Melanoma Cancer Prediction From Microarray Gene Expression Experiments

Abstract

Topics were specifically addresses to a newly developing medical branch in Australia, namely that of Primary Care Skin Cancer Practitioners, and focuses on strategies to improve primary and secondary prevention and early detection of melanoma and non-melanoma skin cancer using dermoscopy where the School of Medicine at the University of Queensland (QLD, Australia) organize this third annual conference on skin cancer. Its goal was to provide a venue for updating primary-care practitioners with special interest in diagnosing and treating skin cancer, as well as to exchange professional information and network with others working in the field. Topics covered melanoma and keratinocyte cancers including pathogenesis, primary and secondary prevention, early diagnosis and treatment. Cutaneous melanoma arises through the interplay of both environmental and genetic factors. Some people have a propensity to develop many nevi, while others have little or no such propensity. In those with low nevus propensity, repeated and cumulative exposure to the sun is required for melanoma development. By contrast, in those with high propensity, only modest amounts of sun exposure are required to develop melanoma .Neurons in children differ from nevi in adults in terms of their morphology, dynamic, genetics and associate melanoma risk and may be derived from different maturation stages in different levels of the skin, according to a study by Iris Zalaudek at the University of Bristol .Screening for skin cancer is a hot topic at this conference focusing on skin cancer screening and early detection of skin cancer as most people who return a 'positive test' do not suffer or will not die of melanoma, a situation that causes harm and costs that affect the potential benefits . Much of the economic burden of skin cancer screening results from excision of moles, especially in young patients A number of new drugs and possible combinations are under investigation for treatment of melanoma. It has been concluded that it is desirable that trials will result in a substantial improvement in survival from the disease. A current trial, ECOG 1609, is comparing treatment with Yervoy™ against standard high-dose IFN-2 b. The role of skin cancer screening in the detection of melanoma has been discussed. Dermoscopy on almost all clinically unselected lesions using a comparative approach and digital dermoscopic monitoring were advocated. Factors that increased the likelihood of developing a skin cancer by total body skin examination were older age, patients consulting for a skin tumor and patients with an equivocal lesion. In addition to Non-melanoma skin cancer Another focus of this conference was related to the pathogenesis and diagnosis of non-melanoma skin cancer. Cutaneous squamous cell carcinoma (SCC) affects people who sunburn easily without tanning and those who are immunosuppressed. The major cause is excessive sun exposure, illustrated by tenfold differences in incidence rates among people of similar heritage living in Australia and the UK. One of the most intensive clinical studies of the natural history of AK was performed in the Queensland community of Nambour, showing that very high regression rates of AKs can occur in prevalent AK within a 6-month period. The Skin Cancer Audit Research Database (SCARD) was presented by Cliff Rosendahl from the School of Medicine, University of Queensland. SCARD is an initiative of the Skin Cancer College of Australia and New Zealand. It has had a substantial uptake by Australasian primary care skin cancer practitioners.

Keywords

actinic keratosis (AK) , dermatoscopy , epidemiology , melanoma , birthmarks , nevi , non-melanoma skin cancer , UV ,3rd Annual Conference ,The School of Medicine at the University of Queensland (QLD, Australia), and its partner HealthCert , cutaneous squamous cell carcinoma (SCC) ,Database (SCARD) , ECOG 1609

Introduction

Annual Skin Cancer Conference 2011

Hamilton Island, Australia, 5–6 August 2011

In this article, we will summarize some of the highlights of the third annual conference on skin cancer, with special emphasis on the recent advances regarding melanoma and non-melanoma skin cancer epidemiology, diagnosis and treatment. Topics were particularly addressed to a newly developing medical branch in Australia, namely that of Primary Care Skin Cancer Practitioners, and focused on strategies to improve primary and secondary prevention and early detection of melanoma and non-melanoma skin cancer using dermoscopy. Controversies related to skin cancer screening programs and recent progresses for treating advanced melanoma were additionally discussed. Yet, besides its scientific goals, the conference aimed also to encourage research originating in primary care and relevant to primary care.

The School of Medicine at the University of Queensland (QLD, Australia), together with its partner Health Cert, organized this third annual conference on skin cancer, which took place at Hamilton Island on 5–6 August 2011. Its goal was to provide a venue for updating primary-care practitioners with special interest in diagnosing and treating skin cancer, on recent research in melanoma and keratinocyte cancers, as well as to exchange professional information and network with others working in the field of skin cancer. The fact that more than 200 primary care practitioners attended this meeting points toward a newly developing medical branch in Australia, namely that of Primary Care Skin Cancer Practitioners. Topics encompassed several aspects related to melanoma and keratinocyte cancers including pathogenesis, primary and secondary prevention, early diagnosis and current progress in treating skin cancer. A group of national and international leaders in the field of skin cancer ran practical pre-and post-conference workshops and a series of plenary presentations; a key feature of the conference were debates, discussions, and moderated questions from the audience. Here, we have summarized some of the highlights of this conference.

