Final Progress Report for Research Projects Funded by Health Research Grants

Instructions: Please complete all of the items as instructed. Do not delete instructions. Do not leave any items blank; responses must be provided for all items. If your response to an item is "None", please specify "None" as your response. "Not applicable" is not an acceptable response for any of the items. There is no limit to the length of your response to any question. Responses should be single-spaced, no smaller than 12-point type. The report **must be completed using MS Word**. Submitted reports must be Word documents; they should not be converted to pdf format. Questions? Contact Health Research Program staff at 717-783-2548.

1. **Grantee Institution:** The Trustees of the University of Pennsylvania

2. **Reporting Period (start and end date of grant award period):** 1/1/2010-12/31/2013

3. **Grant Contact Person (First Name, M.I., Last Name, Degrees):** Gearline R. Robinson-Hall, BSF

4. **Grant Contact Person's Telephone Number:** 215-746-6821

5. **Grant SAP Number:** 4100050912

6. **Project Number and Title of Research Project:** 5 - Does Neural Activation During Nicotine Abstinence Predict Smoking Relapse?

7. **Start and End Date of Research Project:** 6/1/2010-12/31/2013

8. **Name of Principal Investigator for the Research Project:** Caryn Lerman, PhD

9. **Research Project Expenses**.

   9(A) Please provide the total amount of health research grant funds spent on this project for the entire duration of the grant, including indirect costs and any interest earned that was spent:

   $ 396,652.56

   9(B) Provide the last names (include first initial if multiple individuals with the same last name are listed) of **all** persons who worked on this research project and were supported with health research funds. Include position titles (Principal Investigator, Graduate Assistant, Post-doctoral Fellow, etc.), percent of effort on project and total health research funds expended for the position. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name	Position Title	% of Effort on Project	Cost
Lerman	PI	2% Yr 4	$10,510.07
Jepson	Director C	5% Yr 2; 28% Yr 4	$21,124.41
Falcone	Res. Investigator	58% Yr 4	$27,500.00
Ware	Database Admin.	46% Yr 4	$35,140.40
Kerns	Executive Asst.	27% Yr 4	$21,833.34
Thomas	Clin. Research Asst.	59% Yr 1; 39% Yr 2	$14,790.25

9(C) Provide the names of **all** persons who worked on this research project, but who *were not* supported with health research funds. Include position titles (Research Assistant, Administrative Assistant, etc.) and percent of effort on project. For multiple year projects, if percent of effort varied from year to year, report in the % of Effort column the effort by year 1, 2, 3, etc. of the project (x% Yr 1; z% Yr 2-3).

Last Name, First Name	Position Title	% of Effort on Project
Leah La Prate	Project Manager	30% all years
Paul Wileyto	Statistician	5% all years
James Loughead	Assistant Professor	20% year 1 and 3
Steve Siegel	Study MD	3% all years
John Detre	Study MD	3% all years

9(D) Provide a list of **all** scientific equipment purchased as part of this research grant, a short description of the value (benefit) derived by the institution from this equipment, and the cost of the equipment.

Type of Scientific Equipment	Value Derived	Cost
None		

10. Co-funding of Research Project during Health Research Grant Award Period. Did this research project receive funding from any other source during the project period when it was supported by the health research grant?

Yes__X_____ No_____

If yes, please indicate the source and amount of other funds:

Additional support for magnetic resonance imaging scans, recruitment and participant incentives was provided by a P50 Center grant to Dr. Lerman P50 CA143187

11. Leveraging of Additional Funds

11(A) As a result of the health research funds provided for this research project, were you able to apply for and/or obtain funding from other sources to continue or expand the research?

Yes____X_____ No_____

If yes, please list the applications submitted (column A), the funding agency (National Institutes of Health—NIH, or other source in column B), the month and year when the application was submitted (column C), and the amount of funds requested (column D). If you have received a notice that the grant will be funded, please indicate the amount of funds to be awarded (column E). If the grant was not funded, insert "not funded" in column E.

Do not include funding from your own institution or from CURE (tobacco settlement funds). Do not include grants submitted prior to the start date of the grant as shown in Question 2. If you list grants submitted within 1-6 months of the start date of this grant, add a statement below the table indicating how the data/results from this project were used to secure that grant.

A. Title of research project on grant application	B. Funding agency (check those that apply)	C. Month and Year Submitted	D. Amount of funds requested:	E. Amount of funds to be awarded:
Retraining Neurocognitive Mechanisms of Cancer Risk Behavior	X☐NIH ☐ Other federal (specify:__) ☐ Nonfederal source (specify:_)	November 2011	$2,549,618	$2,005,412

11(B) Are you planning to apply for additional funding in the future to continue or expand the research?

Yes___X_____ No_____

If yes, please describe your plans:

These data will be used to submit a grant to evaluate the efficacy of neuromodulation interventions that target brain regions identified in this study.

12. Future of Research Project. What are the future plans for this research project?

We have a rich data set and will continue to publish the results of secondary analyses.

13. New Investigator Training and Development. Did students participate in project supported internships or graduate or post-graduate training for at least one semester or one summer?

Yes_____ No____X_____

If yes, how many students? Please specify in the tables below:

	Undergraduate	Masters	Pre-doc	Post-doc
Male				
Female				
Unknown				
Total				

	Undergraduate	Masters	Pre-doc	Post-doc
Hispanic				
Non-Hispanic				
Unknown				
Total				

	Undergraduate	Masters	Pre-doc	Post-doc
White				
Black				
Asian				
Other				
Unknown				
Total				

14. Recruitment of Out-of–State Researchers. Did you bring researchers into Pennsylvania to carry out this research project?

Yes_____ No____X_____

If yes, please list the name and degree of each researcher and his/her previous affiliation:

15. Impact on Research Capacity and Quality. Did the health research project enhance the quality and/or capacity of research at your institution?

Yes___X_____ No_____

If yes, describe how improvements in infrastructure, the addition of new investigators, and other resources have led to more and better research.

This project was vital to enhance our capacity in the area of neuroimaging, including data acquisition, neurobehavioral probe task development, and data analytic procedures for fMRI.

16. Collaboration, business and community involvement.

16(A) Did the health research funds lead to collaboration with research partners outside of your institution (e.g., entire university, entire hospital system)?

Yes____X_____ No_____

If yes, please describe the collaborations:

We established a new collaboration with Dr. Elliot Stein and his team within the Intramural Research Program at the National Institutes on Drug Addiction. This collaboration led to the JAMA Psychiatry article described in Question 20.

16(B) Did the research project result in commercial development of any research products?

Yes_____ No____X_____

If yes, please describe commercial development activities that resulted from the research project:

16(C) Did the research lead to new involvement with the community?

Yes____X_____ No_____

If yes, please describe involvement with community groups that resulted from the research project:

This project enabled us to provide smoking cessation counseling to underserved smokers residing in the West Philadelphia area.

17. Progress in Achieving Research Goals, Objectives and Aims.

List the project goals, objectives and specific aims (as contained in the grant agreement). Summarize the progress made in achieving these goals, objectives and aims for the period that the project was funded (i.e., from project start date through end date). Indicate whether or not each goal/objective/aim was achieved; if something was not achieved, note the reasons why. Describe the methods used. If changes were made to the research goals/objectives/aims, methods, design or timeline since the original grant application was submitted, please describe the changes. Provide detailed results of the project. Include evidence of the data that was generated and analyzed, and provide tables, graphs, and figures of the data. List published abstracts, poster presentations and scientific meeting presentations at the end of the summary of progress; peer-reviewed publications should be listed under item 20.

This response should be a DETAILED report of the methods and findings. It is not sufficient to state that the work was completed. Insufficient information may result in an unfavorable performance review, which may jeopardize future funding. If research findings are pending publication you must still include enough detail for the expert peer reviewers to evaluate the progress during the course of the project.

Health research grants funded under the Tobacco Settlement Act will be evaluated via a performance review by an expert panel of researchers and clinicians who will assess project work using this Final Progress Report, all project Annual Reports and the project's strategic plan. After the final performance review of each project is complete, approximately 12-16 months after the end of the grant, this Final Progress Report, as well as the Final Performance Review Report containing the comments of the expert review panel, and the grantee's written response to the Final Performance Review Report, will be posted on the CURE Web site.

There is no limit to the length of your response. Responses must be single-spaced below, no smaller than 12-point type. If you cut and paste text from a publication, be sure symbols print properly, e.g., the Greek symbol for alpha (α) and beta (ß) should not print as boxes (□) and include the appropriate citation(s). DO NOT DELETE THESE INSTRUCTIONS.

Project Goals (in Strategic Plan)

(1) To test whether the changes in rCBF, and resting state functional connectivity after overnight abstinence versus smoking as usual, predict smoking relapse, and

(2) To test whether BOLD fMRI during performance of validated neurocognitive tasks predicts smoking relapse.

Original Methods: One hundred participants enrolled in this trial will be invited to complete two MRI scans (one smoking as usual and one after 14 hours of abstinence from nicotine; order counterbalanced). Following the fMRI scans, they will receive smoking cessation counseling and be followed for 8 weeks to confirm smoking status. Identification of the neural substrates of relapse following a quit attempt could inform the development of novel medications. Further, the identification of a "brain signature" that predicts relapse may allow for the use of neuroimaging to screen novel medications and identify those that reverse the liability profile.

Changes to Original Methods: We completed the study with a total of 82 smokers completing two fMRI scans (total of 164 fMRI scans). Recruitment proved to be more costly than anticipated. We were therefore not able to enroll the full sample of 100 participants with available funds in the necessary timeline. That said, this is the largest study of this kind ever conducted to date. Given the data showing the expected low quit rates for counseling only (no medication), we focus our analyses on early quitting success (first 7 days). This measure has been shown to be highly predictive of quitting success at 6 months.

Results

Goal 1: Changes in brain function and connectivity after overnight abstinence versus smoking as usual

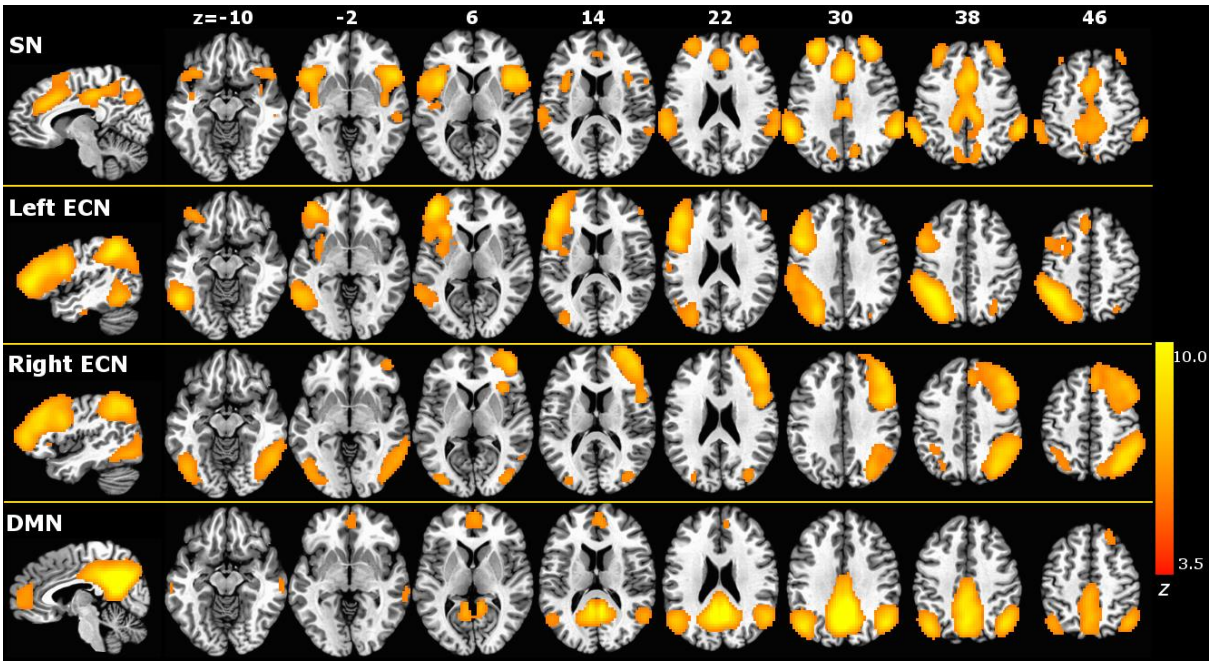
Goal 1:. Age-related Differences in Working Memory Deficits During Nicotine Withdrawal: This analysis tested the hypotheses that (1) abstinence would be associated with decreased BOLD signal in the medial frontal/cingulate gyrus (MF/CG) and the dorsolateral PFC (DLPFC);

(2) decreases in activation would predict poorer task performance (i.e. decreased accuracy and slower response times); and (3) these effects would vary across different age groups of smokers. Abstinence (versus smoking) led to reduced accuracy, slower median correct response time and reduced BOLD signal change in the three a priori regions of interest: medial frontal/cingulate gyrus and right and left dorsolateral prefrontal cortex. Significant age x session effects were found for BOLD signal change in all three regions, as well as for withdrawal and craving; for all measures, abstinence effects were attenuated in smokers aged ≥50 years compared with those <50 years old. These results suggest that abstinence effects on neurocognitive function may be more pronounced for younger smokers, and may indicate a new avenue for research exploring mechanisms underlying age differences in smoking cessation success.

Note: Unfortunately, we neglected to include the acknowledgement to the Commonwealth in this publication and therefore, as per the guidelines, it is not included in the publications list in Question 20. The paper is Falcone et al., *Addiction Biology*, 2013.

Large-Scale Brain Network Coupling Predicts Acute Nicotine Abstinence Effects on Craving and Cognitive Function: We tested the hypothesis that the strength of coupling among 3 large-scale resting state networks – salience, executive control, and default mode- will reflect the state of withdrawal and predict abstinence-induced cravings and cognitive function. For this analysis, we developed and tested a composite measure of connectivity between these networks, examined abstinence effects, and used this to predict clinical outcomes.

