



**THEORYLAB™ (TLC) COLLABORATIVE PILOT GRANT  
APPLICATION INSTRUCTIONS**

**Effective April 2024**

**ELECTRONIC APPLICATION DEADLINE: July 15, 2024**

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**American Cancer Society, Inc.  
Extramural Discovery Science**

**Website: <http://www.cancer.org>**

**Email: [grants@cancer.org](mailto:grants@cancer.org)**

**MISSION**

**The American Cancer Society's mission is to improve the lives of people with cancer and their families through advocacy, research, and patient support, to ensure everyone has an opportunity to prevent, detect, treat, and survive cancer.**

## THEORYLAB (TLC) COLLABORATIVE PILOT GRANT

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## I. PREPARING THE APPLICATION

### 1. GENERAL INFORMATION

Both Co-PIs are required to submit an application for the project. Each Co-PI should use the same project title when submitting the application. Each Co-PI should tailor the Budget, Personnel, and Environment Sections to the components of the collaborative research they are leading and to their institution, but the remainder of the application should be the same. **Note:** When the Co-PI is listed as a Key Person in ProposalCentral this will automatically consider that person as equivalent.

### 2. ACCESSING THE GRANT APPLICATION SYSTEM

The application is not publicly available in ProposalCentral. An application will be created for each applicant in their account, which they will then edit. The application is in the active “proposals” section of the ProposalCentral account.

#### The Key Steps for Starting an Application:

- **Edit Application:** Click on “Edit”. Enter a Project Title and click SAVE.
- **Accessing Application Sections:** Once you click SAVE, the links to the other pages of the application appear in the Proposal Sections menu.

**Enable Other Users to Access this Proposal:** The PI can allow others (e.g., institutional administrators or collaborators) to view, edit, e-sign, or submit your proposal by following these steps:

- Go to <https://proposalcentral.com> and log in under the “Application Login” section.
- Click the blue Proposals tab and the **Edit** button next to the appropriate application.
- Click “Enable Other Users to Access this Proposal” in the gray menu on the left.
- Add the e-mail address at the bottom and click the **Find User** button.
- Select the appropriate access level from the drop down in the “Permissions” column and click the **Accept Changes** button. The possible access levels are:
  - **View:** View only. Cannot change any details.
  - **Edit:** Can view and change information in the application. Cannot submit the application or view the “Enable Other Users to Access this Proposal” screen.
  - **Administrator:** Can view, edit and submit the application, and can give access rights to others on the “Enable Other Users to Access this Proposal” section.

**Technical Assistance:** Detailed information is available through tutorials provided on the ProposalCentral login page. If you have problems accessing or using the electronic application process, click on “Help” or contact ALTUM Customer Service at [pcsupport@altum.com](mailto:pcsupport@altum.com) or 1-800-875-2562.

### 3. APPLICATION FORMAT

- Insert the names of the Co-PIs in the header for each section of the application.
- Type size: Use 12-point Times New Roman or 11-point Arial as the minimum font size for the text of the application. A 10-point Times New Roman or 9-point Arial font type may be used for figures, legends, and tables.

- Applications may be single- or double-spaced (if single spacing, enter a space between paragraphs).
- Margins:  $\geq 0.5$  inches all around, unless a form with different margins is supplied in the Application Templates.
- Cover Pages: The initial pages of the application are considered cover pages and are not numbered. The cover pages include the Title/Signature Page, Contact Page, General Audience Summary, Structured Technical Abstract, Statement of Cancer Relevance and Impact, Alignment with ACS Research Priority Areas, Budget and Budget Justification.
- Numbered Sections: The proposal sections are listed in the Table of Contents and must be numbered in the upper right-hand corner. Each section should be numbered independently.
- Appendix: The appendix should not be numbered.
- NIH Biosketches: Use the current NIH format for all NIH Biosketches. If the NIH has modified the NIH biosketch, applicants may use the newly modified template, or the template provided in ProposalCentral.

#### 4. CHANGES TO AN APPLICATION

**Withdrawal of Application:** Please notify the program office promptly, by email, should you decide to withdraw your application for any reason. If you are withdrawing because you have accepted funding from another organization, please let us know who will be funding your work.

**Change of Address:** Notify the program office by email of any changes of address, email or phone number, following the submission of an application. Include your name and the application number. Please update your contact information in ProposalCentral.

**Change of Institution:** If an applicant changes institutions notify the program office by email.

#### 5. REQUIRED INFORMATION

**Project Title:** Do not exceed 150 characters in length including spaces; avoid abbreviations unless necessary. The title should be the same as the Idea Abstract title. **Note:** The title will truncate after 81 characters on the cover pages.

**Principal Investigator/Applicant Information:** Some (or all) of the required information from your Professional Profile may already be displayed. If any information is outdated, stop and update the Professional Profile before completing this section and submitting an application. Please keep all contact information current.

**PI Data:** The PI demographic information is for use by the Extramural Discovery Science department. While “choose not to disclose” is an option, we **strongly encourage** all applicants to specify their gender, race, ethnicity, and sexual orientation. We use this information for statistical purposes to understand the diversity of our applicant pool. We are committed to investing in a diverse research workforce and this data enhances our ability to develop inclusive policies and new funding opportunities to address current limitations. ***This information is not accessible to peer reviewers and is not considered at peer review.*** By sharing this information with us, you help the American Cancer Society track our progress and identify areas that need improvement.

**Citizenship Status:** On ProposalCentral under “Professional Profile”, indicate your current citizenship status and country of citizenship. **Note: There are no citizenship restrictions for this grant mechanism.**

**Degree and Independent Position Dates:** Under Professional Profile, indicate the date (months and year) your terminal degree was awarded and when your first independent faculty position (or equivalent) began.

**Space:** If applicable, indicate the approximate area of committed, independent research space provided by your institution to support your research program. You must insert a value on the electronic form, even if that number is zero.

**MSI Designation:** Indicate using the radio buttons whether the PI’s institution is a US Department of Education designated Minority Serving Institution (MSI). If yes, then select the type of MSI from the dropdown list. Some common MSI combinations are provided in the dropdown menu, but the list is not exhaustive. Use the text box to enter the type if your institution’s MSI or combination is not in the list.

MSIs and Abbreviations:

- ANNH: Alaska Native and Native Hawaiian
- AANAPISI: Asian American and Native American Pacific Island Serving Institution
- HSI: Hispanic Serving Institution
- HBCU: Historically Black Colleges and Universities
- NASNTI: Native American Indian Serving Non-Tribal Institution
- PBI: Predominantly Black Institution
- TCU: Tribal Colleges and Universities

**Institutional Official:** Indicate the name and address of the official authorized to sign for the institution. Institutional Officials may electronically sign the application if required by the institution, but this is not required by ACS for submission. The PI must give the Institutional Official access to the application for e-signing to be completed. Provide a mailing address for disbursement of funds, in the event that your grant is awarded funding.

**Technology Transfer Officer (TTO):** Indicate the name and email address of the TTO. The TTO is responsible for technology transfer and other aspects of the commercialization of research that take place at a university. The TTO will be responsible for reporting all IP updates to the ACS should the project be awarded funding.

**Department Chair:** Indicate the name, department, and email address of the Department Chair. The electronic signature of the Department Chair is not required by the ACS.

**Key Personnel:** In addition to the Principal Investigator, Key Personnel (e.g., Collaborators) are defined as individuals who will contribute to the scientific development or execution of the project in a substantive, measurable way whether salaries are requested or not. Typically, these individuals have doctoral or professional degrees although individuals at the masters or baccalaureate level can be included if their contribution meets the above definition of Key Personnel. Additional information on Key Personnel can be found on the [All Grant Applications Instructions](#) document under “Required Information.”

**ORCID Identifier:** Please provide an ORCID identifier. To add the ORCID ID, click Professional Profile and connect/register for an ID. Once connected, return to your proposal and click Save.

## 6. GENERAL AUDIENCE SUMMARY

The general audience summary provides a clear overview of the proposed research to people who are **not** trained in the sciences. This summary may be read by peer review community research partners, ACS staff members, potential donors, and the public. **Community Research Partners** are individuals without formal scientific or medical training who are full voting members of peer review panels. Community Research Partners use the general summary to evaluate how the proposed work will benefit cancer patients and their families.

- **ACS staff members** use these summaries to identify projects that align with the specific interests of donors and may share them with donors.
- Staff may use the summary for communicating to local media about ACS-funded studies. Summaries of all grants funded by the Society are also made available to the public. Therefore, do not include proprietary/confidential information.

