

Project 3: Artificial Intelligence Bootcamp  
MAY 2024

# SKIN CANCER: IMAGE AI DIAGNOSTIC TOOL

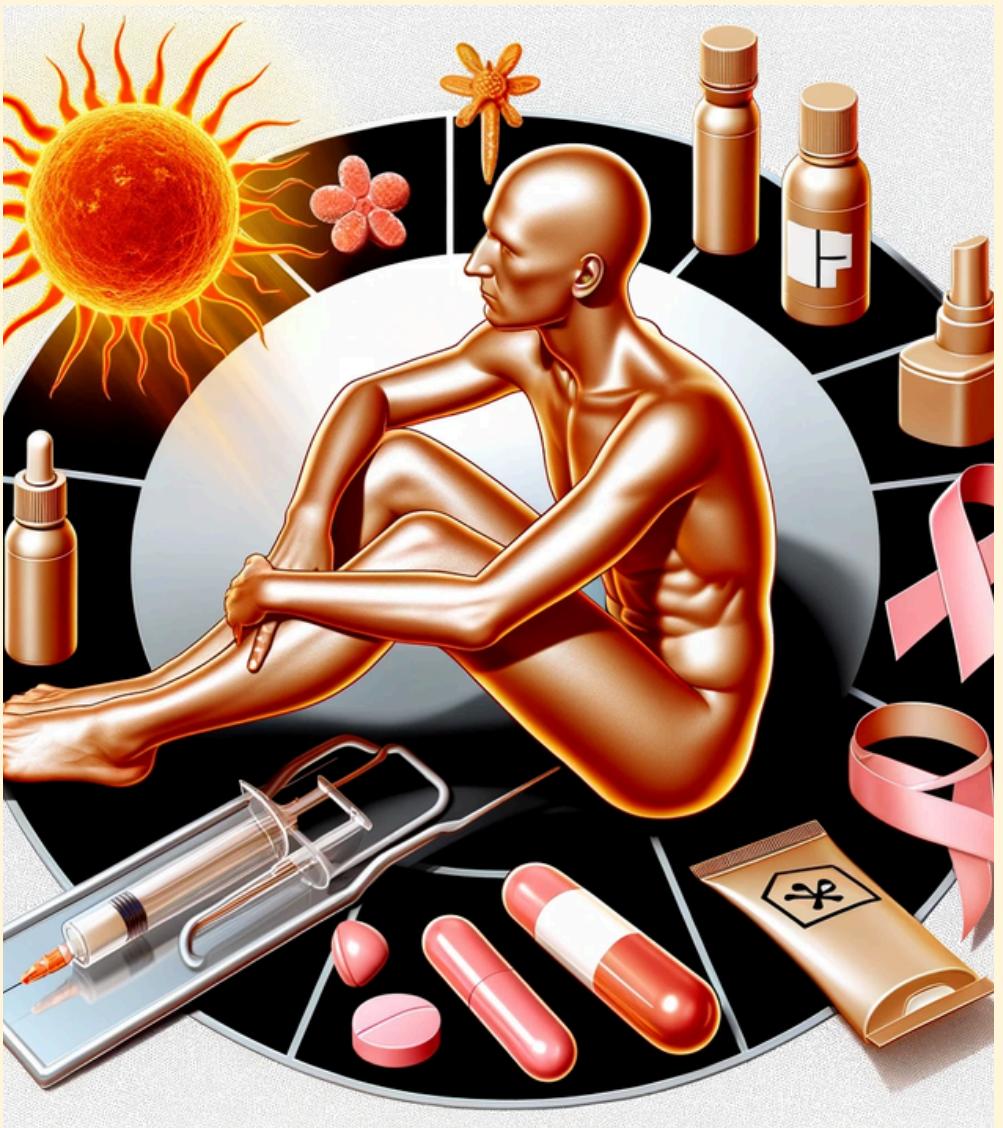
UTILIZING AI FOR EARLY DETECTION AND DIAGNOSIS



# PRESENTATION OUTLINE

- **Introduction**
  - Project overview and contributors
- **Problem & Solution**
  - Skin cancer prevalence and need for early detection
  - Market Opportunity
- **Application**
  - Key Features & Model
  - Application Demo
- **Future Development & Conclusion**
  - Planned enhancements (location detection, EHR integration)
  - Summary and call-to-action
- **Q&A**

