

# Laptop computer-induced hyperpigmentation

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## Abstract

A 25-year-old afebrile man presented with one year of worsening non-pruritic hyperpigmented non-blanchable reticulated patches and one erosion on his abdomen. He denied trauma, contact with new detergents, and recent travel. He was not taking medications and denied ever having similar skin findings. Further questioning revealed that he positioned his laptop computer directly on his abdomen for several hours every night. His progressive skin findings characterize erythema ab igne, which occurs after repetitive prolonged exposure to temperatures between 43 to 47 degrees Celsius. The hyperpigmentation can occur anywhere on unprotected skin and is an ongoing clinical problem in all demographics as heat sources evolve. Guided questioning of an unsuspecting patient can expedite diagnosis and prevent the development of erosions and ulcers, permanent skin discoloration, and even skin cancers.

*Keywords: erythema ab igne, laptop computer*

## Introduction

Erythema ab igne (EAI) was initially described in the 19<sup>th</sup> century on the anterior lower legs of elderly individuals sitting near open fires and stoves for extended periods and was termed ephelis ignealis or "fiery freckle." The nomenclature evolved through several attempts to describe skin findings relative to the offending heat source. