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# The Miniature Macula-Ephelis

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## Abstract

An ephelis is a miniature, benign, brown or tan cutaneous blemish which appears upon sun exposed surfaces. Genetic composition and cutaneous subtype of incriminated individual directs the emergence of ephelis. Generally spherical, ephelis demonstrates a localized area of hyperpigmentation contingent to magnitude of sun exposure. Superimposed stratified squamous epithelium exhibits hyperpigmentation of basal keratinocytes and elongation of rete ridges whereas quantifiable melanocytes remain unaltered. Ephelis requires segregation from conditions such as café-au-lait macules, junctional nevus, solar lentigo, melano-acanthoma, melanosis, moles, sun spots, liver spots and malignant epithelial neoplasms. The innocuous ephelis does not require treatment although protection from sun exposure is recommended.

**Keywords:** Miniature; Ephelis; Cutaneous Blemish; Genetic

## Preface

An ephelis is a miniature, light brown or tan coloured, benign blemish which appears upon sun exposed cutaneous surfaces. The lesion is commonly associated with fair skin and red hair. An ephelis is additionally denominated as a freckle whereas multiple lesions may be designated as ephelides. Innumerable lesions may be denominated upon sun exposed skin.

Ephelis emerges as a characteristic, inherited trait and circumvention of lesion is challenging. However, adequate sun protection may decimate darkening of lesions, especially during the summer season. Ephelis incriminated cutaneous surfaces appear sensitive to sunlight. Hence, appropriate protection of skin and deterrence of actinic induced cutaneous damage is necessitated.

Fair-skinned individuals demonstrating ephelis or cutaneous burns are associated with enhanced possible emergence of cutaneous cancer. Thus, prohibition to sun exposure is recommended. Ephelis can be appropriately discerned upon cogent clinical examination. However, precise tissue sampling of a pigmented lesion is optimal and mandated for conclusive disease assessment.

## Disease Characteristics

Emergence of ephelis appears contingent to genetic composition and cutaneous subtype of the incriminated individual [1,2]. Genetically susceptible individuals may demonstrate frequent appearance of lesions, especially upon exposure to sunlight. Ephelis is particularly common in fair skinned children of Celtic origin. Congenital lesions are absent [1,2]. Fair skinned Caucasians with an absence of tanning, as discerned with Fitzpatrick cutaneous classification with phototype1, delineate red hair and innumerable ephelides [1,2]. Ephelis may appear upon cutaneous surfaces as a characteristic, inherited feature. Incriminated subjects depict singular or multiple copies of variant melanocortin 1 receptor (MC1R) gene, a genomic transcript which engenders red hair [1,2]. Ephelis originating in non-Caucasians is comprised of a diverse variant of melanocortin 1 receptor (MC1R) gene. Variant of melanin production within a specific individual is contingent to genetic mutations within the MC1R gene [1,2]. Genetic susceptibility influences the

category of melanin produced by the body. Commonly, pheo-melanin and eumelanin are configured within sun exposed cutaneous surfaces wherein eumelanin safeguards against the ultraviolet component of sunlight and pheo-melanin appears non-contributory [3,4].

It is posited that melanocytes engender excessive melanin pigment in ephelis which is accumulated as melanosomes and disseminated within circumscribing keratinocytes. Following sun exposure, keratinocytes configure excessive melanin as a safeguard against actinic induced cellular injury with consequent occurrence of ephelis [3,4]. Cutaneous protection from sun exposure may decimate the occurrence of fresh lesions of ephelis. However, existing lesions may not be altered. Generally, ephelis appears proportionately enhanced following exposure to ultraviolet radiation induced with sunlight. Additionally, the lesions appear prominent in summer and fade during the winter months [3,4]. Lesions may occur upon a significant cutaneous expanse and may reoccur or darken during the summer season. Ephelis may mitigate during winter months or with the replacement of denatured keratinocytes with nascent cells [3,4].

Generally, onset of ephelis occurs within early childhood and lesions demonstrate a tendency to decline in adults [3,4]. Ephelis may occur in diverse ethnic communities with dark brown or black hair. Majority of individuals with dark hair, dark irises and cutaneous pigmentation produce eumelanin and display a reduced proportionate emergence of ephelis. Blondes or fair skinned individuals with red hair or light brown hair and light eyes predominantly configure pheo-melanin and display an enhanced occurrence of ephelis [3,4]. Commonly, ephelis appears upon sun exposed cutaneous sites as the face, neck, thoracic region, upper limbs, dorsum of trunk, nose or cheeks. Besides, the lesion may emerge as a solitary melanotic macule, generally within the lower lip [5,6]. Ephelis may predominantly appear within the oral cavity of female subjects and may arise in conjunction with Peutz-Jeghers syndrome. Ephelis is associated with an enhanced propensity for malignant metamorphosis or diverse cutaneous carcinomas [5,6].

