Skin Cancer Database

A

Project Report

Submiited in Fulfillment of the requirement for the award of degree

of

BACHELOR OF BIOTECHNOLOGY

IN

BIOINFORMATICS

Under the supervision

Of

Dr.Tiratha Raj Singh

Associate Professor

By

Naman Sharma (161514)

To

Jaypee University Of Information Technology

WAkNAGHAT, SOLAN - 173234

Declaration & Approval

I herewith declare that the work presented in the thesis entitled "Skin Cancer Database" in fulfillment of the requirements for the award of the degree in **Bachelor Of Technology In Bioinformatics** submitted in the department of Biotechnology and Bioinformatics, Jaypee University Of Information Technology, Waknaghat is an authentic record of my own work carried out over a period from August 2019 to June 2020 under the supervision of Dr Tiratha Raj Singh, Associate Professor, Department of Biotechnology & Bioinformatics.

The matter embodied in the report has not been submitted for the award of and other degree or diploma.

Naman Sharma (161514)

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Dr Tiratha Raj Singh

Associate Professor,

Biotechnology & Bioinformatics

Acknowledgement

I would like to show my sincere gratitude to my supervisor Dr. Tiratha Raj Singh for providing their invaluable guidance, comments and suggestions throughout the course of the project.

Abstract

This Report is about skin cancer and the construction of skin cancer database. It summarizes the material, application, software used for the creation of skin cancer database. The database is commissioned to: provide genes responsible for skin cancer. The GUI of this database is designed with one statement in mind i.e. Easy To Use. HTML is used in here for interface, CSS is used for modification including: colors, layouts, fonts. MySQL which is relational database management system is used for data warehousing. Codes are successfully inserted using Javascript and php for making website more handy. Data regarding skin cancer is divided into four segments i.e. Actinic Keratoses, Squamous cell carcinoma, Basal Cell Carcinoma, Melanoma. This Database include 30 genes responsible for Actinic keratosis, 30 Genes responsible for Basal Cell Carcinoma, 30 Genes Responsible for Squamous Cell Carcinoma, 34 Genes Responsible for Melanoma along with their Symbol, Official Full Name, Primary source, Function, Gene Type etc.

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Introduction

Skin cancers are cancers of skin. They are because of growth of unusual cells that have the means to insert inside body and spread to different parts of living body. There are 4 types of skin based cancers: Melanomaa, Basal.cell.carcinoma (B.C.C), Squamous.Cell.Carcinoma (S.C.C) and Actinic.Keratosis (AK). Basal.cell.carcinoma enlarge slow and may affect the tisue around it but won't spread to far areas or result in death. Squamous cell carcinoma spreads fast. It usualy present as hard lump with a scaly patch.

90% of due to exposure to U.V rays from the Sun. This type of submission increases the risk of all 4 types of skin cancer.

Reducing submission to U.V rays and use of sun protection screens appear to be effective for preventing actinic and squamous.cell skin cancer.

Skin cancer indeed is the most ordianary form of cancer and affect atleast 40% patients globally.

Types Of Skin Cancer

1. Actinic Keratosis
2. Basal Cell carcinoma
3. Squamous Cell Carcinoma
4. Melenoma

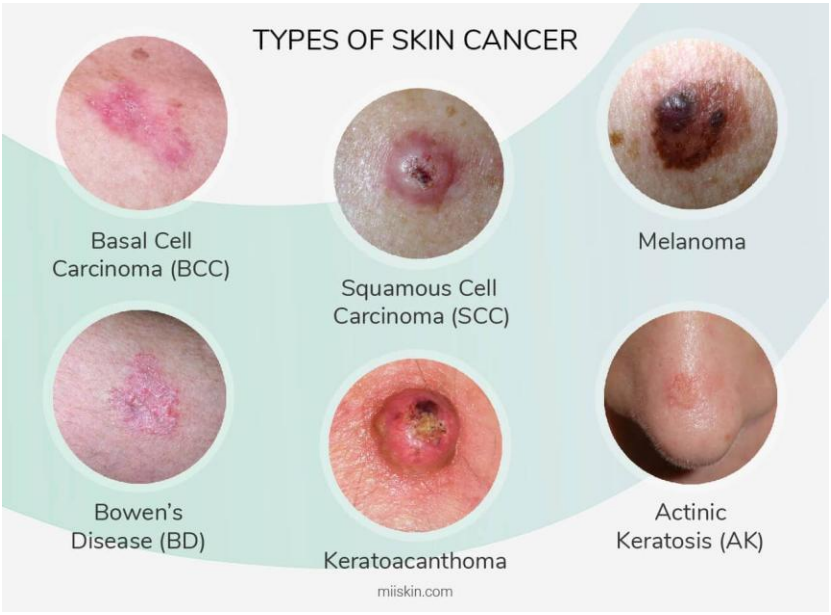


Fig 1: Types Of Skin Cancer

Actinic.Keratosis

Actinic keratosis (A.K.) is the most ordinary cancer of skin shapes on skin caused by deadly exposure to ultraviolet (UV) radiation from the sun.