Figure 1

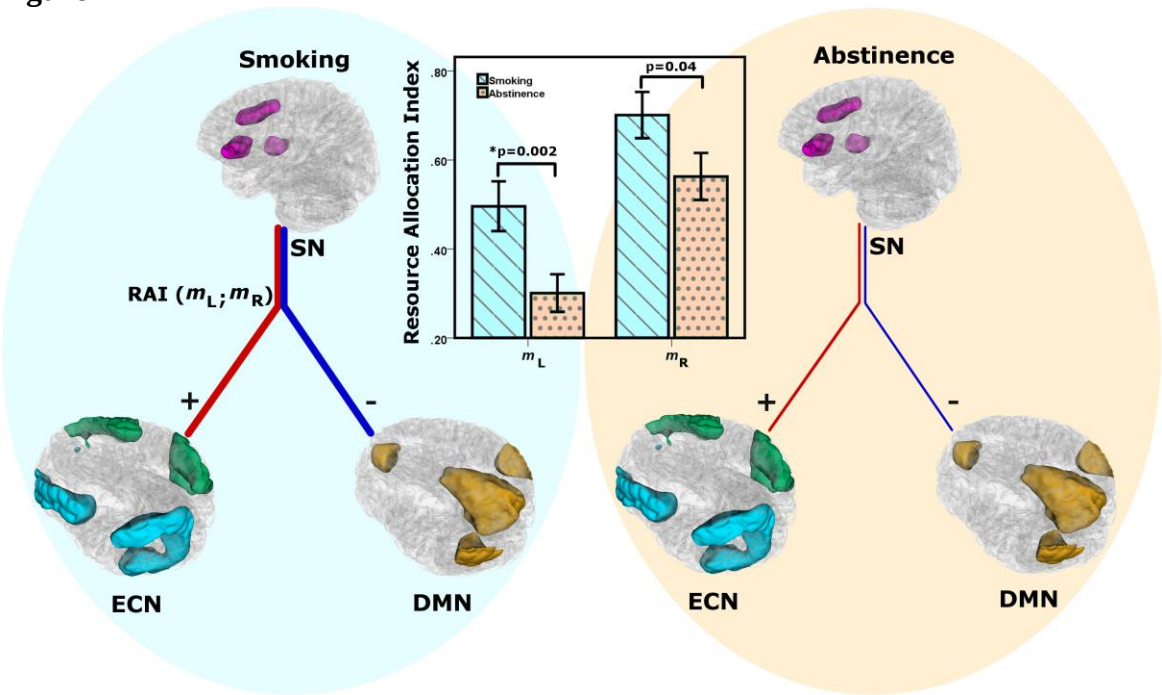


As shown in Figure 1 above, four networks were generated from group Independent Component Analysis (gICA) of the resting state data identified as the Salience Network (SN), Default Mode Network (DMN), and left/right Executive Control Network (ECN). Spatial maps were converted to *z*-score images and then thresholded at $Z = 3.5$ via a mixture model fit. Network maps are displayed in red-yellow overlaid onto the Talairach standard brain based on neurological (left =

left) convention. The key SN regions included dorsal ACC/paracingulate gyrus (Talairach coordinates: 3, 21, 33), bilateral anterior insula (L: -39, 9, 3; R: 51, 15, 0), DLPFC (L: -30, 45, 30; R: 30, 48, 30), supramarginal gyrus (L: -57, -45, 30; R: 57, -42, 33), and precuneus (12, -69, 36). Together the LECN and RECN covered bilateral DLPFC (L: -42, 45, 6; R: 45, 33, 25), parietal cortices (L: -39, -51, 42; R: 39, -57, 48), middle temporal gyrus (L: -51, -54, -9; R: 51, -57, -9), and dorsal medial frontal gyrus (L: -6, 27, 45; R: 6, 30, 45). The DMN included PCC (6, -57, 27), bilateral angular gyrus (L: -42, -69, 33; R: 48, -63, 30), vmPFC/rostral ACC (3, 54, 3), and temporal gyrus (L: -57, -9, -15; R: 60, -18, -15).

In Figure 2 below, rendered brain figures illustrate network components identified by group ICA. Compared with smoking, the Resource Allocation Index (RAI) m_L decreased in abstinence (p = 0.002); m_R showed a decreasing trend (p = 0.04). The thinner width of the path connecting Salience Network and Executive Control Network (SN-ECN), as well as the path connecting Salience Network and Default Mode Network (SN-DMN), in abstinence (vs. smoking) illustrates decreased coupling between the networks.

Figure 2



As shown in Figure 3, below there was a significant reduction in correlation between Salience Network and Default Mode Network (SN,DMN) (p = 0.02) in abstinence versus in the smoking condition.

Figure 3

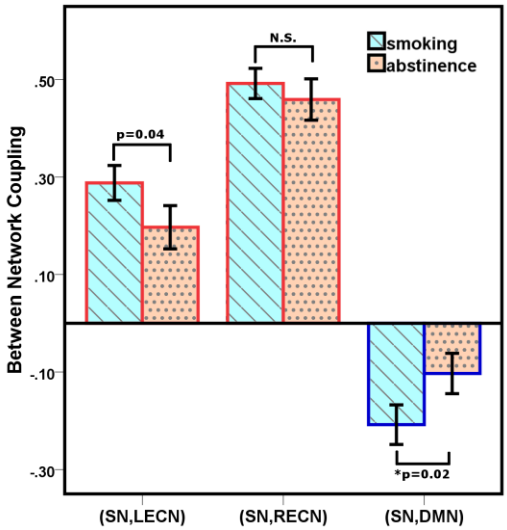
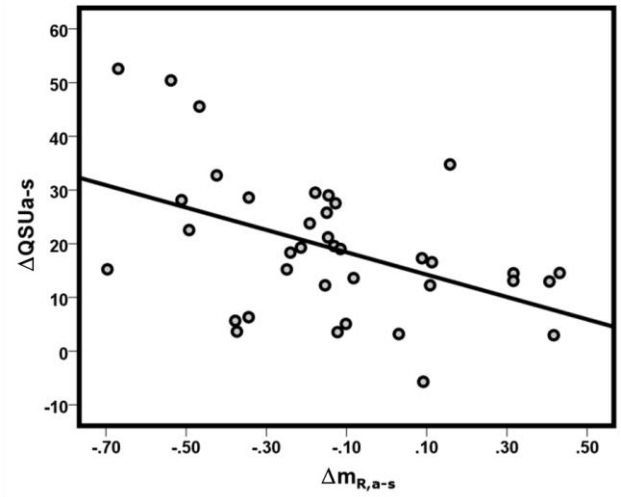