# PROJECT OVERVIEW



## PROBLEM

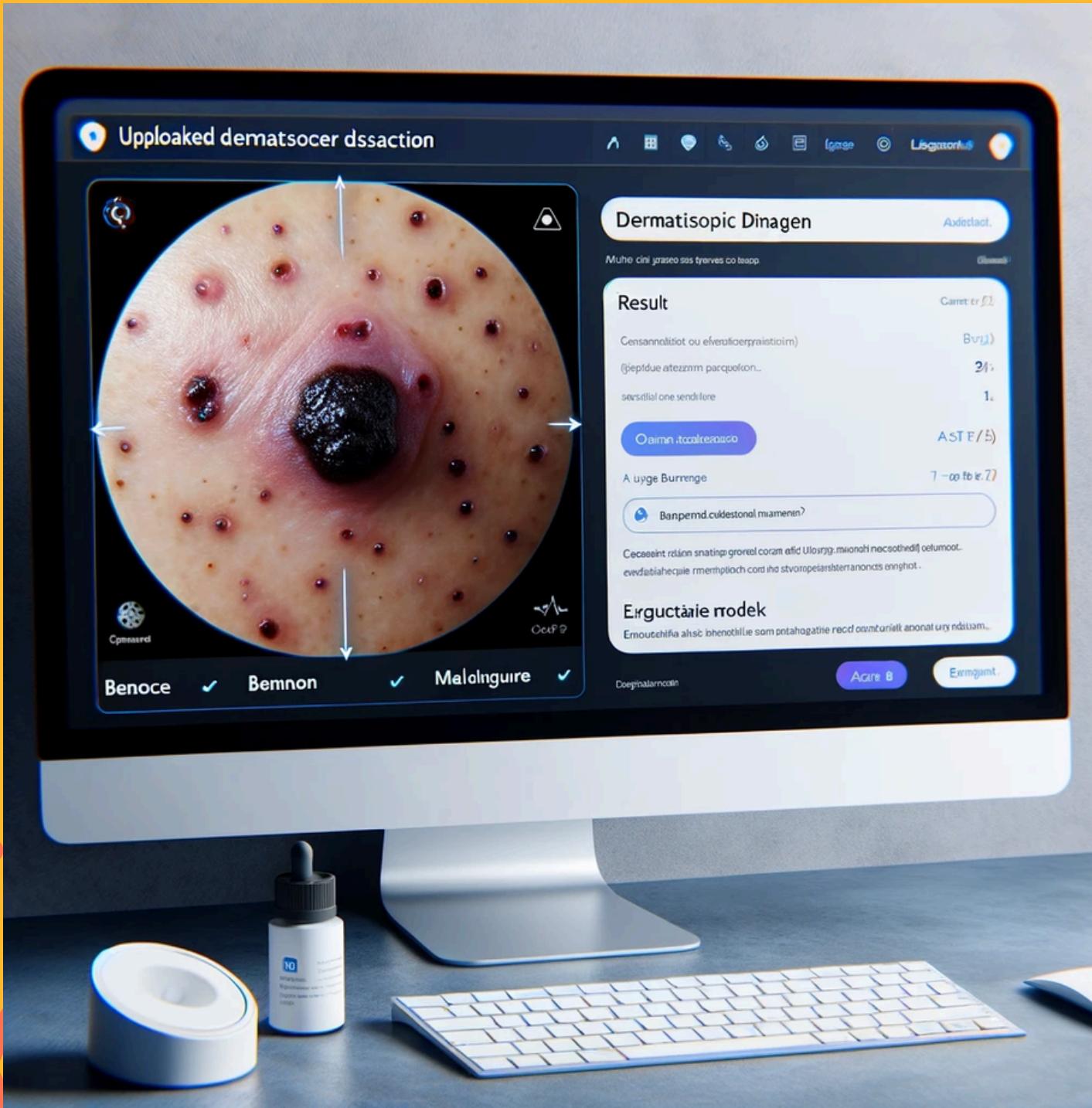
**SKIN CANCER IS A GROWING GLOBAL HEALTH ISSUE WITH MILLIONS OF CASES EACH YEAR.**