The general audience summary should not duplicate the structured technical abstract and should be written in an understandable way for the general public. Describe concisely the background, significance, question(s) being asked, information to be obtained, and potential impact of your proposed research. If symbols or Greek characters must be used, they should be spelled out to avoid formatting problems.

This form is limited to 3,100 characters, including spaces, and will truncate at that point. Comply with the character limit to permit readers (including peer reviewers) to fully appreciate the “big-picture perspective” of the proposal.

## 7. STRUCTURED TECHNICAL ABSTRACT

The structured technical abstract is a summary of the proposed research or scholarly project for **general scientific audiences**. Organize the abstract into the following sections:

- Background
- Objective/Hypothesis
- Specific Aims
- Study Design
- Anticipated Impact

This form is limited to 3,100 characters, including spaces, and will truncate at that point. Comply with the character limit to permit peer reviewers to fully appreciate the technical synopsis.

The American Cancer Society may share the structured technical abstract under a non-disclosure agreement with a third party. Therefore, do not include proprietary information. Please notify us if you do not wish to have your abstract utilized in this manner.

## 8. STATEMENT OF CANCER RELEVANCE AND IMPACT

This section is important to the stakeholders (non-scientific members) on the peer review committees as well as to several general audiences, including donors. **Avoid the use of technical jargon.** This section is limited to 1,500 characters, including spaces.

Describe how the project contributes short- and long-term to the control of cancer. For basic studies relying on experimental models (rather than human cancer cells, tissues, or clinical data) explain how the successful completion of the proposed work will lead to a better understanding of the disease or improve our ability to prevent, detect, treat or manage cancer or cancer patients.

For studies involving human subjects, what do you expect to learn about how access to care impacts the overall cancer burden? How could your study improve both delivery of care and cancer outcomes? What effects do you anticipate on the morbidity, mortality, and/or quality of life of your study population? How might further investigations find potential value for health policy?

## **9. JUSTIFICATION OF PROJECT ALIGNMENT TO RESEARCH PRIORITIES**

Explain how your proposed project aligns to the selected research priority/priorities. If your project aligns to multiple priority areas, provide additional justification of the alignment to those areas in this section as well. Please make sure that the priority area or areas are noted in the statement. Note: If the character limit is exceeded in this section, which is evaluated, it will be truncated. This form is limited to 1,500 characters, including spaces. Examples of research priority alignment statements are provided in Appendix A.

## **10. SELECTION OF RESEARCH PRIORITIES**

Select the research priority or priorities to which your proposed project most strongly aligns. You are required to select at least one research priority area. Indicate the percent alignment of your proposed project with the area(s); the total should be 100%.

### **ACS RESEARCH PRIORITIES**

The Extramural Discovery Science Department has established six areas to prioritize the research we fund to help advance our mission<sup>1</sup>. These include the following:

- **Etiology**

The American Cancer Society supports research into the causes of cancer and the incidence, initiation, and biology of cancers. To accelerate progress in understanding the causes of cancer, this priority area supports research to identify early, inherited, somatic, molecular, behavioral, environmental, and societal causes and risk factors impacting cancer incidence, progression and mortality. Research in this priority area could include:

- Understanding fundamental cellular processes in carcinogenesis including DNA damage, hypoxia, and extracellular matrix remodeling.
- Developing new cancer models to understand the intersection of genetics and exposures for cancer initiation.
- Understanding factors that contribute to tumor evolution including the adaptive immune system and its interplay with innate responses.
- Identifying and characterizing target genes involved in cancer using global scale genomic and epigenomic approaches.

- **Obesity/Healthy Eating and Active Living (HEAL)**

The American Cancer society supports research on diet, metabolism, physical activity, and nutrition-related factors to better understand these factors roles in cancer risk, progression, treatment, and survivorship. Studies can span the research continuum (i.e., from molecular to population). Research in this priority area could include:

- Determining how nutritional and environmental factors (including tumor microenvironment) alter cellular metabolism and impact cancer development, disease progression, recurrence, and survivorship.

- Studying how body size and body composition (adiposity, lean mass) impact cancer treatment, prognosis, and survivorship.
  - Testing evidence-based interventions that lead to the adaptation of a healthy diet and/or adequate levels of exercise/physical activity.
- **Screening and Diagnosis**

The American Cancer Society supports research on cancer screening and early detection, diagnostics, and prognostics. We encourage studies focused on high mortality cancers and major cancer types lacking screening tests. Studies can span the research continuum (i.e., from molecular to population-based). Research in this priority area could include:

    - Discovery and development of new screening opportunities, surveillance, and risk assessment, including developing or advancing technologies that could lead to reducing the burdens of cancer.
    - Development of diagnostic tests to distinguish high-risk early lesions from those that do not necessitate rushing into curative therapy incurring unnecessary side-effects and financial toxicity.
    - Improving understanding of the cellular and molecular underpinnings of the earliest stages of cancer and premalignant disease, with a focus on subtypes associated with health disparities.
    - Understanding and identifying barriers and social determinants of health that interfere with the adoption of recommended guidelines and/or the testing of innovative strategies to increase and sustain their uptake, equity, and effectiveness.
  - **Treatment**

The American Cancer Society supports research to develop new cancer treatments, targets, and systems to monitor and treat resistant disease and to enhance opportunities in immunotherapy and precision medicine. To accelerate progress in cancer treatment, this priority area supports research to improve models and test interventions for prevention, tumor dormancy, recurrence, resistance, and metastasis. This priority area will further generate predictive preclinical models to streamline clinical testing of combination or multi-modal therapies by funding research on tumor microenvironment, heterogeneity, microbiome, and immune escape. Research in this priority could aim to improve timely access to treatment, increase participation rates of diverse populations in clinical trials and advance our understanding of barriers to receipt of timely and high-quality treatment. Research in this priority area could include:

    - Identifying new agents, combinations, and approaches useful in cancer therapy.
    - Developing and integrating interventions which reduce barriers and social determinants of health that interfere with cancer treatments.
    - Development of systems to predict, and monitor for, resistance to treatment.
  - **Survivorship**

Survivorship research focuses on improving the survivorship journey for cancer survivors and their caregivers including physical, emotional, financial, spiritual, and supportive services, including care delivery, from diagnosis through the balance of life. Research may address access barriers to high quality, equitable cancer care, treatment-related outcomes, palliative care, and communication research. Research in this priority area could include:



- Interventions focused on symptom management, treatment adherence, patient-reported outcomes, co-morbidities, psychological, spiritual, and physical well-being, and quality of life in cancer survivors.
  - Research that addresses the mental, emotional, physical, and financial well-being of caregivers
  - Identification of prognostic factors for cancer and treatment-related outcomes
  - Research involving the delivery and practice of palliative care and the physical, mental, and emotional effects on patients receiving palliative care
  - Identifying underlying mechanisms and mitigation strategies for symptoms, adverse events, and co-morbidities that persist throughout survivorship.
- **Health Equity across the Cancer Control Continuum**  
 The American Cancer Society believes that everyone should have a fair and just opportunity to prevent, find, treat, and survive cancer. Societal issues such as poverty, education, social injustices, unequal distribution of resources and power underpin profound inequities. These macro-environmental conditions where people are born, grow, live, work and age along with the available systems supporting health are known as the social determinants of health (SDOH). The SDOH are interrelated and extend across the life span to impact health. This area of research addresses the interplay between SDOH and access to high quality care and services across the cancer continuum to achieve optimal outcomes for all. Research may include:
    - Multilevel research and multilevel interventions addressing root causes of cancer health disparities related to SDOH including classism and structural racism leading to improved health outcomes.
    - Implementation research involving underserved communities to test novel strategies for getting research evidence into clinical and public health practice.
    - Culturally tailored approaches to health promotion strategies.
    - Testing interventions addressing financial barriers, cost benefit, cost effectiveness and implications of health insurance and health policy on care across the cancer continuum.
    - Increasing diversity in clinical trial participants to improve access to cutting edge treatments and generalizability of study findings.

**Applicants are expected to explain how their proposed research integrates into at least one of the above research priorities and advances the mission of the ACS.**

<sup>1</sup>Elmore LW, Greer SF, Daniels EC, Saxe CC, Melner MH, Krawiec GM, Cance WG, Phelps WC. Blueprint for cancer research: Critical gaps and opportunities. CA Cancer J Clin. 2021; 71:107-139.

