Clinical Proteomic Tumor Analysis Consortium (CPTAC)

RFA Renewals

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NIH NATIONAL CANCER INSTITUTE

CPTAC program current scope

Goals

Deepen our understanding of cancer (genotype-to-phenotype) by comprehensively characterizing tumors (proteomic and genomic molecular level), and to establish public resources (data, assays, images, reagents) for hypothesis-driven science

Support clinically relevant research projects that address mechanisms of treatment response, resistance, or toxicity

Achieved through

TUMOR CHARACTERIZATION (2016-2021)

Proteome Characterization Centers **(PCCs)** & Proteogenomic Data Analysis Centers **(PGDACs)**

- treatment naïve tumor / nml adjacent, prospective

TRANSLATIONAL RESEARCH (2017-2022)

Proteogenomic Translational Research Centers **(PTRCs)** & Proteogenomic Data Analysis Centers **(PGDACs)**
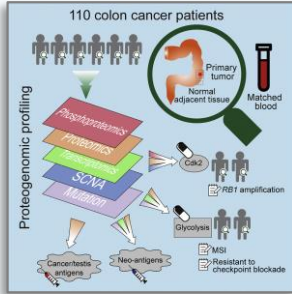
- pre-clinical and clinical trial samples

Integrated research consortium that applies standardized comprehensive proteomics and genomics workflows, strict biospecimen collection protocols (optimized for genomics and proteomics) – ensuring rigor & reproducibility
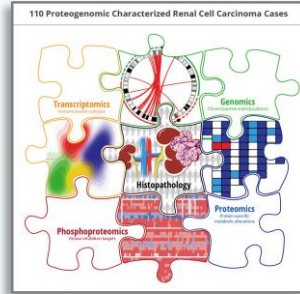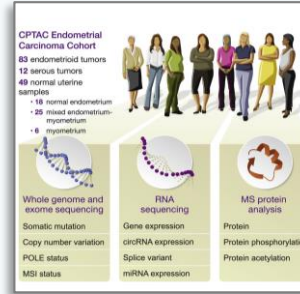
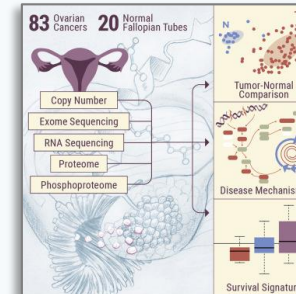# Tumor Characterization Program
(YR 4 of 5)

C P T A C

Colon
Cell 2019

Kidney
Cell 2019

Endometrial
Cell 2020

Ovarian
Cell Rep Med 2020

Lung adeno
Cell 2020
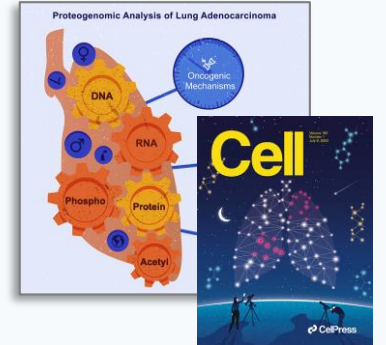
Breast
Cell 2020
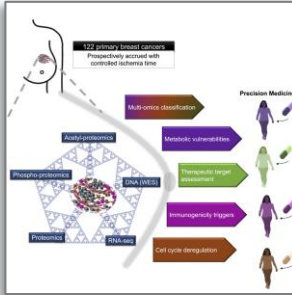
GBM (pediatric)
Cell 2020

NIH OD
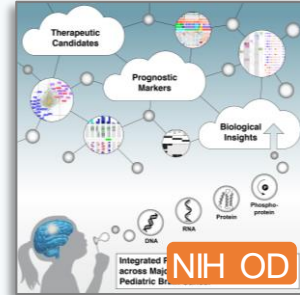
GBM (adult)
Cancer Cell 2020

under review

Head & Neck
Cancer Cell 2020

under review

Lung SCC
in progress

Pancreas
in progress

GBM (AYA)
in progress

C P T A C International collaborations

Oral squamous
Nature Comm 2017
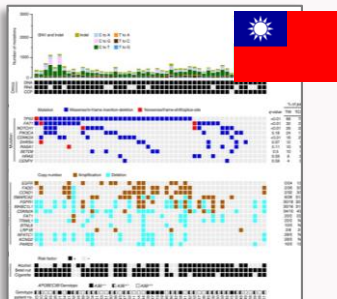
Gastric
Cancer Cell 2019
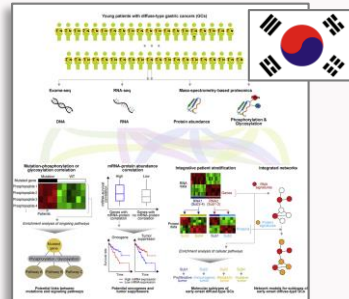
Liver
Cell 2019