Figure 4 below shows partial regression plots of the difference of QSU-brief urge score ΔQSU_{a-s} against the difference of the Resource Allocation Index (RAI) $\Delta m_{R,a-s}$ between the abstinence and smoking sessions. As the RAI measure of connectivity differences in abstinence (vs. smoking) was reduced, craving symptoms in abstinence (vs. smoking) were increased. In addition, there was a significant negative correlation between the RAI change and change in BOLD signal during subsequent performance of a working memory task in the vmPFC and PCC; these results suggest that as connectivity decreased in abstinence versus smoking at rest, there was less suppression of these default mode network regions during the working memory task. Thus, as hypothesized, we have linked resting state brain activity with clinical symptoms that promote smoking relapse.

Figure 4



The findings of this study (*JAMA Psychiatry*, in press) provide novel evidence that resting state functional connectivity between the salience network and the executive control and default mode networks is decreased during abstinence. Importantly, the greater the reduction in coupling, the more severe the cravings to smoke (an important clinical symptom that predicts relapse). Further, resting state measures predicted working memory-related BOLD signal, specifically the ability to suppress regions in the default mode network in which activity is associated with task-irrelevant thoughts. In conclusion these data support the clinical predictive value of a novel resting state neuroimaging biomarker. Future grants will be submitted to conduct additional validation studies for relapse prediction.

Goal 2: Working Memory Related BOLD fMRI Predicting Relapse

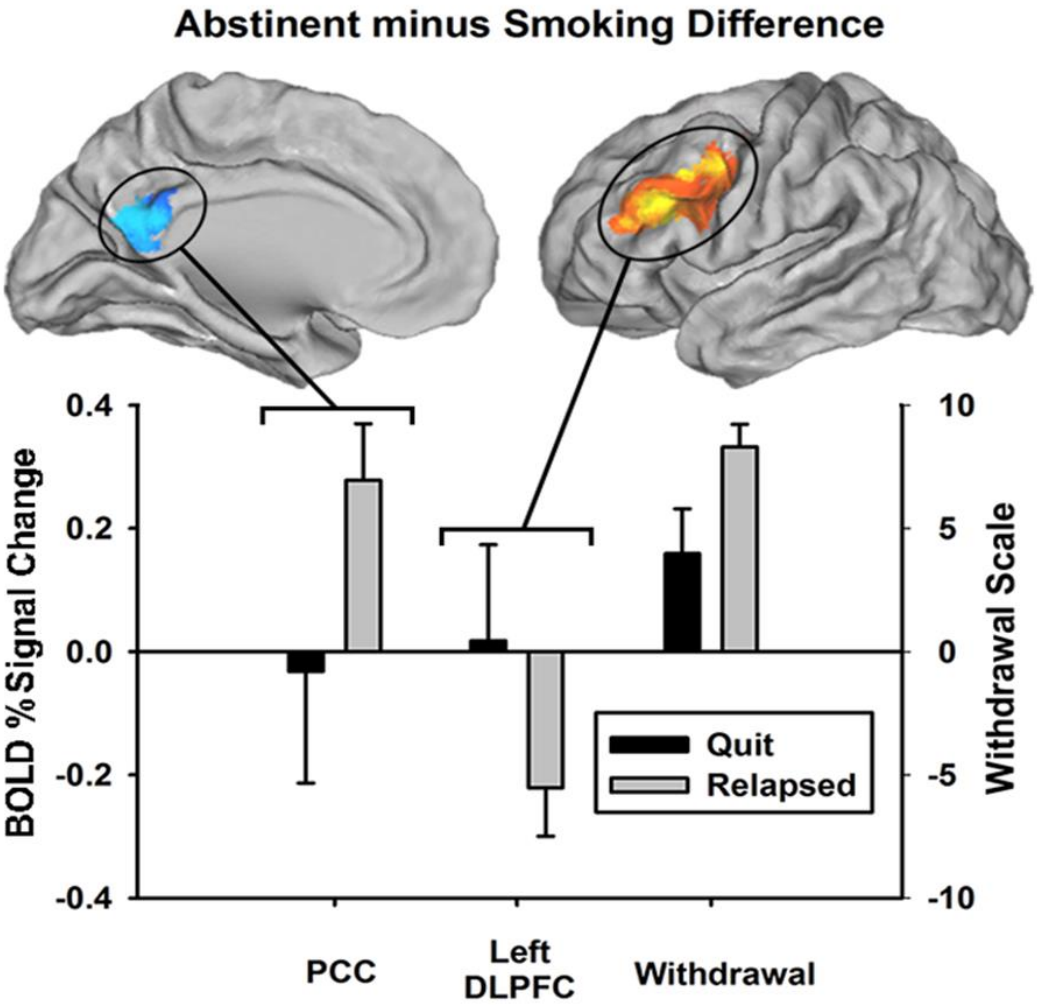
We conducted further analysis from this study to test the hypothesis that increased working memory related BOLD signal in task positive regions and suppression of activity in default mode network regions would predict short term smoking relapse. Seventy-two treatment seeking smokers completed two fMRI sessions (smoking as usual vs. 24hr abstinent) during performance of a visual N-back task. This was followed by brief counseling and a short-term quit attempt. Relapse during the first 7 days was biochemically confirmed by the presence of the nicotine

