Cancer Control and Population Sciences Program  
HCl Annual Progress Reporting  
Kathleen Mooney, PhD, RN, and Sean Tavtigian, PhD, Program Co-Leaders

PROGRAM GOALS AND CHARACTERISTICS
Themes, emphases, and goals of our program **remain the same** as described in HCI’s 2014 CCSG competitive application and site visit:
1. Translational Cancer Predisposition Genetics
2. Cancer Behavioral and Outcomes Research

A number of CCPS members cross both themes, and our studies and collaborations utilize a variety of methods, including molecular and genetic laboratory, bioinformatics, population science, and clinical research approaches.

<table>
<thead>
<tr>
<th>CCPS 2015 PROGRAM CHARACTERISTICS</th>
<th>#</th>
<th>%</th>
<th>$/($</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEMBERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>29</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>20</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Departments</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools/Colleges</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Members with Funding</td>
<td>32</td>
<td>65%</td>
<td></td>
</tr>
<tr>
<td>Full Members with Funding*</td>
<td>28</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>Full Members with PR Funding*</td>
<td>23</td>
<td>79%</td>
<td></td>
</tr>
<tr>
<td><strong>FUNDING (TC)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCI</td>
<td>30</td>
<td></td>
<td>5,345,749</td>
</tr>
<tr>
<td>Other NIH</td>
<td>9</td>
<td></td>
<td>2,840,177</td>
</tr>
<tr>
<td>Other PR</td>
<td>5</td>
<td></td>
<td>169,094</td>
</tr>
<tr>
<td>Total PR</td>
<td>44</td>
<td></td>
<td>8,355,020</td>
</tr>
<tr>
<td>Industry</td>
<td>11</td>
<td></td>
<td>803,723</td>
</tr>
<tr>
<td>Other non-PR</td>
<td>18</td>
<td></td>
<td>1,187,715</td>
</tr>
<tr>
<td>Total Non-PR</td>
<td>29</td>
<td></td>
<td>1,991,438</td>
</tr>
<tr>
<td>Grand Total</td>
<td>73</td>
<td></td>
<td>10,346,458</td>
</tr>
</tbody>
</table>

| DEGREES                           |    |    |        |
| MD                                | 11 | 22%  |        |
| MD/PhD                           | 1  | 2%   |        |
| PhD                              | 37 | 76%  |        |
| **RANK**                          |    |      |        |
| Assistant Professor               | 15 | 31%  |        |
| Associate Professor               | 9  | 18%  |        |
| Professor                        | 24 | 49%  |        |
| Visiting Instructor               | 1  | 2%   |        |
| **CLINICAL TRIALS (2014)**        |    |      |        |
| Number of Trials                  |    |      |        |
| All trials**                      | 68 |      |        |
| Investigator-Initiated (IIT)      | 33 |      |        |
| Treatment                         | 101|      |        |
| Number of Accruals                |    |      |        |
| All trials**                      | 3773|     |        |
| Investigator-Initiated (IIT)      | 2897|     |        |
| Treatment                         | 0  |      |        |
| **PUBLICATIONS**                  |    |      |        |
| Accruals by Funding Source        |    |      |        |
| NCTN                              | 36 |      | 0      |
| Ext Peer-Reviewed                 | 1210|     | 0      |
| Institutional                     | 2348|     | 0      |
| Industry                          | 179 |      | 0      |
| **Total**                         | 3773|     | 0      |

* % of full members; **All trials: IIT, treatment, plus other. Number of trials: trials open to accrual in the given calendar year.

**Program Leadership**

Kathleen Mooney, PhD, RN, and Sean Tavtigian, PhD, continue to lead the CCPS program, having been appointed to this leadership position in May 2013. Both also continue active programs of funded research. Dr. Mooney is a well-known leader in the cancer control field of palliative care, remote telehealth symptom management, and patient reported outcomes. She is the PI on a NCI-funded P01 award; a renewal of that project is currently under review. Dr. Mooney recently received a favorable review (15 impact score, 2\textsuperscript{nd} percentile) on a new NCI R01 (Mooney, PI) that extends her work on remote telehealth symptom management.