Lung adeno
Cell 2020

Translational Research Program
(YR 3 of 5)

PRE-CLINICAL RESEARCH; PILOT STUDIES

AML

- Comprehensive proteogenomics of AML cell lines with different driver mutations and subjected to FDA-approved TKIs. *Outcome: Proteomic profiles based on driver mutations*

- Piloted on 16 pts from BeatAML trial. *Outcome: proteins and phosphoproteins associated with drug sensitivity*

CLINICAL TRIAL SAMPLES

- Expanding to large cohort (200 pts from BeatAML trial) with single driver mutation (FLT3-ITD). *APPROVED*

Leukemia. 2018; PMID: 29743719

Breast

- Developed micro-scale MS technique for comprehensive proteogenomics (breast PDX single-needle core biopsy)

- Piloted on 50 HER2+ pt samples from NSABP DP-1 trial. *Outcome: HER2 phosphorylation change found based on treatment outcome*

- Expanding to 130 HER2+ pt samples from randomized phase 3 trial. Application to NCTN trial. *APPROVED*

Nat Commun. 2020; PMID: 31988290

Ovarian

- Comprehensive proteogenomics of intra-pt cell line pairs (pre/post-platinum resistance), refractory & sensitive PDX, and 350 pt tumors (FFPE, FF, OCT). *Outcome: Proteins associated with Pt resistance. Trained and validated on independent pt tumors (FFPE and FF)*

- Developing MS multiplex assay; Applying to NCTN randomized phase 3 trial for samples.

- CLIA lab; PD markers
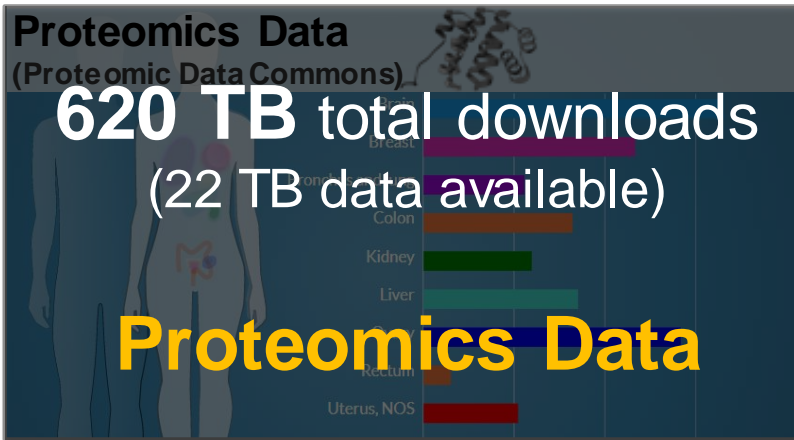
British J of Cancer. 2018; PMID: 30385821

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CPTAC Public Resources (data warehouse)

Largest public repositories of proteogenomics datasets, assays, and reagents

Proteomics Data
(Proteomic Data Commons)

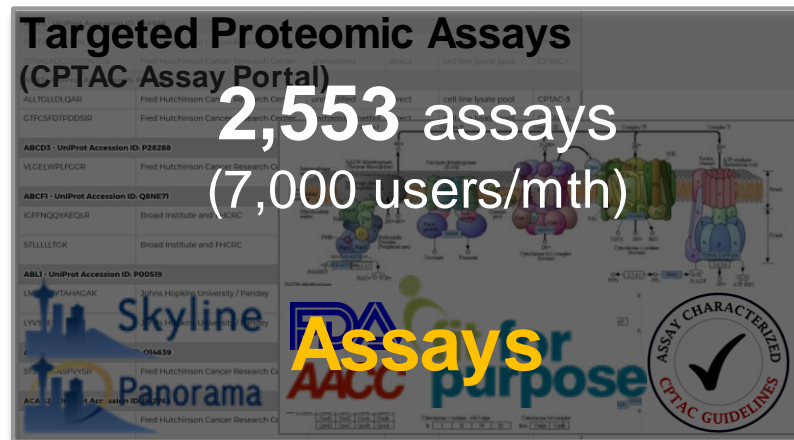**620 TB** total downloads
(22 TB data available)