## Clinical Elucidation

Ephelis may appear as red, brown or tan lesions which commonly emerge on account of subcutaneous amalgamation of melanin [5,6]. Ephelis may manifest as flattened, light brown to dark brown, inadequately circumscribed macules which may amalgamate to configure enlarged patches. Ephelis is exemplified by a localized area of hyperpigmentation which is contingent to magnitude of sun exposure. Generally spherical, ephelis may assume a variable outline and the magnitude usually varies from 3 millimeters to 10 millimetres [5,6]. Fair skinned individuals demonstrating ephelis are susceptible to actinic induced skin damage with the generation of enlarged lesions as lentigines, age related modifications or malignant metamorphosis of the cutis and accompanying adnexa [5,6]. Ephelis, age spots or moles necessitate additional evaluation with the emergence of modifications such as pruritus, haemorrhage, enlargement, asymmetry or altered extraneous appearance with variable outlines. Additionally, parameters such as lesion perimeter, color, diameter and evolution require assessment and may indicate malignant metamorphosis or prognostic outcomes [5,6]. Histological Elucidation Upon morphological evaluation, elevated melanin pigment within the normal cutis is observed which is associated with a lack of quantifiable enhancement of melanocytes [7,8]. Besides, quantifiable cutaneous melanocytes appear normal although melanocyte- induced melanin production is focally increased [7,8]. Upon microscopy, the stratified squamous epithelium exhibits a normal architecture. Hyperpigmentation of basal keratinocytes is associated with elongation of rete ridges. Quantifiable melanocytes remain unaltered. Generally, ephelis is devoid of accompanying cutaneous malignant metamorphosis although a possible transformation may be discerned [7,8] (Figures 1-5).

**Figure 1**: Ephelis exhibiting light and dark brown macules along with small patches distributed upon upper cheeks and bridge of nose [9].

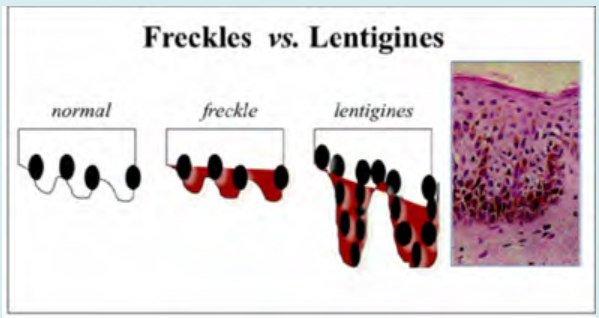


**Figure 2:** Ephelis demonstrating pigmented patches with normal quantities of melanocytes [10].

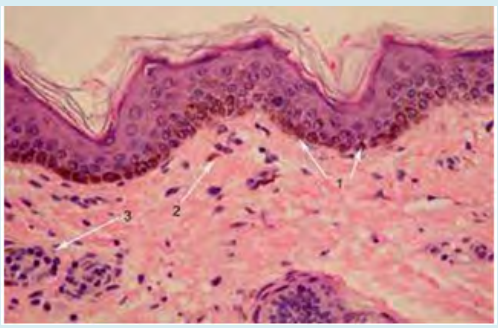


**Figure 3:** Ephelis exhibiting hyperkeratosis and acanthosis of the superimposed stratified squamous epithelial layer long with melanocytes packed with melanin pigment scattered within the upper dermis [11].

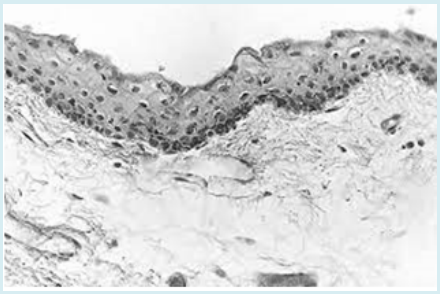

**Figure 4:** Ephelis enunciating acanthosis, hyperkeratosis and spongiosis of superimposed epidermis with dermal accumulation of melanocytes [12].

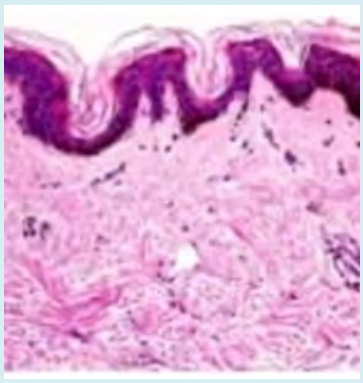

**Figure 5:** Ephelis exemplifying acanthosis, hyperkeratosis and parakeratosis of stratified squamous epithelium with accumulated dermal melanocytes imbued with significant melanin [13].