## **11. AREAS OF RESEARCH AND TYPES OF CANCER**

**Note: The selected areas of research are not considered at peer review.**

Donors often have interests in funding specific types of cancer research. Your selection of project codes permits identification of proposals for consideration of donor-driven special funding. This information also assists the Society in communicating our research portfolio to the public.

Select the most appropriate Areas of Research (Common Scientific Outline—CSO) and Types of Cancer. Note that relevant items may be included under Resources and Infrastructure Related to [specific area]. See Appendix B for specific terms and examples

Applicants must also select the type(s) of cancer of relevance to the project; up to 5 cancer types may be selected.

## 12. ASSURANCES AND CERTIFICATION

All activities involving human subjects or vertebrate animals must be approved by an appropriate institutional committee before the application can be funded. Compliance with current US Department of Health and Human Services and ACS guidelines for conflict of interest, recombinant DNA, and scientific misconduct is also required.

**Vertebrate Animals:** Enter the date of the most recent IACUC approval in the space provided. Every proposal involving vertebrate animals must be approved by an Institutional Animal Care and Use Committee (IACUC), in accordance with Public Health Service Policy on Humane Care and Use of Laboratory Animals before the application can be funded. All research supported by the ACS (including subcontracted activities) involving vertebrate animals must be conducted at performance sites covered under an approved Animal Welfare Assurance. It is the responsibility of the institution to immediately report to the ACS any action, including recertification or loss of IACUC approval, that is pertinent to the work described in the grant application.

**Human Subjects:** All proposed research projects involving human subjects must be approved by an Institutional Review Board (IRB) at an institution approved by the Office for Human Research Protections (OHRP) of the US Department of Health and Human Services (DHHS). Enter the institution's Assurance of Compliance number(s). Copies of the DHHS policy, assured status, and assurance numbers may be obtained from OHRP. Definitions and further clarification can be found at the NIH Office of Extramural Research website.

**Submission of Approval Documentation:** If institutional review of human or vertebrate-animal subjects has not been finalized before the submission date of the application, you must indicate that approval is pending on the certification page and give the appropriate institutional reference numbers, if available. The Institution Official who signs during the grant activation process is responsible for confirming that approval has been granted for the research to begin. In addition, certification of the approval, clearly labeled with the assigned ACS application number, must be uploaded to ProposalCentral within 3 months of grant activation. Failure to comply may result in withholding of payments and/or cancellation of funding.

If the grant is funded, it is the responsibility of the institution to immediately report to ACS any action including recertification or loss of IRB approval which may occur during the term of the award that is related to the work described in the grant application.

## 13. APPLICATION SUBMISSION AND REQUIRED ELECTRONIC SIGNATURES

**We only accept electronic submissions with e-signatures.**

- All application attachments, including the Appendix, must be uploaded as .pdf documents.
- Validate the application on ProposalCentral. An application that has not been validated cannot be electronically submitted.

- Applications must be electronically submitted on ProposalCentral by 11:59 PM ET on July 15, 2024. If the deadline falls on a weekend or holiday, applications will be accepted the following business day.
- The applicant's electronic signature is required on the Signature Page. The e-signature of the Institution Signing Official and the Department Head are optional but available for use should the institution require them. In order to e-sign an application, the signees must be included in the application Contacts in ProposalCentral.
- Technical questions regarding the electronic application process should be directed to Altum at <https://proposalcentral.com/> or 1-800-875-2562.

**Note: After submission, you will not be able to make any changes to the forms or upload any modifications to the files.**

## II. APPLICATION TEMPLATES

Complete the templates off-line (described in individual sections below) and upload as .pdf documents before submitting the online application. For assistance, see ProposalCentral's FAQ or call support at 1-800-875-2562.

### 1. TABLE OF CONTENTS (PAGE 1.1)

Complete the Table of Contents by indicating the appropriate page numbers for the Research Plan section; **limit** the length of the Table of Contents to **two pages**.

### 2. BIOGRAPHICAL SKETCH OF APPLICANT (PAGE 2.1)

Complete the NIH Biosketch template. Follow the formats and instructions provided by the NIH.

### 3. RESEARCH PLAN AND ENVIRONMENT (PAGE 3.1)

**Section A below (Specific Aims) should not exceed 1 page. Sections B-F below must not exceed 4 pages. This page limit does not include Environment (G), or the References (H).**

**Each Co-PI will submit the same Research Plan.** Follow the format for Sections A-G (listed below) on the provided template. Proposals should be realistic in terms of work to be accomplished in the proposed project for which support is requested. Failure to conform to the guidelines on type size, page length, or project scope may result in the application being returned to the investigator without review.

- A. Hypothesis and Specific Aims.** List the hypotheses, objectives, and goals of the proposed research and briefly describe the specific aims.
- B. Background and Significance.** Concisely summarize and critically evaluate related work done by your laboratory/research group and others. Additionally, the model(s) that underpins the research approach and forms the basis of your conceptual framework should be summarized here. If the aims are realized, how will the results of this study impact the research field, scientific knowledge, cancer patients, clinical practice, the public's health, and/or policy?
- C. Innovation.** Provide a rationale for why this proposed research is novel/innovative. Describe how the research proposes meaningful improvements or addresses critical gaps or how the success of the pilot funding will lead to innovative research.

- Explain how the application challenges and seeks to shift current research or paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or intervention(s) to be developed or used, and any advantage over existing methodologies, instrumentation or intervention(s).
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches, methodologies, instrumentation, or interventions.

**D. Preliminary Studies and Previous Experience.** Provide results of your prior research that are relevant to this proposal. Reprints or preprints may serve in lieu of a detailed report and should be included in the appendix. **Note:** The entire application is considered confidential, including reports of unpublished research.

**E. Research Design and Methods.** Describe the overall hypothesis, proposed methods, procedures, and data analysis in sufficient detail to permit evaluation by other scientists; include your rationale for approaches and analysis. Explain your project's feasibility and how the experiments proposed will address the Specific Aims. Discuss potential difficulties and limitations of your proposed methods and provide alternative approaches. Inclusion of an experimental timeline can be helpful.

**F. Co-PI Team.** Describe how each co-PI is taking advantage of their unique expertise, resources, and skillset to contribute to the project. Describe how the collective assets of the team will facilitate the success of the project and provide a foundation for future collaboration. If a current or former collaboration is ongoing, explain how the proposed project is different from previous collaborative efforts.

**G. Environment.** Describe briefly the space and equipment available for you to carry out the proposed research project. Investigators must have an institutional commitment of research facilities and resources.

**H. References.** The list of references should correspond to the citations under headings A-E above. Each literature citation should include the names of all authors, title, book or journal, volume number, page numbers, and year of publication. There is no page limitation for the list of references and this section is not included in the 4-page limit.

#### 4. DETAILED BUDGET

Complete the budget page located online at ProposalCentral. Use a grant start date of January 1.

Each Co-PI will submit a budget tailored to the portion of the collaborative research they will lead. The maximum allowable budget is \$61,200 for a 1-year period, for the total project, which includes \$600 for travel costs per Co-PI. The budget may be divided between Co-PIs however they choose, as long as the total amount requested does not exceed \$61,200. If one Co-PI is an ACS scientist in the Surveillance and Health Equity Science or Population Science departments or is a scientist at a Federal agency refer to the grant policies for details. **Indirect costs are not allowed.**

**A. Personnel.** Names and positions of all key personnel must be individually listed and the percentage of time to be devoted to the project by each person should be noted, even when salary is not requested. Do not list the co-PI on the project since they will be submitting their own budget. List all collaborators (defined as individuals who will participate actively in the

design and/or execution of the studies). Details of contractual arrangements with collaborators should be provided in the Justification of Budget section of the application.

If the individual has not been selected, please list as "vacancy." Personnel may receive salary support up to a maximum that equals the National Cancer Institute salary cap, prorated per their percent effort on the project.

The costs to the institution of employee fringe benefits should be indicated as a percent of the employee's salary. The amount of fringe benefits requested must be prorated to the salary requested. For example, if 5 percent of an individual's annual salary is requested then no more than 5 percent of that individual's annual cost for fringe benefits can be requested.

**Please Note:** Consultants are not considered key personnel, but rather are defined as individuals who will provide any combination of advice, guidance, and reagents but do not commit any specified measurable effort (i.e., person months) to the project and should be included in the budget as subcontractors.