Methods

I. Pathways of melanoma

cutaneous melanoma arises through the interaction of both environmental and genetic factors. the role of nevi was reviewed, both as ‘precursors’ and as risk markers for melanoma. Emerging evidence from Many specialties indicate that a person's tendency to develop nevi is genetically with influenced by environment. Some people have a tendency to develop many nevi, but others have little tendency to develop nevi. hypothesis for melanoma (nevus tendency) has the two

main pathways to melanoma development. Among those with low tendency to develop nevi, repeated and cumulative exposure to the sun is required for melanoma development. On the contrary, in people with high nevus tendency, only modest amounts of sun exposure are required to develop melanoma, and this exposure is probably most harmful early in life. Findings from recent genome-wide association studies of melanoma were integrated with previous research from epidemiological and molecular studies, each of which contributed new understanding to the 'divergent pathway' hypothesis for melanoma. Sunlight is the principal environmental risk factor for cutaneous melanoma. chronic exposure to sunlight cause occurrence of melanoma.

II. New insights into nevogenesis

nevi in children differ significantly from nevi in adults with respect to their epidemiology, morphology, dynamic, genetics and associated melanoma risk. These differences by a neogenesis, which postulates that nevi maybe derived from melanocytes at different maturation stages indifferent levels of the skin.

III. Screening for melanoma

The hot topic of this conference focused on melanoma screening and the early detection of melanoma. Whiteman concluded and reviewed the available evidence for melanoma screening that a key challenge for all screening programs is the low positive-predictive value of the skin examination. This means that most of the people who return a 'positive test' do not have or will not die from melanoma. The presentation concluded with a commentary on primary care skin cancer screening in Australia ('case finding'), and a review of

the national skin cancer screening program in Germany. Giuseppe Argenziano presented the preliminary data of a survey, which showed that the number needed to excise (NNE) decreased significantly over a 10-year period in specialized clinics (from 12.8 to 6.8).

- **Definition Of Melanoma:**

Melanoma is a cancer that develops from melanocytes and that cells produce a natural level from melanocytes, called melanin in the skin, the skin secretes the substance of melanin to protect itself from sun damage this is the reason of skin darkness when exposed to sun. Melanin exists in darkened areas such as freckles, moles, and other spots. Melanocytes may become cancerous when damaged, sometimes by ultraviolet (UV) light from the sun. Because of the damage of ultraviolet, melanoma can appear on areas of the body that receive interrupted sun exposure, for example the trunk, legs, and arms, and higher amounts of sun exposure, such as the face and head. Rarely grow.

Melanoma on the soles of the feet, the palms of the hands, or even in the mucous membranes of the mouth, vagina, or anus. It can be spread quickly and aggressive if not treated early.

- **Symptoms and Signs Of Melanoma:**

  - Serious growth on the skin.
  - Noticeable change in an existing mole or spot.
  - A sore that not healed within 2 weeks.

- **Anatomy Of The Skin:**

Showing the epidermis, dermis and subcutaneous tissue. The skin has several layers, but the two main layers are the epidermis (top or outer layer) and the dermis (lower or inner layer). Skin cancer begins in the epidermis, which is made up of three kinds of cells:

- Squamous cells: Thin, flat cells that form the top layer of the epidermis. Cancer that forms in squamous cells is called squamous cell carcinoma of the skin.
- Basal cells: Round cells under the squamous cells. Cancer that forms in basal cells is called basal cell carcinoma.
- Melanocytes: Found in the lower part of the epidermis, these cells make melanin, the pigment that gives skin its natural color. When skin is exposed to the sun, melanocytes make more pigment and cause the skin to tan or darken. Cancer that forms in melanocytes is called melanoma.