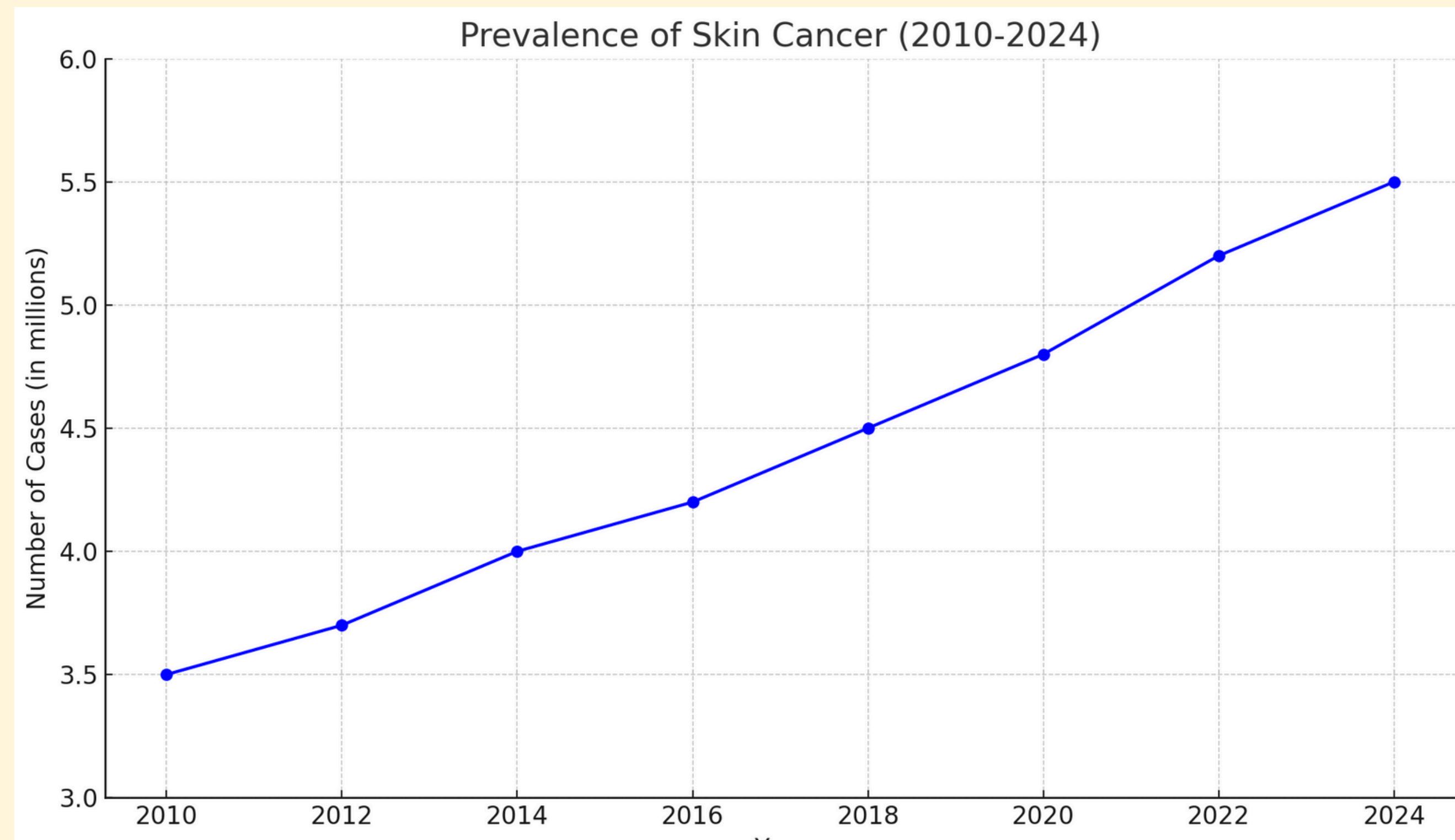
## SOLUTION

**OUR AI-POWERED DIAGNOSTIC TOOL AIMS TO ENHANCE EARLY DETECTION AND ACCURACY, MAKING DIAGNOSIS FASTER AND MORE ACCESSIBLE.**

# CONTRIBUTORS

- Kimberly Kruel
- Mistie McClure
- Todd Snyder



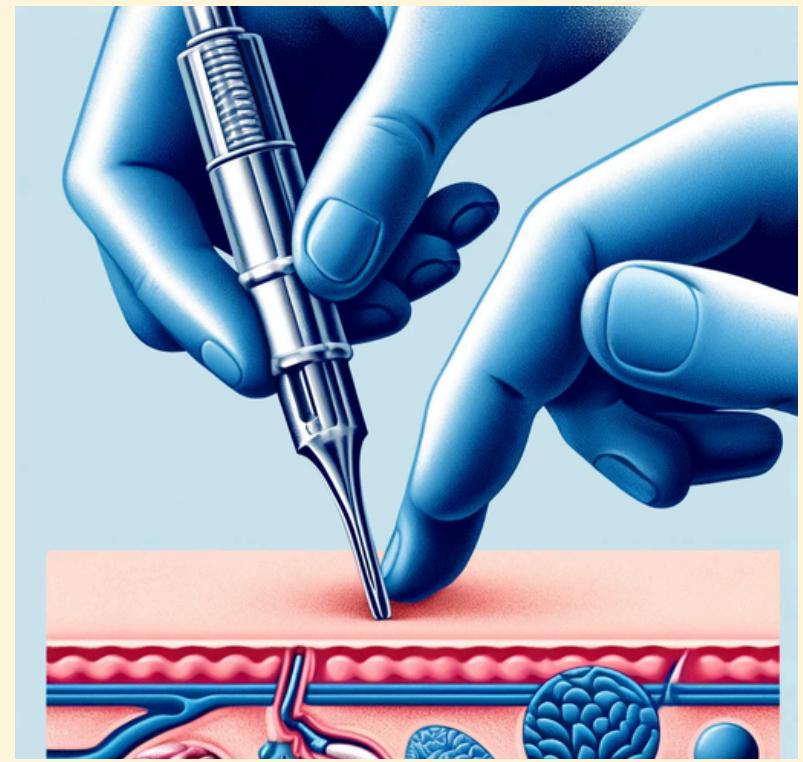


"Skin cancer is the most common type of cancer, but it is also one of the most preventable. Early detection through regular skin checks and protection from ultraviolet radiation are crucial in reducing the incidence and mortality of this disease."

- Dr. Lisa Newman, Chief of the Division of Breast Surgery at Weill Cornell Medicine

# SKIN CANCER FACTS

- **Types of Skin Cancer:**
  - Basal cell carcinoma, squamous cell carcinoma, and melanoma.
  - Basal cell carcinoma is the most common and least aggressive.
  - Melanoma is more dangerous due to its tendency to spread.
- **Causes:**
  - Primary cause: UV radiation from the sun and tanning beds.
  - Other risk factors: exposure to certain chemicals, history of sunburns, and a weakened immune system.
- **Risk Factors:**
  - Fair skin, light hair, light eyes.
  - Family history of skin cancer.
  - High number of moles.
  - History of sunburns, especially in childhood.
- **Symptoms:**
  - New growths, sores that do not heal, and changes in existing moles.
  - Warning signs: asymmetry, irregular borders, multiple colors, large diameter, evolving shape or size (ABCDE rule).
- **Prevalence:**
  - Skin cancer is the most common type of cancer globally.
  - Over 5 million cases are diagnosed annually in the United States.



# SKIN CANCER FACTS

- **Detection:**

- Early detection is crucial for successful treatment.
- Regular self-examinations and annual dermatologist check-ups are recommended.

- **Prevention:**

- Use a broad-spectrum sunscreen with an SPF of 30 or higher.
- Wear protective clothing, seek shade, and avoid tanning beds.
- Wear sunglasses that block UV rays.

- **Treatment:**

- Options depend on type and stage: surgical removal, radiation therapy, chemotherapy, immunotherapy, targeted therapy.

- **Costs:**

- The annual cost of treating skin cancer in the U.S. is \$8.1 billion.
- Melanoma treatment is the most expensive due to its complexity.

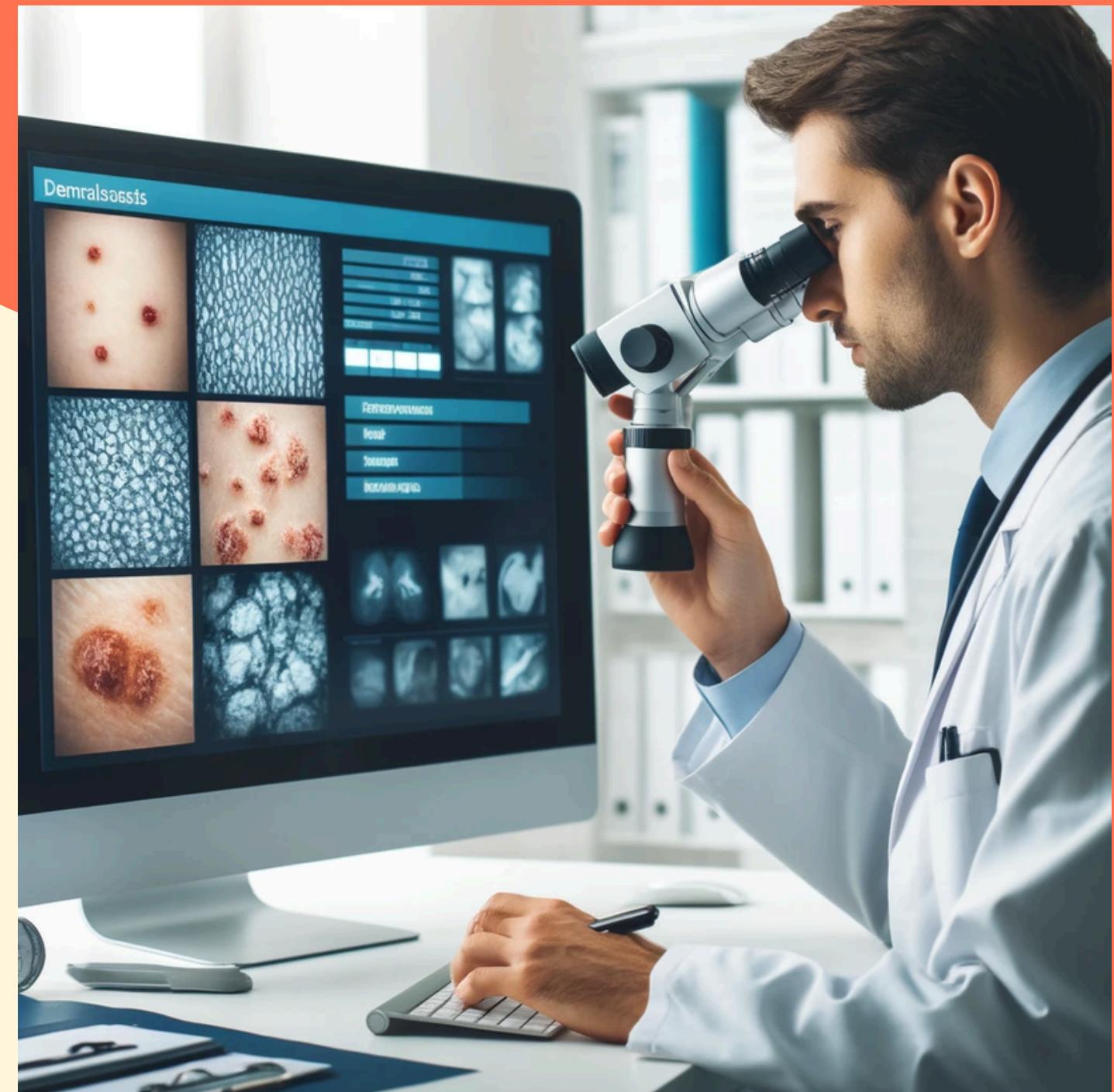
- **Death Rates:**

- Approximately 7,000 people die from melanoma each year in the U.S.
- Early-stage skin cancers have a high survival rate; 5-year survival rate for early-detected melanoma is about 99%.