metabolite cotinine. Mean percent signal change was extracted from *a priori* regions of interest: bilateral DLPFC, MF/CG, PCC, and vmPFC. Signal from these brain regions and additional clinical measures were used to model outcome status, which was then tested with resampling techniques for validation.

As shown in Figure 5, relapse to smoking was predicted by increased withdrawal symptoms, decreased DLPFC and increased PCC activation (abstinence minus smoking). ROC analysis demonstrated 81% correct classification of relapses for the full model, a significant improvement over the model with clinical variables only.

We conclude that abstinence-induced decreases in left DLPFC activation and reductions in suppression of left PCC activation is a marker for smoking relapse. Mechanisms identified are potential targets for development of neuroscience-based interventions for smoking behavior change.

Figure 5



18. Extent of Clinical Activities Initiated and Completed. Items 18(A) and 18(B) should be completed for all research projects. If the project was restricted to secondary analysis of clinical data or data analysis of clinical research, then responses to 18(A) and 18(B) should be "No."

18 (A) Did you initiate a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?

_X____Yes
_____No

18(B) Did you complete a study that involved the testing of treatment, prevention or diagnostic procedures on human subjects?
_X___Yes
_____No

If "Yes" to either 18(A) or 18(B), items 18(C) – (F) must also be completed. (Do NOT complete 18(C-F) if 18(A) and 18(B) are both "No.")

18(C) How many hospital and health care professionals were involved in the research project?
___2___Number of hospital and health care professionals involved in the research project

18(D) How many subjects were included in the study compared to targeted goals?

__100___Number of subjects originally targeted to be included in the study
__82____Number of subjects enrolled in the study

Note: Studies that fall dramatically short on recruitment are encouraged to provide the details of their recruitment efforts in Item 17, Progress in Achieving Research Goals, Objectives and Aims. For example, the number of eligible subjects approached, the number that refused to participate and the reasons for refusal. Without this information it is difficult to discern whether eligibility criteria were too restrictive or the study simply did not appeal to subjects.

18(E) How many subjects were enrolled in the study by gender, ethnicity and race?

Gender:
__47___Males
__35___Females
_____Unknown

Ethnicity:
__5___Latinos or Hispanics
__77___Not Latinos or Hispanics
_____Unknown

Race:
_____American Indian or Alaska Native
___1___Asian
__45___Blacks or African American
_____Native Hawaiian or Other Pacific Islander
__31___White
___3___ More than one race
___1___Other, specify:_Puerto Rican_____
___1___Unknown

18(F) Where was the research study conducted? (List the county where the research study was conducted. If the treatment, prevention and diagnostic tests were offered in more than one county, list all of the counties where the research study was conducted.)

Philadelphia County only

19. Human Embryonic Stem Cell Research. Item 19(A) should be completed for all research projects. If the research project involved human embryonic stem cells, items 19(B) and 19(C) must also be completed.

19(A) Did this project involve, in any capacity, human embryonic stem cells?
_____Yes
_X___ No

19(B) Were these stem cell lines NIH-approved lines that were derived outside of Pennsylvania?
____Yes
____ No

19(C) Please describe how this project involved human embryonic stem cells:

20. Articles Submitted to Peer-Reviewed Publications.

20(A) Identify all publications that resulted from the research performed during the funding period and that have been submitted to peer-reviewed publications. Do not list journal abstracts or presentations at professional meetings; abstract and meeting presentations should be listed at the end of item 17. **Include only those publications that acknowledge the Pennsylvania Department of Health as a funding source** (as required in the grant agreement). List the title of the journal article, the authors, the name of the peer-reviewed publication, the month and year when it was submitted, and the status of publication (submitted for publication, accepted for publication or published.). Submit an electronic copy of each publication or paper submitted for publication, listed in the table, in a PDF version 5.0.5 (or greater) format, 1,200 dpi. Filenames for each publication should include

the number of the research project, the last name of the PI, and an abbreviated title of the publication. For example, if you submit two publications for Smith (PI for Project 01), one publication for Zhang (PI for Project 03), and one publication for Bates (PI for Project 04), the filenames would be:

Project 01 – Smith – Three cases of isolated
Project 01 – Smith – Investigation of NEB1 deletions
Project 03 – Zhang – Molecular profiling of aromatase
Project 04 – Bates – Neonatal intensive care

If the publication is not available electronically, provide 5 paper copies of the publication.

