16
8	BANDELIER HALL EAST (BANDE)	J-15
9	MARRON HALL (MARN)	K-17
10	SCHOLES HALL (SCHL)	K-14
11	ANTHROPOLOGY (ANTHO)	J-14
12	ANTHROPOLOGY ANNEX (ANTHX)	J-16
14	SCIENCE & MATHEMATICS LEARNING CENTER (SMLC)	J-15
15	HIBBEN CENTER FOR ARCHAEOLOGY RESEARCH (HIBB)	J-15
16	BANDELIER HALL WEST (BANDW)	J-15
19	BIOLOGY ANNEX (BIOANX)	K-16
20	INTERNAL AUDIT	K-14
20A	608 BUENA VISTA DR. N.E.	K-14
21	CASTETTER HALL (CAST)	K-17
22	CLARK HALL (CLARK)	K-15
23	MITCHELL HALL (MITCH)	K-15
24	NORTHROP HALL (NTHP)	K-16
25	ALUMNI MEMORIAL CHAPEL (ALUMNI)	J-15
26	UNM PRESS & OFFICE OF RESEARCH	J-14
29	DISPUTE RESOLUTION (DISP)	K-14
34	LOGAN HALL (LOGAN)	J-17
35	REGENER HALL (REGH)	J-16
42	EQUAL OPPORTUNITY PROGRAMS (EOP)	J-14
44	THE WHITE HOUSE	J-13
46	ELECTRICAL AND COMPUTER ENGINEERING CENTENNIAL LIBRARY (EECE)	J-16
48	DANE SMITH HALL (DSH)	K-14
51	UNIVERSITY HOUSE (UNIVH)	L-14
53	ZIMMERMAN LIBRARY (ZIMM)	L-15
55	COLLABORATIVE TEACHING AND LEARNING BUILDING	M-14
56	MESA VISTA HALL (MVH)	N-16
57	ECONOMICS (ECON)	M-14
58	HOKONA HALL (ZUNI-OFFICES, ZIA-DORMITORY) (HOKW)	N-14
59	JOHNSON CENTER (JOHNS)	N-17
60	STUDENT UNION BUILDING (SUB) (NMU)	M-16
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65	TRAVELSTEAD HALL (TRAV)	M-14
66	SIMPSON HALL (SIMP)	N-14
67	EDUCATION CLASSROOMS (EDUC)	M-15
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69	KIVA (KIVA)	N-15
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71	SANTA ANA HALL (DORMITORY)	P-15
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74	LAGUNA HALL (DORMITORY) (LAGUNA)	O-14
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85	UNIVERSITY ADVISEMENT & ENRICHMENT CENTER (UAEC)	N-15
87	ANDERSON GRADUATE SCHOOL OF MANAGEMENT / PARISH LIBRARY (GSM)	M-13
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102	BOOKSTORE	M-17
103	HODGIN HALL (HODGIN)	J-17
104	SARA RAYNOLDS HALL (SARAR)	K-17
105	ART ANNEX (ARTX)	J-17
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187	EXTENDED UNIVERSITY	K-13
190	UNM PUBLIC EVENTS / POPEJOY	K-13
191	HOUSE OF PREVENTION EPIDEMIOLOGY (HOPE)	K-13
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FINE ARTS LIBRARY (GEORGE PEARL HALL - BLDG #195)	N-17
GEOLOGY MUSEUM (NORTHROP HALL - BLDG #24)	K-16
GREENHOUSE CONSERVATORY (CASTETTER HALL - BLDG #21)	K-17
HUMAN RESOURCES (JOHN AND JUNE PEROVICH BUSINESS CENTER - BLDG #183)	J-11
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KELLER HALL (CENTER FOR THE ARTS - BLDG #62)	M-17
MASLEY HALL ART GALLERY (BLDG #68)	N-15
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RODEY THEATRE (CENTER FOR THE ARTS - BLDG #62)	M-17
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WELCOME CENTER (BLDG #198)	M-17

H HOSPITAL LIBRARY (P) PARKING INFORMATION FOOD/DINING

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Part III. Professional Development

The following pages provide advice and exercises for mentees to practice their current and future workplace skillsets.

Practice Writing a Professional Email

Emailing is often the preferred method to communicate with your professors or employers.

- In this activity, write a generic email to your professor about the following topics:
  - You need clarification on a homework assignment
  - When you submitted an assignment on Learn, there was an error in your submission
  - A mistake you have found in the professor's lecture
- The following is a guide for the process of writing a professional email to a professor:
  1. **Read the syllabus, assignment instructions, and/or course website:** Often, your question has already been answered in the material the professor has provided. Check with classmates, too.
  2. **Use your academic account:** Using your academic account helps avoid having your personal email address be removed by the spam filter
  3. **Format:** Using an appropriate format is highly professional.
     a. **Meaningful subject line:** Start with a professional and descriptive title. You should include the course number and the topic of your email. Saying "Question" is not enough detail.
     b. **Greeting:** Start with a greeting. Spell their name correctly. "Dear Professor" will typically cover most of your professors' circumstances. Do not use the professor's first name unless you have been invited to do so.
     c. **Brief and polite reason for your email:** Explain why you are emailing in a way that is short and to the point, while also giving your professor enough information to address your situation. Include dates where necessary. Name the assignment or projects you are referring to instead of using pronouns or phrases, such as "this assignment".

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   d. Reminder: If your professor cannot understand why you are emailing, they may not respond or they may ask what you meant which just prolongs the time until you get your question answered.
   e. **Suggest a solution:** If you are having a problem, suggest a solution. Don't simply say "I missed class". Instead, introduce that you missed class and suggest a solution such as, "can I come to your office hours to talk about what I missed?"
   f. **Thank them:** Remember, professors often teach multiple classes; they may have hundreds of students. Thank them for their time and consideration of your email.
   g. **Sign your name:** Sign it with your first/last name and course/section number. Do this even if you know your professor knows you by name.
   h. **Attachments:** If your email is regarding an assignment or article, attach the document. This way, your professor does not have to hunt around for it. You can also attach screenshots of any problems you are having with online computer software.
4. **Proofread**: Read your email over and use spell check. If your email account does not have spell check, paste the message into a word-processing program to run spell check. Strive for a polite, concise, and clear message. Check that documents are actually attached to the email.
5. **Timing**: Leave enough time for a reply. Some professors do not have email access everyday so it may be a while before you get a reply. For time sensitive questions, it may be better to call or go to office hours.
6. **Acknowledge the reply:** A simple "Thank you, Professor." may do the trick. You can also send a longer, professional thank you message. If the issue is not being resolved, ask to meet in person.
7. **Consult:** If you have questions related to emailing professors, review the online article, search for other online resources, ask mentors/peers, etc.