A.Ksis occurs due to the long term exposure to (U.V) radiation. If you have an A.K already you are inclined to develop more actinic keratosis in future. This puts one at higher risk for skin associated cancer, because A.Ksis can develop into squamous cell carcinoma (S.C.C), a common and maybe disastrous form of the disease.

A.Ksis are proof of sustained sun radiation**.**

A.Ksis can be red, light or dark tan a mixture of colors and are sometimes raised. Because of their hardened texture, actinic keratosis are mostly **easier to feel** .

Basal.Cell.Carcinomas

Basal.cell.carcinoma (B.C.C) is the supreme common of skin cancer and have occurred more recently. In U.S. only, more than 4.5 million cases are registered each year. B.C.Cs rose from abnormal, difficult to control growth of basal cells.

Because BCCs grow slow, caught on time can be treated fairly easily. Understanding B.C.Cs cause, warnings, risks signs can help you find them early, when the are in the first stages of development.

1 of 3 variety of cell in the highest part of skin, basal.cells appear as brand new one form. B.C.Cs occur mostly when D.N.A gets harm from ultraviolet (U.V) rays from sun tan trigger changes in basal cells in the out most coating of skin, resulting in difficult to control growth.

B.C.Cs can look like scrape, red patches growth with slightly raised edges and a middle indentation. B.C.Cs might bleed, ooze , itch. The lesion mostly arise in sun bare areas of body.

Squamous.Cell.Carcinomas

Squamous cell carcinomas (S.C.C) is the 2nd most ordianary form of skin based cancer. It's seen mostly on areas of the body damaged by U.V. rays from the sun, tan beds.

S.C.Cs mostly grows slowly. Unlike different types of skin cancer, it can spread other parts of body where it may become difficult to treat. Early detection helps with easy treatment.

S.C.Cs usually starts as top shaped bump of color red with scaly patch. It's rough, crusty like other skin cancer, and can bleed easily. Massive growth may itch, hurt.

Squamous cell carcinomas mostly can be treated with basic surgery and can be done in doc'c office or clinic. Depending on the location of the S.C.Cs.

M.Melanoma

Melanoma, aka malignant melanoma, is a deadly kind of skin based cancer that occur from pigment construct cells aka melanocytes. Melanomas mostly occur inside skin but can sometime take place in intestines mouth or eye.

In ladies, they take place on the legs, while in men they mostly take place on back. About 28% of malignant melanomas evolve from moles. Modification in mole include an rise in size, itchiness, irregular edges, color change, or skin breakdown.

The main cause of melanoma is (U.V.) exposure in humans with lower skin color pigment melanin. The U.V. light may be from tanning devices,the sun or different sources. Those with alot of moles, a background of m.m infected family members, week immune system are at higher risk. A no of extremely rare genetic conditions like pigmentosum xeroderma increases the risk. Diagnosis is by analysis & biopsy by skin based lesion that show potential sign of being carcinogenic.

Premature signs of melanomas are reconstruct in shape or color of existent moles, At final stage the mole may bleed, itch. Early expression of melanomas are summarized by "ABCDEF"

Causes

U.V. rad. from suntan is the common natural cause of skin cancers. This may occur farming jobs. Other risky factors include:

H.P.V. infections inc. the risk for developing squamous cell carcinomas.

Some genetical problems include nevi syndrome, congenital melanocytic which is differentiated by existence of nevi birthmark moles of different size which were there at birth or appear in 7 months of new born. A Nevi birthmark larger than 20 m.m in measurement are mostly at greater risk of becoming carcinogenic.

Long-term difficulty in wound healing. These are known as Mjorlin ulcers based on their features, and can change into squamous.cell.carcinomas.

Ionized radiation such as x rays, artificial U.V.radiation environmental carcinogens, and light skin color. It is believed that tann bed's are the mazor cause of thousands of squamous & basal cell skin carcinoma. The W.H.O has started to place people who use's artificial tann bed's in its major risk category for developing skin based cancer. Consumption of alcohols also multiply the risk of sun based burns.