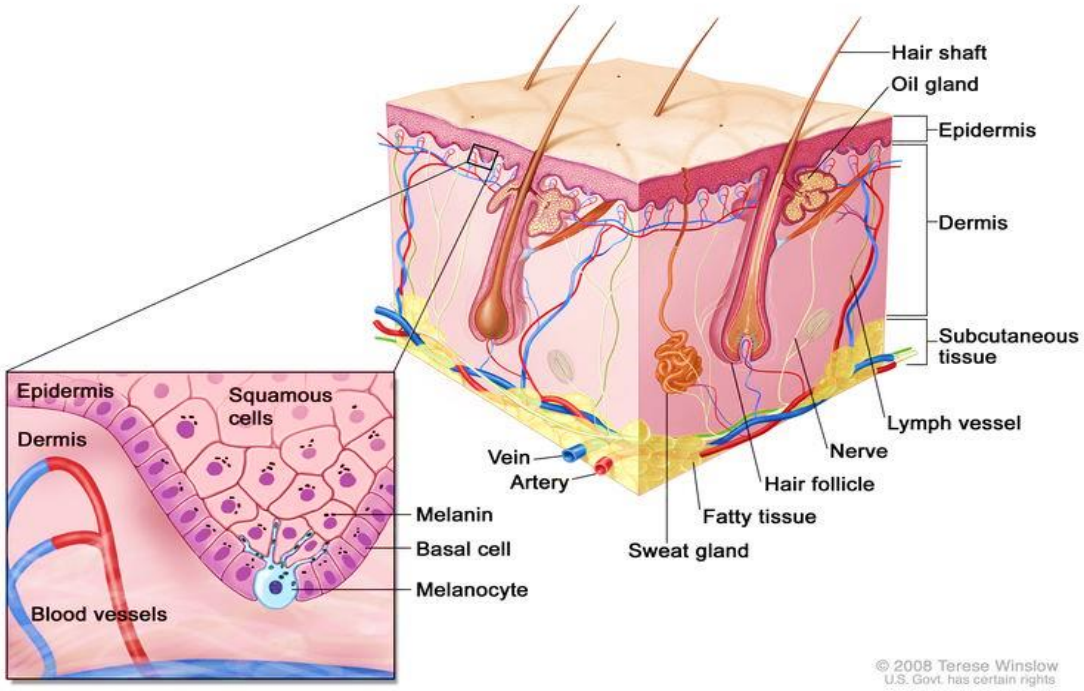


Image from: **https://nci-media.cancer.gov/pdq/media/images/579033-750.jpg**

- **What is screening?**

  - Screening is looking for cancer before a person has any symptoms. This can help find cancer at an early stage. When abnormal tissue or cancer is found early, it may be easier to treat. By the time symptoms appear, cancer may have begun to spread.Scientists are trying to better understand which people are more likely to get certain types of cancer. They also study the things we do and the things around us to see if they cause cancer. This information helps doctors recommend who should be screened for cancer, which screening tests should be used, and how often the tests should be done.

  - It is important to remember that your doctor does not necessarily think you have cancer if he or she suggests a screening test. Screening tests are given when you have no cancer symptoms.

  - If a screening test result is abnormal, you may need to have more tests done to find out if you have cancer. These are called diagnostic tests.

- **Melanoma Screening Tool:**

  Perlmutter Cancer Center researchers and doctors founded the ABCDE system, which helps you identify the signs and symptoms of melanoma based on any changes in the size, shape, or color of the skin.the ABCDE is now the standard screening tool used by doctor around the world, The Component Of ABCDE System:

  - A for Asymmetry.

  - B for Border Irregularity.

  - C for Color.

  - D for Diameter.

  - E for Evolution.

- **Melanoma Screening Program:**

  Our doctors are experts at monitoring people at high risk for developing melanoma. They use advanced imaging techniques to detect early melanomas and to reduce unnecessary biopsy the removal of tissue for examination under a microscope. **Such as:**

  1-Dermoscopy

  A dermatologist examines your skin with a dermatoscope, a handheld device that uses a lens to light and magnify the skin. This device allows the doctor to see more deeply into the skin, identify subtle features of melanoma, and determine if a biopsy is needed.

2-Photography

Total body photography is sometimes used in people who have more than 50 moles or who have unusual moles. High-resolution digital photos are taken of a person's skin as a baseline. The photos can be used as a reference when your doctor looks for new or changing lesions during future skin exams. Photographs of specific moles may be taken, sometimes through the lens of a dermatoscope.

3-Self-examination

Melanoma can appear anywhere on the body, even on areas that are not exposed to the sun. The most frequent locations for melanoma are the face, scalp, trunk or torso (chest, abdomen, back), legs, and arms. However, melanoma can also develop under the fingernails or toenails; on the palms, soles, or tips of fingers and toes; or on mucous membranes, such as skin that lines the mouth, nose, vagina, and anus.

Our dermatologists recommend that you conduct a monthly skin self-exam while fully naked to look for unusual-looking moles or skin lesions. The ABCDE system can help you find suspected melanoma. A family member or close friend can help you check places on your body that are hard to see, such as your scalp or back.

Self-examinations should be performed in front of a full-length mirror in a brightly lit room that helps to have another person check the scalp and back of the neck. **Include the following steps in a self examination:**

- Examine the front and back of the entire body in a mirror, then the right and left sides, with arms raised.
- Bend the elbows and look carefully at the outer and inner forearms, upper arms (especially the hard-to-see back portion), and hands.
- Look at the front, sides, and back of the legs and feet, including the soles and the spaces between the toes.
- Part the hair to lift it and examine the back of the neck and scalp with a hand mirror.
- Check the back, genital area, and buttocks with a hand mirror.
- If you suspect that certain areas of skin are changing, take photos of the lesion(s) to look for changes over time.