# MARKET OPPORTUNITY

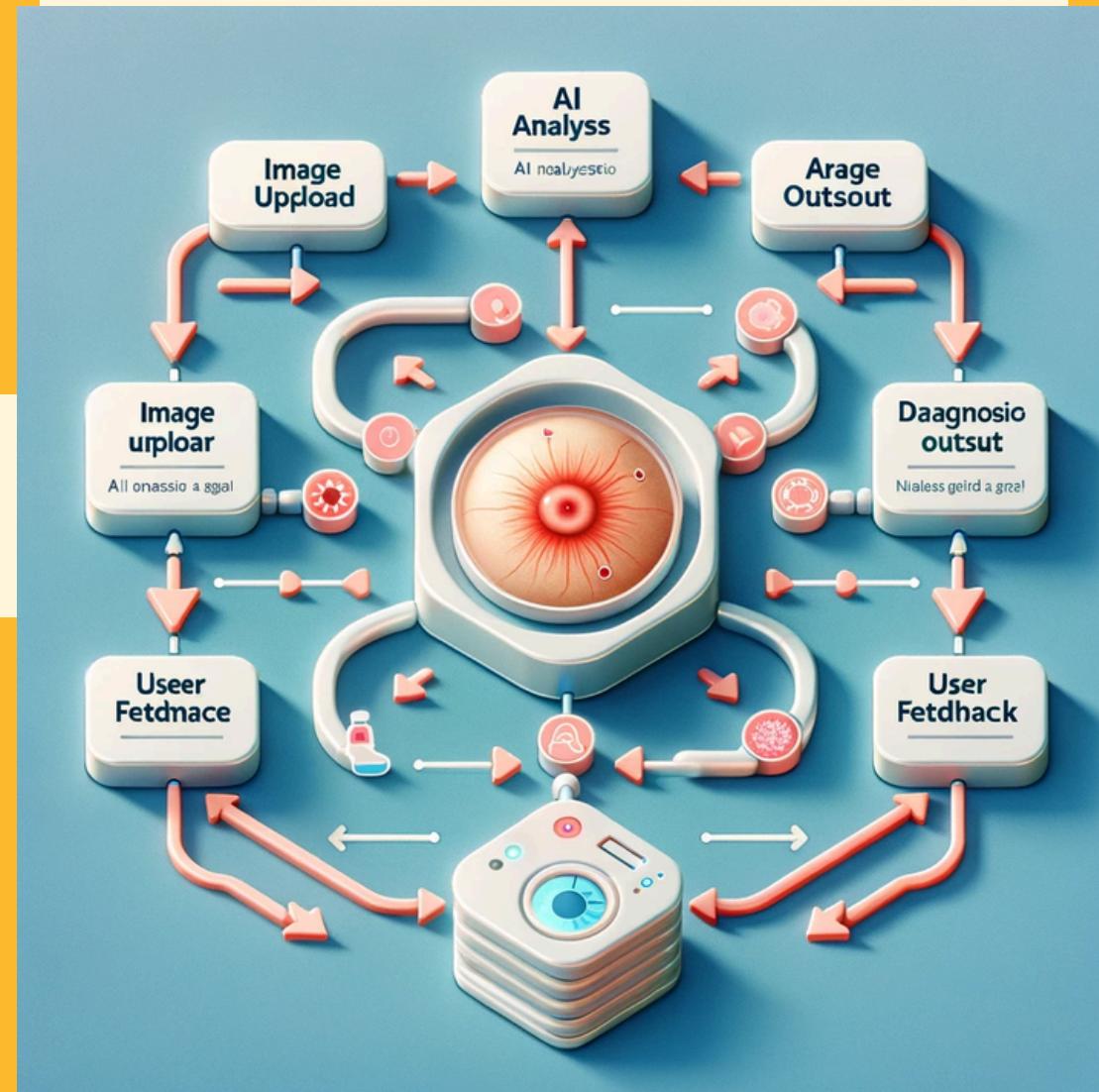
- **Statistics:** Over 5 million cases of skin cancer are diagnosed annually in the U.S. alone.
- **Market Size:** The AI healthcare market is projected to reach \$45 billion by 2026.
- **Potential Impact:** Early detection can significantly reduce treatment costs and improve patient outcomes.



# SOLUTION

**AI Accuracy:** Utilizes advanced machine learning algorithms for high diagnostic accuracy.

**User-Friendly Interface:** Simple and intuitive interface powered by Gradio for easy image uploads and immediate results.