## **B. Equipment.**

- **Permanent equipment** – Defined as items of nonexpendable property with a purchase cost per unit that equals or exceeds \$5,000 with a useful life of more than one year. List separately and justify the need for each item of permanent equipment.
- **Small or expendable equipment** – Defined as expendable property with a purchase cost per unit that is less than \$5,000 and/or that has a short service life (<1 year).
- **General purpose equipment** – Equipment such as computers or laptops used primarily or exclusively in the actual conduct of the proposed scientific project are considered direct cost. Computers, laptops or other general-purpose equipment that will be used on multiple projects or for personal use should not be listed as a direct cost.

**C. Supplies.** Group into major categories (glassware, chemicals, radioisotopes, survey materials, animals).

**D. Travel.** Any foreign travel requires **pre-approval** by your Program Office. Domestic travel expenses do not require pre-approval. At a minimum, include the \$600 allowance for both Co-PIs.

**E. Miscellaneous Expenditures.** List specific amounts for each item; examples of expenditures allowed include publication costs, special fees (e.g., publication costs, pathology, computer time, scientific software, and equipment maintenance).

**F. Subcontracts.** If any portion of the proposed research is to be carried out at another institution, enter the total costs on the budget detail page. Provide a categorical breakdown of costs using the Subcontractor Budget and Justification form (one form per subcontractor).

Subcontracts may be with public or private institutions provided they are not in violation of ACS policies. Subcontracts involving a contractor residing outside the borders of the United States are not permitted unless the applicant can document that it is not feasible to have the work performed within the United States; and use of any subcontractor outside of the United States must be approved in writing by ACS prior to the performance of any work funded by the ACS grant.

**Administrative pages:** A Letter of Agreement pertaining to the subcontract should be included in the Appendix

**G. Total Amount Requested.** Budget totals should reflect a maximum duration of 1 year. The amount on the application title page should match the total costs in the detailed budget section.

Note: For budgets that do not request the maximum allowable amount, if the grant is funded, the ACS will round the total to the nearest thousand dollars. We encourage applicants to request a budget amount that is rounded to an even thousand dollars.

## 5. JUSTIFICATION OF BUDGET

Justify the need for personnel, supplies, travel, miscellaneous items and all items of permanent equipment costing over \$5,000. If the budget includes a request for funds to be expended outside the United States, its territories, or the Commonwealth of Puerto Rico, this section should include an explanation of why such costs are essential for the successful conduct of the project, and why there are no alternatives.

## 6. BIOGRAPHICAL INFORMATION OF KEY PERSONNEL (PAGE 4.1)

Complete the NIH Biosketch template. **Note:** Follow the formats and instructions provided by the NIH.

## 7. OTHER SUPPORT (PAGE 5.1)

Projects supported all or in part by another agency are not allowed for submission; this means that projects are considered to overlap if there are **any** shared *Specific Aims or areas of budgetary overlap*.

The only exceptions are:

- Funds provided by the institution as “start-up” support to develop a new laboratory or to gather pilot data, and
- Awards that provide only salary support for the Principal Investigator. In the latter case, if the salary support for the PI’s contribution to the project is covered by the other agency, no additional salary support for the PI may be requested in this grant application.

Provide the following information separately for the PI and all other Key Personnel:

**A. Current Support.** List all current awards including funding from intramural and extramural sources (e.g., institutional awards, and grants from for-profit, and not-for-profit agencies, including other grants from the American Cancer Society). For **each** award provide:

- a. Source of funds-identify the agency, institute, foundation, or other organization that is providing the support. Include institutional, federal, public and private sources of support
- b. Grant number
- c. Title of project
- d. Dates of Approved/Proposed Project: Indicate the inclusive dates of the project as approved/proposed. For example, in the case of NIH support, provide the dates of the approved/proposed competitive segment
- e. Total Direct Costs

- f. Role (e.g., PI, Co-PI, etc.) and percent effort/Person months. For an active project, provide the level of actual effort in person months (even if unsalaried) for the current budget period. Person months should be classified as academic, calendar and/or summer
- g. Outline the goals of the project in a brief paragraph
- h. *Clearly indicate whether there is any overlap between this grant and the proposed study.* If necessary, an explanatory letter may be included in the appendix to clarify the differences between the present application to the American Cancer Society and currently funded projects

**B. Pending Support.** List all pending applications to other funding sources including funding from intramural and extramural sources (e.g., institutional awards, and grants from for-profit, and not-for-profit agencies, including other grants from the ACS). For **each** award provide:

- a. Source of funds—identify the agency, institute, foundation, or other organization that is providing the support. Include institutional, federal, public and private sources of support
- b. Title of project
- c. Dates of Proposed Project: Indicate the inclusive dates of the project as approved/proposed. For example, in the case of NIH support, provide the dates of the approved/proposed competitive segment
- d. Total Direct Costs
- e. Role (e.g., PI, Co-PI, etc.) and percent effort/Person months. For a pending project, indicate the level of effort in person months as proposed for the initial budget period. In cases where an individual's appointment is divided into academic and summer segments, indicate the proportion of each devoted to the project
- f. Outline the goals of the project in a brief paragraph
- g. *Clearly indicate whether there is any overlap between this grant and the proposed study.* If necessary, an explanatory letter may be included in the appendix to clarify the differences between the present application to the American Cancer Society and currently funded projects. In such cases, only one award can be accepted if both are approved for funding. The American Cancer Society does not negotiate partial funding of grants with overlapping specific aims

**C. Institutional Support.** The Principal Investigator only should provide the following:

- a. Details of the institutional commitment to support the applicant's salary and research program.
- b. A description of the space committed to the project.
- c. The current term of the applicant's appointment.

## **8. LIST OF LETTERS OF SUPPORT FROM COLLABORATORS/CONSULTANTS (PAGE 6.1)**

Provide a list of collaborators/consultants. **A letter is not required from the Co-PI.** Then directly upload the letter from each individual collaborator/consultant. The letter should outline the role that person will play with enough detail for evaluation of the value of the individual contribution. A template is provided however you are not required to use the template.

## 9. STATEMENT OF INSTITUTIONAL SUPPORT (PAGE 7.1)

The applicant's Department Chair (or equivalent) should provide the following information for the Principal Investigator only:

- A description of any start-up funds provided by the institution to the applicant if the applicant is within 10 years of starting their first independent faculty position. An award of start-up funds does not decrease the likelihood of ACS support and can be important evidence of institutional commitment.
- Details of the institutional commitment to support the applicant's salary and research program, including salary support and dedicated space.
- Details of how the environment and resources at the institution will directly support and contribute to the success of the candidate's research.
- The current term of the applicant's appointment.
- The Department's long-term goals for the applicant's career

## 10. COMPLIANCE STATEMENTS (PAGE 8.1)

### Human Subjects

**Selection of study population.** When conducting research on humans, provide the rationale for selecting your target population. Include the involvement of children, minorities, and especially vulnerable populations such as neonates, pregnant women, prisoners, institutionalized individuals, or others who may be considered vulnerable populations or others who may be considered vulnerable populations. The institution is required to ensure IRB approval is obtained for the grant to start, and the approval documentation is uploaded into ProposalCentral within 3 months of grant activation.

On the planned enrollment form estimate the total number of subjects by primary ethnicity and race, race/ethnicity subgroup (if applicable), and gender. Include a rationale for excluding any population. Estimate the planned enrollment based on these calculations.

Also include estimates of the sample distribution by gender, race, and ethnicity (if available). For example, if your sample size is 200, to complete the *total number of subjects* column by race (based on what you know about the population demographics or the existing dataset you plan to analyze), multiply by the estimated percentage.

Estimated percentage of the population by race	Estimated total number of subjects
50% White	100 (200 x 0.50)
49% AA	98 (200 x 0.49)
1% Asian	2 (200 x 0.01)

For applicants performing research with non-human subjects, check the box that most appropriately describes your research.

**Potential benefits, risks, and knowledge gained.** Succinctly describe the potential benefits and risks to subjects (physical, psychological, financial, legal, or other). Explain why the risks are reasonable in relation to the anticipated benefits, both to research participants and others. Where appropriate, describe alternative treatments and procedures, including the risks and potential benefits to participants.



**Research specimens and data.** If the proposed research involves bio-specimens, explain how the research material will be obtained from living subjects and what materials will be collected. List any specific non-biological data, such as demographic information, and how it will be collected, managed, and protected. Specify who will have access to such data and what measures you will maintain to keep personally identifiable private information confidential.

**Collaborating sites.** Where appropriate, list any collaborating sites where research on human subjects will be performed and describe the role of those sites and collaborating investigators in performing the proposed research. Explain how data from the site(s) will be obtained, managed, and protected.

\*For additional protections for vulnerable populations, see <http://www.hhs.gov/ohrp/policy/populations/index.html>.