Dr. Tavtigian is an internationally recognized molecular geneticist whose research focuses on identification and further evaluation of cancer susceptibility genes and methods of evaluating unclassified variants of cancer susceptibility genes. He is currently joint-PI on three NCI R01s and joint-PI on an NCI PPG. He recently submitted an Outstanding Investigator (R35) application, as well as a R01, and plans a new PPG submission for January 2016.
**Program Membership**

The CCPS program has benefitted from new HCI Senior Leadership appointments, with the arrivals of Cornelia Ulrich, PhD, in late 2014, to the position of Senior Director of Population Sciences and Ana Maria Lopez, MD, in 2015, to the position of Director of Cancer Health Equity. Both are CCPS members. Dr. Ulrich is an internationally known molecular epidemiologist whose research focuses on lifestyle and biologic factors in cancer prevention and cancer prognosis. She came to HCI from the German Cancer Research Center and National Center for Tumor Diseases, where she was Director, as well as Head of the Department of Preventive Oncology. Dr. Lopez is a medical oncologist. In addition to her HCI position as Director of Cancer Health Equity, she is also Associate Vice President for Health Equity and Inclusion for University of Utah Health Sciences. Her research interests include integrative oncology, cancer health disparities, and innovative uses of telemedicine. Dr. Lopez came from the University of Arizona where she was a professor of medicine and directed the telemedicine program.

Since the 2014 competitive renewal of HCI’s CCSG, we have added 11 new members, including six associate and five full members. We have continued to grow our membership through both new faculty hires and recruitment of current faculty. New members include the following: HCI and the University of Utah Communications Department strategically recruited Kimberly Kaphingst, ScD, from Washington University School of Medicine in St. Louis. Dr. Kaphingst's research interests are in health literacy, cancer communication, and the communication of genetic and genomic information. She is PI on a NCI-funded R01 study that is examining communication preferences for whole genome sequencing results among women diagnosed with breast cancer at age 40 or younger. Among internally recruited new CCPS members is Gary W. Donaldson, PhD, a professor in the Department of Anesthesiology since 2001. Previously, he was at the University of Washington Fred Hutchinson Cancer Research Center, where he still holds an affiliate investigator position. Dr. Donaldson’s research focuses on statistical methodologies related to quality-of-life research in the fields of cancer and acute and chronic pain. CCPS also recruited two professors from the department of Human Genetics, Gabor Marth, PhD and Mark Yandell, PhD, to its membership.

We are pleased with the progress and success of several of our associate members. Yelena Wu, PhD, a child psychologist who was recruited to the University of Utah and CCPS two years ago was awarded a NCI-funded K07 academic career award for her work on communicating genetic risk information to children. Jakob Jensen, PhD, an Associate Professor in the Communications Department and also recruited two years ago, was awarded a 2015 New Innovator Grant from NIH for his research program in skin cancer control. Deborah Neklason, PhD, a genetic epidemiologist, has a pending NCI R21 grant on carcinoid tumors that reviewed at the 4th percentile and Deanna Kepka, PhD, has been project director of a P30 CCSG administrative supplement grant focused on developing collaborations across several states to increase HPV vaccine uptake. She also has a pending NCI R03 application that is currently being processed. We continue to mentor and work closely with our CCPS early stage investigators.

**2015 KEY SCIENTIFIC ACCOMPLISHMENTS**

**Theme 1: Translational Cancer Predisposition Genetics**

**Familiality of less-common cancers**

Ken Boucher, PhD (CCPS), Randall Burt, MD (CCPS), Saundra Buys, MD (CCPS), Lisa Cannon-Albright, PhD (CCPS), Karen Curtin, PhD (CCPS), Heidi Hansen, PhD (CCPS), Mia Hashibe, PhD (CCPS), Will Lowrance, MD (CCPS), Deborah Neklason, PhD (CCPS), Jewel Samadder, MD (CCPS), Ken Smith, PhD (CCPS), Cornelia Ulrich, PhD (CCPS), Neeraj Agarwal, MD (ET), and Wallace Akerley, MD

Over the years, the Utah Population Database (UPDB) has been used for studies of site-specific cancer familiality, susceptibility gene discovery, and, once genes have been identified, studies of tumor spectrum and penetrance. Most of the headline results have come from the relatively common cancers for which high-risk susceptibility genes have been found, principally breast, colorectal, and ovarian cancer. This past year, CCPS members Ken Boucher, PhD, Randall Burt, MD, Saundra Buys, MD, Lisa Cannon-Albright, PhD, Karen Curtin, PhD, Heidi Hansen, PhD, Mia Hashibe, PhD, Will Lowrance, MD, Deborah Neklason, PhD, Jewel Samadder, MD, Ken Smith, PhD, and Cornelia Ulrich, PhD, teamed up in various combinations, along with Neeraj Agarwal, MD (ET), and Wallace Akerley, MD (ET), to study the familiality of carcinoid cancer, lung cancer in non-smokers, prostate cancer, and carcinoma of unknown primary.
Supported by a CCPS pilot grant, Deborah Neklason, PhD (CCPS) and team used UPDB data to examine the familiality of neuroendocrine tumors of the small intestine (carcinoid tumors). They found that siblings have a 13.4-fold relative risk, and parents have a 6.5-fold relative risk, suggesting both genetic and environmental influences. The risk extends out to 3rd degree relatives, who have a 2.3-fold relative risk. Close relatives of carcinoid cancers were also at increased risk of colon, bladder, non-Hodgkin lymphoma, melanoma, and prostate cancers (Neklason et al., Endocr Relat Cancer, 2016). This work led to an NCI R21 scoring 4th percentile.