Adapted from Wiki How's "How to Email a Professor" at http://www.wikihow.com/Email-a-Professor

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Part III. Professional Development

EXAMPLE EMAIL

Subject Line: UNIV 175—Question about Planning to Achieve Your Dream Assignment

Dear Professor Hackel,

My name is Mary and I am a student in your UNIV 175 course. I am working on the "Planning to Achieve Your Dream" Assignment and am having trouble with question number four. Question four reads "Which undergraduate majors does the graduate school accept and is a BA or BS version of that major required?" I am pursuing a Bachelor of Science in Nursing which is not a graduate program. Could you help me identify how I should address this question?

I have attached the assignment for your reference. Thank you for your time

Best regards,

Mary Cianflone

UNIV 175, Section 2

Attached: Planning to Achieve Your Dream.docx

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Part III. Professional Development

My Goals

1. Why did you choose to come to college?

2. What degree are you pursuing?

3. Why are you interested in pursuing degree in science, math, or engineering?

4. How does obtaining a degree in science, math, or engineering fit into your long-term life goals? Your career?

5. What strengths do you possess that will be beneficial for obtaining your degree at UNM?

6. What challenges do you perceive to your ability to complete your science, math, or engineering degree? How will you overcome these challenges?

7. Given your long-term goals, what compatible goal or goals do you have for this semester? For the next month? For this week?

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Part III. Professional Development

Planning to Achieve Your Dream

1. What are your top 2-3 professional career choices (dream job)?

2. Which top 2-3 professional schools (departments within universities) you would apply to?

3. Which exams (MCAT/GRE/etc.) and minimum GPA do they require for applicants? What will you need to do to meet the requirements?

4. Which undergraduate majors does the graduate school accept and is a BA or BS version of that major required?

5. What is your planned undergrad major(s) at this point?

6. What type of honors programs or extracurricular activities will you participate in?

7. What exploration have you already done help you confirm your answers to questions 5 and 6?

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Critical Thinking Exercise

Find an article on popular media and the corresponding peer-reviewed journal article. Does the popular article accurately reflect the original journal? Why or why not? An example of an article depicted in media, along with the original journal is included on the following pages.

The New York Times

February 20, 2012

Nutrition: Dessert at Breakfast May Help Dieters

By NICHOLAS BAKALAR

As improbable as it sounds, researchers have found that a low-calorie meal plan that includes dessert with breakfast may help dieters.

Scientists randomized 144 obese people, ages 20 to 65, to two low-carbohydrate diets providing 1,400 daily calories for women and 1,600 for men. The diets were identical except that one included a high-carbohydrate, protein-enriched breakfast with a choice of cookies, chocolate, cake or ice cream for dessert.

Throughout the study, which appears in the March 10 issue of the journal Steroids, participants were tested periodically for blood levels of insulin, glucose, lipid and ghrelin, a hormone that stimulates appetite.

During an initial 16-week period, the average weight loss in each group was identical — about 32 pounds. But over a 16-week follow-up, people on the dessert-with-breakfast diet lost an additional 13 pounds on average, while the others gained back all but 3.5 of the pounds they had lost.

Those on the dessert regimen maintained lower levels of ghrelin and reported significantly higher levels of fullness. “Most people simply regain weight, no matter what diet they are on,” said the lead author, Dr. Daniela Jakubowicz of Tel Aviv University. “But if you eat what you like, you decrease cravings. The cake — a small piece — is important.”

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Steroids 77 (2012) 323–331

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Steroids

journal homepage: www.elsevier.com/locate/steroids

Review

Meal timing and composition influence ghrelin levels, appetite scores and weight loss maintenance in overweight and obese adults

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ABSTRACT

Background: Although dietary restriction often results in initial weight loss, the majority of obese dieters fail to maintain their reduced weight. Diet-induced weight loss results in compensatory increase of hunger, craving and decreased ghrelin suppression that encourage weight regain. A high protein and carbohydrate breakfast may overcome these compensatory changes and prevent obesity relapse.
Methods: In this study 193 obese (BMI 32.2 ± 1.0 kg/m^2), sedentary non diabetic adult men and women (47 ± 7 years) were randomized to a low carbohydrate breakfast (LCb) or an isocaloric diet with high carbohydrate and protein breakfast (HCPb). Anthropometric measures were assessed every 4 weeks. Fasting glucose, insulin, ghrelin, lipids, craving scores and breakfast meal challenge assessing hunger, satiety, insulin and ghrelin responses, were performed at baseline, after a Diet Intervention Period (Week 16) and after a Follow-up Period (Week 32).
Results: At Week 16, groups exhibited similar weight loss: 15.1 ± 1.9 kg in LCb group vs. 13.5 ± 2.3 kg in HCPb group, $p = 0.11$. From Week 16 to Week 32, LCb group regained 11.6 ± 2.6 kg, while the HCPb group lost additional 6.9 ± 1.7 kg. Ghrelin levels were reduced after breakfast by 45.2% and 29.5% following the HCPb and LCb, respectively. Satiety was significantly improved and hunger and craving scores significantly reduced in the HCPb group vs. the LCb group.
Conclusion: A high carbohydrate and protein breakfast may prevent weight regain by reducing diet-induced compensatory changes in hunger, cravings and ghrelin suppression. To achieve long-term weight loss, meal timing and macronutrient composition must counteract these compensatory mechanisms which encourage weight regain after weight loss.

Contents

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1. Introduction

Weight regain after weight loss represents one of the major obstacles in the therapeutic management of overweight and obesity, undoubtedly contributing to the epidemic of overweight which now exceeds 60% in United States adults and almost 20% of children [1–5]. Although dietary restriction often results in initial weight loss, the majority of obese dieters fail to maintain their reduced weight [5]. These diets are typified by short term [3–6 months] success; however, most individuals cannot maintain such weight loss strategies over time [1,3,6–9].