IV. New promises in adjuvant therapy of melanoma

melanoma of the skin is the most frequent cause of mortality from skin cancer. 20–25% of all melanoma patients will die due to disseminated metastases, Adjuvant cancer therapy is additional treatment given after the primary treatment for melanoma, usually surgery. The goal of adjuvant therapy is to reduce the risk of melanoma returning, Once melanoma has spread to regional lymph nodes, survival diminishes to approximately 30–55%. After dissemination to visceral organs, only very few patients can be cured. The median survival with stage IV (AJCC classification) disseminated melanoma is approximately 6–12 months. To date, Physicians often recommend adjuvant therapy for patients with melanoma with involvement of lymph nodes or patients with metastatic disease who have undergone complete resection. High-risk melanoma is usually defined as melanoma that is deeper or thicker (more than 4 mm thick) at the primary site or involves nearby lymph nodes. These patients have a high risk of recurrence because some melanoma cells can remain in your body, even if the surgery successfully removed the visible melanoma tumors, In the adjuvant setting interferon-α is until today the only drug which has shown beneficial effects in high-risk cutaneous melanoma patients.

V. Strategies to improve melanoma detection

The detection and removal of melanoma before it spreads improves the diagnosis and survival through modern methods and techniques that have the ability to reduce the death rate from skin cancer, as it is considered the most prevalent in the past decades.

Discovery of the spread of melanoma

The dermatologists at the Dermatology and Venereology Clinic at the Sarajevo University Clinics Center began the first general preventive procedure called “Days of Fighting Melanoma” in May 2008 with the goal being to provide free skin examinations and all volunteers were physically examined (inspection of entire skin , visible mucosa and semimucosa as well as palpation of lymph nodes) where the screening included a photo-type of patients, type and abundance of moles, actinic keratosis, keratoa- canthoma, basal cell and squamous cell carcinoma, melanoma and other malignant skin tumors. Where the surgically removed tumors that were histologically verified were analyzed, in addition, they found that the spread of malignant melanoma increased compared to other types of cancers.

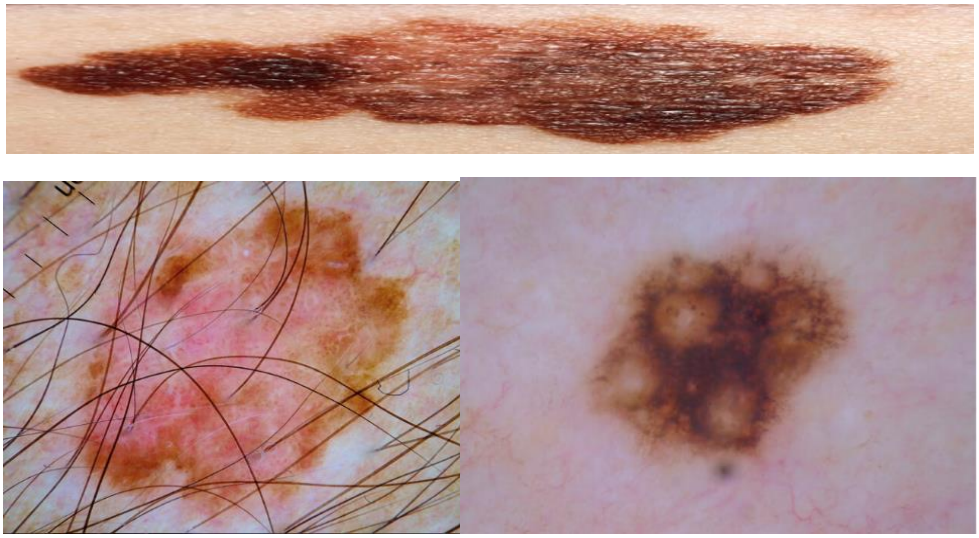
Medical tests for early detection

There are medical tests for early detection, which are considered painless methods used for early detection of skin cancer, including light microscopy or dermoscopy. Using a hand-held device, a doctor can assess patterns of size, shape, and pigmentation in pigmented skin lesions Dermoscopy.may reduce the number of biopsies of pigmented lesions to exclude melanoma.

Part of the discussion of the annual skin cancer conference:

the annual skin cancer conference held in 2011 discussed. Scott Menzies from the Sydney Melanoma Diagnostic Center (NSW, Australia) presented a review on the effect of digital cutaneous endoscopy in the management of patients with multiple moles and concluded that this method is safe and improves early detection of melanomas.

Particular attention has been paid to the role of opportunistic screening in the detection of skin cancer. Where they showed opportunistic screening for skin cancer in a group of patients who were not scheduled for a comprehensive examination of the body, and they found that one person out of 47 patients had any type of skin cancer, and they also clarified some factors that increased the probability of detecting skin cancer is the getting old, patients with lesions in uncovered areas and patients with cutaneous fibroma.



