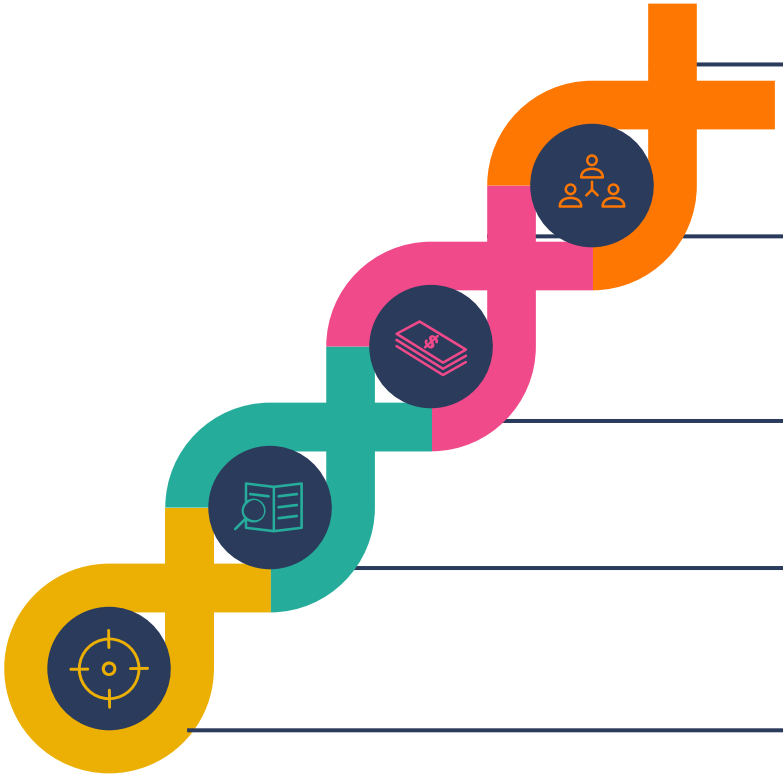
BTech Project

Design and development of an app for cancer outcome prediction

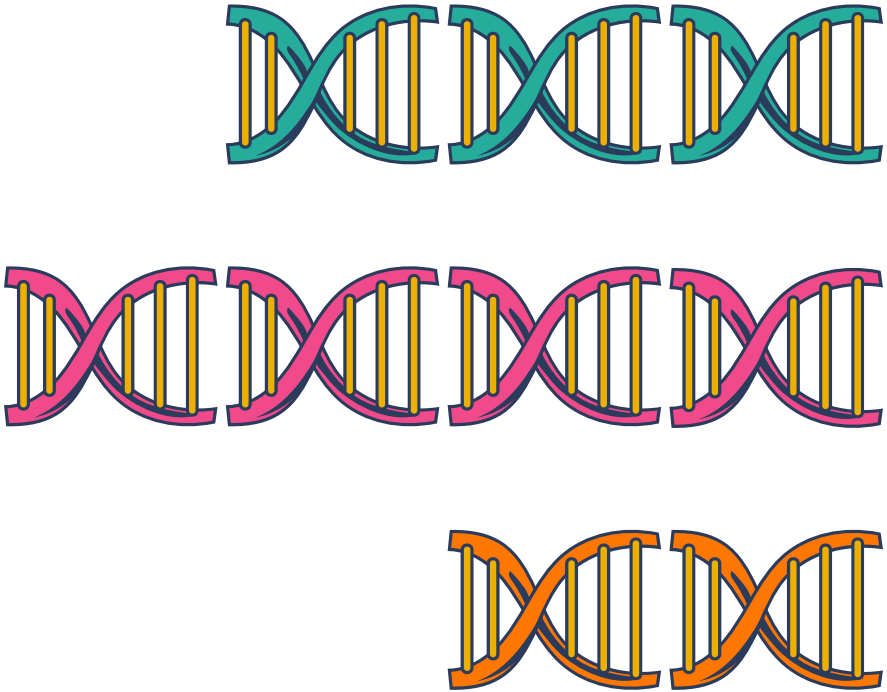
Mentors -
Dr. Siddharth Srivastava (BSBE)
Dr. Sushmitha Jha (BSBE)
Dr. Sumit Kalra (CSE)

Presentation by,
Addepalli Bharat Sai (B19BB002)
Aman Prakash (B19BB005)

CONTENTS



Introduction



What is Cancer?

Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body.

Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place.

Introduction

The probability of being born with the characteristics you have is about 1/400 trillion.

- Mel Robbins, TedTalk

How Does Cancer Develop?

Cancer occurs due to genetic changes, it may also be inherited—that is, it is caused by changes to genes that control the way our cells function, especially how they grow and divide.

Genetic changes that cause cancer can happen because:

- of errors that occur as cells divide.
- of damage to DNA caused by harmful substances in the environment, such as the chemicals in tobacco smoke and ultraviolet rays from the sun.
- they were inherited from our parents.

Precision Medicine

A form of medicine that uses information about a person's own genes or proteins to prevent, diagnose, or treat disease. In cancer, precision medicine uses specific information about a person's tumor to help make a diagnosis, plan treatment, find out how well treatment is working, or make a prognosis.

Examples of precision medicine include using targeted therapies to treat specific types of cancer cells, such as HER2-positive breast cancer cells, or using tumor marker testing to help diagnose cancer. Also called personalized medicine.

Precision medicine is "an emerging strategy for illness treatment and prevention that incorporates individual variability in genes, environment, and lifestyle for each person," according to the Precision Medicine Initiative. With the help of this method, medical professionals and researchers will be able to anticipate with more accuracy which disease-specific treatments and preventative measures will be effective in different populations.

Problem Statement

Vast Information

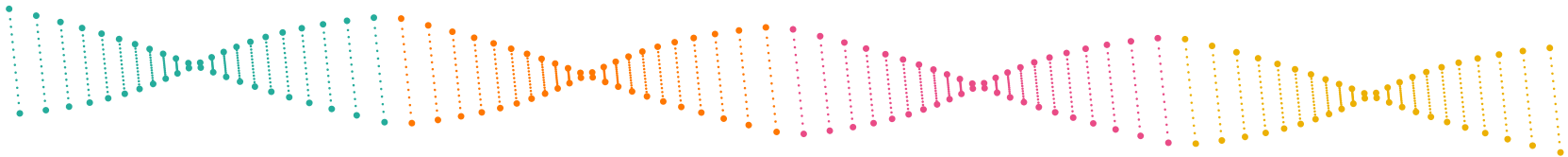
Net has some excellent information about everything about cancer available. Which source to believe or not is still a challenge to till date. **Cancer is an ongoing research**. A new treatment, or precision medicine, is suggested. The doctor or the health-care professional should be up to date to give the best suitable and beneficial treatment to the patient.

Awareness

Many doctors are still learning precision medicine, which is still an area of development. Many will not even want to adapt to the new treatments and still want to pursue their traditional treatment.

Application

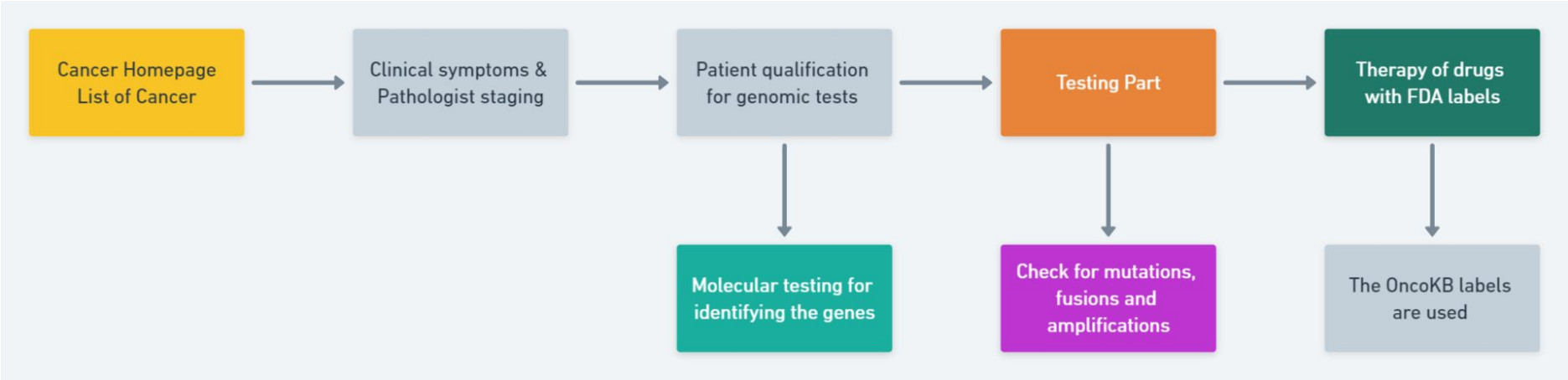
Design and development of an app for cancer outcome prediction