Graphical User Interface

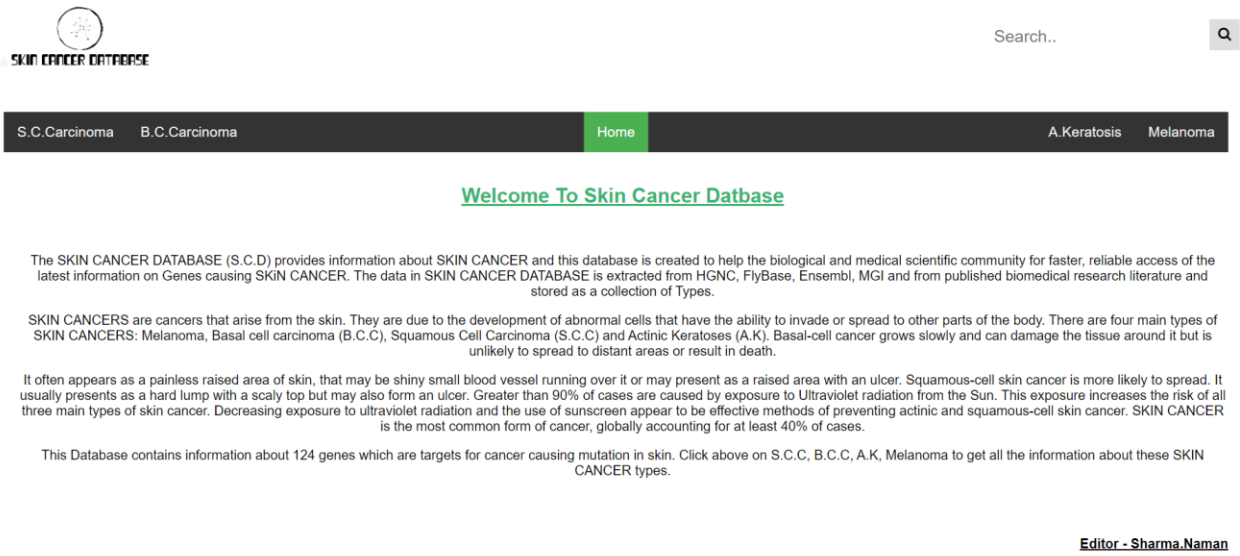


Fig 2: Main Page of Skin Cancer Database.

Programing languages that i used to create this webpage –

1. HTML
2. CSS
3. JavaScript
4. PHP
5. MySql

Contd.

Actinic Keratoses

Items : 1 - 12

Name/Gene ID	Description	Organism	PMID
TP53	Tumor protein p53	Homosapiens	8183576
CDKN2A	Cyclin Dependent Kinase Inhibitor	Homosapiens	10208428
BRAF	B-Raf proto-oncogene	Homosapiens	19377299
HRAS	HRAS proto-oncogene	Homosapiens	1849697
Rela	V-Rel Reticuloendotheliosis	Musmusculus	23977171
TP63	Tumor Protein p63	Homosapiens	17497299
MMP14	Matrix metallopeptidase	Homosapiens	22534634
FOXP3	forkhead box P3	Homosapiens	29419888
LUM	Lumican	Homosapiens	23719483
FLG	Filaggrin	Homosapiens	28213896
CDKN2B	Cyclin dependent kinase inhibitor 2B	Homosapiens	18331779
PDPN	Podoplanin	Homosapiens	27069135

Next »

Fig 3: Genes Related To Actinic Keratoses

In here i used TABLE options (th, tr, td)

CSS is also used to change the background color.

Contd.