### **Vertebrate Animals**

IACUC approval must be obtained before animal work begins. An IACUC approval letter must be uploaded to ProposalCentral immediately upon approval.

Provide your rationale for using live vertebrate animals including the:

1. Necessity for using the animals and species proposed;
2. Appropriateness of the strains, ages, genders of the animals to be used;
3. Justifications for, and appropriateness of, the numbers of animals proposed. When completing the Targeted Enrollment Table, select non-human subjects research and check the box that most appropriately describes your research.

### **Biohazards**

Briefly describe whether any materials or procedures proposed are potentially hazardous to research personnel, equipment, and/or the environment. What protections will mitigate such risks? Include biological or chemical hazards.

### **Authentication of Key Biological and/or Chemical Resources**

Briefly describe methods to ensure the identity and validity of key biological and/or chemical resources to be used in the proposed studies. These resources may or may not be generated with ACS funds and:

- may differ from laboratory to laboratory or over time;
- may have qualities and/or qualifications that could influence the research data; and
- must be integral to the proposed research.

These may include, but are not limited to, cell lines, specialty chemicals, antibodies, and other biologics. Researchers should transparently report how they have authenticated key resources, so consensus can emerge.

Standard laboratory reagents that are not expected to vary need not be included in the plan (e.g., buffers and other common biologicals or chemicals). After reviewers assess the information you provide in this Section, their questions will need to be addressed prior to an award.

In this section, focus only on authentication and/or validation of key resources to be used in the study. Include all other information within the page limits of the research strategy. Applications that fail to comply may be dismissed.

## **11. APPENDIX TO APPLICATION**

In addition to the application templates, other key documents may be uploaded and submitted as part of the application. However, applicants are urged to keep this section as brief as possible.

Appended materials may include:

- Recent reprints or preprints (optional)
- Clinical Protocols (if applicable)
- Logic Model (for dissemination and implementation pilots – if applicable)

It is not necessary to number the pages of the appendix, but please list by categories (i.e., reprints, preprints, etc.) in the Table of Contents of the application.

## **III. REVIEWER GUIDELINE CRITERIA**

The overall impact of the proposed research will be assessed based on evaluation of the strengths and weaknesses, using the following criteria:

### **1. ALIGNMENT WITH ACS RESEARCH PRIORITY AREAS**

Has the applicant identified and appropriately justified how their project fits within one or more ACS research priority areas?

### **2. RESEARCH PLAN**

Provide a brief overview of the project.

### **3. SIGNIFICANCE AND CANCER RELEVANCE**

Does the project address an important problem or a critical need/barrier to progress the field? If the aims are achieved, how will scientific knowledge, technical capability, and/or some aspect of the cancer care or research continuum be impacted? How is this research relevant to persons at risk for or living with cancer or their family, caregivers, friends, and community? The relevance to cancer may be indirect, but the connection must be clearly articulated by the applicant.

### **4. INNOVATION/IMPROVEMENT**

Does the application propose the use of novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? If the project is successful, will the pilot funding contribute to innovative research in the future?

### **5. INVESTIGATORS/RESEARCH TEAM**

Do the co-PI's and their research teams have the training and experience needed to carry out the proposed research? Do team members have complementary skills and meaningful involvement in study implementation that leverage their expertise? Have the co-PIs justified or demonstrated the advantages of their collaboration? Are the co-PIs in different disciplines, departments, or at different institutions? Is this a new and/or different collaboration for the co-PIs? If the collaboration is not new have the PIs clearly articulated how the collaboration is different from previous collaborative projects?

## 6. APPROACH

TLC grants are intended to support collaborative projects and pilot test ideas or establish feasibility. Will the proposed project generate preliminary data that has the potential to secure additional grant funding? Is the overall strategy, methodology, data collection, analyses, and timeline well-reasoned and appropriate to accomplish the specific aims of the project? Where appropriate, are proposed recruitment and/or case ascertainment methods well developed? Is the sample size adequate? Are potential pitfalls, alternative approaches, benchmarks for success, and future plans articulated?

## 7. SCIENTIFIC ENVIRONMENT AND RESOURCES

Will the project benefit from unique features of the scientific environment, subject populations, collaborative arrangements, or emerging technologies? Will the scientific environment and resources contribute to the probability of success?

## 8. LIKELIHOOD OF SUCCESS

Comment on the degree to which the research, if successfully completed, would be impactful, and whether the research team is likely to achieve stated aims within the timeline, budget, environment, and other resources available.

## 9. BUDGET

NOT TO BE CONSIDERED IN SCORING

Evaluate the overall budget and individual budget categories with respect to the award cap and the project aims. Are the budget items justified, specified, and accurate? Is the percent effort of key personnel appropriate? Is there a potential overlap with the PI's other funded research?

## 10. COMPLIANCE STATEMENTS

NOT TO BE CONSIDERED IN SCORING

- **Human Subjects:** If applicable, evaluate the plans for protection of human subjects from research risks justified in terms of the scientific goals and research strategy proposed. For example, are the potential benefits and risks to subjects articulated reasonable and appropriate given the study design? Are plans for conducting sub-analysis by group, data security and confidentiality, biohazards and data and safety monitoring adequate.
- **Inclusion of Women, Minorities, and Children:** When the proposed project involves human subjects, evaluate the adequacy of the proposed plans for inclusion or exclusion of minorities, male and female genders, as well as children.
- **Vertebrate Animals:** Evaluate the plan for live, vertebrate animals as part of the scientific assessment according to the following points: 1) necessity for the use of the animals and species proposed; 2) appropriateness of the strains, ages, and gender; 3) justifications for, and appropriateness of, the numbers of animals.
- **Biohazards:** Assess whether materials or procedures proposed are potentially hazardous to research personnel and/or the environment, and if needed, determine whether adequate protection is proposed.

## **APPENDIX A: EXAMPLES OF PROJECT ALIGNMENT TO RESEARCH PRIORITIES**

### **Example 1**

Epiluminescent microscopy is used for the clinical evaluation of pigmented skin lesions, including early-stage melanoma. However, several common benign skin conditions can sometimes exhibit hyperpigmentation leading to unnecessary surgical excision. We have recently discovered that amplification of gene X is associated with early-stage melanoma. Based on encouraging preclinical validation, we propose to develop a non-invasive, light-based companion diagnostic assay to identify early-stage melanoma (i.e., during an annual skin exam). This concept, which is technically and conceptually innovative, highly aligns with the ACS priority area screening and early detection.

#### **Selection of Priorities**

Screening and Diagnosis: 100%

### **Example 2**

The focus of this investigation is to elucidate how cancer stem cells in triple negative breast cancers resist chemotherapies with the goal of developing new strategies for anti-cancer drug design (Treatment as the primary priority). The mechanistic insights we glean from the ability of cancer stem cells to continuously self-renew could also lead to the development of improved prognostic and diagnostic markers (Screening and Diagnosis) as well as a better understanding of the cells that drive tumorigenesis and disease recurrence (Etiology).

#### **Selection of Priorities**

Etiology: 25%

Screening and Diagnosis: 25%

Treatment: 50%

### **Example 3**

Underlying genetic mutations in leukemia cells are a significant factor in the risk and outcomes in childhood acute leukemia. One specific type of genetic mutation is found in multiple subtypes of acute leukemia associated poor prognosis. In this project, we will characterize this and other mutations in blood samples from acute leukemia patients in a large-scale study to identify potential markers that can be used to diagnose acute leukemia (Screening and Diagnosis). This analysis will also be used to identify proteins specific to acute leukemia that may be targeted therapeutically (Treatment).

#### **Selection of Priorities**

Screening and Diagnosis: 85%

Treatment: 15%

### **Example 4**

Children with refractory or relapsed solid tumors remain essentially incurable with conventional chemotherapy and radiation, and the effects of these treatments are life threatening. Current “tumor-specific” treatments, such as infusion of natural killer immune cells, have had limited

success. This project will use several approaches to improve refractory solid tumor by testing an antibody recognized neuroblastoma and osteosarcoma tumor cells. Success of any of these approaches will be a breakthrough for children with refractory or relapsed neuroblastoma and osteosarcoma.

### **Selection of Priorities**

Treatment: 100%

### **Example 5**

Prostate cancer (PCa) diagnosis and mortality rates are higher in African-American (AA) men compared to Caucasian-American (CA) men. AA patients respond poorly to treatments, and the PCa tumors are more aggressive than those in CA patients. We have identified a cellular dysfunction in tumors from AA PCa patients that may contribute to treatment in AA patients. In this project we will screen AA PCa tumors for this dysfunction (Etiology) and determine if treatments that target the cellular dysfunction in AA PCa cells can help improve treatment outcomes for AA patients (Treatment).

