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Date: February 15, 2013

Name and degree(s): Jennifer Lewis, MD, MS

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Pager #: 3938

Current Residency Year: HO2

Faculty mentor: Dr. Jeff Petty and Dr. Kate Weaver

Title of Project: Low Dose CT Lung Cancer Screening Practices and Attitudes among Primary Care Providers

Previous research experience (summarize experience below and attach your CV/resume):

I first became involved in basic science research as a college student when I spent a summer working on anti-angiogenic cancer research and learned basic techniques in sterile tissue culture. My interest in research then led me to take a post-baccalaureate fellow position at the National Cancer Institute (NCI) at the National Institutes of Health. At NCI, I spent two years in a core laboratory performing affinity gel purification of proteins, gel electrophoresis, Western blots, and ELISA assays while working on a quantitative Western blot for a protein called gamma-glutamyl hydrolase. During medical school, I participated in the "Research Track," and was awarded a Gill Fellowship, which allowed me the opportunity and funding to focus on a project exploring molecular carcinogenesis. Specifically, my project involved studying double stranded DNA breaks and cellular repair mechanisms in death sensitive and death resistant cells when exposed to various genotoxins. This experience culminated in an abstract publication in our medical school journal, *Fusion*, as well as a poster presentation at GW's Research Day symposium. Since that time, I have presented two case report presentations: the first as a fourth-year medical student on a patient with a bronchogenic cyst at GW's Research Day, and another case report on two patients who developed a severe hemolytic anemia while on an HDAC inhibitor and dapsons at the Wake Forest Resident Research Day in 2012.

Statement of career goals including any research plans after residency:

I enjoyed several years of basic science research, and benefited from the detail-oriented, technical, and analytical aspects of this work. As a resident, I would like to broaden my experience to include clinical research. The proposed research project will achieve this goal as well as complement my background in basic research. One of my personal goals is to present on a national level and have that research published in a peer-reviewed journal. Pursuing research in this manner is important because I plan to pursue a career in academic Hematology Oncology, for which I believe the Harrison scholarship would provide me with a solid foundation of research experience and mentorship.

Research Plan:

Background

Lung cancer is the leading cause of cancer deaths worldwide¹. In the United States alone, lung cancer is expected to cause more than 160,000 deaths in 2012². The current 5-year survival of lung cancer is 16%³ but increases to 52.2% for localized disease³. Therefore, a screening method to detect lung cancer before the onset of symptoms would be optimal.

The gold-standard measurement of a screening test is its ability to improve mortality in randomized clinical trials⁴. Prior studies evaluating chest radiograph for lung cancer screening failed to show a mortality benefit⁵. However, in late 2010 the National Lung Screening Trial (NLST) showed a 20% reduction in lung cancer specific mortality, as well as a 6.7% benefit for "all cause" mortality, with low dose computed tomography (LDCT) in a high-risk patient population when compared to radiography⁶.

Following the results of this large, randomized controlled trial, several organizations have published guidelines for lung cancer screening with LDCT. The American Society of Clinical Oncology recommends LDCT screening for 55-74 year-olds with a 30 pack-year smoking history who are current smokers, or nonsmokers who quit in the past 15 years, with annual LDCT in settings that can deliver comprehensive cancer care similar to that provided to NLST participants⁷. Other organizations that have developed guidelines include the National Comprehensive Cancer Network⁸, the American Association for Thoracic Surgery⁹, the American Cancer Society¹⁰.

It is well established that physician recommendation is a crucial predictor of cancer screening behavior of patients¹¹. Furthermore, previous studies have found that primary care providers frequently order lung cancer screening tests despite evidence-based recommendations and guidelines^{12,13}. However, since the publication of these new guidelines for low dose chest CT scans, lung cancer screening attitudes and practices among primary care providers are largely unknown as there are no studies to date. It is therefore critical to understand lung cancer screening behaviors, providers' attitudes, and the barriers that may exist to lung cancer screening.

Research Plan

The goal of this research is to survey primary care providers at Wake Forest Baptist Medical Center (n= 211) regarding their practices and attitudes towards using low dose chest CT for lung cancer screening. We have developed a survey using adapted questions from NCI cancer screening questionnaires (NCI National Survey of Primary Care Physicians' Cancer Screening Recommendations and Practices, Colorectal and Lung Cancer Screening Questionnaire^{13,14} and NCI Survey of Colorectal Cancer Screening Practices: Primary Care Physician Questionnaire^{15, 16}) with additional content added as necessary to address the following aims:

Aim 1: To determine the current lung cancer screening practices of primary care physicians.