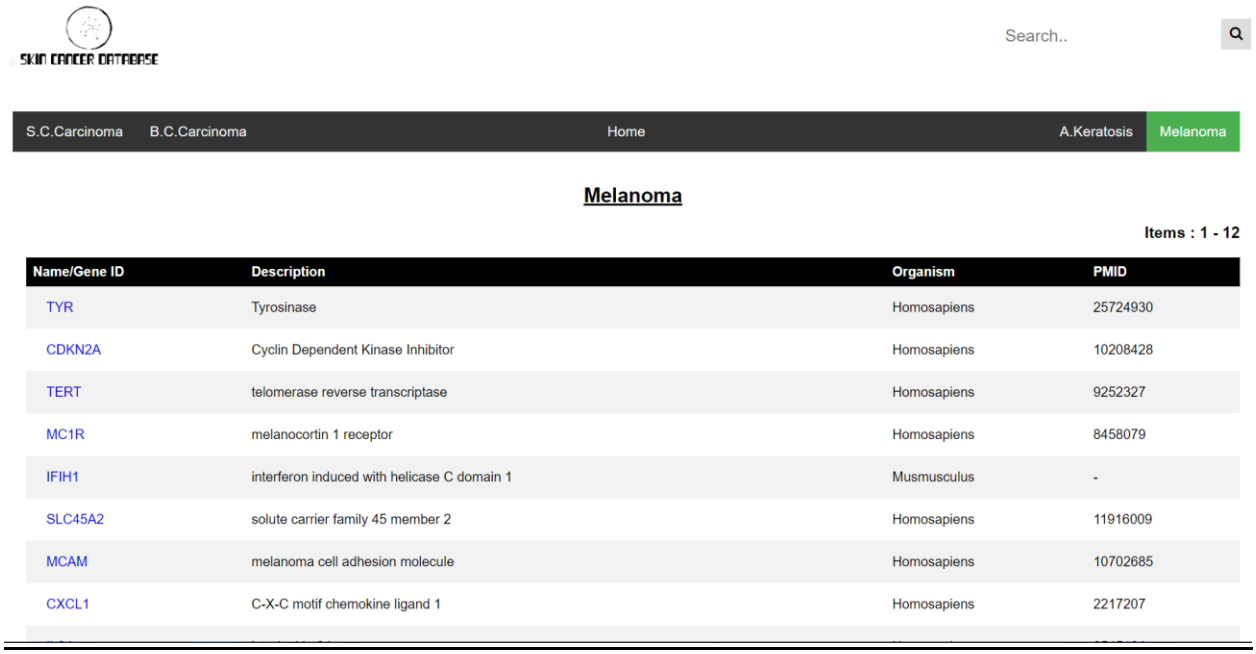


Fig 4: Genes Related To Melanoma

Responsive Bar is used in here to give webpage a fresh look

Description Visible Of Genes –

Gene ID

Description

Organism

PMID

HTML, CSS

Hypertext Markup Language (H-T-M-L) is the basic markup language for document design to be viewed under web browser. It can used with tec's such as Cascading.Style.Sheets (C.S.S), scripting language same as Java.Script.

Web based browsers receive H.T.M.L document from local storage or web server and start's rendering document into m.m web page. H.T.M.L shows the structure of w.w.w page systematically & includes cues for view of document.

Cascading.Style.Sheets (C.S.S) is a system based on sheets used for making the visual of a document user-friendly, written in H-T-M-L beautifull. C-S-S is a milestone technology of the W.W.W, alongside H-T-M-L and Java.Script.

C.S.S. is created to make separation in presentation , conten includng layout, font & color. The separation may improve content viewing pleasure of individualsand give dev's greater power to make website look catchy by adding eye candy enabling maximum w.w.w pages to serve formats by showcasing the possible relevant C.S.S. in a separate file (.css), which reduce repetition & complexity.

HTML & CSS: Example

```
<!DOCTYPE html>
<html>
<head>
<title>Skin Cancer | S.C.D</title>
 < style >

 Body  { background-color: #e9e9e9;
  Margin : 0;
  font-family: Arial, sans-serif;
}
</style>
</head>
<body>
  < a href="E:/Documents/litest.html">
< img border = "0" src="scd2.png" alt="logo3" width ="200"
height ="100"></a>
<p align="center"><iframe src="frame1.html" style="border:none;" height="750"
width="1460"></iframe></p>
</body>
</html>
```