### **Selection of Priorities**

Etiology: 20%

Treatment: 80%

### **Example 6**

Lung cancer survivors have a high symptom burden. Prior research has demonstrated that early palliative care improves quality of life. Cancer rehabilitation plays an important role in survivorship care by facilitating participation in daily living. This study involves collaboration between palliative care and cancer rehabilitation teams. We will compare a novel home-based intervention to in-person ambulatory rehabilitation and evaluate objective measures of pulmonary functioning, physical functioning, and health related quality of life. This aligns with the ACS survivorship priority.

### **Selection of Priorities**

Survivorship: 100%

### **Example 7**

ACS believes that everyone should have a fair and just opportunity to prevent, find, treat and survive cancer. Where you live and your income may impact the ability to receive high quality cancer care. Our preliminary data reveal that distance from a primary care provider impacts screening rates for breast, lung and colorectal cancer. To increase screening rates in a diverse group of low wage workers, we will test a culturally tailored worksite intervention for farm and poultry workers and use a waitlist control group. The social determinants of health we believe are drivers of differential screening outcomes include low socioeconomic status, inadequate health insurance coverage and low health literacy.

### **Selection of Priorities**

Health Equity: 100%

### **Example 8**

According to the ACS Facts and Figures, colorectal cancer (CRC) is the third most common cancer and third leading cause of death among men and women in the US. Trend data, especially over the last decade, reveals increased CRC incidence for individuals under the age of 50. This study aims to better understand the birth cohort effect and involves mixed methods to better understand factors associated with early onset CRC. Our findings will be used to inform a larger tailored intervention to improve early diagnosis of CRC under the age of 50 years. This aligns with the ACS research priority for screening and diagnosis.

### **Selection of Priorities**

Screening and Diagnosis: 100%

## APPENDIX B: CLASSIFICATION CATEGORIES - AREAS OF RESEARCH

The areas of research are based on seven broad categories called the Common Scientific Outline (CSO) developed by the International Cancer Research Partnership (ICRP):

1. Biology
2. Etiology
3. Prevention
4. Early Detection, Diagnosis and Prognosis
5. Treatment
6. Cancer Control, Survivorship and Outcomes Research

Applicants are asked to select from the following codes:

### 1 – BIOLOGY

Research included in this category looks at the biology of how cancer starts and progresses as well as normal biology relevant to these processes.

#### 1.1 Normal Functioning

*Examples of science that would fit:*

- Developmental biology (from conception to adulthood) and the biology of aging
- Normal functioning of genes, including their identification and expression, and the normal function of gene products, such as hormones and growth factors
- Normal formation of the extracellular matrix
- Normal cell-to-cell interactions
- Normal functioning of apoptotic pathways
- Characterization of pluripotent progenitor cells (e.g., normal stem cells)

#### 1.2 Cancer Initiation: Alterations in Chromosomes

*Examples of science that would fit:*

- Abnormal chromosome number
- Aberration in chromosomes and genes (e.g., in chronic myelogenous leukemia)
- Damage to chromosomes and mutation in genes
- Failures in DNA repair
- Aberrant gene expression
- Epigenetics
- Genes and proteins involved in aberrant cell cycles

#### 1.3 Cancer Initiation: Oncogenes and Tumor Suppressor Genes

*Examples of science that would fit:*

- Genes and signals involved in growth stimulation or repression, including oncogenes (Ras, etc.), and tumor suppressor genes (p53, etc.)
- Effects of hormones and growth factors and their receptors such as estrogens, androgens, TGF-beta, GM-CSF, etc.
- Research into the biology of stem cell tumor initiation

#### **1.4 Cancer Progression and Metastasis**

*Examples of science that would fit:*

- Latency, promotion, and regression
- Expansion of malignant cells
- Interaction of malignant cells with the immune system or extracellular matrix
- Cell mobility, including detachment, motility, and migration in the circulation
- Invasion
- Malignant cells in the circulation, including penetration of the vascular system and extravasation
- Systemic and cellular effects of malignancy
- Tumor angiogenesis and growth of metastases
- Role of hormone or growth factor dependence/independence in cancer progression
- Research into cancer stem cells supporting or maintaining cancer progression
- Interaction of immune system and microbiome in cancer progression

#### **1.5 Resources and Infrastructure**

*Examples of science that would fit:*

- Informatics and informatics networks
- Specimen resources
- Epidemiological resources pertaining to biology
- Reagents, chemical standards
- Development and characterization of new model systems for biology, distribution of models to scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Guidance note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer-term research-based training, such as Ph.D. or post-doctoral fellowships.

## **2 – ETIOLOGY**



Research included in this category aims to identify the causes or origins of cancer - genetic, environmental, and lifestyle, and the interactions between these factors.

## 2.1 Exogenous Factors in the Origin and Cause of Cancer

*Examples of science that would fit:*

- Research into the role of lifestyle factors such as smoking, chewing tobacco, alcohol consumption, parity, diet, sunbathing, and exercise in the origin and cause of cancer or increasing the risk of cancer
- Research into the social determinants of cancer such as crime, housing dilapidation, (poor housing), neighborhood level, socio-economic status, and services and their relationship to cancer incidence and mortality, etc.
- Studies on the effect(s) of nutrients or nutritional status on cancer incidence
- Development, characterization, validation, and use of dietary/nutritional assessment instruments in epidemiological studies and to evaluate cancer risk
- Environmental and occupational exposures such as radiation, second-hand smoke, radon, asbestos, organic vapors, pesticides, and other chemical or physical agents
- Infectious agents associated with cancer etiology, including viruses (Human Papilloma Virus-HPV, etc.), and bacteria (helicobacter pylori, etc.)
- Viral oncogenes and viral regulatory genes associated with cancer causation
- Contextual Factors Contributing to Cancer Incidence (e.g., race/ethnicity, socioeconomic status, neighborhood factors, community factors, built environment)

## 2.2 Endogenous Factors in the Origin and Cause of Cancer

*Examples of science that would fit:*

- Free radicals such as superoxide and hydroxide radicals
- Identification /confirmation of genes suspected of being mechanistically involved in familial cancer syndromes; for example, BRCA1, Ataxia Telangiectasia, and APC
- Identification/confirmation of genes suspected or known to be involved in "sporadic" cancer events; for example, polymorphisms and/or mutations that may affect carcinogen metabolism (e.g., CYP, NAT, glutathione transferase, etc.)
- Investigating a role for stem cells in the etiology of tumors

## 2.3 Interactions of Genes and/or Genetic Polymorphisms with Exogenous and/or Endogenous Factors

*Examples of science that would fit:*

- Gene-environment interactions, including research into the role of the microbiome
- Interactions of genes with lifestyle factors, environmental, and/or occupational exposures such as variations in carcinogen metabolism associated with genetic polymorphisms

- Interactions of genes and endogenous factors such as DNA repair deficiencies and endogenous DNA damaging agents such as oxygen radicals or exogenous radiation exposure

## 2.4 Resources and Infrastructure Related to Etiology

*Examples of science that would fit:*

- Informatics and informatics networks; for example, patient databanks
- Specimen resources (serum, tissue, etc.)
- Reagents and chemical standards
- Epidemiological resources pertaining to etiology
- Statistical methodology or biostatistical methods
- Centers, consortia, and/or networks
- Development, characterization and validation of new model systems for etiology, distribution of models to the scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Guidance note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer term research-based training, such as Ph.D. or post-doctoral fellowships.

### 3 – PREVENTION

Research included in this category looks at identifying individual and population-based primary prevention interventions, which reduce cancer risk by reducing exposure to cancer risks and increasing protective factors.

#### 3.1 Interventions to Prevent Cancer: Personal Behaviors (Non-Dietary) that Affect Cancer Risk

Examples of science that would fit:

- Research on determinants of personal behaviors, such as physical activity, sun exposure, and tobacco use, known to affect cancer risk and interventions (including educational and behavioral interventions directed at individuals as well as population-based interventions including social marketing campaigns, environmental supports, and regulatory, policy and legislative changes), to change determinants or to target health inequalities.
- Directed education to specified populations of patients, health care providers, and at-risk groups about cancer risk and prevention and relevant interventions with the intent of promoting increased awareness and behavioral change. This includes communication of lifestyle models that reduce cancer risk, such as communicating smoking and tobacco cessation interventions, genetic counselling, or targeting/addressing health inequalities.