Objective of the Btech Project

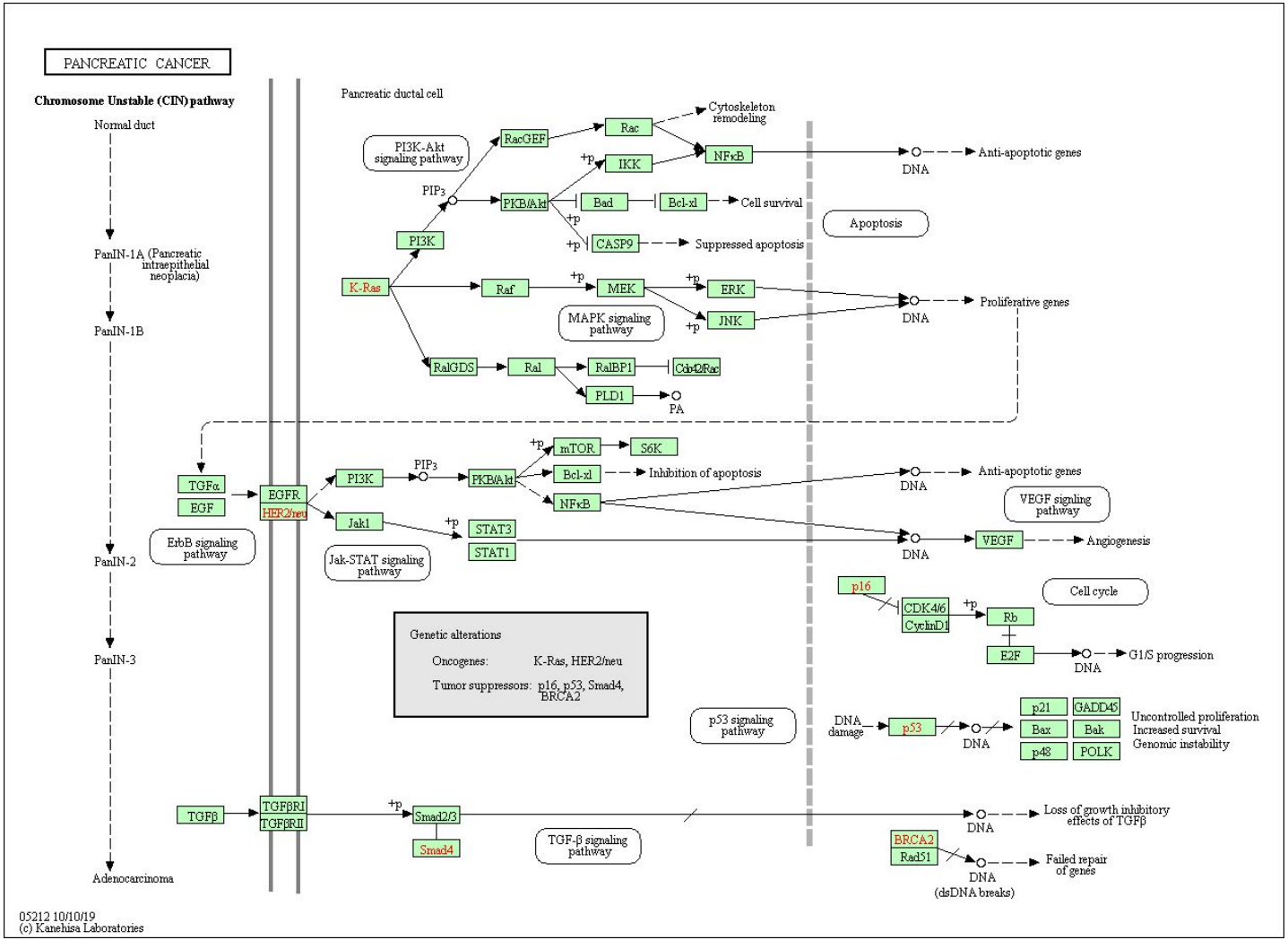
- About 20 million people are affected by cancer every year and cancer can originate in any part of the body.
- In our app, we are together working on Non-small cell lung cancer, Pancreatic cancer, Occult Primary, Ovarian Cancer, Pediatric Acute Lymphoblastic Leukemia.
- We worked on the product, design and structuring of the framework of the app and chose Pancreatic cancer outcome as our main objective of the project.
- We developed framework through which we can identify metastatic, non metastatic adenocarcinoma, biomarker testing, clinical presentation etc.