Code Used For Main Page Creation

```
<!DOCTYPE html>

<html>

<head>

<title>S.C.D</title>

<link rel="icon" type="scd2./png" href="scd2.png">

<linkrel="stylesheet"href="https://cdnjs.cloudflare.com/ajax/libs/fontawesome/4.7.0/css/font-awesome.min.css">

<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">

<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">

<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">

< style >

 Body  { background-color: #FFFFFF;

  Margin - 0;

  font-family: sans-serif;


}


 .topnav  {

  Overflow : hidden;

  Background – colour : white;

}
```

```
. topnav b {
 display : block;
 color : white;
 Float : left;
padding : 23px 25px;
text - decoration: none;
 text-align : middle;
 font - size: 17px;
}
.topnav b.active {
 background-color: #216F3;
 color: white;
}
.topnav b:hover {
 background-color: #dd;
 color: black;
}
.topnav input [ type = text ] {
 Padding : 6px;
.topnav .ssearch-container {
 float: right;
}
```

```
 Border : none;
Margin - top: 50px;
  Font - size: 20px;
}
 . topnav  . ssearch - container button:hover {
  background: #cc;
}
.topnav .ssearch-container button {
  Margin-top : 50px;
  Float : right;
  Padding : 6px 10px;
   Margin-right : 16px;
   Background : #ddd;
  Cursor: pointer;
  Font-size : 17px;
  Border: none;
}
{  .topnav .ssearch-container {
    float: right;
  }
  .topnav , .topnav .ssearch-container button, .topnav input[type=text] {
```

```
text-align: left;
        width: 100%;
Float : none;
   display: block;
          margin: 0;
            padding: 14px;
 }
 .topnav iinput[type==text] {
   border: 2px solid #cc;
 }
}</style>
</head>
<body>
< div class="topnav">
  < a href="E:/Documents/litest.html"> < img_border="0" src ="scd2.png" alt="scd2" width = "200" height ="100"></a>

<p align="center"><iframe src="bar.html" style="border:none;" height="628" width="1460"></iframe></p>
</body>
</html>
```

JavaScript

JavaScript often pronounced as J.S., is a basic level, O.O.P. language that works on E.C.M.A Script spec's. JavaScript got curly bracket, dynamic typing, dynamic typing and first-class functions at its core.

Alongside C.S.S, H.T.M.L, Java.Script is one of the main technologies of the W.W.W. Java.Script enables users to surf through W.W.W using interaction based web pages and serve's as a major element of web applications. A great class of majority uses Java.Script for interactive experience also most web browsers have a engine dedicated to Java.Script.

All popular Web browsers support Java.Script with built in execution environments.

Java.Script is a weakly types language, which means certain types are implicitly depending on the operation intended. Java.Script has received criticism for it implementation and inconsistency. Example include, Number addition to string, concatenation.

Java.Script Example :

```
<!DOCTYPE html>
<html>
  <body>
   <button id="Sup?">How are you?</buton>
    <script>

    document.getElementById.('Sup?').onhover = function() {

       popup('Sup?!');

         var mynewTextNode = document.createnewTextNode(' U ready?');

             document.body.appendChildfn(myTextNode);
    </script>
  </body>
</html>
```

PHP

P.H.P is a easy to use programming language created for basic web development. It was created by Lerdorf Rasmus in 1994.

P.H.P originally was called Personal.Home.Page, but is now called recursive.initialism P.H.P : Hypertext Preprocessor.

P.H.P code can be executed with (C.L.I), embedded into H.T.M.L language, or can used with different web templates. P.H.P code is mostly executed by a P.H.P interpreter used as an advanced module in a w.w.w server or as a (C.G.I) executable.

The server output the result & executes P.H.P code, & generates H.T.M.L program or binary img data. P.H.P can be implemented for a lot of tasks outside of the web focused context, such as (S.G.A) and robotic.drone.control.

P.H.P mostly stores integers in a platform focused range, mostly 64 bit, 32 bit or 128 bit registered integer equal to the C based language type. Unsigned integers are changed into signed values this behavior is different from other programing based languages.

PHP Example :

This Code is Used to Connect website with mySql database.

```
<?php
$adminname  = 'kyle';
$pass  = '74789';
try {
   $dbconn = new PDO ('mysql:host=127.7.8.9;dbname=skin cancer db', $adminname, $pass);

} catch (PDOException $e) {
   print "Error!: " . $e->getMessage() . "<br/>";
   die();
}
$dbconn = null;
?>
```

MySQL

MySQL is a (R.DB.M.S) based on S.Q.L The app is used warehousing data, logins for applications etc.

The most basic use of mySQL is to warehouse web data . One can use it to store a single file or a set of files, records based on a full inventory datasets used for Skin Cancer Database.

Could do great many things with the collaboration of a scripting languages like Perl or P.H.P.