### **3.2 Dietary Interventions to Reduce Cancer Risk and Nutritional Science in Cancer Prevention**

*Examples of science that would fit:*

- Quantification of nutrients, micronutrients, and purified nutritional compounds in cancer prevention studies
- Development, characterization, validation, and use of dietary/nutritional assessment instruments to evaluate cancer prevention interventions
- Research on determinants of dietary behavior and interventions to change diet, including educational and behavioral interventions directed at individuals as well as population-based interventions including social marketing campaigns, environmental supports, and regulatory and legislative changes, to change diet
- Education of patients, health care providers, at-risk populations, and the general population about cancer risk and diet
- Communicating cancer risk of diet to underserved populations, at-risk populations, and the general public
- Communication of nutritional interventions that reduce cancer risk
- Nutritional manipulation of the microbiome for cancer prevention

### **3.3 Chemoprevention**

*Examples of science that would fit:*

- Chemopreventive agents and their discovery, mechanism of action, development, testing in model systems, and clinical testing
- Other non-vaccine, preventive measures such as prophylactic surgery (e.g., mastectomy, oophorectomy, prostatectomy etc.), use of antibiotics, immune modulators/stimulators or other biological agents
- Manipulation of the microbiome for cancer prevention (e.g. fecal transplant)

### **3.4 Vaccines**

*Examples of science that would fit:*

- Vaccines for prevention, their discovery, mechanism of action, development, testing in model systems, and clinical testing (e.g., HPV vaccines)

### **3.5 Complementary and Alternative Prevention Approaches**

*Examples of science that would fit:*

- Discovery, development, and testing of complementary/alternative medicine (CAM) approaches or other primary prevention interventions that are not widely used in conventional medicine or are being applied in different ways as compared to conventional medical uses
- Mind and body medicine (e.g., meditation, acupuncture, hypnotherapy), manipulative and body-based practices (e.g., spinal manipulation, massage therapy), and other practices (e.g., light therapy, traditional healing) used as preventive measures

### 3.6 Resources and Infrastructure Related to Prevention

*Examples of science that would fit:*

- Informatics and informatics networks; for example, patient databanks
- Specimen resources (serum, tissue, etc.)
- Epidemiological resources pertaining to prevention
- Clinical trials infrastructure
- Statistical methodology or biostatistical methods
- Centers, consortia, and/or networks
- Development and characterization of new model systems for prevention, distribution of models to scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Guidance note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer term research-based training, such as Ph.D. or post-doctoral fellowships.

## 4 – EARLY DETECTION, DIAGNOSIS, AND PROGNOSIS

Research included in this category focuses on identifying and testing cancer markers and imaging methods that are helpful in detecting and/or diagnosing cancer as well as predicting the outcome or chance of recurrence or to support treatment decision making in stratified/personalized medicine.

### 4.1 Technology Development and/or Marker Discovery

*Examples of science that would fit:*

- Discovery or identification and characterization of markers (e.g., proteins, genes, epigenetic), and/or technologies (such as fluorescence, nanotechnology, etc.) that are potential candidates for use in cancer detection, staging, diagnosis, and/or prognosis
- Use of proteomics, genomics, expression assays, or other technologies in the discovery or identification of markers
- Defining molecular signatures of cancer cells, including cancer stem cells (e.g., for the purposes of diagnosis/prognosis and to enable treatment decision planning in personalized/stratified/precision medicine)

### 4.2 Technology and/or Marker Evaluation with Respect to Fundamental Parameters of Method

*Examples of science that would fit:*

- Development, refinement, and preliminary evaluation (e.g., animal trials, preclinical, and Phase I human trials) of identified markers or technologies such as genetic/protein

biomarkers (prospective or retrospective) or imaging methods (optical probes, PET, MRI, etc.)

- Preliminary evaluation with respect to laboratory sensitivity, laboratory specificity, reproducibility, and accuracy
- Research into mechanisms assessing tumor response to therapy at a molecular or cellular level

#### **4.3 Technology and/or Marker Testing in a Clinical Setting**

*Examples of science that would fit:*

- Evaluation of clinical sensitivity, clinical specificity, and predictive value (Phase II or III clinical trials), including theranostics and prediction of late/adverse events
- Quality assurance and quality control
- Inter- and intra-laboratory reproducibility
- Testing of the method with respect to effects on morbidity and/or mortality
- Study of screening methods, including compliance, acceptability to potential screenees, and receiver-operator characteristics. Includes education, communication (e.g., genetic counselling and advice on screening behavior based on cancer risk factors), behavioral and complementary/alternative approaches to improve compliance, acceptability or to reduce anxiety/discomfort, and evaluation of new methods to improve screening in healthcare settings.
- Research into improvements in techniques to assess clinical response to therapy

#### **4.4 Resources and Infrastructure Related to Detection, Diagnosis, or Prognosis**

*Examples of science that would fit:*

- Informatics and informatics networks; for example, patient databanks
- Specimen resources (serum, tissue, images, etc.)
- Clinical trials infrastructure
- Epidemiological resources pertaining to risk assessment, detection, diagnosis, or prognosis
- Statistical methodology or biostatistical methods
- Centers, consortia, and/or networks
- Development, characterization and validation of new model systems for detection, diagnosis or prognosis, distribution of models to the scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Guidance note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer term research-based training, such as Ph.D. or post-doctoral fellowships.

## 5 – TREATMENT

Research included in this category focuses on identifying and testing treatments administered locally (such as radiotherapy and surgery) and systemically (treatments like chemotherapy which are administered throughout the body) as well as non-traditional (complementary/alternative) treatments (such as supplements, herbs). Research into the prevention of recurrence and treatment of metastases are also included here.

### 5.1 Localized Therapies - Discovery and Development

*Examples of science that would fit:*

- Discovery and development of treatments administered locally that target the organ and/or neighboring tissue directly, including but not limited to surgical interventions, cryotherapy, local/regional hyperthermia, high-intensity, focused ultrasound, radiotherapy, and brachytherapy
- Therapies with a component administered systemically but that act locally (e.g., photodynamic therapy, radioimmunotherapy, radiosensitizers and theranostics)
- Development of methods of localized drug delivery of systemic therapies e.g., Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC), direct intratumoral polymers/gels/nanoparticles/microsomes etc.
- Research into the development of localized therapies to prevent recurrence
- Guidance note: localized therapies are considered to be localized when the site of action is the same as the site of administration.

### 5.2 Localized Therapies - Clinical Applications

*Examples of science that would fit:*

- Clinical testing and application of treatments administered locally that target the organ and/or neighboring tissue directly, including but not limited to surgical interventions, cryotherapy, local/regional hyperthermia, radiotherapy, and brachytherapy.
- Clinical testing and application of therapies with a component administered systemically but that act locally (e.g., photodynamic therapy, radiosensitizers and theranostics, Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC), direct intratumoral polymers/gels/nanoparticles/microsomes etc.)
- Phase I, II, or III clinical trials of promising therapies that are administered locally
- Side effects, toxicity, and pharmacodynamics
- Clinical testing of localized therapies to prevent recurrence and prevent and treat metastases

### 5.3 Systemic Therapies - Discovery and Development

*Examples of science that would fit:*

- Discovery and development of treatments administered systemically such as cytotoxic or hormonal agents, novel systemic therapies such as immunologically directed therapies (treatment vaccines, antibodies), gene therapy, angiogenesis inhibitors, apoptosis

inhibitors, whole body hyperthermia, bone marrow/stem cell transplantation, differentiating agents, adjuvant and neo-adjuvant treatments, systemically-delivered nanoparticles/microsomes, cell-based therapies, manipulation of the microbiome etc.