Proposed predictors of weight regain after weight loss include increased subjective appetite scores, especially increased hunger and craving [6–12]. Energy and/or carbohydrate restricted weight loss diets have been shown to produce a carbohydrate withdrawal effect which further exacerbates hunger and carbohydrate cravings, ultimately resulting in weight regain [9,12–16]. The reward value of carbohydrates and the consequences of its withdrawal on hunger, cravings and satiety, are not addressed by many weight loss diets, including the more successful methods [17].

Most weight loss diets result in compensatory metabolic changes, including reduced energy expenditure [18,19], increased hunger [9,12,13,20,21] and craving scores [14–16], increased circulating ghrelin and decreased posprandial ghrelin suppression [21,22]. These alterations persist over time, even 1 year after initial weight reduction [21]; further, these changes promote weight regain after diet-induced weight loss. Long term strategies to counteract these changes and to facilitate maintenance of weight loss over time might include consideration of dietary macronutrient composition and meal timing.

Macronutrient composition of the diet has been shown to influence hunger, satiety and cravings [16,23]. Several studies have shown that dietary protein is the most satiating of the macronutrients in conditions of both energy restriction and energy balance [24–27]. It has also been shown that the addition of carbohydrates to protein leads to additional reduction of hunger and increased satiety [28–30].

Meal timing also appears to influence its satiating properties. Specifically, protein consumed at breakfast (compared to lunch or dinner) leads to greater initial and sustained feelings of fullness, increased satiety and reduced levels of the appetite-regulating hormones such as ghrelin [31–35]. Moreover, the daily addition of a carbohydrate-rich snack (i.e. sweet) to breakfast has been shown to reduce the snack's reward value decreasing cravings for sweets, breads, carbohydrates and fast food [36].

The present study was designed to address whether a change in diet macronutrient composition and meal timing impacts these metabolic outcomes (appetite and ghrelin levels) leading to long term dietary adherence and prevention of weight regain. We studied a population of overweight and obese adults and compared the effects of two isocaloric weight loss diets with different meal timing and composition on appetite, craving scores, ghrelin levels, weight loss and maintenance during two consecutive periods: (1) Diet Intervention Period; and (2) Follow-up Period.

2. Materials and methods

2.1. Study design

The present study is a randomized, treatment controlled, open clinical trial comparing the effects of two isocaloric dietary interventions with different composition and meal timing on subjective appetite scores, craving, ghrelin suppression, weight loss and maintenance.

2.2. Participants

The study protocol initially included 193 obese/overweight subjects (115 women), recruited from outpatient clinics by means of personal interview and advertising. Inclusion criteria were adult (age 20–65 years); overweight or obese (body-mass index 25–37 kg/m^2) non-diabetic [glucose <200 mg/dl 2 h after oral administration of 75 g glucose after an overnight fast]; with normal thyroid, liver and kidney function as assessed by standard blood tests. Exclusion criteria included individuals with diabetes or abnormal thyroid, liver or kidney function. Individuals who were presently dieting, using medications affecting body weight or who had experienced a change in weight >4.5 kg or a change in physical activity within the six months preceding study onset were excluded. Gastrointestinal problems possibly preventing dietary adherence; pregnancy or lactation; cancer or other characteristics [psychological or physical disabilities] deemed likely to interfere with participation in or compliance with the study were further exclusion criteria. Subjects taking antihypertensive or lipid-lowering medication were asked to maintain all medications and supplements at pre-study doses. Most subjects were sedentary at baseline and were asked to maintain their usual physical activity levels and to refrain from drinking >2 standard glasses of alcohol per week throughout the study.

The protocol and potential risks and benefits of the study were fully explained to each subject before he/she provided a written informed consent. All experimental procedures followed ethical standards of and were approved by the Institutional Review Board Helsinki Committee at the Wolfson Medical Center, Holon, Israel.

Table 1
Diet composition by treatment assignment and sex.

	HCb Women				LCb Women			
	Kcal	gCh (%)	gProt (%)	gFat (%)	Kcal	gCh (%)	gProt (%)	gFat (%)
Breakfast	600	60 (40)	45 (30)	20 (30)	300	10 (13.3)	30 (40)	16 (48)
Lunch	500	10 (8)	70 (56)	20 (36)	500	10 (8)	70 (56)	20 (36)
Dinner	300	8 (10.7)	45 (60)	10 (30)	600	16 (10.6)	90 (60)	20 (30)
Total	1400	78(19.6)	160 (48.6)	50 (32)	1400	36 (10.6)	190 (52)	56 (38)
	HCb Men				LCb Men			
Breakfast	600	60 (40)	45 (30)	20 (30)	300	10 (13.3)	30 (40)	16 (48)
Lunch	600	12 (8)	84 (56)	24 (36)	600	12 (8)	84 (56)	24 (36)
Dinner	400	11 (10.7)	60 (60)	20 (30)	700	19 (10.6)	105 (60)	23 (30)
Total	1600	83 (19.5)	189 (48.7)	64 (32)	1600	41 (10.7)	219 (52)	63 (38)

HCPb = high carbohydrate and protein breakfast diet. LCb = low carbohydrate breakfast diet; gCh (%) = grams of carbohydrate and %; gProt (%) = grams of protein and %; gFat (%) = grams of fat and %.

2.3. Diet Intervention Period (Week 0–Week 16)

Subjects were assigned to one of two isocaloric weight loss diets which differed primarily in the composition of the breakfast meal:

a) Low carbohydrate diet (LCb): a low carbohydrate diet with a low calorie, and low carbohydrate breakfast; and
b) High carbohydrate- and protein-enriched breakfast diet (HCPb) with similar composition at lunch and at dinner to the low carbohydrate diet, but with a calorie-carbohydrate-and protein-enriched breakfast. In this group, the breakfast also included a "dessert" on a daily basis. The "dessert" was a sweet food selected from the following list: chocolate, cookies, cake, ice cream, chocolate mousse or donuts.

