Integrated Canine Data Commons Home

This is the wiki for the Integrated Canine Data Commons (ICDC) project. This is a joint project between FNL's Applied and Developmental Research Directorate (ADRD) and Biomedical Informatics and Data Science (BIDS) Directorates to develop the ICDC for NCI's DCTD group, with Toby Hecht as the Federal Lead. The project was initiated via Task Order- HNC17V-12 - Integrated Canine Data Commons. The first phase of the project is to develop and deploy a prototype in two years. There are two option phases, create a production version and then operation and maintenance of Production version.

The ICDC will be part of NCI's CRDC and will be developed using Gen3 technology stack on Amazon AWS. The ICDC will contain canine clinical trial data consisting of many data types such as images, clinical data and sequencing.

URLs are as follows:

Dev: http://caninecommons-dev.cancer.gov

QA: http://caninecommons-QA.cancer.gov

Stage: http://caninecommons-stage.cancer.gov

Prod: http://caninecommons.cancer.gov

Charter:

Baseline Period of Performance: 9/24/18-9/23 /20

Option 1 Period of Performance: 9/24/20-9/23 /21 (exercised)

Option 2 Period of Performance: 9/24/21-9/23 /23 (exercised)

Funding: Non-Severable

TO: HHSN2610076

PIDs:

400.041.0076.0002.001.002 – BIDS

400.041.0076.001.001.001 - ADRD

COR: Toby Hecht, PhD - DCTD

FNL Project Leads:

Todd Pihl - BIDS

John Otridge - BIDS

Ralph Parchment - ADRD

Kickoff meeting: Nov. 21, 2018

High Level Scope:

Websites of Interest to ICDC:

Cancer In Kids And Canines

Ontology Guidelines from Chris Mungal

Model-Tool for ICDC

NLM Domain Specific Repositories

In the News:

https://vet.purdue.edu/pcop/index.php

https://vet.purdue.edu/news/purdue-scientists-join-in-launch-of-cloud-based-canine-cancer-database-to-benefit-humans-and-their-best-friends.php

How are dogs helping us cure cancer in people - US News and World Report: 2018

Precision medicine in dogs

Helping Dogs—and Humans—with Cancer: NCI's Comparative Oncology Studies

Dogs, Kids and Cancer

'Lucky dog' beats cancer - Superbowl Ad

Papers of Interest:

https://www.nature.com/articles/s41568-020-0297-3 (Nature Reviews Cancer, LeBlanc, 2020)

https://mcr.aacrjournals.org/content/13/6/993.long

https://www.nature.com/articles/s41467-019-09373-w

Phylogenetic Reconstruction of Orthology, Paralogy, and Conserved Synteny for Dog and Human: 2006

Perspectives from man's best friend: National Academy of Medicine's Workshop on Comparative Oncology: 2016

Canine Cancer Genomics: Lessons for Canine and Human Health: 2019

To create a new, dynamic data commons for canine cancer data, including not only clinical outcomes and genomics findings from canine clinical trials being conducted by the Comparative Oncology Program (COP) in collaboration with DCTD, but also the trials' molecular, pharmacological, microenvironment, medical imaging and other study data.

Build a cloud-based prototype Canine Data Commons using Gen3 architecture. Follow CBIIT EPLC process. Linked to the Cancer Research Data Commons suite of projects (e.g., Expand Data Commons). A low number of concurrent users is expected for the prototype. Staffing will be internal FNL as well as external sub-contracts for SMEs. Stand-up and run a Steering Committee and incorporate their feedback into system design. Import existing data into developed system and provide mechanism for future data incorporation.

Success Criteria:

Technical Success:

e.g., stand up of system, ability to search, ability to load data, ability to login, etc.

Collaborative Success:

e.g., number and results of steering committee meetings, use cases defined, relationships developed with public, hits on the website.

Scientific Success:

e.g., papers developed based on data contained in the system, new ideas sparked by data or system collaboration, mentions at scientific meetings, new studies proposed/developed as a result of this system being publicly available.