- Identifying mechanisms of action of existing cancer drugs and novel drug targets, including cancer stem cells for the purposes of treatment/identifying drug targets
- Drug discovery and development, including drug metabolism, pharmacokinetics, pharmacodynamics, combinatorial chemical synthesis, drug screening, development of high throughput assays, and testing in model systems, including that which may aid treatment planning in stratified/personalized medicine
- Investigating the molecular mechanisms of drug resistance (including the role of cancer stem cells) and pre-clinical evaluation of therapies to circumvent resistance
- Development of methods of drug delivery
- Research into the development of systemic therapies to prevent recurrence

#### **5.4 Systemic Therapies - Clinical Applications**

*Examples of science that would fit:*

- Clinical testing and application of treatments administered systemically such as cytotoxic or hormonal agents, novel systemic therapies such as immunologically directed therapies (treatment vaccines, antibodies, antibiotics, theranostics or other biologics), gene therapy, angiogenesis inhibitors, apoptosis inhibitors, whole body hyperthermia, bone marrow/stem cell transplantation, and differentiating agents, adjuvant and neo-adjuvant treatments, systemically-delivered nanoparticles/microsomes, cell-based therapies, manipulation of the microbiome etc.
- Phase I, II, or III clinical trials of promising therapies administered systemically
- Side effects, toxicity, and pharmacodynamics
- Clinical testing of systemic therapies to prevent recurrence and prevent and treat metastases

#### **5.5 Combinations of Localized and Systemic Therapies**

*Examples of science that would fit:*

- Development and testing of combined local and systemic approaches to treatment (e.g., radiotherapy and chemotherapy, or surgery and chemotherapy)
- Clinical application of combined approaches to treatment such as systemic cytotoxic therapy and radiation therapy
- Development and clinical application of combined localized and systemic therapies to prevent recurrence and prevent and treat metastases

#### **5.6 Complementary and Alternative Treatment Approaches**

*Examples of science that would fit:*

- Discovery, development, and clinical application of complementary/alternative medicine (CAM) treatment approaches such as diet, herbs, supplements, natural substances, or other interventions that are not widely used in conventional medicine or are being applied in different ways as compared to conventional medical uses

- Complementary/alternative or non-pharmaceutical approaches to prevent recurrence and prevent and treat metastases

## 5.7 Resources and Infrastructure Related to Treatment and the Prevention of Recurrence

*Examples of science that would fit:*

- Informatics and informatics networks; for example, clinical trials networks and databanks
- Mathematical and computer simulations
- Specimen resources (serum, tissue, etc.)
- Clinical trial groups
- Clinical treatment trials infrastructure
- Epidemiological resources pertaining to treatment
- Statistical methodology or biostatistical methods
- Drugs and reagents for distribution and drug screening infrastructures
- Centers, consortia, and/or networks
- Development and characterization of new model systems for treatment, distribution of models to scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Reviews/meta-analyses of clinical effectiveness of therapeutics/treatments
- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer term research-based training, such as Ph.D. or post-doctoral fellowships.

## 6 - CANCER CONTROL, SURVIVORSHIP, AND OUTCOMES RESEARCH

Research included in this category includes a broad range of areas: patient care and pain management; tracking cancer cases in the population; beliefs and attitudes that affect behavior regarding cancer control; ethics; education and communication approaches for patients, family/caregivers, and health care professionals; supportive and end-of-life care; and health care delivery in terms of quality and cost effectiveness.

### 6.1 Patient Care and Survivorship Issues

*Examples of science that would fit:*

- Research into patient-centered outcomes
- Quality of life
- Pain management
- Psychological impacts of cancer survivorship
- Rehabilitation, including reconstruction and replacement



- Economic sequelae, including research on employment, return to work, and vocational/educational impacts on survivors and their families/caregivers
- Reproductive issues
- Long-term issues (morbidity, health status, social and psychological pathways)
- Symptom management, including nausea, vomiting, lymphedema, neuropathies, etc.
- Prevention and management of long-term treatment-related toxicities and sequelae, including symptom management (e.g., physical activity or other interventions), prevention of mucosities, prevention of cardiotoxicities, opportunistic infections, cachexia etc.
- Psychological, educational or complementary/alternative (e.g., hypnotherapy, relaxation, transcendental meditation, imagery, spiritual healing, massage, biofeedback, herbs, spinal manipulation, yoga, acupuncture) interventions/approaches to promote behaviors that lessen treatment-related morbidity and promote psychological adjustment to the diagnosis of cancer and to treatment effects
- Burdens of cancer on family members/caregivers and interventions to assist family members/caregivers
- Educational interventions to promote self-care and symptom management
- Research into peer support, self-help, and other support groups
- Behavioral factors in treatment compliance

## 6.2 Surveillance

*Examples of science that would fit:*

- Epidemiology and end results reporting (e.g., SEER)
- Registries that track incidence, morbidity, co-morbidities/symptoms, long-term effects and/or mortality related to cancer
- Surveillance of established cancer risk factors in populations such as diet, body weight, physical activity, sun exposure, and tobacco use, including method development
- Analysis of variations in established cancer risk factor exposure in populations by demographic, geographic, economic, or other factors
- Trends in use of interventional strategies in populations (e.g., geographic variation)

## 6.3 Population-based Behavioral Factors

*Examples of science that would fit:*

- Research into populations' attitudes and belief systems (including cultural beliefs) and their influence on behaviors related to cancer control, outcomes and treatment. For example, how populations' beliefs can affect compliance/interaction with all aspects of the health care/service provision
- Research into the psychological effects of genetic counselling
- Research into behavioral barriers to improving cancer care/survivorship clinical trial enrollment

## 6.4 Health Services, Economic and Health Policy Analyses

*Examples of science that would fit:*

- Development and testing of health service delivery methods
- Interventions to increase the quality of health care delivery
- Impact of organizational, social, and cultural factors on access to care and quality of care, including studies on variations or inequalities in access among racial, ethnic, geographical or socio-economic groups
- Studies of providers such as geographical or care-setting variations in outcomes
- Effect of reimbursement and/or insurance on cancer control, outcomes, and survivorship support
- Health services research, including health policy and practice and development of guidelines/best practice for healthcare delivery across the diagnostic/preventive/treatment spectrum
- Analysis of health service provision, including the interaction of primary and secondary care
- Analyses of the cost effectiveness of methods used in cancer prevention, detection, diagnosis, prognosis, treatment, and survivor care/support
- Ethical, legal or social implications of research/health service delivery (e.g. genetic counselling)
- Research into systemic or operational barriers to trial enrollment

## **6.5 Education and Communication Research**

*Examples of science that would fit:*

- Development of generic health provider-patient communication tools and methods (e.g., telemedicine/health)
- Tailoring educational approaches or communication to different populations (e.g., social, racial, geographical, or linguistic groups)
- Research into new educational and communication methods and approaches, including special approaches and considerations for underserved and at-risk populations
- Research on new methods and strategies to disseminate cancer information/innovation to healthcare providers (e.g., web-based information, telemedicine, smartphone apps, etc.) and the effectiveness of these approaches
- Research on new communication processes and/or media and information technologies within the health care system and the effectiveness of these approaches
- Media studies focused on the nature and ways in which information on cancer and cancer research findings are communicated to the general public
- Education, information, and assessment systems for the general public, primary care professionals, or policy makers
- Research into barriers to successful health communication

## **6.6 End-of-Life Care**

*Examples of science that would fit:*

- Hospice/end-of-life patient care focused on managing pain and other symptoms (e.g., respiratory distress, delirium) and the provision of psychological, social, spiritual and practical support through either conventional or complementary/alternative interventions/approaches throughout the last phase of life and into bereavement
- Quality of life and quality of death for terminally-ill patients
- Provision of psychological, social, spiritual and practical support to families/caregivers through either conventional or complementary/alternative interventions/approaches
- Research into the delivery of hospice care

## **6.7 Research on Ethics and Confidentiality**

*Examples of science that would fit:*

- Informed consent modeling/framing and development
- Quality of Institutional Review Boards (IRBs)
- Protecting patient confidentiality and privacy
- Research ethics
- Research on publication bias within the cancer research field

## **6.8 – Historical code [no longer used]**

## **6.9 Resources and Infrastructure Related to Cancer Control, Survivorship, and Outcomes Research**

*Examples of science that would fit:*

- Informatics and informatics networks
- Clinical trial groups related to cancer control, survivorship, and outcomes research
- Epidemiological resources pertaining to cancer control, survivorship, and outcomes research
- Statistical methodology or biostatistical methods pertaining to cancer control, survivorship and outcomes research
- Surveillance infrastructures
- Centers, consortia, and/or networks pertaining to cancer control, survivorship and outcomes research
- Development and characterization of new model systems for cancer control, outcomes or survivorship, distribution of models to scientific community or research into novel ways of applying model systems, including but not limited to computer-simulation systems, software development, in vitro/cell culture models, organ/tissue models or animal model systems. Guidance note: this should only be used where the focus of the award is creating a model. If it is only a tool or a methodology, code to the research instead.
- Psychosocial, economic, political and health services research frameworks and models

- Education and training of investigators at all levels (including clinicians and other health professionals), such as participation in training workshops, conferences, advanced research technique courses, and Master's course attendance. This does not include longer-term research-based training, such as Ph.D. or post-doctoral fellowships.