Men were instructed to consume 1600 kcal while women were instructed to consume 1400 kcal daily. Composition of the diet interventions is presented in Table 1. In order to maintain daily energy intake constant, the dinner in the HCPb was reduced from 600 to 300 kcals for women and from 700 to 400 kcals for men (Table 1). All subjects were counseled by a registered dietitian who instructed subjects how to keep daily diet intake checklists for all foods consumed. The subjects' body weights and dietary intake checklists were monitored every 4 weeks, and dietary adjustments were made as necessary.

2.4. Follow-up Period (Week 16–Week 32)

At the end of the Diet Intervention Period (Week 16), both groups entered the Follow-up Period (Week 16–Week 32). Participants received individual counseling and written advice from a dietitian to continue the diets, including meal timing, followed during the Diet Intervention Period; however, they were to be self-supervised in terms of caloric restriction, and were free to eat as motivated by hunger or cravings. Nevertheless, the dietitian emphasized that the maintenance of weight loss is predicated on the participant's ability to adhere to their previously assigned weight loss strategy over time. During the Follow-up Period, subjects continued visiting the clinic every 4 weeks, with the checklist for all foods consumed, for weighing and examinations, but without dietetic counseling. Food checklists were for post-hoc analyses

2.5. Anthropometric measurements

Subjects were weighed every 4 weeks during the study on a Detecto Physician Beam Scale (HOSPEQ, Inc., Miami, FL), before breakfast, wearing light clothes but no shoes. Waist circumference was measured using a tape measure at the umbilicus. Blood pressure was measured with the patient in a supine position using a standard cuff and sphygmomanometer. The mean of three rested measures was recorded.

2.6. Fasting blood assays

All assays were performed after overnight fast on Week 0, Week 16 and Week 32, for measurement of lipids, glucose, insulin serum levels and ghrelin plasma levels.

2.7. Breakfast meal challenge

At three time points during the study, baseline (Week 0), Week 16 and Week 32, we conducted an acute meal challenge in which subjects consumed the breakfast prescribed by their assigned diet intervention. Specifically, subjects assigned to the HCPb diet received an enriched breakfast, as prescribed by the HCPb diet, while subjects assigned to the LCb diet received a low calorie, low carbohydrate breakfast. The breakfast meals were consumed in their entirety within 15 min. On the day of the meal challenge, each subject reported to the laboratory at 07:00 after an overnight fast. After voiding, the subject was instructed to lie in a supine position on a bed. At 07:30, a catheter was placed in an antecubital vein of the non-dominant arm and kept in the patient for the next 240 min by saline drip. Thirty minutes after the catheter was inserted, the fasting baseline blood sample was taken for measurement of insulin and ghrelin. Venous blood samples were collected before and 30, 60, 120, 180 and 240 min after breakfast to assess insulin and ghrelin responses. The appetite scores were concomitantly completed.

2.8. Blood analysis

Blood samples for measurement of glucose, insulin and lipid concentrations were collected in tubes with no additives and allowed to coagulate at room temperature for 30 min. Serum was isolated by centrifugation (Beckman, Fullerton, CA) at 600×*g* for 10 min at 4 °C and was frozen at −20 °C until analyzed. Serum glucose was determined by the glucose oxidase method (Beckman Glucose Analyzer, Fullerton, CA). Serum total cholesterol, HDL cholesterol, and triacylglycerols, were measured enzymatically using a Hitachi-Cobas Bio centrifugal analyzer (Roche) using standard enzymatic kits (Roche). Low-density lipoprotein cholesterol (LDL-C) was calculated according to the methods described [37]. Serum insulin was determined by a double antibody RIA [CIS Bio International, Gif-Sur Yvette-Cedex, France), Sensitivity was 2.0 μU/ml and the intra- and inter-assay variability were 4.2% and 8.8%, respectively. Homeostasis model assessment (HOMA-R) index was calculated using the following formula: fasting serum insulin [mlU/ml] × fasting serum glucose (mmol/l)/22.5 [38].

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Blood samples for measurement of plasma ghrelin concentrations was collected in tubes containing EDTA and centrifuged at 3000 rpm at −4 °C for 15 min. The plasma was then separated and stored in microcentrifuge tubes at −80 °C for future analysis. Plasma total ghrelin was measured with an enzyme immunoassay kit (Phoenix Pharmaceuticals, Belmont, CA). The range of the kit was 0–261 pM/L. The assay sensitivity was 12 pM/L; the intra-assay and inter-assay coefficients of variation for the assay control was 4%. All samples from a given subject were tested in duplicate and analyzed in the same assay. Total (insulin and ghrelin) and net [visual analog scores for appetite] areas under the curve during the 4-h breakfast meal tolerance test were calculated geometrically by using the trapezoidal rule.

2.9. Appetite questionnaires

Appetite scores for hunger and satiety were assessed using 100-mm visual analog scales (VAS), after acute meal challenge, at the same time points blood sampling was performed. Subjects were asked to make a single vertical mark on each scale somewhere between the 0 and 100 mm extremes (e.g., not at all hungry to very hungry) to indicate their feelings at that time point. Subjects did not discuss their ratings with each other and could not refer to their previous ratings when marking the scale. Reliability and validity of using VAS for assessing measures of appetite has been reported [39].

2.10. Craving scores questionnaire

Food cravings were assessed using the Food Craving Inventory (FCI), a 28-item questionnaire designed to measure the frequency of overall food cravings as well as cravings for specific types of foods [40]. Cravings for specific types of foods were measured by four independent subscales, each consisting of 4–8 items within the food category: high fats [i.e., fried chicken, gravy, sausage, hot dogs, fried fish, corn bread, bacon, steaks]; sweets (i.e., cakes, cinnamon rolls, ice cream, cookies, chocolate, donuts, candy, brownies); carbohydrates/starches (i.e., sandwich bread, rice, biscuits, pasta, pancakes/waffles, rolls, cereal, baked potato]; and fast-food (i.e., pizza, French fries, hamburger, chips). Participants rated how often they experienced a craving for each of the foods using a 5-point Likert scale (1 = never, 5 = always/almost every day). In addition to the four independent subscales, an overall score was calculated by summing the subscales and represents the general food craving score. Craving scores were assessed 2 days prior to initiating the diet intervention; at Week 16 and Week 32 of the study.