**Scalability:** Cloud-based solution capable of handling large datasets and multiple users simultaneously

**Real-Time Feedback:** Provides instant diagnostic results, reducing patient anxiety and waiting times.

# MODEL EVALUATION:

## ACCURACY



```
# Print the validation accuracy  
val_loss, val_accuracy = model_adam_5.evaluate(X_train_np, y_train_encoded)  
  
print(f'Validation Accuracy: {val_accuracy:.4f}')
```

```
372/372 [=====] - 16s 43ms/step - loss: 0.1025 - accuracy: 0.9698  
Validation Accuracy: 0.9698
```

```
# Print the validation accuracy  
val_loss, val_accuracy = model_adam_5.evaluate(X_test_np, y_test_encoded)  
  
print(f'Validation Accuracy: {val_accuracy:.4f}')
```

```
63/63 [=====] - 3s 42ms/step - loss: 0.8934 - accuracy: 0.8680  
Validation Accuracy: 0.8680
```

```
# Predict the test data  
y_pred_unscaled = imported_adam_5.predict(X_test_np)  
  
y_pred_unscaled = y_pred_unscaled > 0.5  
  
# Generate classification report  
report = classification_report(y_test_encoded, y_pred_unscaled)  
print(report)
```

	precision	recall	f1-score	support
0	0.86	0.89	0.87	1000
1	0.88	0.85	0.87	1000
accuracy			0.87	2000
macro avg	0.87	0.87	0.87	2000
weighted avg	0.87	0.87	0.87	2000

# HOW IT WORKS

## THE STEPS



**1**

Upload an image of  
the skin lesion.



**2**

AI analyzes the image  
using pre-trained  
models.



**3**

Instant diagnosis and  
information with a  
probability score  
indicating the likelihood  
of malignancy.

# LIVE DEMONSTRATION



**Screenshot:** Showcase the Gradio interface.

**Demo:** Walk through the process of uploading an image and receiving a diagnosis.

**Key Benefits:** Highlight speed, ease of use, and accuracy.

# SCREENSHOT

Select prediction language and upload image to start.

Response Language - Default English

Image



Results

Prediction: Benign Explanation: It's great to hear that the skin lesion appears benign. Benign skin lesions are usually harmless growths that do not pose any serious health risks. However, it's important to have any new or changing skin lesions evaluated by a healthcare provider to confirm the diagnosis and ensure proper management. If you have any concerns or if the lesion changes in size, shape, or color, please schedule an appointment with a dermatologist for further evaluation.

Do you have a question about the results or skin cancer?