Images from: https://www.thepmfajournal.com/features/features/post/melanoma-skin-cancer-how-can-we-improve-early-detection-in-the-uk

VI..Pathogenesis, pathways & prevention of squamous cellcarcinoma

Skin cancer that develops in the squamous cells that make up the middle and outer layers of the skin is known as squamous cell carcinoma.

Skin cancer called squamous cell carcinoma is normally not life-threatening, but it can be aggressive. Squamous cell carcinoma of the skin, if left untreated, can become large and spread to other parts of the body, posing major health risks.

The majority of skin squamous cell carcinomas are caused by extended exposure to ultraviolet (UV) radiation, which can come from the sun, tanning beds, or lamps. Squamous

cell carcinoma of the skin and other types of skin cancer can be reduced by avoiding UV exposure.

Squamous cells can be found all over your body, and squamous cell carcinoma can develop anyplace there are squamous cells. Squamous cell carcinoma of the skin is a type of cancer that develops in the skin's squamous cells.

Symptoms:

Squamous cell carcinoma of the skin is most common in sun-exposed areas of the body, such as the scalp, backs of hands, ears, and lips. It can, however, appear anywhere on your body, including within your mouth, the soles of your feet, and your genitals.

The following are signs and symptoms of squamous cell carcinoma of the skin:

A nodule that is hard and red in color.

A scaly crust covers a flat sore.

An existing scar or ulcer with a new sore or elevated region

A rough, scaly spot on your lips that could turn into an open sore.

Inside your mouth, a red sore or scratchy spot

On or in the anus or on your genitals, a red, elevated patch or wartlike sore

Causes:

Where does skin cancer start?

Activate the pop-up dialogue box

The flat, thin squamous cells in the middle and outer layers of your skin develop alterations (mutations) in their DNA, resulting in squamous cell carcinoma. The DNA of a cell includes the instructions that tell it what to do. The mutations cause the squamous cells to expand uncontrollably and to live when normal cells would die.

UV radiation, which is found in sunshine as well as commercial tanning lamps and tanning beds, causes the majority of DNA mutations in skin cells.

Sun exposure, on the other hand, does not account for skin malignancies that appear on skin that is not normally exposed to the sun. Other variables, such as having a condition that impairs your immune system, may contribute to your risk of skin cancer.

Factors that are at risk:

Squamous cell carcinoma of the skin can be caused by a number of factors, including:

Skin that is light in colour. Squamous cell carcinoma of the skin can affect anyone, regardless of skin colour. Having less pigment (melanin) in your skin, on the other hand, gives less protection from harmful UV rays.

If you have blond or red hair, light-colored eyes, and you freckle or sunburn easily, you're significantly more likely than someone with darker complexion to develop skin cancer, especially squamous cell carcinoma.

Excessive exposure to the sun. Squamous cell carcinoma of the skin is increased when you are exposed to UV rays from the sun. Spending a lot of time in the sun, especially if you don't cover your skin with clothing or sunscreen, raises your chances of developing squamous cell carcinoma of the skin.

The use of tanning beds is prohibited. Indoor tanning bed users have a higher chance of developing squamous cell carcinoma of the skin.

Sunburns have been a part of my life for a long time. You're more likely to develop squamous cell carcinoma of the skin as an adult if you've experienced one or more severe sunburns as a child or teenager. Adulthood sunburns are also a risk factor.

Personal experience with precancerous skin lesions. Squamous cell carcinoma of the skin is more likely if you have a precancerous skin lesion such as actinic keratosis or Bowen's disease.

A personal experience with skin cancer. You're significantly more likely to get squamous cell carcinoma of the skin if you've had it before.

Immune system is weakened. Skin cancer is more likely in people who have compromised immune systems. People with leukaemia or lymphoma, as well as those who use immune-suppressing drugs, such as those who have had organ transplants, fall into this category.

A rare genetic condition. Skin cancer is far more likely in people who have xeroderma pigmentosum, a condition that causes excessive sensitivity to sunlight.

Complications:

Squamous cell carcinoma of the skin, if left untreated, can kill neighbouring healthy tissue, migrate to the lymph nodes or other organs, and even be deadly.

The chance of developing severe squamous cell carcinoma of the skin may be higher if the cancer:Is it unusually huge or deep?

Mucous membranes, such as the lips, are involved.

It can happen to anyone who has a weakened immune system, such as someone who has chronic leukaemia or is on anti-rejection medication after an organ transplant.

Prevention:

The majority of skin squamous cell carcinomas can be avoided. To safeguard yourself, take the following steps:

In the middle of the day, stay out of the sun. The sun's beams are greatest for many people in North America between 10 a.m. and 3 p.m. Even in the winter or when the sky is hazy, schedule outside activities for other times of the day.

Wear sunblock all year. Even on cloudy days, use a broad-spectrum sunscreen with an SPF of at least 30. Apply sunscreen liberally and reapply every two hours — or more frequently if you're swimming or sweating heavily.

