ICRP International Cancer Research Partnership

Common Scientific Outline (CSO) v1

The CSO was developed by the International Cancer Research Partners and is maintained for the classification and analysis of cancer research. It is openly available for use as a research management tool. The International Cancer Research Partners reserve the right to control its content and may issue new versions at:

http://www.cancerportfolio.org/cso.jsp

To register as a CSO user, please register by emailing the Membership Committee (lynne.davies@cancer.org.uk). You will then be notified of any changes or updates to the CSO.

CSO 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
(Note: This code is a new addition to the CSO and has not yet been applied by all funding organizations. Where not applied, research fitting this category will be coded to category 1.6.)

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 apoptopic pathways

1.2 Cancer Initiation: Alterations in Chromosomes
(Note: This code is a new addition to the CSO and has not yet been applied by all funding organizations. Where not applied, research fitting this category will be coded to category 1.6.)

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

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1.3 Cancer Initiation: Oncogenes and Tumor Suppressor Genes
(Note: This code is a new addition to the CSO and has not yet been applied by all funding organizations. Where not applied, research fitting this category will be coded to category 1.6.)

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.

1.4 Cancer Progression and Metastasis
(Note: This code is a new addition to the CSO and has not yet been applied by all funding organizations. Where not applied, research fitting this category will be coded to category 1.6.)

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 extrasavation
- Systemic and cellular effects of malignancy
- Tumor angiogenesis and growth of metastases
- Role of hormone or growth factor dependence/independence in cancer progression

1.5 Resources and Infrastructure
(Note: grants coded as 1.2 in previous versions of the CSO become 1.5)

Examples of science that would fit:
- Informatics and informatics networks
- Specimen resources
- Epidemiological resources pertaining to biology
- Reagents, chemical standards
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

1.6 Cancer Related Biology
(Historical Code; for internal use only by ICR Partners. For crosswalk purposes previous 1.1 codes become 1.6)

CSO 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:
- Lifestyle factors such as smoking, chewing tobacco, alcohol consumption, parity, diet, sunbathing, and exercise
- 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

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
- Genes known to be involved or suspected of being mechanistically involved in familial cancer syndromes; for example, BRCA1, Ataxia Telangiectasia, and APC
- 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.)

2.3 Interactions of Genes and/or Genetic Polymorphisms with Exogenous and/or Endogenous Factors
Examples of science that would fit:
- Gene-environment interactions
- 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
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

CSO 3: Prevention

Research included in this category looks at identifying interventions which reduce cancer risk by reducing exposure to cancer risks and increasing protective factors. Interventions may target lifestyle or may involve drugs or vaccines

3.1 Interventions to Prevent Cancer: Personal Behaviors that Affect Cancer Risk
Examples of science that would fit:
- Research on determinants of personal behaviors such as diet, physical activity, sun exposure, and tobacco use, that affect cancer risk
- Interventions to change personal behaviors that affect cancer risk

3.2 Nutritional Science in Cancer Prevention
Examples of science that would fit:
- Quantification of nutrients and micronutrients
- Studies on the effect(s) of nutrients or nutritional status on cancer incidence
- Dietary assessment efforts including dietary questionnaires and surveys
- Development, characterization, and validation of dietary/nutritional assessment instruments

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

3.4 Vaccines
Examples of science that would fit:
- Vaccines for prevention - discovery, mechanism of action, development, testing in model and clinical systems

3.5 Complementary and Alternative Prevention Approaches
Examples of science that would fit:
- Discovery, development, and testing of complementary/alternative prevention approaches such as diet, herbs, supplements, or other interventions that are not widely used in conventional medicine or are being applied in different ways as compared to conventional medical uses
- Hypnotherapy, relaxation, transcendental meditation, imagery, spiritual healing, massage, biofeedback, etc., used as a preventive measure

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
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

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CSO 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

4.1 Technology Development and/or Marker Discovery
Examples of science that would fit:
- Discovery of markers (e.g., proteins, genes), 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 of markers

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 and Phase I human trials)
- 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)
- 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
- 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
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

CSO 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 is 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 and radiotherapy
- Therapies with a component administered systemically but that act locally (e.g., photodynamic therapy, radioimmunotherapy and radiosensitizers)
- Development of methods of drug delivery
- Research into the development of localized therapies to prevent recurrence

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 and radiotherapy
- Clinical testing and application of therapies with a component administered systemically but that act locally (e.g., photodynamic therapy and radiosensitizers)
- 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

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 (vaccines, antibodies), gene therapy, angiogenesis inhibitors, apoptosis inhibitors, and differentiating agents
- Defining molecular signatures of cancer cells
- Identifying molecular targets for drug discovery. Includes mechanistic studies of cellular metabolism, combinatorial chemical synthesis, drug screening, development of high throughput assays, and testing in model systems
- Investigating molecular mechanisms of drug resistance. Pre-clinical therapy evaluation 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 (vaccines, antibodies), gene therapy, angiogenesis inhibitors, apoptosis inhibitors, and differentiating agents
- 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

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5.5 Combinations of Localized and Systemic Therapies

Examples of science that would fit:
- Development and testing of combined approaches to treatment
- 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

