Pigmented Skin Lesion Classifier -

What is a mole?

A mole is officially called a: nevus ( nevi, plural ) in medical jargon. According to the National Cancer Institute, most people have 10-40 nevi that are harmless. The majority of pigmented skin lesions are NOT cancerous. They can a variety of color: pink, tan, brown, black (in people with dark skin), or a color that is very close to a person’s normal skin tone. The color is usually even throughout. They are usually round or oval. A common mole has a distinct edge that separates it from the rest of the skin.

Examples of benign skin pigments:

- melasma  
- birthmarks  
- scars  
- post-inflammatory hyperpigmentation  
- lentigines  
- discoloration from sun damage  
- age spots

Examples of malignant skin pigments:

- basal cell carcinoma (BCC)  
- Actinic Keratoses (akiec) or squamous cell carcinoma (SCC)  
- melanoma

  Primary Care Physicians/Dermatologists have developed the **ABCDE method** to for identifying signs of skin cancer.

* A is for asymmetrical shape. Look out for moles that look different on each side.
* B is for border. Moles should have solid borders, not irregular or curvy borders.
* C is for color. Check for any moles that contain several colors or uneven and splotchy color. Also note if any have changed in color.
* D is for diameter. Keep an eye on moles that are larger than a pencil eraser.
* E is for evolving. Look for any changes in a mole’s size, color, shape, or height. Also watch for any new symptoms, such as bleeding or itchiness.

What is Skin Cancer?

Skin cancer is the uncontrolled growth of abnormal skin cells. It occurs when skin cells chromosomal DNA has been damaged by UV light triggering mutations, or genetic defects, that lead the skin cells to multiply uncontrollably to form malignant tumors.

In our HAM-10000 dataset, pigmented skin lesions are classified into four benign and three malignant categories.

Benign skin pigmented lesions:

**Common nevi (nv):**

Melanocytic nevi are benign neoplasms of melanocytes and appear in a myriad of variants, which all are included in our series. The variants may differ significantly.

**Benign keratosis (bkl):**

"Benign keratosis" is a generic class that includes seborrheic keratoses ("senile wart"), solar lentigo - which can be regarded a flat variant of seborrheic keratosis - and lichen-planus like keratoses (LPLK), which corresponds to a seborrheic keratosis or a solar lentigo with inflammation and regression.

**Vascular skin lesions (vasc):**

Vascular skin lesions in the dataset range from cherry angiomas to angiokeratomas and pyogenic granulomas. Hemorrhage is also included in this category.

**Dermatofibroma (df):**

Dermatofibroma is a benign skin lesion regarded as either a benign proliferation or an inflammatory reaction to minimal trauma. It is brown often showing a central zone of fibrosis dermatoscopically.

Malignant skin pigmented lesions:

**Melanoma (mel):**

Melanoma is a malignant neoplasm derived from melanocytes that may appear in different variants. If excised in an early stage, it can be cured by simple surgical excision. Melanomas can be invasive or non-invasive (in situ).

**Basal cell carcinoma (bcc):**

Basal cell carcinoma is a common variant of epithelial skin cancer that rarely metastasizes but grows destructively if untreated. It appears in different morphologic variants (flat, nodular, pigmented, cystic, etc), which are all included in this set.

**Actinic Keratoses (akiec):**

Actinic Keratoses (Solar Keratoses) and intraepithelial Carcinoma (Bowen’s disease) are common non-invasive, variants of squamous cell carcinoma that can be treated locally without surgery. Some researches regard them as precursors of squamous cell carcinomas and not as actual carcinomas.

## Acknowledgments

<https://www.skincancer.org/skin-cancer-information>

<https://www.cancer.gov/types/skin/moles-fact-sheet#q1>

Tschandl, P., Rosendahl, C. & Kittler, H. The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions. Sci. Data 5, 180161 doi:10.1038/sdata.2018.161 (2018).