Put on some protection gear. Dark, tightly woven clothing that covers your arms and legs, as well as a broad-brimmed hat that gives greater protection than a baseball cap or visor, should be worn to protect your skin.

Some businesses also sell protective gear. A dermatologist can suggest a suitable brand. Don't forget to bring your shades. Those that block both UVA and UVB rays are the ones you look for.

Avoid tanning beds at all costs. UV rays from tanning beds can raise your risk of skin cancer.

Check your skin on a regular basis and notify your doctor if anything changes. Examine your skin for new skin growths or changes in existing moles, freckles, lumps, and birthmarks on a regular basis. Examine your face, neck, ears, and scalp using mirrors.

Examine the tops and undersides of your arms and hands, as well as your chest and trunk. Examine your legs and feet from the front to the rear, including the soles and gaps between your toes. Check your vaginal area as well as the area between your buttocks.

VII. The Skin Cancer Audit Research Database:

The Skin Cancer Audit Research Database (SCARD) was presented by Cliff Rosendahl from the School of Medicine, University of Queensland (QLD, Australia). It is an initiative of the Skin Cancer College of Australia and New Zealand (SCCANZ), primarily designed to enhance patient safety by tracking specimens through the treatment cycle [17]. The registration for SCARD is free and is available to bona fide medical practitioners [102]. At this dedicated online internet-based version of the SCARD, physicians can record and track

information regarding their specimens at each stage of management. The dataset (currently at >130,000 specimens) satisfies all ethics requirements for research and can be accessed at [103]. SCCANZ has also entered into a partnership with The University of Queensland which has incorporated SCARD into the curriculum for students of the Master of Medicine, Primary Care Skin Cancer Medicine course and Queensland University also provides academic support for data management and analysis and research. It was concluded that SCARD is a unique project which is proving to be a valuable asset for physicians who treat skin cancer. It has had a substantial uptake by Australasian primary care skin cancer practitioners and is being promoted internationally.

Related work

Many different techniques of skin cancer detection analysis have been tried. In all these efforts researchers have tried to improve the accuracy of diagnosis by employing different classification algorithms and techniques, our review is the only one that describes and summarizes features of the identified techniques ,we are using data mining techniques (supervised learning) classification ,classify treat and tumor cells The International Skin Imaging Collaboration (ISIC) event of 2018 has become a de facto benchmark in skin cancer detection by hosting a challenge contest. It is also reported that a mobile app can be used to detect skin cancer.

The first breakthrough on skin cancer classification by a pre-trained GoogLeNet Inception V3 CNN model came from Esteva et al Haenssle et using ECOC SVM and deep learning CNN was developed by Dorj et al.

The approach was to use ECOC SVM with pre-trained AlexNet Deep Learning CNN and classify multiclass data. An average accuracy of 95.1% is reported in this work. Han et al. have used a deep convolutional neural network to classify the clinical images of 12 skin diseases.

Results and visualizations

Melanoma is a type of skin cancer that develops in pigment-producing melanocytes and often spreads to other parts of the body. Aberrant gene expression has been considered as a crucial step for increasing the risk of melanomagenesis, but how chromatin reorganization contributes to this pathogenic process is still not well understood. Here we report that matrix metalloproteinase 9 (MMP-9) localizes to the nucleus of melanoma cells and potentiates gene expression by proteolytically clipping histone H3 N-terminal tail (H3NT). From genome-wide studies, we discovered that growth regulatory genes are selectively targeted and activated by MMP-9-dependent H3NT proteolysis in melanoma cells. MMP-9 cooperates functionally with p300/CBP, because MMP-9 cleaves H3NT in a manner that is dependent on p300/CBP-mediated acetylation of H3K18. The functional significance of MMP-9-dependent H3NT proteolysis is further underscored by the fact that RNAi knockdown and small-molecule inhibition of MMP-9 and p300/CBP impede melanomagenic gene expression and melanoma tumor growth. Together, our data establish new functions and mechanisms for nuclear MMP-9 in promoting melanomagenesis

and demonstrate how MMP-9-dependent H3NT proteolysis can be exploited to prevent and treat melanoma skin cancer.