Project Management Plan

Potential future meetings to attend:

Paws-For-A-Cure Symposium: Sept. 29-30, 2020: Abstract Submitted.

Veterinary Cancer Society: Oct. 15-17, 2020: Abstract accepted. http://vetcancersociety.org/conference/poster-presentations/

AACR TUMOR IMMUNOLOGY AND IMMUNOTHERAPY - 2021.

AACR, ASCO. AACR Lymphoma meeting (June 2021). CTOS meeting for sarcoma. Society for neurooncology

Potential Collaborators:

"BREED-SPECIFIC CANCER RISK
Cancer is the leading cause of disease-associated death in dogs, affecting one in four individuals, with 50% of dogs >10 years old developing the disease (65–67). Studies indicate that the genes and pathways involved in canine cancer development are similar to those found in humans (68, 69). The compressed life span of dogs means that cancers that take 15–20 years to mature in humans can be studied in the dog in 2–3 years (7, 70). Perhaps most importantly, canine cancers are spontaneous, distinguishing the dog from other mammalian cancer models such as the mouse, in which many cancers must be induced (reviewed in 3, 11, 13–15). Overall, this rationale argues that genetic studies of canine disease are a powerful way to advance our understanding of cancer in humans and companion animals alike (3, 11, 13, 71)."

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"Perhaps most importantly, comparative genome hybridization arrays have the potential to yield information regarding ancestral mechanisms of cancer development by identifying common rearrangements in comparable human cancers. Examples include formation of the BCR-ABL fusion (Philadelphia chromosome) in canine chronic myelogenous leukemia in dogs, the translocation of the MYC gene to the immunoglobulin heavy-chain enhancer region in canine lymphoma, and deletion of the RB-1 locus in chronic lymphocytic leukemia (85)."

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"In 2015, in an effort led by the National Human Genome Research Institute, we revealed the first comprehensive analysis of dog genome sequences, releasing data on 186 canine WGS (152), a data set composed of 102 purebred dogs, 12 wild canids, and 72 semiferal village dogs. This initial analysis revealed 28.01 million single-nucleotide variants (SNVs), 12.62 million indels, and 31,613 structural variants (SVs) (https://research.nhgri.nih.gov/dog_genome/). Canine dbSNP contains only SNVs and includes less than one-third of the variants found in the average canid WGS, while we found that a mean of 99.55% of SNVs, 99.57% of indels, and 95.63% of SVs from any single canid were present in at least one other individual in our WGS catalog. All data are available through the National Center for Biotechnology Information Sequence Read Archive or database of structural variation." (color emphasis added)

Reasons why Canines make a good model:

FDA Center for Veterinary Medicine (Director: Dr. Steven Solomon) - JANUS SEND program - Dr. Rosario

External Presentations:

CCDI

ICDC CMCM Poster

CRDC Fact Sheet:

Celebration Days:

August 26 - International Dog Day

Canine patients with spontaneous tumors have many advantages for both immunotherapy and targeted therapy research

- The complexity of canine tumors in terms of heterogeneity, their relationship to the tumor microenvironment (its symbiosis and evolution), and the development of resistance to treatment are closely related to cancers in humans
- Dogs are immunocompetent
- Dogs are relatively outbred compared with laboratory animals, although some breeds have greater susceptibility to certain forms of cancer
- Few standards of care; investigational agents can be considered even in early or minimal residual disease states.
- There is an established track record of responsiveness to known chemotherapeutic agents
- For many cancers, dogs and humans share major cytogenomic aberrations in signaling pathways
- Spontaneously-occurring cancers in pet dogs have been increasing as a result of increased life expectancy

Tumor mutational burden: https://oncologypro.esmo.org/Education-Library/Factsheets-on-Biomarkers/Tumour-Mutational-Load

COP and how it fits into the CCR and ICDC: http://nas-sites.org/ilar-roundtable/files/2017/10/LEBLANC_NAS-precision-medicine-2017-LeBlanc-shared-FOR-WEB.pdf

Video: https://caninesnkids.org/about/canine-and-pediatric-cancers.html . Why Canine Trials are so relevant to Human Trials.