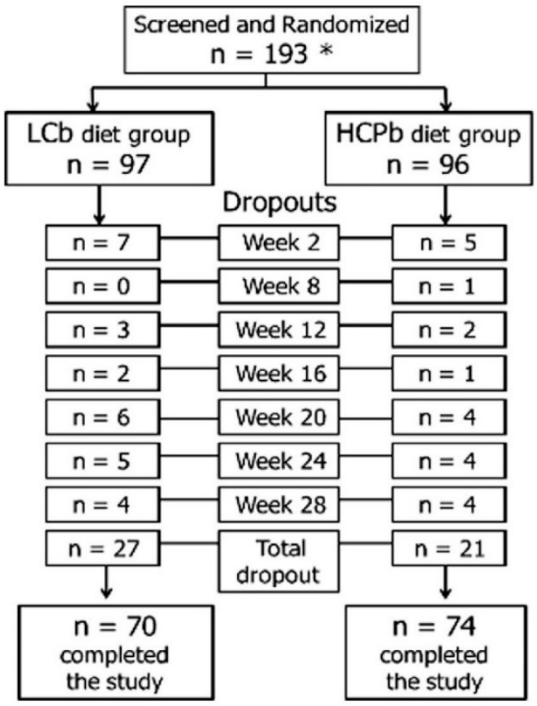

Fig. 1. Consort diagram. *All randomized subjects are included in the analysis per intention to-treat principle. Missing data were imputed using last observation carried forward.

2.11. Sample size and study power

A sample size of 130 participants (65 in each treatment group) provided 80% power to detect a true, between-group difference of 5 ± 10 kg at the end of follow-up. An additional 63 subjects were recruited to cover drop outs, which we predicted would reach almost 50% based on diet study drop-out rates in the literature.

2.12. Statistical analysis

All data are presented as the mean ± SEM. Statistical comparisons of group differences were performed using one-way ANOVAs combined with Tukey's post-hoc tests to compare the results between surgical groups (S-ADREC, ADREC and A-DEX) and cell treatment groups. Analysis of data was carried out using SPSS 11.0 statistical analysis software (SPSS Inc., Chicago, IL). For continuous variables, such as age, weight and biochemical measures, descriptive statistics were calculated and reported as mean ± standard deviation. Normality of distribution of continuous variables was assessed using the Kolmogorov–Smirnov test (cut off at $p = 0.01$). Normally distributed continuous variables were compared by treatment assignment using the *t*-test for independent samples, while continuous variables with distributions significantly deviating from normal were compared by treatment assignment using the Mann Whitney U. Categorical variables, such as sex and treatment assignment, were described using frequency distributions and are presented as *n* (%). A model of each of the continuous outcomes: appetite scores, cravings scores, ghrelin and body weight was developed using general linear modeling (GLM) repeated measures analyses. Treatment assignment and sex were included in all models as fixed factors and a sex-by-treatment interaction was assessed. Additionally, areas under the curve for biochemical measures, appetite and cravings scores over time were calculated using the trapezoidal rule and compared by treatment assignment using the *t*-test for independent samples. All tests follow the intention-to-treat principle and missing data were imputed using last observation carried forward. All tests are two-tailed and considered significant at $p < 0.05$.

3. Results

3.1. Patient dispensation

Of the 193 subjects (BMI=32.3 ± 1.8 kg/m^2) initially recruited and accepted for participation in the study, 96 (57 women and 39 men) were assigned to the HCPb group and 97 subjects (58 women and 39 men) were assigned to the LCb group. Patient dispensation is depicted in Fig. 1. As can be seen, a total of 144 participants completed the study, 74 (44 women) in HCPb group and 70 (42 women) in LCb group. Participants are compared by completion status in Table 2. In contrast to subjects who

Table 2
Characteristics of the study population by completion status.

	HCPb group		LCb group	
	Completed	Withdrew	Completed	Withdrew
	$n = 74$	$n = 22$	$n = 70$	$n = 27$
Follow-up time (weeks)	32	16.2 ± 10.4	32	15.5 ± 10.4
Age	46.7 ± 7.1	42.3 ± 7.3	47.5 ± 6.5	44 ± 8.3
Sex (females)	59.5	59.1	60	59.3
Weight week 0 (kg)	91.2 ± 9.8	93.5 ± 7.5	90.4 ± 9.2	93.3 ± 7.2
BMI week 0 (kg/m^2)	32.2 ± 1.9	32.2 ± 2.0	32.3 ± 1.9	32.4 ± 1.5
Weight Δ Week 0–16 (kg)	−13.6 ± 2.3	−1.4 ± 1.6	−15.3 ± 1.9	−2.1 ± 2.6
Hunger $AUC_{240\ min}$	19,391 ± 2355	19,343 ± 2328	35,628 ± 2497	35,374 ± 1761
Satiety $AUC_{240\ min}$	41,460 ± 3056	40,882 ± 3366	24,966 ± 2754	24,936 ± 1316
Craving Scores Week 0				
Sweets	12.7 ± 1.6	14.0 ± 2.7	12.3 ± 2.3	13.9 ± 1.8
Fats	9.7 ± 1.1	11.6 ± 1.1	9.3 ± 1.6	11.1 ± 2.1
Carb/starches	12.5 ± 1.5	12.9 ± 1.5	12.5 ± 1.5	13.0 ± 1.6
Fast foods	13.1 ± 1.5	12.1 ± 1.5	13.5 ± 1.7	12.7 ± 1.3
General craving	48.0 ± 4.4	50.5 ± 5.2	47.6 ± 4.9	50.7 ± 3.2

Data are indicated as mean ± SD. Compared to participants who completed the study, those who withdrew (regardless of treatment assignment) were significantly younger ($p = 0.001$); had significant higher craving scores for sweets ($p < 0.0001$), fats ($p < 0.0001$), and general craving ($p < 0.0001$), but had significant lower scores for fast food craving ($p = 0.001$). Additionally, subjects who dropped out gained weight by Week 16, while completers had lost weight at Week 16 ($p < 0.0001$).

completed the study, those who dropped out were significantly younger and had significantly higher general craving scores and craving scores for sweets and fats, and significantly lower craving scores for fast foods, regardless of treatment assignment. Additionally, subjects who withdrew had gained weight by Week 16, while those who completed the study had lost weight at this time point. Subjects who withdrew did not differ from completers in terms of sex or treatment assignment. All 193 subjects randomized to treatment are included in the analysis of results according to the intention-to-treat principle and using last observation carried forward to impute values.