We classified between control cells (melanoma cells) and treat cells(Effect of MMP-9 knockdown in melanoma cells) as shown in fig1 and fig2:

```
=== Classifier model (full training set) ===

Decision Stump

Classifications

shMMP9_1 <= 3.4469582145 : 1.3269418787561154
shMMP9_1 > 3.4469582145 : 5.5864194923990995
shMMP9_1 is missing : 3.5882169568872033


Time taken to build model: 0.3 seconds

=== Cross-validation ===
=== Summary ===

Correlation coefficient                  0.8681
Mean absolute error                      0.9872
Root mean squared error                  1.2154
Relative absolute error                 46.4229 %
Root relative squared error             49.6452 %
Total Number of Instances           18539
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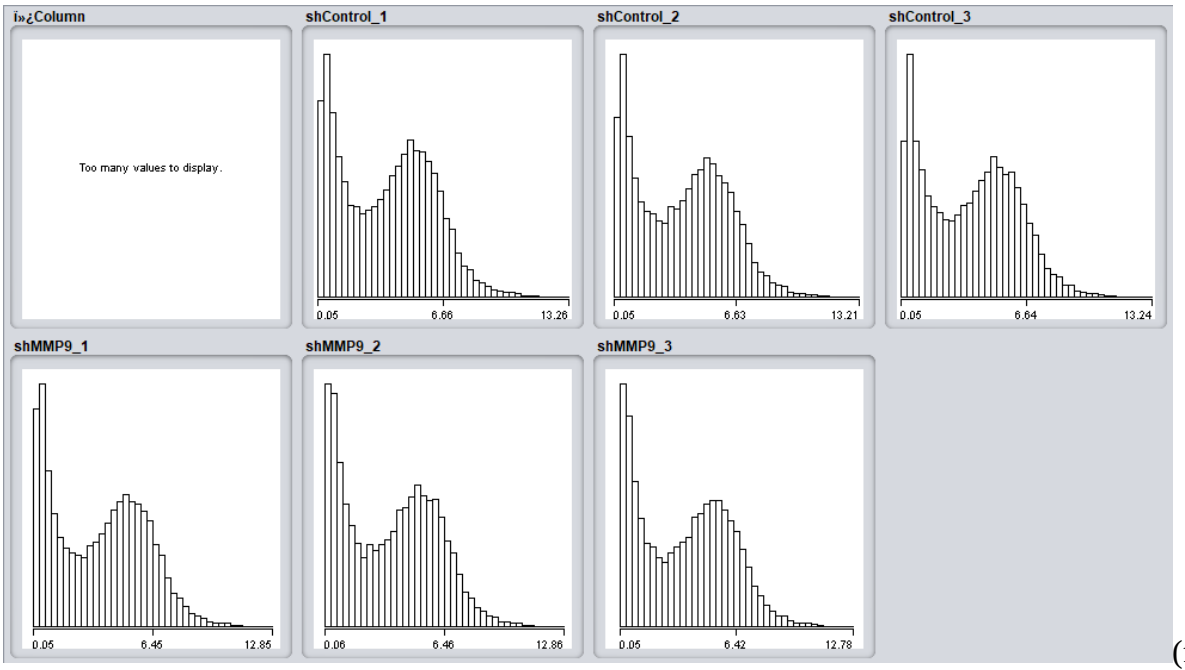
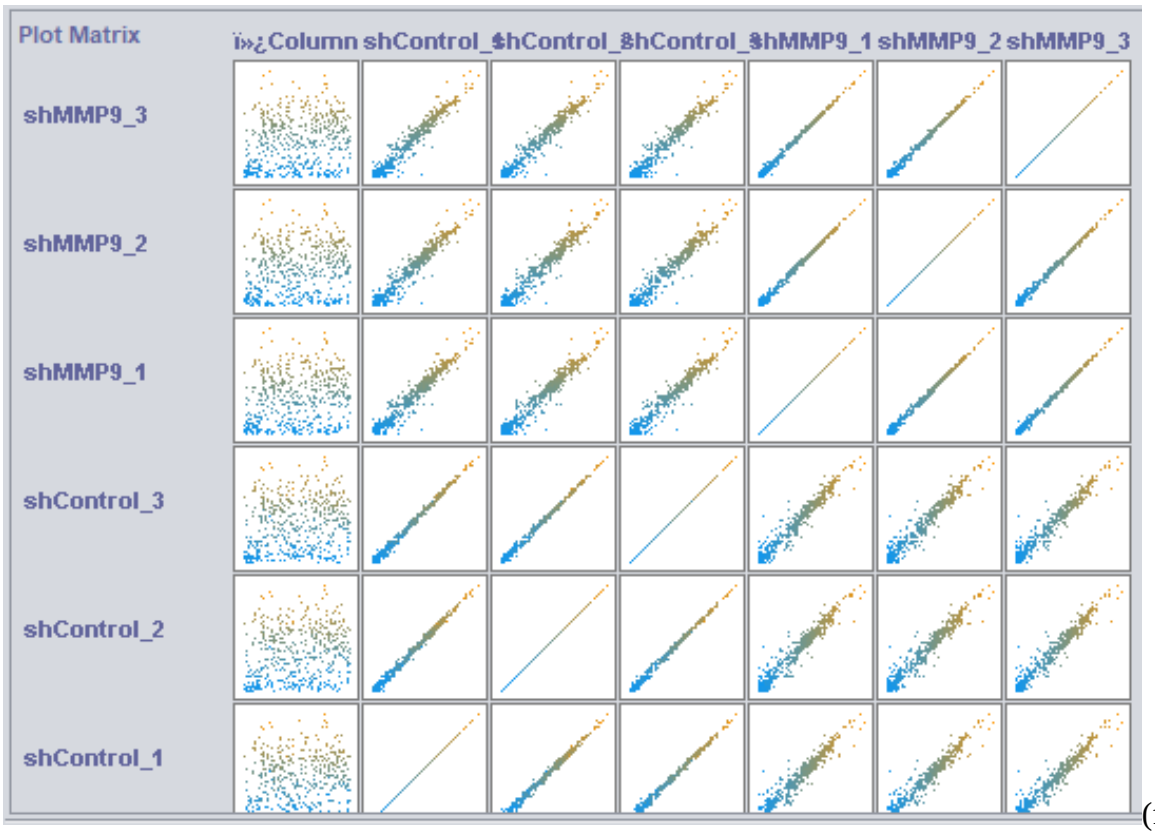
(fig1)



(fig2)

We can visualize result in fig3



(fig3)

Compare different techniques that we used for classifying the data

We compare between two different experiment profiling by array to identify microarray gene expression experiment with the organism is Homo sapiens:

- Comparative gene expression profiles of NOS1-KO and WT A375 melanoma cell lines (6 samples), the summary of the experiment is that: NOS1 plays a vital role in tumor. A cell model of NOS1 gene knockout in human melanoma cell line A375 was constructed using CRISPR/Cas9 technique for the study of its function. We used microarrays to detail the Global gene expression underlying NOS1-knockout compare to wild type A375 cell. and the overall design is that: NOS1-KO and WT A375 cells for RNA extraction and hybridization on Affymetrix microarrays. There were three biological replicates performed for each cell lines.

- HOXA13 Cut & Run of Human Melanoma Cells (24 samples), the summary of the experiment is that: The goal of the experiment was to determine HOXA13 binding loci in human melanoma cells to infer downstream targets of a HOXA13 positional program. and the overall design is that: We performed Cut&Run for the melanoma cell lines SKME-1088, SKMEL-1176, and SKME-1206. For Cut&Run we used 100’000 cells per condition, and it was performed as described in110. We used antibodies against HOXA13 (Invitrogen, #PA5-76440, 1:100), H3K27ac (Active Motiv, #39034, 1:100), IgG (abcam, #ab6709, 1:100) and we added a “no antibody” condition as additional negative control.

Conclusion