Note: The grant agreement requires that recipients acknowledge the Pennsylvania Department of Health funding in all publications. Please ensure that all publications listed acknowledge the Department of Health funding. If a publication does not acknowledge the funding from the Commonwealth, do not list the publication.

Title of Journal Article:	Authors:	Name of Peer-reviewed Publication:	Month and Year Submitted:	Publication Status (check appropriate box below):
1. Large scale brain network coupling predicts acute nicotine abstinence effects on craving and cognitive function	Lerman C, Gu H, Loughead J, Ruparel K, Yang Y, Stein EA	JAMA Psychiatry	April 2013	☐ Submitted ☐ Accepted ☒ Published

20(B) Based on this project, are you planning to submit articles to peer-reviewed publications in the future?

Yes___X_____ No_____

If yes, please describe your plans:

Additional papers examining results from secondary cognitive tasks will be prepared as will a paper on the composite model described above.

21. Changes in Outcome, Impact and Effectiveness Attributable to the Research Project. Describe the outcome, impact, and effectiveness of the research project by summarizing its impact on the incidence of disease, death from disease, stage of disease at time of diagnosis, or other relevant measures of outcome, impact or effectiveness of the research project. If there were no changes, insert "None"; do not use "Not applicable." Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

These findings have important clinical implications:

1. fMRI BOLD signal change in response to abstinence challenge may be a valid predictor of smoking relapse. With further validation, such a measure could be applied prior to treatment to identify smokers most likely to relapse and who may need more intensive smoking cessation interventions.
2. The brain regions and networks identified in these results can now be considered as novel targets for the development of new treatment for neuromodulation to assist with smoking cessation. Examples of treatment strategies that can target these regions include neurocognitive training and noninvasive brain stimulation.

22. Major Discoveries, New Drugs, and New Approaches for Prevention Diagnosis and Treatment. Describe major discoveries, new drugs, and new approaches for prevention, diagnosis and treatment that are attributable to the completed research project. If there were no major discoveries, drugs or approaches, insert "None"; do not use "Not applicable." Responses must be single-spaced below, and no smaller than 12-point type. DO NOT DELETE THESE INSTRUCTIONS. There is no limit to the length of your response.

As described above, we have discovered that brain responses to an abstinence challenge predict risk of smoking relapse above and beyond standard clinical variables. This information can aid in the diagnosis of smokers and targeted therapy for smoking cessation.

23. Inventions, Patents and Commercial Development Opportunities.

23(A) Were any inventions, which may be patentable or otherwise protectable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of work under this health research grant? Yes____ No X

If "Yes" to 23(A), complete items a – g below for each invention. (Do NOT complete items a - g if 23(A) is "No.")

a. Title of Invention:

b. Name of Inventor(s):

c. Technical Description of Invention (describe nature, purpose, operation and physical, chemical, biological or electrical characteristics of the invention):

d. Was a patent filed for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?
Yes_____ No____

If yes, indicate date patent was filed:

e. Was a patent issued for the invention conceived or first actually reduced to practice in the performance of work under this health research grant?
Yes_____ No____
If yes, indicate number of patent, title and date issued:
Patent number:
Title of patent:
Date issued:

f. Were any licenses granted for the patent obtained as a result of work performed under this health research grant? Yes_____ No____

If yes, how many licenses were granted?_____

g. Were any commercial development activities taken to develop the invention into a commercial product or service for manufacture or sale? Yes___ No____

If yes, describe the commercial development activities:

23(B) Based on the results of this project, are you planning to file for any licenses or patents, or undertake any commercial development opportunities in the future?

Yes_____ No_____X_____

If yes, please describe your plans:

24. Key Investigator Qualifications. Briefly describe the education, research interests and experience and professional commitments of the Principal Investigator and all other key investigators. In place of narrative you may insert the NIH biosketch form here; however, please limit each biosketch to 1-2 pages.

BIOGRAPHICAL SKETCH

NAME Lerman, Caryn	POSITION TITLE Mary W. Calkins Professor
eRA COMMONS USER NAME CLERMAN	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MO/YRS	FIELD OF STUDY
Pennsylvania State University, University Park, PA	B.S.	05/1981	Psychology
University of Southern California, Los Angeles, CA	M.A.	05/1982	Psychology
University of Southern California, Los Angeles, CA	Ph.D.	05/1984	Clinical Psychology

A. Personal Statement

Dr. Lerman is the Mary W. Calkins Professor in the Department of Psychiatry and the Deputy Director of the Abramson Cancer Center at the University of Pennsylvania. She is an Elected Member of the Institute of Medicine of the National Academy of Sciences, and has served as a member of the National Cancer Institute Board of Scientific Advisors and the National Human Genome Research Institute Advisory Council. She is a current member of the National Institute on Drug Abuse Advisory Council and past President of the Society for Research on Nicotine and Tobacco. Her research focuses on nicotine addiction medication development, pharmacogenetics, and neuroimaging.