3.2. Weight loss

At baseline, body weight was similar by treatment group (Table 3). By the end of the Diet Intervention Period (Week 16), subjects in both treatment groups lost a significant amount of weight from baseline (Fig. 2). During the Follow-up Period, from Week 16 through Week 32, subjects in the HCPb group lost additional weight, while subjects in the LCb group regained weight. Thus, at the end of the Follow-up Period (Week 32), body weight was significantly different between the two groups and was significantly lower in the HCPb than LCb group ($p < 0.0001$) (Table 3).

3.3. Fasting serum glucose, insulin and lipids

Fasting concentrations of glucose, insulin and HOMA-IR decreased from baseline to Week 16 in both groups. From Week 16 to Week 32, these values further declined in the HCPb group. By contrast, these values increased from Week 16 to Week 32 in the LCb group. Values differed significantly between the groups at Week 32 (Table 3). At baseline, both groups were similar in total, HDL and LDL cholesterol and triglycerides (TG). By Week 16, TG values were significantly lower and HDL values significantly higher in the LCb group. At Week 32, total cholesterol, TG and LDL were all significantly lower, while HDL was significantly higher, in the HCPb vs. LCb group (Table 3).

3.4. Craving scores

At baseline, none of the food craving scores differed significantly by diet intervention group. At the end of the Diet Intervention Period (Week 16), all craving scores were significantly higher in the LCb than in the HCPb group. By the end of the Follow-up Period (Week 32), all craving scores, including general cravings, sweets, high fats, carbohydrates/starches and fast foods, were significantly higher in the LCb than in the HCPb group (Table 3). The overall increase in craving scores in the LCb group was greatest for sweets, which was significantly greater than the increase in any other food category. Fat cravings were significantly greater than fast foods cravings in this group. The greatest reduction in cravings in the HCPb group was detected for sweets and fats. Other pair wise differences in cravings were not significant.

3.5. Cravings and weight change

Change in body weight during the Follow-up Period, Week 16 to Week 32, was significantly, positively associated with change in craving scores during the same phase. Specifically, in the Follow-up Period, weight change was associated with a change in cravings for sweets ($r = 0.24$, $p = 0.004$); carbohydrates and starches ($r = 0.2$, $p = 0.02$); fast foods ($r = 0.25$, $p = 0.003$); and general craving ($r = 0.22$, $p = 0.007$). An association between change in fats craving and change in body weight was not detected.

3.6. Breakfast meal challenge

3.6.1. Insulin response

Insulin area under the curve [AUC] response to breakfast meal challenge did not differ between diet intervention groups at the baseline. At Week 16, both groups exhibited a significant reduction of insulin-AUC from baseline. The HCPb group exhibited a further decrease at the end of Follow-up Period, while insulin AUC significantly increased in LCb group (Table 3). As shown in Table 3, at the Week 32 breakfast meal challenge, for insulin AUC was significantly, positively associated with body weight ($r = 0.61$, $p < 0.0001$).

3.6.2. Ghrelin response

The nadir ghrelin value at baseline of the breakfast meal challenge was 301.2 ± 36.0 pg/ml in the HCPb group compared to 350.2 ± 26.4 pg/ml in the LCb group ($p < 0.0001$) (Table 3). Nadir ghrelin in response to HCPb breakfast was significantly decreased from baseline to Week 16 ($p < 0.0001$) and remained suppressed at Week 32 (Fig. 3). By contrast, in the LCb group, nadir ghrelin levels did not differ significantly between baseline and Week 16 ($p = 0.06$) and were significantly less decreased after the Follow-up

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Table 3
Participant characteristic at baseline and after 16 and 32 weeks, $n = 193$ LCb group: $n = 97$; HCPb group: $n = 96$.