Aim 2: To reveal the attitude(s) held by primary care physicians towards effectiveness of LDCT for lung cancer screening compared with their attitudes toward mammography, colorectal cancer screening, pap smears, and prostate specific antigen testing.

Aim 3: To determine primary care providers' knowledge of published guidelines for lung cancer screening, and specifically, the appropriate target patient population.

Aim 4: To determine the barriers that may exist at the patient, system, and primary care practice levels for implementation of lung cancer screening with LDCT.

Aim 5: To identify potential educational opportunities regarding lung cancer screening targeted to meet the needs of primary care providers.

Hypothesis: Less than 25% of primary care providers will report that they have ordered a low dose chest CT for lung cancer screening in the past 12 months. More than half of primary care providers will lack awareness of current guideline recommendations for low dose CT screening for lung cancer. The most commonly endorsed barriers to screening implementation will include lack of insurance coverage for this procedure and concerns about radiation exposure & efficacy.

The survey will be conducted online using the HIPAA-compliant Research Electronic Data Capture (REDCap) Survey software. Prior to the launching the institution-wide survey, we will conduct two pilot surveys using 6-8 participants representative of the survey sample but outside of the sample population. The first pilot will be used to assess the adequacy of the survey question content and format. The second pilot study will examine the usability of the electronic format of the survey. Following the pilot study, the final survey will be distributed to the Wake Forest community of primary care providers. We plan to distribute this questionnaire before, and possibly after, the US Preventive Task Force publishes its recommended guidelines. This includes Internal Medicine residents and attendings, Family Medicine residents and attendings, and Obstetric and Gynecology residents and attendings who provide primary care services. At the end of the survey, participants will be invited to enter their e-mail address into a drawing for a \$50 Amazon.com gift card.

Analytic Plan

Dr. Janet Tooze will perform statistical analysis of the survey results.

Aim 1: To determine the current lung cancer screening practices of primary care physicians. The percent of providers who have ordered chest radiograph, sputum cytology, low dose chest CT, initiated discussions about risks/benefits of lung cancer screening and discussed CT results with a self-referred patient will be calculated. The distribution of the frequency of ordering LDCT screening for at risk patients (rarely, sometimes, usually, always) and the likelihood of recommending LDCT lung cancer screening in the future (very likely, somewhat likely, not likely, don't know) will be determined. We will examine potential correlates of those providers who 1) usually or always order LDCT lung cancer screening and 2) those who are somewhat or very likely to recommend screening using logistic regression analyses. Potential correlates will include provider age, years in practice, specialty, and attitudes towards LDCT screening.

Aim 2: To reveal the attitude(s) held by primary care physicians towards effectiveness of LDCT for lung cancer screening compared to mammography, colorectal cancer screening, pap smears, and PSA. The distribution of attitudes (very effective, somewhat effective, minimally effective, not effective, do not know) towards the effectiveness of different cancer screening techniques in reducing cancer-specific mortality will be described. The percent of providers who report that LDCT screening is less effective will be calculated for each screening modality (e.g., mammography, colorectal cancer screening).

Aim 3: To determine primary care providers' knowledge of published guidelines for lung cancer screening, and specifically, the appropriate patients to screen. The percent and 95%

CI of providers who correctly identify LDCT screening eligibility criteria (e.g., patient age, number of pack years), interval of screening, and Medicare reimbursement for LDCT screening will be calculated. We will examine potential correlates (eg. provider age, years in practice, specialty, and attitudes towards LDCT screening) of providers who have greater knowledge (calculated as a sum of the knowledge questions) using linear regression.

Aim 4: To determine the barriers that may exist at the patient, system, and primary care practice levels for lung cancer screening with LDCT. The percent and 95% CI of providers who endorse each barrier will be calculated.

Aim 5: To identify potential opportunities for lung cancer screening education targeted to meet the needs of primary care providers. The percent of providers who prefer each modality of education (online, on-site, conference, periodical) and their time commitment preference (<5 min, 6-10 min, 11-30 min, >30 min) will be identified. These answers will guide future education outreach to the medical community.

Anticipated Results & Next Steps

The information obtained from the survey will be used to develop educational resources for primary care providers to improve implementation of evidence-based lung cancer screening. The results will be submitted to a peer-review journal for publication and submitted for presentation at a national conference.