## Differential Diagnosis

Ephelis requires segregation from conditions such as:

- Café-au-lait macules which demonstrate basal hyperpigmentation of epidermal layer, absence of deep seated pigmentation, enhanced pigment within melanocytes and exceptional occurrence of melanophages. Adnexal epithelium is devoid of increased pigmentation [14,15].
- Junctional nevus exhibits a junctional component which is comprised of uniformly distributed nests of nevus cells situated upon inferior segment of rete ridges. An occasional lentiginous pattern of melanocyte dissemination is observed. However, pagetoid cellular distribution and cellular or nuclear atypical is absent. Lesions appear asymmetrical with increasing age [14,15].
- Solar lentigo enunciates elongation of rete ridges with augmented, irregular pigmentation upon the edges of rete ridges. Features such as solar elastosis, telangiectasia and a variable, dermal inflammatory infiltrate of chronic inflammatory cells may be exemplified [14,15].
- Melano-acanthoma exhibits melanocytes commingled with keratinocytes. Lesions are superimposed with an acanthotic superficial epidermal layer constituted of miniature; cuboidal keratinocytes intermingled with numerous intensely pigmented, dendritic melanocytes imbued with abundant melanin granules. Transmission of melanin into adjacent keratinocytes is minimal. Dendritic melanocytes are immune reactive to markers of melanocytic differentiation as S100 protein, human melanoma black (HMB45) antigen and Melan A. Compact eosinophilic parakeratosis of the superimposed epithelium is frequent. Cytological atypia is usually absent [14,15].
- Melanosis is a condition which demonstrates pigmented patches upon the hard palate or gingiva [16,17].

Additionally, ephelis may simulate and require a distinction from moles, sun spots, age spots or liver spots and malignant neoplasms of stratified squamous epithelium or cutaneous adnexa [16,17]. Moles may be congenital or appear in childhood or adolescence. Usually, moles are flattened, elevated and dark-tinged [2,3]. Ephelis and age spots are primarily configured due to sun exposure. Typically, age spots are enlarged, appear in older individuals with variable skin pigmentation and tones, in contrast to ephelis [2,3]. Morphological alteration within ephelis mandates appropriate, extensive evaluation [16,17].

## Therapeutic Options

Usually, ephelis appears as an innocuous lesion which does not require therapeutic intervention. However, protection of incriminated zones from sun exposure is necessitated and recommended [18,19]. Circumvention of cutaneous actinic induced damage may be possible with employment of water-resistant sunscreen with sun protection factor of ≥30 which protects against ultraviolet A (UVA) and ultraviolet B (UVB) radiation. Also, traditional clothing

with long sleeves, hat, sunglasses, indoor habitation within hours of intense sunlight as 10 am to 2 pm, reapplication of sunscreen at 2 hour interval following sweating or outdoor activity as swimming and prohibition of tanning beds may be beneficially adopted [18,19]. Diverse cosmetic manoeuvers may be utilized to camouflage the lesions. However, cosmetic concerns may necessitate therapeutic intervention with specific agents [18,19]. Several topical creams and spot or chemical skin peels may be applied with trichloroacetic acid (TCA) and phenol, manoeuvers which appear efficacious in decimating the lesions [18,19]. Additionally, chemical compounds such as alpha hydroxy acids, azelaic acid, cysteamine, retinoids and vitamin C appear beneficial [18,19]. Certain home-based remedies may be adopted to decimate the pigmentation as lemon juice with constituent vitamin C, honey with specific antioxidant properties or aloe vera with constituent salicylic acid and aloin. A patch test for home-based remedies is recommended in order to circumvent allergic reactions [18,19]. Laser therapy may be adopted. Although impermanent, pigment reduction laser therapy may be utilized to decimate pigmentation of the lesion [18,19]. Nevertheless, aforesaid therapeutic measures may induce adverse reactions as cutaneous scarring [18,19] (Table 1).

| | Ephelis | Age spots | Mole |
|---|---|---|---|
| Countenance | Flat, aggregated lesions with an expansive spread | Flat lesions, may appear in clusters | Flat or elevated singular lesion, may arise in clusters |
| Inducing factors | Genes, sun exposure | Sun exposure | Accumulation of melanocytes |
| Age | May appear > 2 years | Adults >40 years | Congenital, childhood, adolescence |
| Site | Sun exposed areas as face, neck, chest, arms, back | Sun exposed areas as face, hands, arms, shoulders, back | No site is exempt |
| Outline | Irregular, well defined edge | Well defined perimeter | Spherical, oval, well defined |
| Hue | Tan, brown, red | Tan, brown, black | Light or dark brown or black |
| Magnitude | ~2 mm or more | ~2mm or more | <6 mm |
| Modifications | Fade in winter, dark in summer | Dark in sunlight, unchanged | Unchanged, may disappear |

**Table 1:** Common Cutaneous Blemishes [2,3].

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9. Image 1 Courtesy: Educalingo.com.

10. Image 2 Courtesy: Research gate.

11. Image 3 Courtesy: Ocular pathology.

12. Image 4 Courtesy: Pathology outlines.

13. Image 5 Courtesy: Quizlet.com.

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