IS there a dermatologist near my zip code 85044

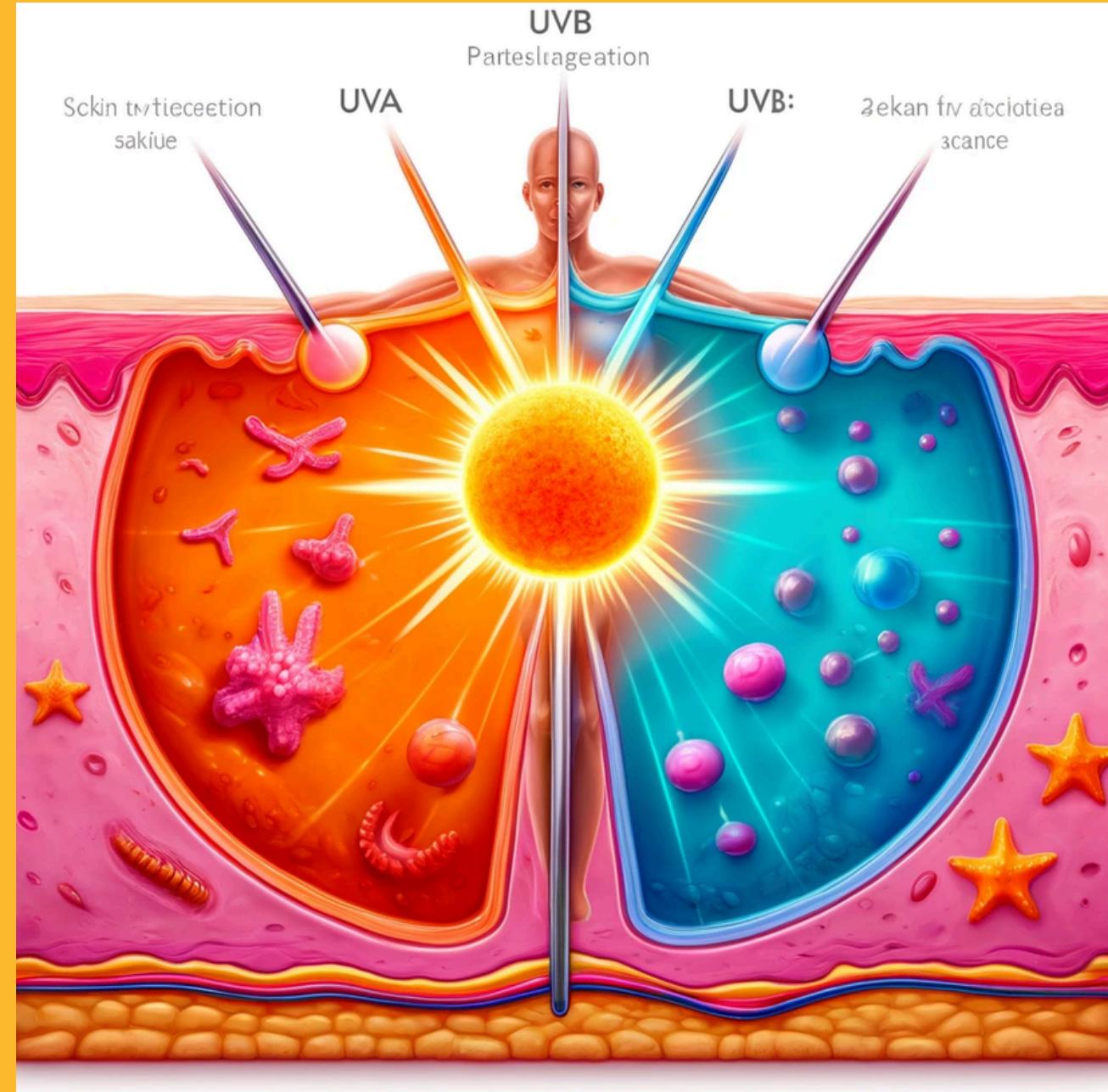
Chat Response

I recommend checking online directories such as Zocdoc or Healthgrades to find a dermatologist near your zip code 85044. You can also contact your insurance provider for a list of dermatologists in your network. It's important to schedule an appointment with a dermatologist for any skin concerns you may have.