Whole Design



https://whimsical.com/cancer-app-AyNn6w3d1bNzP4FTTxRWS

Kegg Pathway Pancreatic Cancer



KEGG PATHWAY: Pancreatic cancer - Homo sapiens (human) (genome.jp)

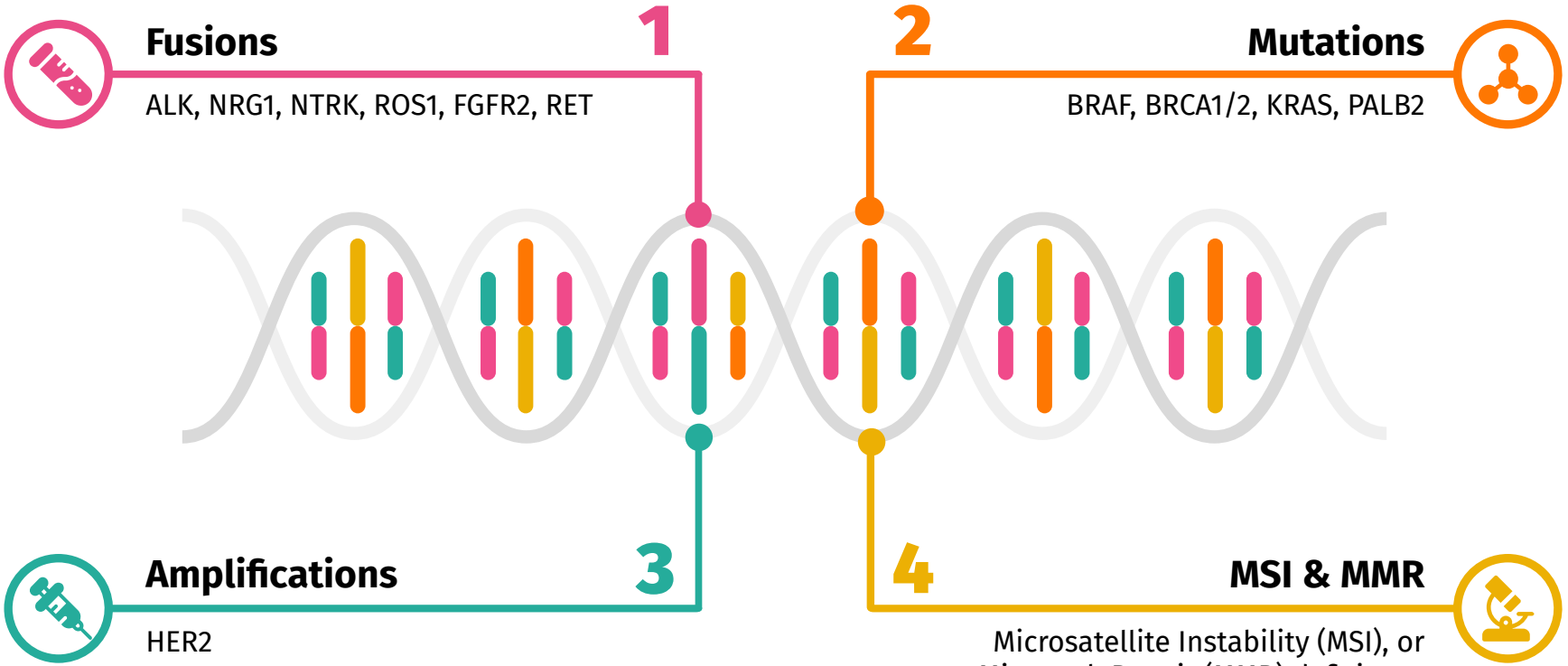
Kegg Pathway

Doctor do not consult the pathway for every cancer individual

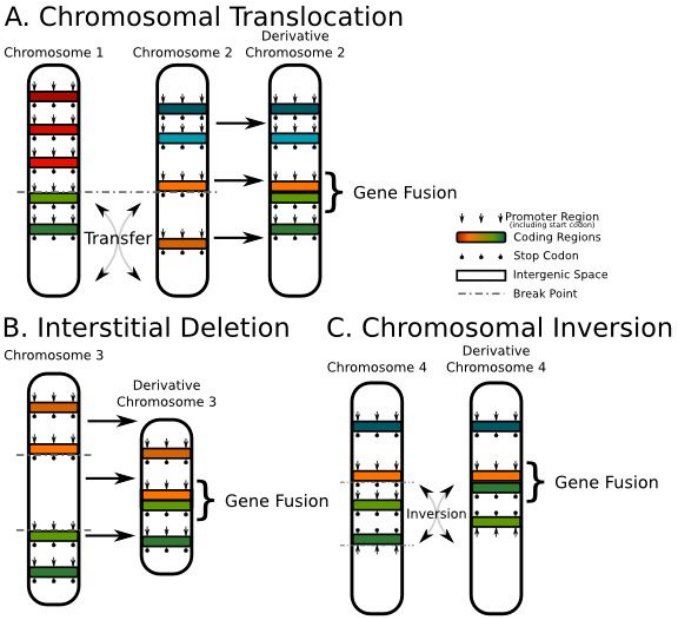
