

Supporting Informatics Needs Across the Cancer Research Continuum

Informatics technology is essential to the field of cancer research, where the complexity and heterogeneity of the disease translate to unique challenges for data management and analysis. The NCI ITCR program aims to address these challenges by supporting investigator-initiated, research-driven informatics technology development spanning all aspects of cancer research.

FUNDING OPPORTUNITIES



Algorithm Development (R21) PAR-15-334

Development of innovative methods and algorithms in biomedical computing, informatics, and data science addressing priority needs.



Prototyping & Hardening (U01) PAR-15-332

Development of enabling informatics technologies to improve the acquisition, management, analysis, and dissemination of data.



Enhancement & Dissemination (U24) PAR-15-331

Advanced development and enhancement of emerging informatics technologies to improve the acquisition, management, analysis and dissemination of data.



Sustainment (U24) PAR-15-333

Continued development and sustainment of high-value informatics research resources to serve current and emerging needs.

PROGRAM GOALS

- Encourage development of innovative informatics technologies that empower basic and translational research in cancer and targeted cancer treatment
- Promote development of interoperable informatics technologies that allow integration of multilevel data collected in basic science, prevention, epidemiology and population science, detection, diagnosis, and treatment
- Stimulate development of enabling tools for data sharing and data hosting
- Support dissemination and widespread use of informatics technologies through collaborative, open source development
- Foster a community of developers and users in cancer informatics technology
- Provide support using multiple mechanisms matched to different stages of informatics technology development



UNIQUE ASPECTS OF ITCR

Investigator-initiated Support

ITCR uses investigator-initiated research project grant mechanisms, relying on the investigator and their collaborators to identify the need and to propose the solution.

Enhanced Dissemination

Software developed is open source and freely available for use and modifications by the research community. Code repositories for ITCR tools are listed at <http://itcr.nci.nih.gov/informatics-tools>.

Review Structure and Process

Applications are reviewed by Special Emphasis Panels coordinated by the NCI Division of Extramural Activities. This allows customized review panels to best fit the applications.

Trans-NCI Program

All four NCI extramural Divisions (Division of Cancer Biology, Division of Cancer Control and Population Science, Division of Cancer Prevention, Division of Cancer Treatment and Diagnosis) participate in ITCR, ensuring support for cancer research across the spectrum of needs.

Program Activities

Interaction, collaboration and interoperability among ITCR projects are supported through:

- Monthly PI conference calls
- Annual face-to-face meetings
- Budget set-asides for collaborative projects
- Investigator-led working groups supporting technical and community outreach best practices

INFORMATICS TOOLS

The current ITCR portfolio includes tools supporting OMICS, imaging, network biology, clinical research, as well as data standards. Details about these tools, including short, introductory videos, are available on the ITCR website.

The screenshot displays the ITCR website interface. At the top, a navigation bar includes the NIH logo, the text 'NATIONAL CANCER INSTITUTE Informatics Technology for Cancer Research', and links for 'Home | Contact Us | Download ITCR Fact Sheet'. Below this is a search bar. The main content area features a 'Supporting Informatics Needs Across the Cancer Research Continuum' banner with navigation links: HOME, ABOUT ITCR, FUNDING OPPORTUNITIES, INFORMATICS TOOLS, and RELATED PROGRAMS. A 'FEATURED ITCR TOOLS' section highlights the 'Single-Cell Genome Viewer' with a video player and a 'Learn More >>' button. Below this is an 'INTRODUCTORY VIDEOS' section with a note: 'ITCR supports a wide range of informatics tools to serve current and emerging needs across the cancer research continuum. Short introductory videos for many of the ITCR Tools are available below.'

The left sidebar shows a 'Category Filter' with the following counts: All (19), Imaging (19), -omics (28), Clinical (6), Data Standards (7), and Network Biology (1). Below the filter are several tool cards:

- 3D Slicer**: 3D Slicer is the free open source software for medical image visualization and analysis. Category: Imaging.
- Bioconductor**: Bioconductor provides tools for the analysis and comprehension of high-throughput genomic data. R/Bioconductor will be enhanced to meet the increasing complexity of multiassay cancer genomics experiments. Category: -omics.
- Allele-Specific Alternative mRNA processing (ASARP)**: A software pipeline for prediction of allele-specific alternative RNA processing events using single RNA-seq data. The current version focuses on prediction of alternative splicing and alternative polyadenylation modulated by genetic variants. Category: -omics.
- Cancer and Phenomics Toolkit (CaPTK)**: CaPTK is a tool that facilitates translation of highly sophisticated methods that help us gain a comprehensive understanding of the underlying mechanisms of cancer from medical imaging research to the clinic. It replicates basic interactive functionalities of radiological workstations and is distributed under a BSD-style license.
- Apache Clinical Text and Knowledge Extraction System (cTAKES)**: The tool extracts deep phenotypic information from the clinical narrative at the document, episode, and patient-level. The final output is FHIR compliant patient-level phenotypic summary which can be consumed by research warehouses or the DeepPhe native visualization tool. Category: Clinical.
- Cancer Slide Digital Archive (CDSA)**: The CDSA is a web-based platform to support the sharing, management and analysis of digital pathology data. The Emory Instance currently hosts over 23,000 images from The Cancer Genome Atlas, and the software is being developed within the ITCR grant to be deployable as a digital pathology platform for other labs.