Proteomics Data

Targeted Proteomic Assays
(CPTAC Assay Portal)

2,553 assays
(7,000 users/mth)

Assays
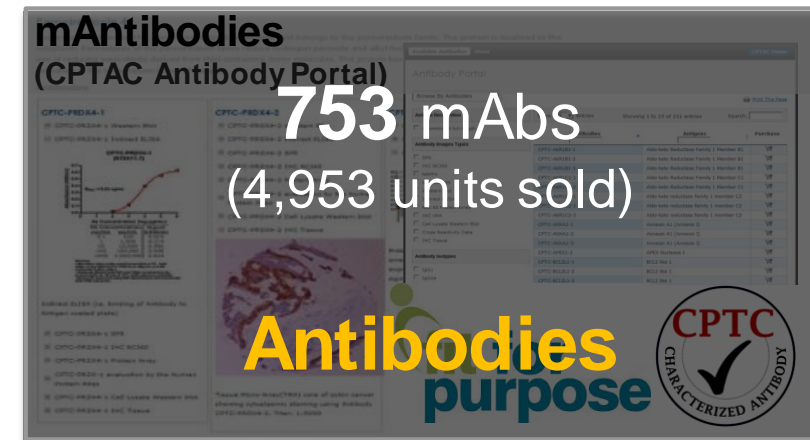
mAntibodies
(CPTAC Antibody Portal)

6753 mAbs
(4,953 units sold)

Antibodies
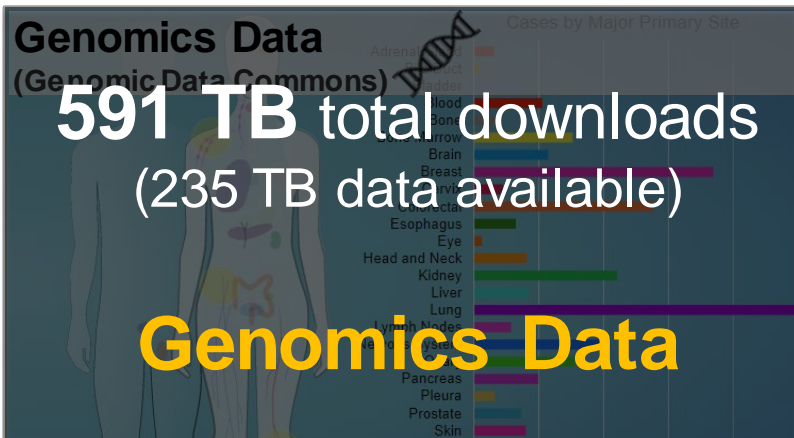
Genomics Data
(Genomic Data Commons)

591 TB total downloads
(235 TB data available)

Genomics Data

Imaging Data
(The Cancer Imaging Archive)

5,675 images
(2 TB downloads/mth)
(1.5 TB data available)

Imaging Data

Data Portals

Assay Portal

Antibody Portal

What's next for CPTAC

Recommendations: build on the achievements of CPTAC, while optimizing its scientific approach based on Lessons Learned to accelerate molecularly oriented cancer research and clinical impact

Goal 1: Comprehensive tumor characterization

Proteome Characterization Centers **(PCCs)** & Proteogenomic Data Analysis Centers **(PGDACs)**

- Extend CPTAC's approach to 5 new cancer types where questions remain on their proteogenomic complexity

Future directions (lessons learned):

- Expand PTMs (beyond phospho, such as such as acetylation, ubiquitination, and glycosylation); add metabolites (when appropriate); microenvironment; incorporate pre-clinical models, metastatic and rare cancers; retrospective samples (if possible)
- Host outreach activities of CPTAC's resources and bioinformatics tools

Goal 2: Applying proteomics to clinical trial research

Proteogenomic Translational Research Centers **(PTRCs)** & Proteogenomic Data Analysis Centers **(PGDACs)**

- Support clinically relevant research projects (pre-clinical in collaboration with clinical researchers and use human biospecimens from clinical trials)

Future directions (lessons learned):

- Extend the specialized analytical expertise and infrastructure to trial experts outside of the network with cancer interests beyond those selected by PTRCs
- Develop pilot studies (DCTD Steering Committee) that address needs in clinical trials brought forward by the NCI

www.cancer.gov   www.cancer.gov/espanol