Many proteins or genes may or may not lead to tumours

The whole genome can be considered a time and resources burden

According to NCCN, ESMO, AICR, and Some Research Papers

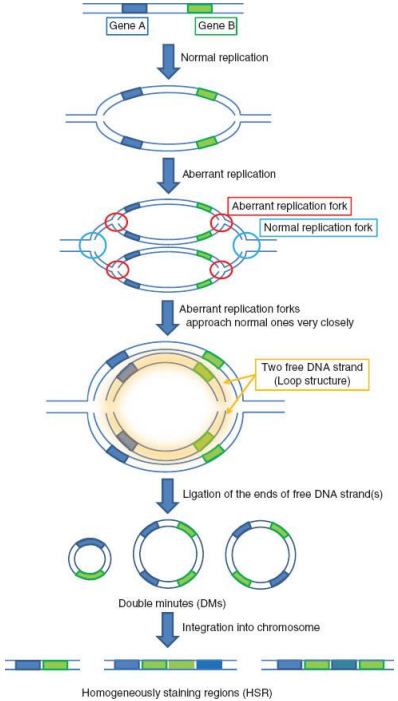


Fusions



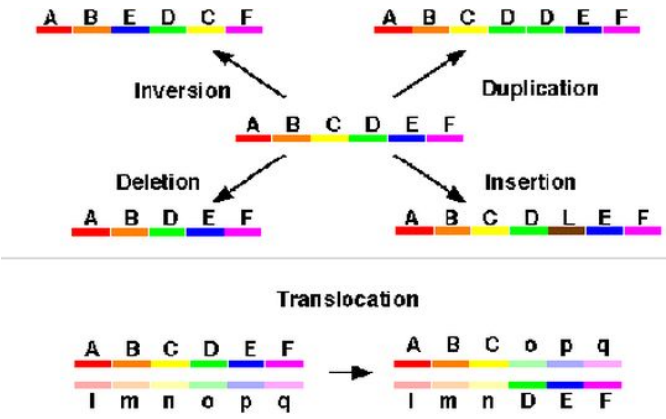
Gene fusions are hybrid genes formed when two previously independent genes become juxtaposed