We could concisely outline some of the highlights of the third annual skin cancer conference, with a focus on current breakthroughs in melanoma and non-melanoma skin cancer epidemiology, diagnostics, and therapy. Topics centered on efforts to promote primary and secondary prevention and early diagnosis of melanoma and non-melanoma skin cancer utilising dermoscopy, which is a newly established medical branch in Australia. Controversies surrounding skin cancer screening programmers and new advancements in the treatment of metastatic melanoma were also reviewed. However, in addition to its scientific objectives, the conference aspired to promote research that originated in primary care and was relevant to primary care.This third annual conference on skin cancer was held on Hamilton Island on the 5th and 6th of August 2011 by the School of Medicine at the University of Queensland (QLD, Australia) and its partner Health Cert. Its purpose was to create a forum for primary-care practitioners with a special interest in identifying and treating skin cancer to learn about new research in melanoma and keratinocyte malignancies, as well as to share professional information and network with others in the field. The presence of more than 200 primary care practitioners at this meeting indicates the emergence of a new medical discipline in Australia: Primary Care Skin Cancer Practitioners.as a result Melanoma is a kind of skin cancer that starts in pigment-producing melanocytes and quickly spreads throughout the body. Aberrant gene expression has long been thought to be a key factor in the development of melanoma, but the role of chromatin remodeling in this pathogenic process is still

unknown. Matrix metalloproteinase 9 (MMP-9) is found in the nucleus of melanoma cells and promotes gene expression by proteolytically clipping histone H3's N-terminal tail (H3NT). MMP-9-dependent H3NT proteolysis specifically targets and activates growth regulating genes in melanoma cells, according to genome-wide studies. MMP-9 and p300/CBP work together because MMP-9 cleaves H3NT in a way that relies on p300/CBP-mediated acetylation of H3K18.The fact that RNAi knockdown and small-molecule inhibition of MMP-9 and p300/CBP reduce melanomagenic gene expression and tumour formation adds to the functional significance of MMP-9-dependent H3NT proteolysis. Our findings show how MMP-9-dependent H3NT proteolysis can be used to prevent and treat melanoma skin cancer by establishing novel functions and pathways for nuclear MMP-9 in promoting melanomagenesis. then we divided cells into two categories: control (melanoma cells) and treated (Effect of MMP-9 knockdown in melanoma cells).

The results of the supervised classification we performed are: correlation coefficient 0.8681,Mean absolute error 0.9872 ,root mean squared error 1.2154 ,Relative absolute error 46.4229% ,Root relative squared error 49.6452% ,Total number of instances 18539.

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