Also using UPDB data, Drs. Akerley, Hashibe, and Cannon-Albright examined the familiality of lung cancer among both smokers and non-smokers. While both subsets showed elevated relative risks for close relatives, only the non-smoking-related subset of cases showed significant excess relatedness when close relationships were ignored (Carr et al., Thorax, 2015). This latter result provides evidence for a genetic contribution from moderate to high-risk susceptibility genes to lung cancer susceptibility.

Carcinoma of Unknown Primary (CUP) accounts for 3-5% of all cancers, but familial clustering of this constellation of tumors has not been examined. From analyses of UPDB data, Dr. Samadder and team found that first-degree relatives of CUP cases had a 1.35-fold increased risk of CUP themselves, as well as 1.2-fold to 1.4-fold increased risk of lung cancer, pancreatic cancer, myeloma, and non-Hodgkin lymphoma. The constellation of site-specific tumors over-represented among the relatives of CUP cases may suggest the sites of origin of a large fraction of CUP tumors (Samadder et al., JAMA Oncology, 2015).


Intersection of Themes 1 and 2: Influence of Genetics on Behavior and Outcomes

Reducing risk of melanoma: towards genetic counseling for childhood carriers of CDKN2a (p16) mutations
Lisa Cannon-Albright, PhD (CCPS) and David Goldgar, PhD (CCPS)

In 1994, CCPS members Dr. Cannon-Albright and David Goldgar, PhD, used UPDB-derived pedigrees to demonstrate that CDKN2A (p16) is an important melanoma susceptibility gene. At that time, mutation screening of CDKN2A in melanoma cell lines revealed an excess of somatic variants that were likely to be the consequence of UV-induced thymidine dimers, pointing towards a role for sunburn in the development of melanoma in mutation carriers.

Given the suspected etiology of early life sunburns in the development of melanoma, it is important to develop methods to encourage healthy sun behaviors in children who carry these mutations. However, there has been no research that examines individuals’ discussions about melanoma preventive behaviors with children and grandchildren after melanoma genetic testing.

With CCPS pilot funding, program members Drs. Wu, Lisa Aspinwall, PhD, and Sancy Leachman, MD, as well as Genetic Counseling Shared Resource Leader, Wendy Kohlmann, examined individuals’ intentions to discuss melanoma preventive behaviors with children and grandchildren following p16 genetic test reporting and counseling, as well as whether individuals followed through on these intentions (Wu et al., J Community Genet 2015). There were substantial proportions of participants who reported an intention to increase discussion of healthy sun behaviors with offspring, but who reported discussing preventive behaviors infrequently at one and six months. p16 carriers reported more frequent overall discussion of screening and risk behaviors compared with non-carriers. For both carriers and non-carriers, the frequency of discussion of preventive behaviors with children and grandchildren decreased significantly over time (from the time of genetic test reporting and counseling to six months post-genetic test reporting). Their results indicate that genetic test reporting and individualized genetic counseling alone do not appear to sustain individuals’ discussions about preventive behaviors for a hereditary cancer with their offspring who are at risk for the
illness. Individuals who receive melanoma genetic testing could benefit from additional support focused on ongoing discussions with offspring about establishing lifelong healthy sun habits.

This year, Dr. Wu received a K07 award to continue research towards translational approaches to melanoma prevention in children at high genetic risk in other areas of genetic susceptibility, for example, inherited mutations in DNA homologous recombination repair genes, where childhood and adolescent exposures may interact with inherited mutations to dramatically increase cancer risks many years later.


**Theme 2: Cancer Behavioral and Outcomes Research**

*Home hospice cancer care*

Lee Ellington, PhD (CCPS), Margaret Clayton, PhD (CCPS), and Maija Reblin, PhD (CCPS)

Funded by an NCI behavioral Program Project Grant, CCPS members Lee Ellington, PhD, Margaret Clayton, PhD, and Maija Reblin, PhD, have been studying the interaction between home hospice nurses and family caregivers. Family caregivers are often at the frontline of symptom management for cancer patients in home hospice. These caregivers need to take advice from hospice nurses, but also face distressing issues during care and after bereavement.