Amplification



Increase in the number of copies of a gene

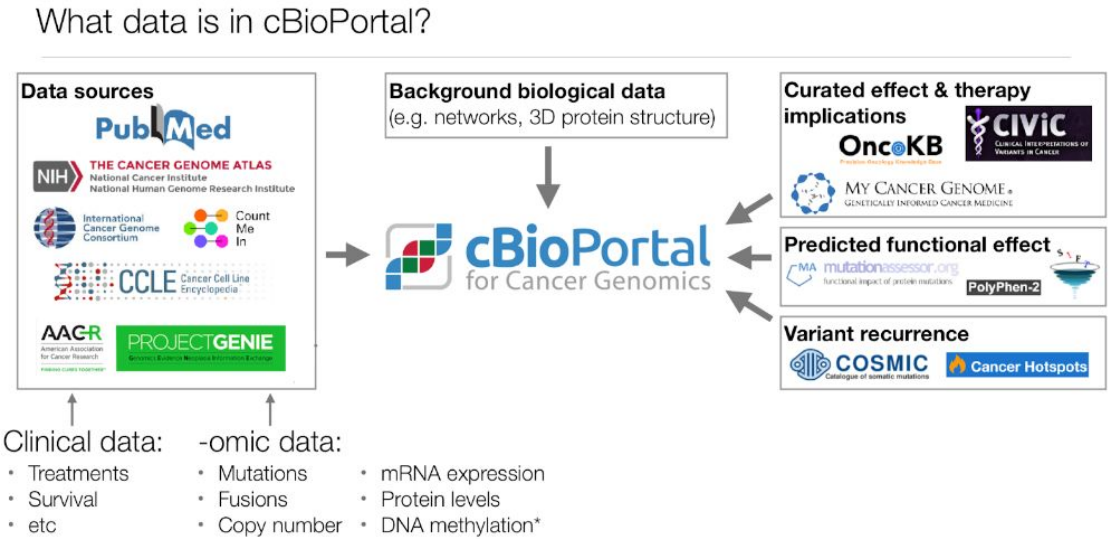
Mutations



A mutation is a change in the DNA sequence of an organism

cbioportal.org

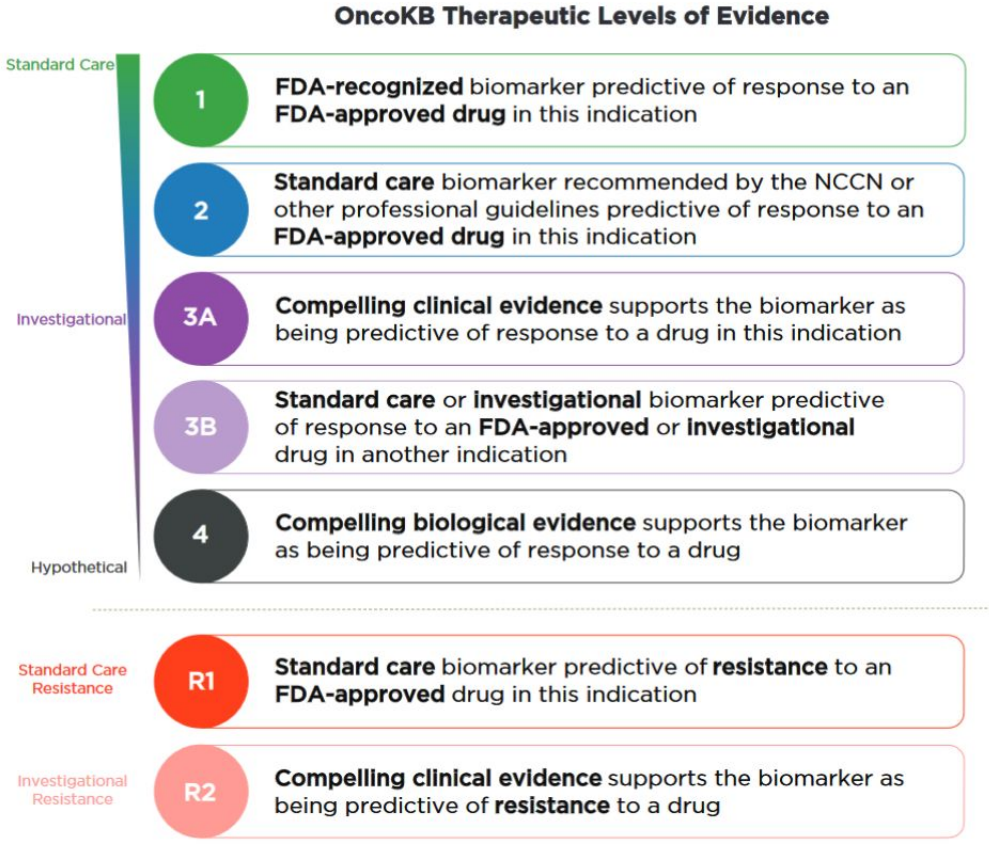
The cBioPortal for Cancer Genomics provides visualization, analysis and download of large-scale cancer genomics data sets.