	Group	Baseline	Week 16	Week 32
Weight (kg)	HCPb	91.2 ± 9.8	77.6 ± 9.0	70.6 ± 8.7
	LCb	90.4 ± 9.2	75.2 ± 8.1	86.9 ± 9.7
	p-value	0.65	0.11	<0.001
BMI (kg/m^2)	HCPb	32.2 ± 1.9	27.4 ± 1.8	24.9 ± 1.9
	LCb	32.3 ± 1.9	26.9 ± 1.7	30.9 ± 2.0
	p-value	0.79	0.08	<0.001
Waist circumference (cm)	HCPb	110.7 ± 3.1	103.3 ± 4.3	96.4 ± 5.3
	LCb	110.4 ± 3.2	102.5 ± 4.3	108.7 ± 3.6
	p-value	0.46	0.28	<0.001
FASTING VALUES				
Fasting glucose (mg/dl)	HCPb	94.4 ± 7.0	86.2 ± 5.6	84.2 ± 4.6
	LCb	94.6 ± 7.4	85.1 ± 6.7	95.5 ± 4.9
	p-value	0.81	0.26	<0.001
Fasting insulin (μU/ml)	HCPb	21.7 ± 3.6	12 6 ± 3.4	8.9 ± 3.9
	LCb	21.7 ± 3.6	13.9 ± 4.8	23.69 ± 3.8
	p-value	0.97	0.30	<0.001
HOMA-IR	HCPb	5.0 ± 0.9	2.5 ± 0.5	1.6 ± 0.4
	LCb	5.1 ± 0.9	2.4 ± 0.5	5.9 ± 0.9
	p-value	0.89	0.19	<0.001
Total cholesterol (mg/dl)	HCPb	211.8 ± 17.6	189.1 ± 10.6	179.2 ± 11.1
	LCb	212.3 ± 19.8	188.6 ± 13.2	190.8 ± 18.2
	p-value	0.87	0.81	<0.001
Triacylglycerol (mg/dl)	HCPb	174.4 ± 17.6	140.8 ± 10.9	122.6 ± 9.7
	LCb	174.5 ± 22.6	134.9 ± 7.9	174.5 ± 20.9
	p-value	0.98	<0.001	<0.001
HDL cholesterol (mg/dl)	HCPb	45.8 ± 5.3	48.8 ± 4.9	50.9 ± 4.9
	LCb	47.4 ± 5.3	51.2 ± 5.0	48.0.2 ± 5.0
	p-value	N/A	N/A	N/A
LDL cholesterol (mg/dl)	HCPb	157.2 ± 17.4	133.3 ± 10.8	122.2 ± 12.3
	LCb	156.2 ± 20.6	130.7 ± 14.2	134.1 ± 19.5
	p-value	N/A	N/A	N/A
CRAVING SCORES				
Sweets	HCPb	12.9 ± 1.9	9.7 ± 3.7	8.4 ± 4.3
	LCb	12.78 ± 2.3	15.4 ± 1.8	17.1 ± 1.8
	p-value	0.34	<0.001	<0.001
Fats	HCPb	10.1 ± 1.8	9.2 ± 2.6	8.1 ± 2.9
	LCb	9.8 ± 1.9	11.3 ± 1.7	12.3 ± 1.9
	p-value	0.14	<0.001	<0.001
Carb/starch	HCPb	12.6 ± 1.5	8.8 ± 3.8	8.2 ± 4.1
	LCb	12.6 ± 1.6	15.7 ± 1.9	16.6 ± 1.9
	p-value	0.85	<0.001	<0.001
Fast foods	HCPb	12.8. ± 1.6	9.2 ± 3.6	8.5 ± 3.9
	LCb	13.2 ± 1.6	15.9 ± 1.9	16.6 ± 2.0
	p-value	0.15	<0.001	<0.001
General craving	HCPb	48.6 ± 4.7	37.1 ± 12.9	33.2 ± 14.7
	LCb	48.5 ± 4.8	58.4 ± 5.7	62.7 ± 6.1
	p-value	0.57	<0.001	<0.001
BREAKFAST MEAL CHALLENGE AUC				
Ghrelin $AUC_{240\ min}$ pg/ml × 240 min	HCPb	219,431 ± 7479	204,325 ± 5579	201,115 ± 7295
	LCb	275,432 ± 13,873	280,100 ± 11,735	282,968 ± 9526
	p-value	<0.001	<0.001	<0.001
Ghrelin nadir (pg/ml)	HCPb	300.7 ± 35.9	243.3 ± 13.6	239.1 ± 23.4
	LCb	350.5 ± 26.6	357.6 ± 17.1	363.9 ± 20.5
	p-value	<0.001	<0.001	<0.001
Insulin $AUC_{240\ min}$ μU/ml × 240 min	HCPb	28,564 ± 3543	20,282 ± 3031	14,798 ± 4364
	LCb	29,066 ± 3001	18,050 ± 3859	29,816 ± 5863
	p-value	0.34	<0.001	<0.001
Hunger $AUC_{240\ min}$	HCPb	19,346 ± 2310	19,301 ± 2475	19,890 ± 2204
	LCb	35,499 ± 2436	40,651 ± 3264	40,639 ± 3110
	p-value	<0.001	<0.001	<0.001
Satiety $AUC_{240\ min}$	HCPb	41,407 ± 3035	41,047 ± 3683	41,749 ± 2872
	LCb	24,955 ± 2736	26,200 ± 6852	25,320 ± 2844
	p-value	<0.001	<0.001	<0.001

Data are indicated as mean ± SD. HCPb = energy-, carbohydrate- and protein-enriched breakfast diet; LCb = low carbohydrate breakfast diet. Conversion factors (metric units to SI units); glucose, mg/dl × 0.056 = mmol/l; insulin, μU/ml × 6.0 = pmol/L; ghrelin, pg/ml × 3.371 = pmol/L; total cholesterol, mg/dl × 0.0259 = mmol/l; triacylglycerol, mg/dl × 0.0113 = mmol/l; HDL-cholesterol, mg/dl × 0.0259 = mmol/l.

Period, ($p = 0.03$) in the LCb group. In the HCPb group after the Follow-up Period at Week 32, nadir ghrelin levels were significantly lower than at the end of the Follow-up Period in the LCb group ($p < 0.0001$) (Table 3). Nadir ghrelin, was significantly, inversely correlated with body weight after Diet Intervention Period ($r = -0.35$, $p < 0.0001$) and after Follow-up Period ($r = -0.42$, $p < 0.0001$) in both groups. Additionally, nadir ghrelin was positively correlated with all cravings scores at Week 16 and Week 32.

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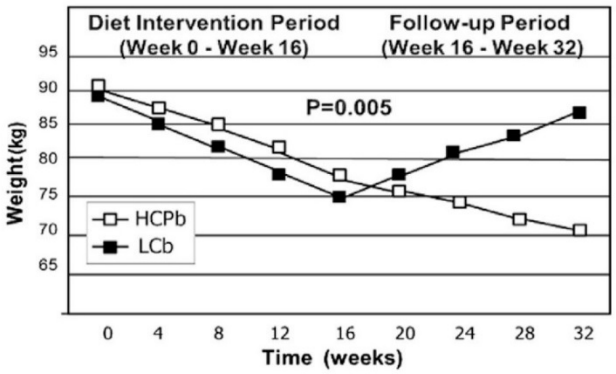

Fig. 2. Body weight by Diet Intervention Group. The *p*-value is for general linear model repeated measures comparisons. HCPb = energy-, carbohydrate- and protein-enriched breakfast diet group, white squares: □ LCb = low carbohydrate breakfast diet group, black squares: ■.

3.6.3. Hunger, satiety VAS scores

At each breakfast challenge: baseline, Week 16 and Week 32, hunger AUC was significantly lower, while satiety AUC was significantly higher after the breakfast in the HCPb group than in LCb group ($p < 0.0001$) (Table 3). In the HCPb group, significant differences in satiety and hunger scores were not detected from challenge to challenge. By contrast, a significant increase in hunger was observed in the LCb group between baseline and after the Follow-up Period.

4. Discussion

In this study we observed that two isocaloric diets which differed in meal timing and composition resulted in similar weight reduction at the end of the Diet Intervention Period. Weight regain after diet-induced weight loss was observed only in the LCb group, as has been reported in previous studies [4]. Subjects in the HCPb group were more successful in maintaining reduced weight; moreover, they continued losing weight during the Follow-up Period. Possible explanatory mechanisms for this between-group difference in weight maintenance outcomes include the different influence of both of the assigned diets on appetite, cravings and posprandial ghrelin levels.