B. Positions and Honors

Positions and Employment

1985-1986 Assistant Professor of Psychiatry, Director of Health Psychology, Medical College of Pennsylvania, Philadelphia, PA
1986-1988 Assistant Professor of Medicine and Psychiatry, Temple University School of Medicine, Philadelphia, PA
1988-1993 Associate Member, Director of Behavioral Oncology Research, Fox Chase Cancer Center, Philadelphia, PA
1993-1998 Associate Professor, Departments of Medicine and Psychiatry, Georgetown University Medical Center (GUMC), Washington, DC
1998-2001 Professor, Departments of Oncology and Medicine, Georgetown University Medical Center (GUMC), Washington, DC
2001-2006 Associate Director, Cancer Control and Population Sciences, Abramson Cancer, University of Pennsylvania, Philadelphia, PA
2001-pres. Mary W. Calkins Professor, Department of Psychiatry and Annenberg Public Policy Center, University of Pennsylvania, Philadelphia, PA
2010-2011 Interim Director, Abramson Cancer Center, University of Pennsylvania, Philadelphia, PA
2006-pres. Deputy Director, Abramson Cancer Center, University of Pennsylvania, Philadelphia, PA
2013-pres. Director, Neuroscience of Behavior Initiative, University of Pennsylvania, Philadelphia, PA

Honors

1981 Phi Beta Kappa
1981 Magna Cum Laude, Pennsylvania State University
1989 New Investigator Award, Society of Behavioral Medicine
1991 Preventive Oncology Academic Award, National Cancer Institute/National Institutes of Health
1995 Award for Outstanding Contributions to Health Psychology, American Psychological Assn.
1. Joseph Cullen Memorial Award, American Society of Preventive Oncology
2007 Alton Ochsner Award Relating Smoking and Health, American College of Chest Physicians
2007 American Cancer Society, Cancer Control Award - Southeastern Pennsylvania
2008 Arthur Asbury Outstanding Faculty Mentor Award, University of Pennsylvania

2009 Elected President of the Society for Research on Nicotine and Tobacco
2010 Elected Member, Institute of Medicine of the National Academy of Sciences
2011 William Osler Patient-Oriented Research Award, University of Pennsylvania

C. Selected Peer-Reviewed Publications (Out of 349)

Lerman C, et al. BRCA1 testing in families with hereditary breast-ovarian cancer. A prospective study of patient decision-making and outcomes. Journal of the American Medical Association, 1996; 275(24):1885-1892.

Lerman C, et al. Genetic testing in families with hereditary nonpolyposis colon cancer. Journal of the American Medical Association, 1999; 281(17):1618-1622.

Lerman C, et al. Individualizing nicotine replacement therapy for the treatment of tobacco dependence. Annals of Internal Medicine, 2004; 140(6):426-433.

Lerman C, et al. Translational research in medication development for nicotine dependence. Nature Reviews Drug Discovery, 2007; 6(9)746-762.

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BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
James W. Loughead	Reseach Accociate
eRA COMMONS USER NAME (credential, e.g., agency login)	
jloughead	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
University of Delaware, Newark, DE	B.A.	1984-1989	Political Science
New Mexico Highlands University, Las Vegas, NM	M.S.	1995-1997	Psychology
Drexel University, Philadelphia, PA	Ph.D.	1997-2002	Clinical Neuropsychology
University of Pennsylvania, Philadelphia, PA	Post-Doc	2003-2006	Clinical Neuropsychology

A. Personal Statement

I received my doctorate in Clinical Neuropsychology from Drexel University in 2002. After I completed a NIH sponsored neuroimaging fellowship at the University of Pennsylvania in 2006, I was appointed as an Assistant Professor of Psychology in Psychiatry at that institution. I am experienced in traditional neuropsychological assessment as well as the development and use of computerized cognitive assessment. I served as the director of fMRI studies at the Center for Neuroimaging in Psychiatry since 2006 and in 2009 was named co-director of the Center. For the proposed study, I will be responsible for the implementation the computerized cognitive testing and neuroimaging components. My team will be responsible for scheduling, adherence to procedures during image acquisition and data transfer for image processing, and appropriate application of image analysis procedures. I will also supervise the personnel responsible for tasks administration during fMRI measurements and data analysis.

B. Positions and Honors

1998-2002 *Adjunct Instructor*, Drexel University, Philadelphia, PA
2002-2012 *Adjunct Assistant Professor*, Drexel University, Philadelphia, PA
2006-2012 *Assistant Professor,* University of Pennsylvania School of Medicine, Philadelphia, PA
2013-present *Research Associate,* University of Pennsylvania School of Medicine, Philadelphia, PA (Associate Proefessor Apointment Pending)

C. Selected Peer-reviewed Publications

Loughead J, Gur RC, Elliott M, Gur RE (2008). "Neural circuitry for accurate identification of facial emotions." Brain Res 1194:37-44 (PMID: 18191116).

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Ashare RL, Valdez JN, Ruparel K, Albelda B, Hopson RD, Keefe, JR, **Loughead J,** Lerman C (2013). "Association of abstinence-induced alterations in working memory function and COMT genotype in smokers." Psychopharmacology (Berl) 230(4):653-662 (PMID: 23828159; PMC3840089).

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