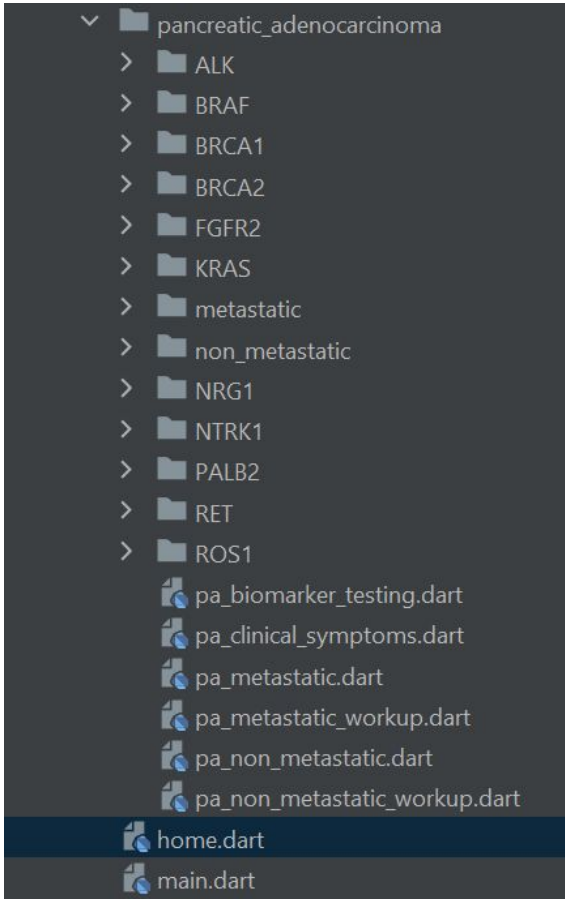
Demo - https://www.cbioportal.org/

cbioportal.org

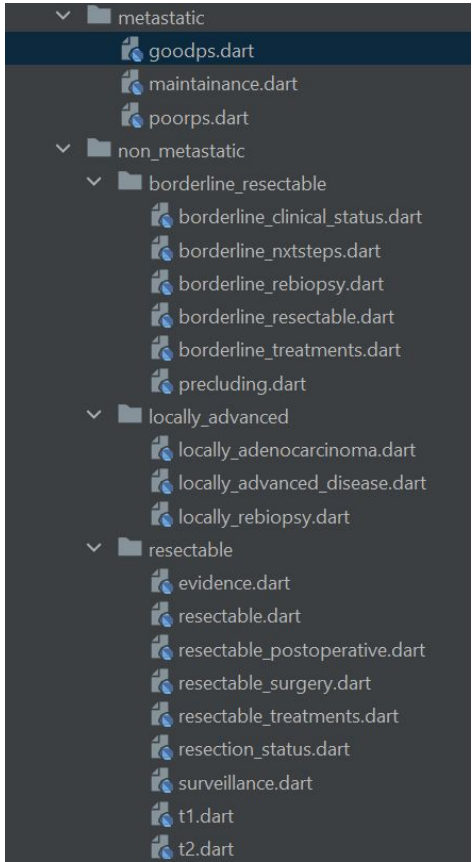
https://www.oncokb.org/content/files/levelOfEvidence/V2/LevelsOfEvidence.pdf