Informational support—guiding family caregivers in knowing what to do—is often a key component of a home hospice nurse’s job. It is extremely important that the nurses explain to the caregiver what they are likely to encounter. In recorded and coded conversations between nurses and caregivers, the nurses most often mentioned Informational, Esteem, Tangible, and, finally, Emotional support, but with little difference in the frequency of each of these types of support. Thus, it appears that the nurses saw these types of support to be needed in equal measure across the range of their caseloads. In contrast, the family caregivers most often mentioned Tangible, followed by Informational and Emotional support, and least mentioned Esteem support. This result suggests that the nurses could become more sensitive and adept at matching their interventions to the caregiver’s needs (Reblin et al., Palliat Support Care, 2015).

An interesting observation from these studies was that during treatment of the terminally ill patient, the family caregivers often report being so focused on their spouse/partner’s needs that they rarely spoke with hospice staff about their own personal needs and emotions. After the patient’s death, bereavement counseling generally came in the form of generic pamphlets or phone calls from someone that they had not met during prior interactions with hospice staff. This appears to be a missed opportunity for hospices to address the family-oriented goals often described in their mission statements (Tabler et al., J Soc Work End Life Palliat Care, 2015).

Looking forward, their team also conducted a methodological study designed to capture home hospice nurse-caregiver communication, a highly understudied location and type of communication event. The study developed example protocols encompassing data collection in the home environment, large-scale, multisite secure data management, the development of theoretically-based communication coding, plus strategies to prevent coder drift and thereby improve reliability of analyses (Reblin et al., Health Communication, 2015).

Very recently, Dr. Ellington received a score of 10.0 on an R01 application that extends this work in a new direction.

Reblin M (CCPS), Cloyes KG, Carpenter J, Berry PH, Clayton MF(CCAPS), Ellington L (CCPS) Social support needs: Discordance between home hospice nurses and former family caregivers. Palliat Support Care 2015 13:465-72


RESEARCH AND/OR INITIATIVES FOCUSED ON THE NEEDS OF HCI’S CATCHMENT AREA

CCPS members are cognizant of gaps in cancer control and population science research relevant to our large catchment area, including disparities related to high risk (melanoma), poor utilization of screening and preventive strategies (HPV vaccine uptake), ethnic disparities (Native American and Latino), and disparities in care due to remote geography (rural/frontier residence). Examples include:

- Kathi Mooney, PhD—Improving palliative care for rural/frontier dwellers, through R01 and P01 projects utilizing remote, automated monitoring and coaching related to poorly controlled treatment-related or end-of-life symptoms
- Kathi Mooney, PhD, Lee Ellington, PhD, Margaret Clayton, PhD, and Mike Caserta, PhD—A pending P01 renewal focused on palliative care outreach and testing of interventions that can be delivered remotely, including to cancer patients and family caregivers living in rural/frontier communities
- Jakob Jensen, PhD—2015 NIH New Innovator Grant for research program in high-tech methods of mole identification and monitoring
- Lisa Aspinwall, PhD, Yelena Wu, PhD—A R01 examining family outcomes of genetic testing for genes associated with heightened melanoma risk
- Yelena Wu, PhD—A K07 related to genetic risk communication to children of melanoma genetic risk families
- Deanna Kepka, PhD—HPV vaccine uptake studies of parental and provider barriers, as well as studies focused on Latinos and immigrant workers. This work is funded, in part by a supplement to HCI’s P30 CCSG grant to build a multi-state coalition to increase vaccine uptake.
- Ana Maria Lopez, MD—The NCI Geographical Management of Cancer Health Disparities Program (GMaP, funded by a supplement to the HCI CCSG) is a systematic and comprehensive approach to facilitating collaboration, cooperation, information- and resource-sharing, and capacity-building among cancer health disparities researchers, trainees, outreach workers, and organizations, with the key goal of advancing cancer health disparities (CHD) research and training. In 2015, NCI named HCI as the GMaP hub serving Idaho, Montana, Nevada, North Dakota, South Dakota, Utah and Wyoming. The HCI GMaP hub will enhance regional capacity in communication/dissemination, recruitment/placement and evaluation, along with offering support and efficient management of CHD research, training, and outreach.
- Martha Slattery, PhD—HCI Staff Investigator; studies of gene-environment epidemiology among individuals of Native American ancestry
SELEcTED CCPS PUBLICATIONS YEAR 26

The journal articles listed below are selected from a total of 181 Program-related publications. Publications for dual members are reported in only one Program.

Reference | Inter Col. | Intra Col.
--- | --- | ---