Hunger and satiety response after the breakfast meal at baseline were consistent with previous reports [30,31,34]. Specifically, hunger scores were significantly lower and satiety scores significantly higher in the HCPb compared to the LCb group. By the end of Diet Intervention Period, despite similar weight reduction in both groups, hunger scores increased significantly in the LCb group. This group reported significantly more hunger than subjects in the HCPb group. Contrastly, weight reduction was not associated with an increase in posprandial hunger in the HCPb group; furthermore, HCPb subjects continued losing weight during the Follow-up Period and continued to report suppressed hunger throughout this period. This effect of an enriched breakfast on hunger and satiety persisted over time and was not less pronounced at Week 32 than after the baseline breakfast meal challenge, indicating a persistence of the treatment effect even in individuals habituated to a large breakfast [30]. These findings suggest that an enriched breakfast may represent a useful strategy to maintain weight loss and prevent weight regain over time.

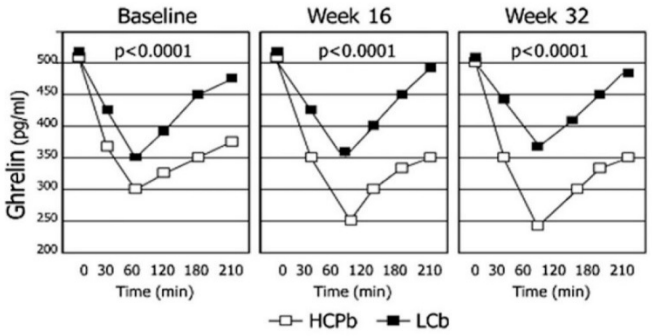

Fig. 3. Ghrelin suppression after breakfast meal challenge at baseline, Week 16 and Week 32 by diet intervention group. The *p*-values are for GLM repeated measures comparison by group. HCPb = energy-, carbohydrate- and protein-enriched breakfast diet group, white squares: □ LCb = low carbohydrate breakfast diet group, black squares: ■.

All craving scores decreased in the HCPb group, especially for sweets and fats. By contrast, an overall increase in craving was observed in the LCb group, including general cravings and cravings for sweets, high fats, carbohydrates/starches and fast foods. The greatest between-group difference was craving for sweets, which were significantly higher in the LCb than in the HCPb group. Increased craving, particularly craving for sweets, was strongly associated with the regain of weight observed during the Follow-up Period in the LCb group. The weight reduction observed in the HCPb group during the Follow-up Period was correlated with decreased craving scores, especially for sweets and fats.

In many weight loss diets, energy is restricted concomitantly with the restricted intake of preferred foods, leading to an increase in the reinforcement value of the omitted or restricted food. This may be expressed as increased cravings for the desired food [14,41]. In contrast, repeated reinforcer presentation leads to a reduction of reinforcer efficacy and reduced motivation to obtain the desired food [36,42]. It is possible that the consumption of sweets at breakfast in the HCPb diet group [chocolate bar, chocolate mousse, cake, or donut] represents repeated reinforcement leading to reduced cravings.

Ghrelin suppression has been shown to be impaired in obese subjects, suggesting a defect in ghrelin-induced satiety mechanisms [43]. In this study, even before weight reduction, ghrelin levels were significantly more suppressed after HCPb than LCb breakfast, suggesting that breakfast composition might overcome the obesity related defect in ghrelin suppression. This between-group difference in ghrelin suppression is also consistent with previous reports showing greater ghrelin suppression after carbohydrate enriched vs. protein- or lipid-enriched meals [44,45].

Recent studies have shown that diet induced weight loss is associated with decreased posprandial ghrelin suppression, that persist over long time and that would be expected to facilitate regain of lost weight [21]. Despite similar weight loss in both groups at the end of the Diet Intervention Period, the association between-diet induced weight loss and decreased posprandial ghrelin suppression was seen only in the LCb group. By contrast, HCPb group subjects exhibited a significant increase in ghrelin suppression at Week 16. This suggests an improvement of ghrelin suppression after diet-induced weight loss which occurs selectively following a carbohydrate-enriched breakfast [46]. Moreover, despite additional weight loss in the Follow-up Period in the HCPb group, nadir posprandial ghrelin remained suppressed. This implies that in the HCPb group, meal timing or diet composition or both, overcame or prevented the decrease of ghrelin suppression as has been shown in previous studies [21,22].

Cravings, especially for sweets and carbohydrates/starches, have been shown to be associated with ghrelin levels [47]. The strong association between nadir ghrelin levels and all craving scores categories observed in our study may represent an alternative mechanism through which in the HCPb group the craving scores were significantly reduced.

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Findings of the present study must be considered in the framework of the study's limitations. First, the between-group similarity in weight loss at Week 16 suggests similar within-group compliance, and the large between-group weight difference at Week 32 suggests that LCb subjects ceased dietary compliance while the subjects in the HCPb group maintained adherence even in the Follow-up Period. On the other hand, subjects in the HCPb group consumed added protein and carbohydrates in the morning, while the LCb group consumed a higher energy meal in the evening. This was necessary to ensure that the two diets remained isocaloric. Subjects in both groups lost weight until Week 16, indicating that both calorie-restricted diets resulted but in short term weight loss. The direct effects of meal timing (morning vs. evening consumption of carbohydrates) were not tested; however, this is the subject of our ongoing study.

In summary, increased hunger and craving scores coupled with decreased ghrelin suppression after diet induced weight loss in the LCb group was correlated with failed maintenance of weight reduction; on the contrary, progressive weight regain was observed during the Follow-up Period. This suggests that LCb subjects were not able to comply with this weight loss strategy over time. Subjects in the HCPb group continued losing weight during the Follow-up Period, implying that a carbohydrate- and protein-enriched diet may represent a strategy with which individuals can comply over the long term.

5. Conclusion

We found that the compensatory changes of appetite, craving and circulating as well as posprandial ghrelin that facilitate obesity relapse after diet-induced weight loss was prevented by addition of high carbohydrate, protein and calorie enriched breakfast. To achieve long term weight loss, the diet meal timing and macronutrient composition has to counteract the compensatory mechanisms that encourage weight regain after weight loss.

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Thank you!

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We look forward to serving even more students in the future.

Thank you!

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