MOLECULAR GENETICS AND BIOCHEMISTRY OF CANCER – MICHAEL MELNER, PHD
Gene regulation, transcription, epigenetics, translation, DNA replication, DNA repair, recombination, biochemistry, mechanisms of signal transduction, hormone-receptor, structural biology.

DNA Mechanisms in Cancer
**Scope:** Functional and structural changes in DNA in carcinogenesis including transcriptional regulation, epigenetic regulation, DNA repair, DNA replication, DNA recombination, chromatin, and telomeres.

RNA Mechanisms in Cancer
**Scope:** Functional and structural changes in RNA in carcinogenesis including RNA processing, miRNAs, translation, protein interactions with nucleotides and the biophysical determination of structure of macromolecules.

Tumor Biochemistry and Endocrinology
**Scope:** Role of changes in the biochemical mechanisms of signal transduction, hormone-receptor function, hormones, and cell membrane structural biology on the processes of carcinogenesis. This includes the impacts of post-translational protein modifications, changes in membrane lipids and carbohydrates, and role of secondary message transduction and ion channels.

CANCER CELL BIOLOGY AND METASTASIS – KARL SAXE, PHD
Meiosis, mitosis, cell cycle control, cell death, cell-cell interactions, cell to substrate interactions, metastasis, motility, polarity, angiogenesis, membrane trafficking, cytoskeleton, stem cells, model systems.

Cell Cycle and Growth Control
**Scope:** Cell cycle control mechanisms in all systems. Cellular events and structural components involved in mitosis and meiosis. Effects of signal transduction on the cell cycle. Oncogenes and suppressor genes as their expression or products affect cell cycle events. Cellular and molecular events responsible for programmed cell death. Relationship of chromosome structure and cytogenetics to cell cycle regulation.

Cell Structure and Metastasis
**Scope:** Ultrastructure and function of cells from intact organisms to cell culture. Organelle biology involving the nucleus, the cytoskeleton, and membrane-bound organelles; organelle trafficking. Metastasis; relationships between cells and the extracellular matrix. Cell-cell interaction, adhesion, the development of cell polarity, and the signals responsible for these processes. Cellular and molecular events responsible for angiogenesis.
Development, Differentiation, and Cancer

**Scope:** Developing systems in higher and lower organisms and the relationship to malignant processes. Developmental regulation of cell proliferation, differentiation and dedifferentiation; developmental control of morphogenesis; the relationship between development and cellular transformation; development-dependent cell migration and metastasis; lineage-dependent differentiation; germline development and stem cell production and maintenance. A wide variety of model systems are employed.

PRECLINICAL AND TRANSLATIONAL CANCER RESEARCH – WILLIAM PHELPS, PHD

Synthetic chemistry, drug screening, pharmacology, structure-activity relationships, biomarkers development, tumorigenesis in vivo, mouse/rat tumor models, target validation, genomics, genotype to phenotype, opportunistic infections, host pathogen interactions, microbial pathogenesis, infectious agents in cancer, gene therapy, oncolytic viruses, innate immunity.

Cancer Drug Discovery

**Scope:** Synthetic chemistry, drug screening, chemical libraries, biosynthesis, pharmacology, structure-activity relationships, chemoinformatics, drug design, drug delivery, mechanisms of drug resistance, isolation and characterization of natural products

Microbial Pathogenesis and Cancer

**Scope:** Role of infectious agents in cancer, opportunistic infections, host pathogen interaction, microbial pathogenesis, gene therapy development, oncolytic viruses, innate immunity, inflammatory responses to infectious agents

Tumor Biology and Genomics

**Scope:** In vivo tumor models, oncogenes and tumor suppressor genes in vivo, gene target validation, drug efficacy testing, human genetics/genomics, pharmacogenetics, pharmacogenomics, genetic risk, genotype to phenotype, gene therapy testing, biomarker identification/development

CLINICAL CANCER RESEARCH AND IMMUNOLOGY – WILLIAM CHAMBERS, PHD

Chemical carcinogenesis, environmental exposure, diet, nutrition, epidemiology, radiology, imaging, therapeutic intervention, clinical trials, patients and patient cohorts, drug resistance, immunology, vaccine testing, immunotherapy, acquired immunity, inflammation.

Clinical Research, Cancer Control, and Epidemiology

**Scope:** Epidemiology, diagnostic radiology, molecular imaging, radiation oncology, therapeutic interventions, clinical trials, patient cohorts, surgery, drug therapy and resistance, adverse drug reactions, biomarker evaluation, diagnostics

Carcinogenesis, Nutrition, and the Environment

**Scope:** Role of environmental exposures in the molecular mechanisms of carcinogenesis or their prevention. The exposures may result from the effects of chemicals, radiation, and biological agents, as well as from dietary exposures or changes in nutrition, and may involve
aspects of chemo- or biochemoprevention and gene-environment or gene-nutrition interactions. The research may involve basic, preclinical, or clinical studies.