5.6 Complementary and Alternative Treatment Approaches

Examples of science that would fit:
- Discovery, development, and clinical application of complementary/alternative 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 approaches to the prevention of recurrence
  (please note that primary prevention using complementary or alternative approaches should be coded under 3.5)

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
- Epidemiological resources pertaining to treatment
- Statistical methodology or biostatistical methods
- Drugs and reagents for distribution and drug screening infrastructures
- Centers, consortia, and/or networks
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

CSO6: 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 behaviour regarding cancer control; ethics, education and communication approaches for patients 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:
- Quality of life
- Pain management
- Psychological impacts of cancer survivorship
- Rehabilitation
- Reproductive issues
- Long term morbidity
- Symptom management, including nausea, vomiting, lymphedema, neuropathies, etc.
- Prevention of treatment-related toxicities and sequelae including symptom management, prevention of mucosities, prevention of cardiotoxicities, etc.

6.2 Surveillance
Examples of science that would fit:
- Epidemiology and End Results Reporting (e.g., SEER)
- Surveillance of cancer risk factors such as diet, body weight, physical activity, sun exposure, and tobacco use
- Analysis of variations in risk factor exposure by demographic or other factors
- Registries that track incidence, morbidity, and/or mortality related to cancer
- Trends in use of interventional strategies
- Method development for risk factor surveillance

6.3 Behavior
Examples of science that would fit:
- Behavioral medicine research and interventions
- Influence of social factors, such as community, policy, education, and legislation, on behaviors related to cancer control
- Attitudes and belief systems and their influence on psychological health and on behaviors related to cancer control. For example, how beliefs can alter attempts to seek screening, detection, and treatment
- Interventions to change attitudes and beliefs that affect behavior related to cancer control and cancer outcomes
- Influences of attitudes and beliefs on compliance to treatment and prevention protocols
- Psychological or educational interventions 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 psychological/behavior issues

6.4 Cost Analyses and Health Care Delivery
Examples of science that would fit:
- Analyses of the cost effectiveness of methods used in cancer prevention, detection, diagnosis, prognosis, treatment, and survivor care/support

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- 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 and quality of care
- 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
- Access to care issues
- Health services research including health policy and practice
- Analysis of health service provision, including the interaction of primary and secondary care; cost effectiveness of treatments

6.5 Education and Communication
Examples of science that would fit:
- Development of communication tools and methods
- Education of patients, health care providers, at-risk populations, and the general population about cancer
- Communication to patients regarding therapeutic options
- Educational interventions to promote self-care and symptom management
- Communicating cancer risk to underserved populations, at-risk populations, and the general public
- Alternative teaching methods to communicate therapeutic options and risk-reduction behavior to patients and the general public
- Communication of lifestyle models that reduce cancer risk, such as communication of nutritional interventions
- Communicating smoking and tobacco cessation interventions
- Special approaches and considerations for underserved and at-risk populations
- Education, information, and prevention/screening/assessment systems for the general public, primary care professionals, or policy makers
- Training, predictive cancer models, pain management, and surveillance systems for primary care professionals, telehealth/telemedicine applications
- Communication regarding cancer genetics, managed oncology care, and communicating with survivors
- Barriers to successful health communication

6.6 End-of-Life Care
Examples of science that would fit:
- End-of-life care issues, including palliative care, psychological interventions with families at end of life, hospice care, and pain management for terminally ill patients

6.7 Ethics and Confidentiality in Cancer Research
Examples of science that would fit:
- Informed consent modeling and development
- Quality of Institutional Review Boards (IRBs)
- Protecting patient confidentiality and privacy
- Research ethics

6.8 Complementary and Alternative Approaches for Supportive Care of Patients and Survivors
Examples of science that would fit:
- Hypnotherapy, relaxation, transcendental meditation, imagery, spiritual healing, massage, biofeedback, etc., as used for the supportive care of patients and survivors
- Discovery, development, and testing of complementary/alternative approaches such as diet, herbs, supplements, or other interventions that are not widely used in conventional medicine or are being applied in different ways as compared to conventional medical uses

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
- Surveillance infrastructures
- Centers, consortia, and/or networks
- Psychosocial, economic, political and health services research frameworks and models
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

CSO 7: Scientific Model Systems

Research included in this category looks at the development of new animal models, cell cultures and computer simulations and their application to other studies across the spectrum of cancer research

7.1 Development and Characterization of Model Systems
Examples of science that would fit:
- Development and characterization of model systems, including but not limited to:
  - Computer-simulation model systems and computer software development
  - In vitro models systems
  - Cell culture model systems
  - Organ and tissue model systems
  - Animal model systems such as drosophila and c. elegans, zebra fish, mouse, etc.

7.2 Application of Model Systems
Examples of science that would fit:
- Research into new ways of applying model systems, including but not limited to:
  - Computer simulation model systems and computer software development
  - In vitro model systems
  - Cell culture model systems
  - Organ and tissue model systems
  - Animal model systems such as drosophila and c. elegans, zebra fish, mouse, etc.

7.3 Resources and Infrastructure Related to Scientific Model Systems
Examples of science that would fit:
- Models made available for distribution to the scientific community
- Centers, consortia, and/or networks
- Education and training of investigators at all levels (including clinicians), such as participation in training workshops, 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

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