Software used –

XAMPP -

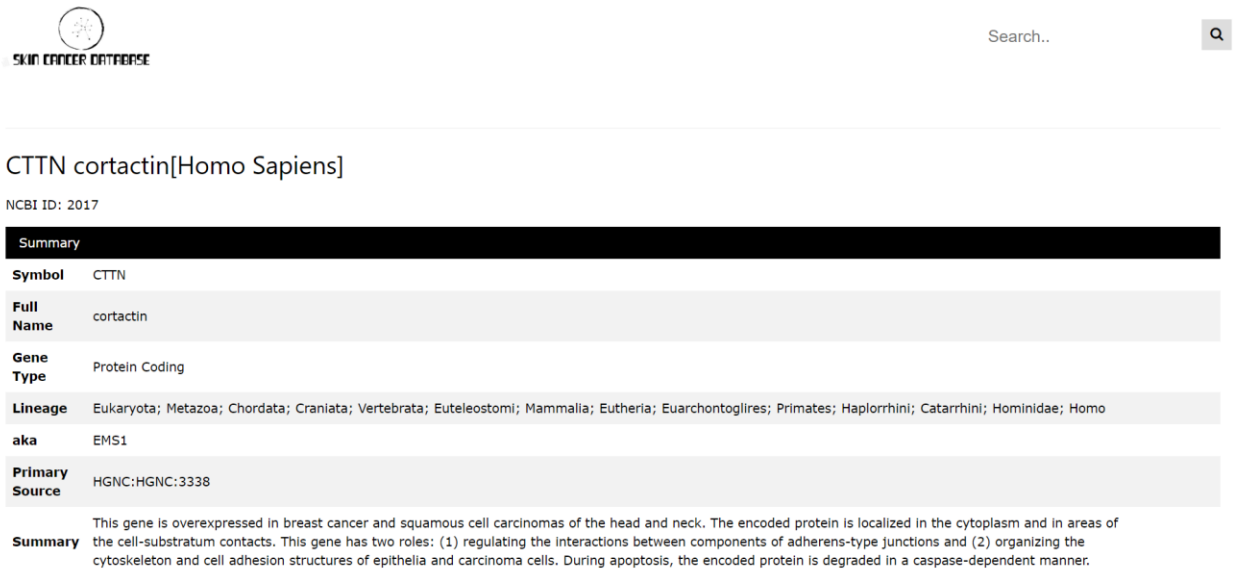
XAMPP is a (Cross platform Apache MariaDB PHP and Perl) by the name suggests it is a cross platform system which is a lightweight Apache distribution used to make web servers locally for beta testing purposes.

Results

1. Successfully Extracted and Inserted Data from HGNC, FlyBase, Ensemble, MGI and from published biomedical research literature.
2. Genes that are extracted and inserted based on skin cancer types –
3. Actinic Keratoses - 22
4. Basal Cell Carcinoma - 30
5. Squamous Cell Carcinoma – 30
6. Melanoma - 34
7. Inserted (Official Symbol, Official Full Name, Organism, PMID, NCBI ID, Gene Type, Lineage, Also known as, Primary source, Summary etc)

Results Contd.

Gene of Squamous Cell Carcinoma



SKIN CANCER DATABASE

Search..

CTTN cortactin[Homo Sapiens]

NCBI ID: 2017

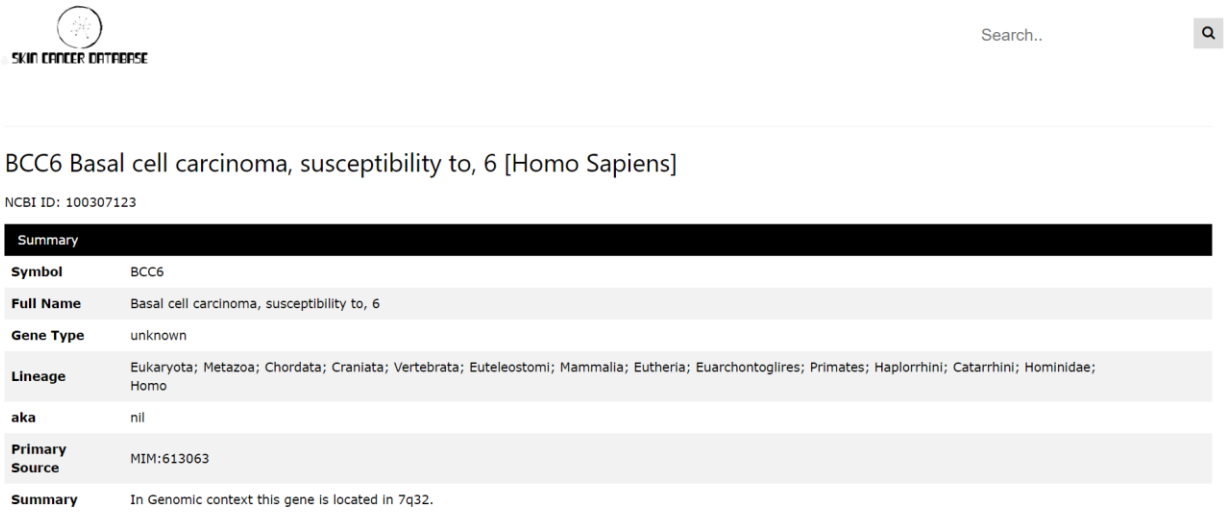
Summary	
Symbol	CTTN
Full Name	cortactin
Gene Type	Protein Coding
Lineage	Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini; Catarrhini; Hominidae; Homo
aka	EMS1
Primary Source	HGNC:HGNC:3338
Summary	This gene is overexpressed in breast cancer and squamous cell carcinomas of the head and neck. The encoded protein is localized in the cytoplasm and in areas of the cell-substratum contacts. This gene has two roles: (1) regulating the interactions between components of adherens-type junctions and (2) organizing the cytoskeleton and cell adhesion structures of epithelia and carcinoma cells. During apoptosis, the encoded protein is degraded in a caspase-dependent manner.