**Leukemia, Immunology, and Blood Cell Development**

**Scope:** Hematological malignancies, hematopoietic system, immunology, vaccine testing, immunotherapy, acquired immunity, cell mediated and humoral immunity, immunogenetics, immune markers, immune tolerance, antigen presentation, cytokines

**CANCER CONTROL AND PREVENTION RESEARCH - RONIT ELK, PHD**

Study of behaviors or interventions across the cancer control continuum (from prevention to end of life) that enhance cancer prevention and risk reduction, treatment adherence, improved treatment outcomes and the impact of treatment and other health care interventions on patients’ and families quality of life. Research that predicts or influences the impact of social factors, financing systems, organizational structures and processes, legislation, health technologies, and personal behaviors on access to care and quality and cost of healthcare, and on cancer outcome in individuals, families, communities, populations, organizations and institutions.

**Cancer Control and Prevention: Psychosocial and Behavioral Research**

**Scope:** Prevention (health behaviors, communication, lifestyle factors), early detection (screening adherence, enhancement, barriers, determinants, interventions), interventions to change behaviors on individual, group, community level; genetic testing (risk assessment, understanding, communication, legal & ethical implications); treatment decision-making; barriers to treatment reduction of complications/side-effects, symptom-reduction interventions (; psychological effects of cancer & interventions to enhance coping; complementary treatments; psycho-neuro-immunology; quality of life & survivorship; post-traumatic growth; long-term effects of treatment; symptom management (treatment choices, decision-making, , doctor-patient-family communication); Community Based Participatory Research (CBPR), methodology (development and assessment of measurement scales, evaluation of statistical methodology), disparity reduction in underserved populations

**Palliative Care and Symptom Management Research**

**Scope:** Research that focuses on prevention and relief of suffering by early identification, assessment and treatment of pain, as well as of other physical, psychosocial, legal, economic and spiritual problems associated with cancer in patients and their families who are facing: (1) Poor prognosis malignancies at any stage of illness, (2) Have advanced malignancies (recurrent and/or metastatic disease) or (3) Have favorable prognosis malignancies associated with a high symptom burden. Palliative care interventions can occur early in the course of illness, in conjunction with other therapies intended to prolong life, such as chemotherapy or radiation therapy, as well as at the end-of-life and includes investigations to better understand and manage distressing clinical complications of cancer. (Research proposals that focus on patients and their families that are not included in these three categories will continue to be reviewed by the CPPB committee.)
**Cancer Control and Prevention: Health Policy and Health Services Research**

**Scope:** Health systems analysis, health system & health policy interventions, cost-effectiveness analyses, effects of policies, effects of health technologies, quality and cost of health care, impact of social factors, financing systems, organizational structures and processes, legislation, health technologies and personal behaviors on access to health care, and quality and cost of healthcare.

**HEALTH PROFESSIONAL TRAINING IN CANCER CONTROL – VIRGINIA KRAWIEC, MPA**
Grants in support of nurses, physicians and social workers to pursue training in outstanding programs that must meet high standards for excellence. The program goal is to ensure that an adequate number of highly qualified individuals enter careers in cancer prevention and control practice.

**Primary Care Physician Awards**
Support for primary care physicians in supervised programs intended to develop clinical and teaching expertise and the capacity to perform independent research or educational innovation in cancer control.

**Physician Training in Preventive Medicine**
Awards to institutions to support physician training in accredited preventive medicine residency programs that provide cancer prevention and control research and practice opportunities.

**Scholarships in Oncology Nursing**
Support for students pursuing either a doctoral degree in nursing or a related research area, or a master's degree in cancer nursing.

**Oncology Social Work Training**
Support the training of second-year master’s degree students to provide psychosocial services to persons with cancer and their families, and for doctoral students to conduct oncology psychosocial research.

**SPECIAL AREAS**

**Institutional Research Grants – David Ringer, PhD, MPH**
Awarded to institutions as block grants that provide seed money for independent beginning investigators to initiate cancer research projects.

**Clinical Research Professors – John Stevens, MD**
Awards to outstanding mid-career investigators who have made seminal contributions that have changed the direction of clinical, psychosocial, behavioral, health policy or epidemiologic research.

**Research Professors – John Stevens, MD**
Supports outstanding mid-career investigators who have made seminal contributions that have changed the direction of basic cancer research.