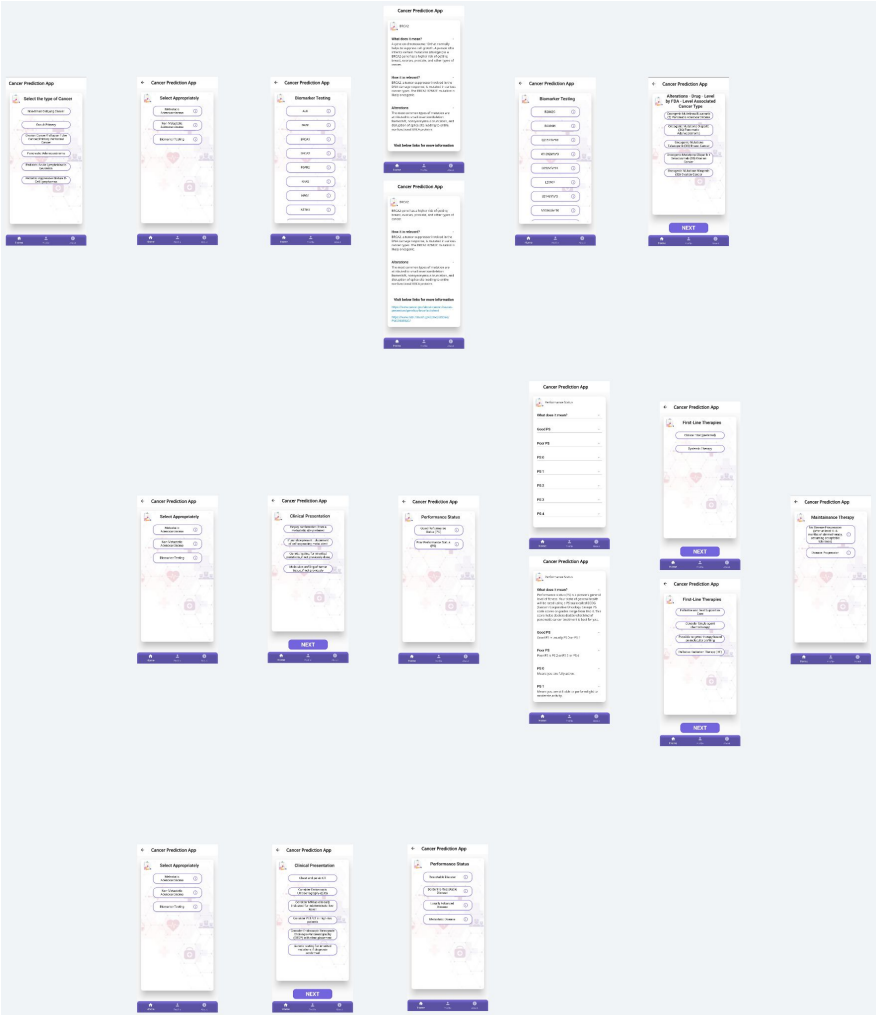


App Flow



https://github.com/ABharatSai/Cancer-Prediction-App





App Flow

https://whimsical.com/cancer-app-AyNn6w3d1bNzP4FTTxRWS

Conclusion and Future Implications

Our app will have a wide range of applications in the healthcare industry when made fully available to the public. However, we have worked only on single cancer, namely pancreatic cancer, which should not limit us from recognizing the importance of this soon. It is just a brick in building the bridge. Our other colleagues have worked on NSCLC.

Our design model will benefit many when all cancer models are ready. However, as stated before, cancer is ongoing research. Currently, standard new treatment and diagnostic biomarkers will be updated, so there is a requirement for a team of individuals to collect this information and update the app, respectively.

Our app will help the healthcare community by being a one-stop solution for many doctors who have to do much research to come up with the proper biomarker testing and the right therapeutic drugs to suggest.

Also, the cbioportal data majorly originated from the American population, which we adapt as per our requirement, however in India, such initiatives to collect the data and give them some basic functionalities to analyze the data are required more than ever, with this information and reports might benefit some other person.

Thank you

Any Questions?