Data 1: End Result of gene cortactin of S.C.C

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Results Contd.

Gene of Basal Cell Carcinoma

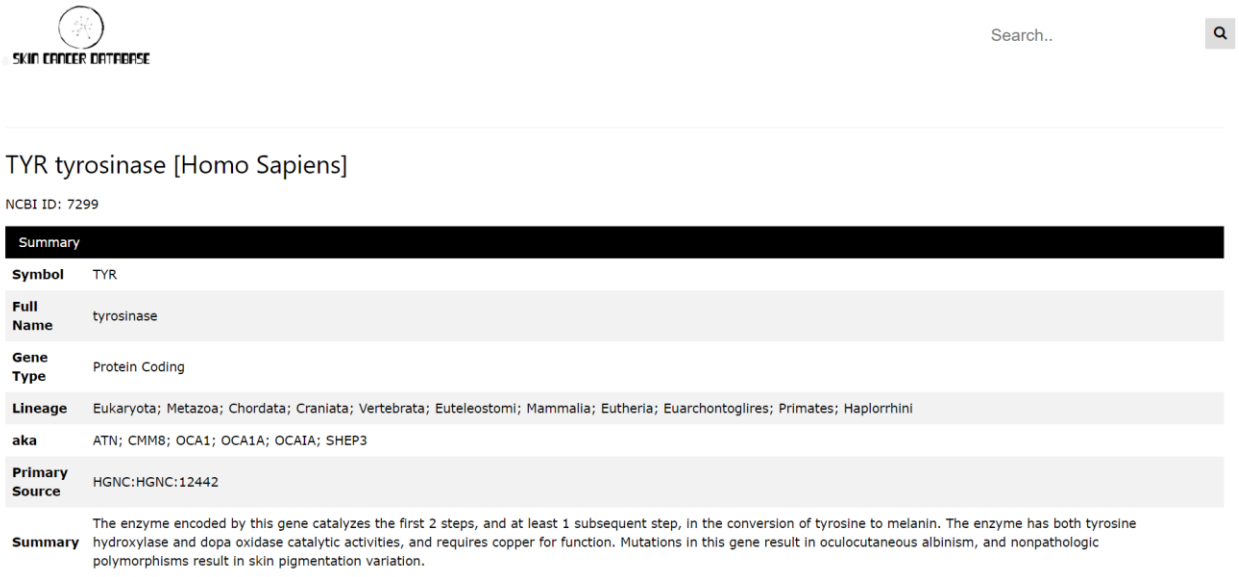


Data 2: End Result of gene BCC6 of B.C.C

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Results Contd.

Gene of Melanoma



Data 3: End Result of gene Tyrosinase of Melanoma

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Results Contd.

Gene of Actinic Keratoses


SKIN CANCER DATABASE

Search..

TP53 tumor protein p53 [Homo Sapiens]

Gene ID: 7157

Summary	
Symbol	TP53
Full Name	Tumor Protein p53
Gene Type	Protein Coding
Lineage	Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Primates;
aka	BCC7; LFS1; BMFS5;
Primary Source	HGNC:HGNC:11998
Summary	This gene encodes a tumor suppressor protein containing transcriptional activation, DNA binding, and oligomerization domains. The encoded protein responds to diverse cellular stresses to regulate expression of target genes, thereby inducing cell cycle arrest, apoptosis, senescence, DNA repair, or changes in metabolism.Mutations in this gene are associated with a variety of human cancers, including hereditary cancers such as Li-Fraumeni syndrome. Alternative splicing of this gene and the use of alternate promoters result in multiple transcript variants and isoforms.