Literature cited:

1. World Health Organization Cancer mortality and morbidity. *WHO* (2012). at http://www.who.int/gho/ncd/mortality_morbidity/cancer/en/index.html
2. American Cancer Society. *Cancer Facts and Figures 2012*. (American Cancer Society: Atlanta, 2012). at < <http://www.cancer.org/cancer/lungcancer-nonsmallcell/detailedguide/non-small-cell-lung-cancer-key-statistics> >
3. Howlander N, N.A. SEER Cancer Statistics Review 1975-2008. at http://seer.cancer.gov/csr.1975_2008/
4. Franco EL, Duarte-Franco E, Rohan TE. Evidence-based policy recommendations on cancer screening and prevention. *Cancer Detection and Prevention* 2002;26:350-361.
5. Oken MM, Hocking WG, Kvale PA, Andriole GL, Buys SS, Church TR et al. Screening by chest radiograph and lung cancer mortality: the Prostate, Lung, Colorectal, and Ovarian (PLCO) randomized trial. *JAMA* 2011;306:1865-73.
6. The National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. *The New England Journal of Medicine* 2011;365:395-407.
7. Bach PB, Mirkin JN, Oliver TK, Azzoli CG, Berry DA, Brawley OW et al. Benefits and harms of CT screening for lung cancer: a systematic review. *JAMA* 2012;307:2418-2429.
8. National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Lung Cancer Screening. Version 1.2013. at http://www.nccn.org/professionals/physician_gls/pdf/lung_screening.pdf
9. Jaklitsch MT, Jacobson FL, Austin JH, Field JK, Jett JR et al. The American Association for Thoracic Surgery guidelines for lung cancer screening using low-dose computed

- tomography scans for lung cancer survivors and other high risk groups. *The Journal of Thoracic and Cardiovascular Surgery* 2012;144:33-8.
10. Wender R, Fontham ET, Barrera E, Colditz GA, Church TR et al. American Cancer Society lung cancer screening guidelines. *CA: a cancer journal for clinicians* 2013;[Epub ahead of print].
 11. Zapka JG, Lemon SC. Interventions for patients, providers, and health care organizations. *Cancer* 2004;101:1165-1187.
 12. Klabunde CN, Marcus PM, Silvestri GA, Han PK et al. U.S. primary care physicians' lung cancer screening beliefs and recommendations. *American Journal of Preventive Medicine* 2010;39:411-20.
 13. Klabunde CN, et al. Lung cancer screening practices of primary care physicians: results from a national survey. *Annals of Family Medicine* 2012;10:102-110.
 14. National Cancer Institute Survey of Primary Care Physicians' Cancer Screening Recommendation and Practices. 2006.
http://healthservices.cancer.gov/surveys/screening_rp/screening_rp_colo_lung_inst.pdf
 15. Klabunde CN, et al. Colorectal cancer screening by primary care physicians: recommendations and practices 2006-2007. *American Journal of Preventive Medicine* 2009;37:8-16.
 16. National Cancer Institute Survey of Colorectal Cancer Screening Practices-Primary Care Physician Questionnaire. At
<http://healthservices.cancer.gov/surveys/colorectal/prim0520.pdf>

Budget (if your project requires any supplies or payment for services please describe the costs and the source of funds that will be used to support the project. It is expected that the mentor will provide this support. In the unusual case that additional funds are needed, please explain.)

The major cost of the survey is the incentives used to increase participation; we will use 20 Amazon gift cards worth \$50. The mentor(s) have agreed to cover this cost.

Timeline: The standard time available for Harrison scholars is two research blocks in the HO2 year with additional elective time (1 to 2 months) that can be used for research in the HO3 year. Please describe a brief timeline for your project, indicating when you will accomplish key steps (such as background literature review, finalizing study design, obtaining needed IRB approvals, conducting the research, analyzing the data, and writing your results):

Finalize survey & IRB submission: March & April 2013

Complete 1st pilot study: May 2013

Survey revisions and Build Redcap database: May-June 2013

Complete 2nd pilot study: June 2013

Complete institution survey: July 2013

Analyze data and abstract/manuscript development: September 2013

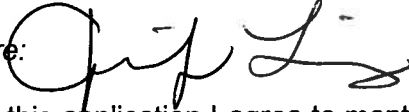
Manuscript submission: December 2013

Poster presentation at a national or international conference: ACP, ASCO, ASCO Thoracic Oncology Symposium, or other conference

Signatures:

Tinsley R. Harrison Translational Research Scholar Program Application
Academic Year 2013-2014

Applicant (by signing this application I agree, if selected, to abide by the requirements of the Harrison Scholars program including presentation of research in the IM Resident Research Seminar series and at IM Research Day)

Electronic Signature: 

Mentor (by signing this application I agree to mentor the resident on this project and provide the resources needed for successful completion).

Electronic Signature:  

Please return completed application and a current CV to Kate O'Hara, MD, ACM for Research: cohara@wakehealth.edu. Applications for the 2013-2014 Academic Year are due by **February 21, 2013**.