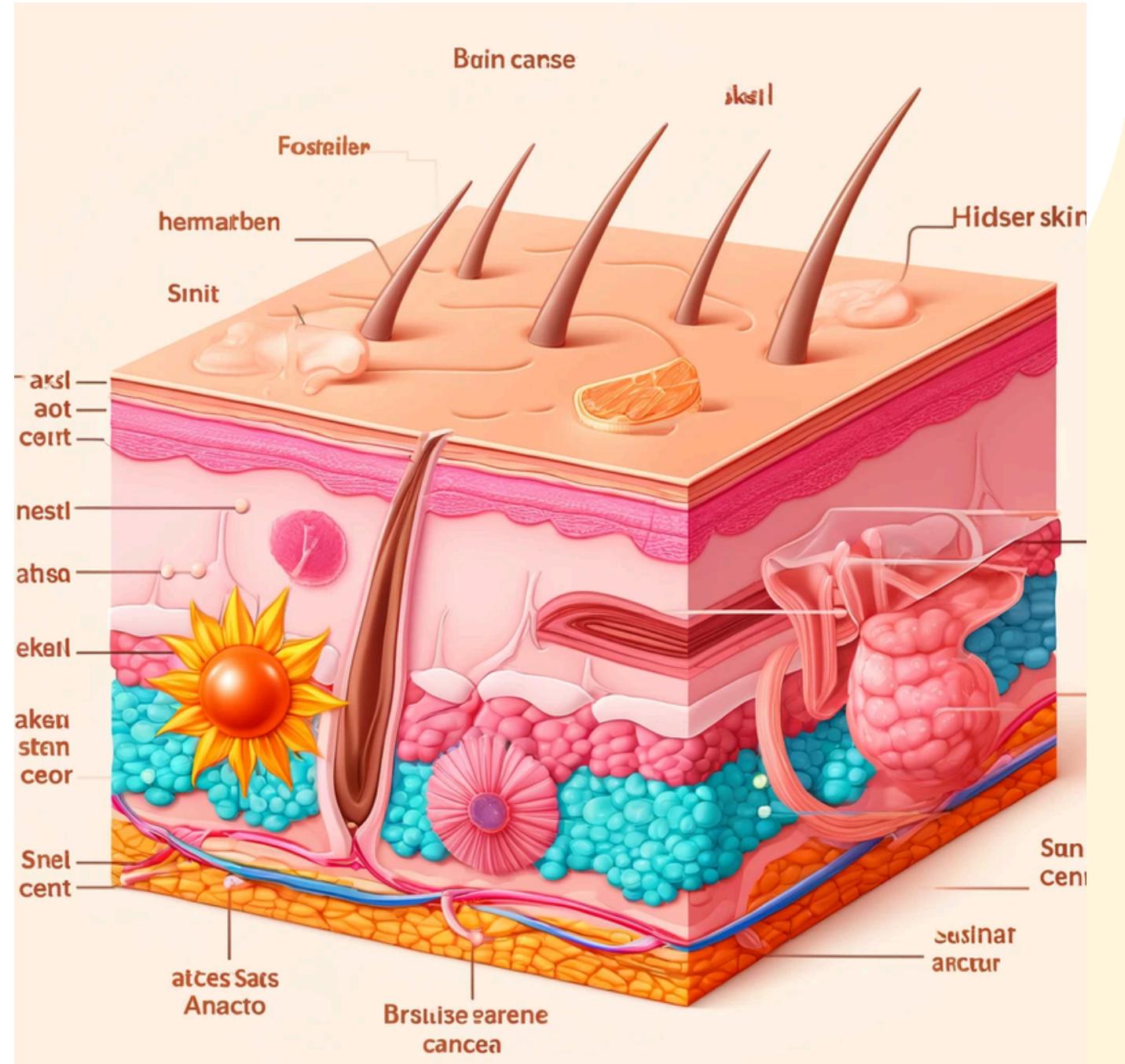
Clear

# FUTURE DEVELOPMENT

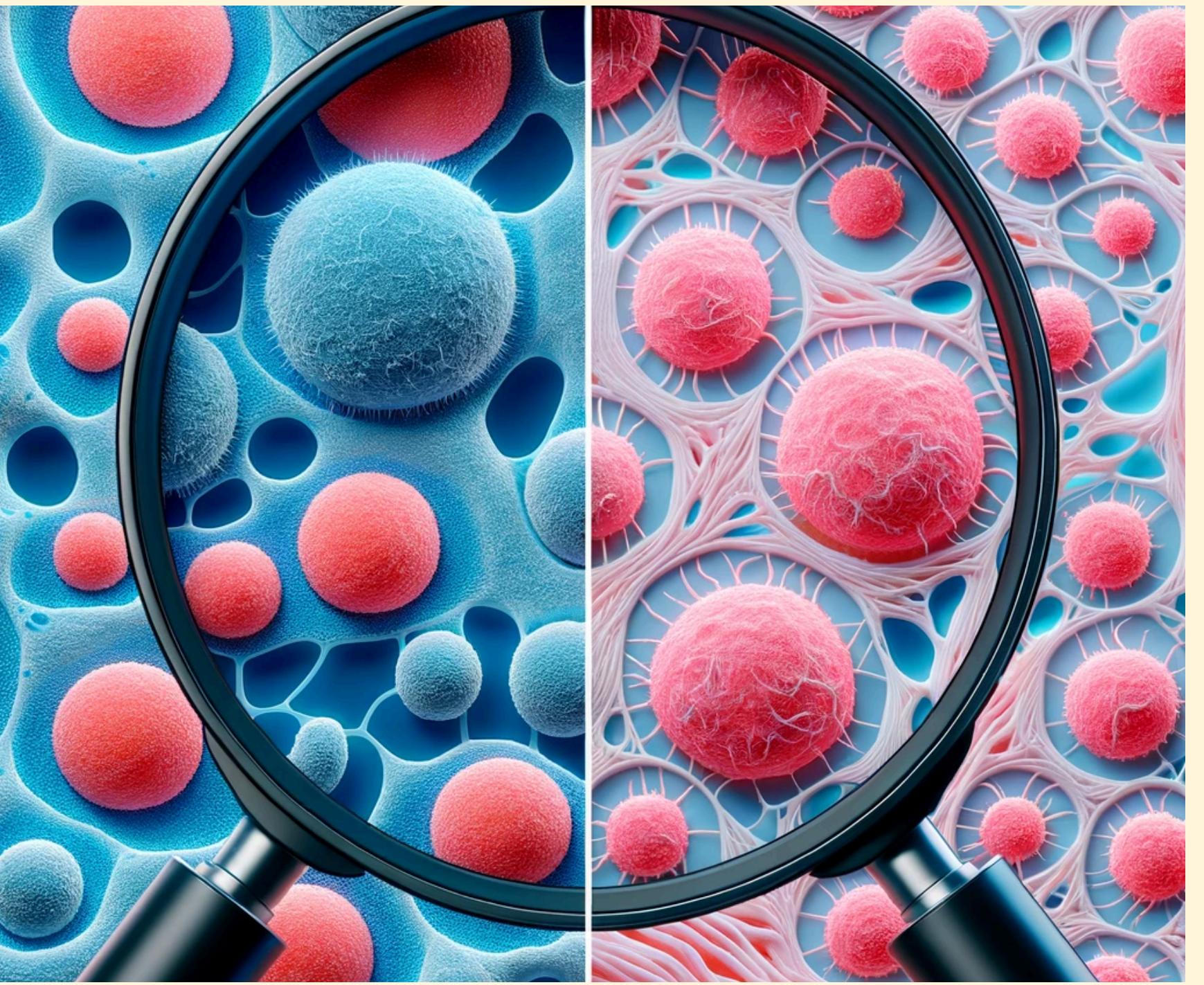
- Integrate location detection and possibly Google Maps to provide local information such as dermatologists in the area, skin cancer rates, and making the application more tailored to each user.
- Expand the AI's capabilities to detect other skin conditions or types of cancer, providing a broader diagnostic tool.
- Integrate with electronic health records (EHRs) and telemedicine platforms.
- Connect with electronic health record (EHR) systems to provide a comprehensive view of the patient's medical history.



# CONCLUSION



- **Innovative Solution:** Leveraging cutting-edge AI technology for early and accurate skin cancer detection.
- **Market Potential:** Significant opportunity in a growing healthcare market with high demand for advanced diagnostic tools.
- **Proven Results:** High accuracy and validated performance, ensuring reliable diagnostics.
- **Strategic Growth:** Clear plans for expansion and integration, aiming to revolutionize healthcare diagnostics globally.



# QUESTION & ANSWER

DON'T HESITATE  
TO ASK ANY  
QUESTIONS!



THANK YOU  
FOR  
LISTENING!