Data 3: End Result of gene Tyrosinase of Melanoma

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Results Contd.

Gene of Actinic Keratoses


SKIN CANCER DATABASE

Search..

TP63 tumor protein p63 [Homo Sapiens]

NCBI ID: 8626

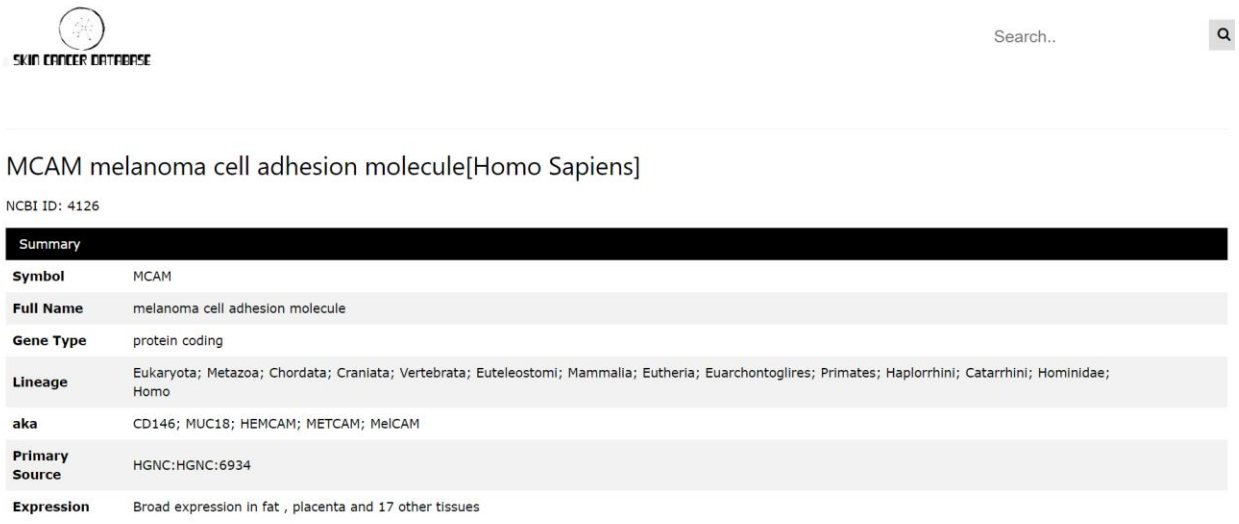
Summary	
Symbol	TP63
Full Name	tumor protein p63
Gene Type	Protein Coding
Lineage	Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini; Catarrhini; Hominidae; Homo
aka	AIS; KET; LMS; NBP; RHS; p40; p51; p63; EEC3; OFC8; p73H; p73L; SHFM4
Primary Source	HGNC:HGNC:15979
Summary	This gene encodes a member of the p53 family of transcription factors. The functional domains of p53 family proteins include an N-terminal transactivation domain, a central DNA-binding domain and an oligomerization domain. Alternative splicing of this gene and the use of alternative promoters results in multiple transcript variants encoding different isoforms that vary in their functional properties. These isoforms function during skin development and maintenance, adult stem/progenitor cell regulation, heart development and premature aging. Some isoforms have been found to protect the germline by eliminating oocytes or testicular germ cells that have suffered DNA damage.

Data 4: End Result of gene TP63 of Actinic Keratoses

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Results Contd.

Gene of Melanoma



Data 4: End Result of gene MCAM of Melanoma

It Contains Symbol, Full Name, Lineage, Also known as, Gene Type, Primary Souce, Summary & NCBI ID

Refrences

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2. Toll-like receptor 4 play a tumor suppressive role in cutaneous squamous cell carcinoma.

   DOI: 10.3892/ijo.2019.4790

3. Expression profile of sonic hedgehog signaling-related molecules in basal cell carcinoma.
   DOI: 10.1371/journal.pone.0225511
4. Co expression of network analysis identified genes associated with Cancer Stem Cells Characteristics Lung squamous.cell.carcinomas.
   DOI: 10.1080/07357907.2019.1697281
5. Transcriptome, cytogenetic, profiling analysis of matched in situ, cutaneous squamous.cell.carcinomas fromimmune competent patients.
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   DOI: 10.1016/j.annder.2018.06.009

Refrences Contd.

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    DOI: 10.1038/ng.234
11. A Chemically Induced Model for Squamous.Cell. Carcinoma of the Lung in Mice: Histopathology and Strain Susceptibility
    DOI: 10.1158/0008-5472.can-03-3273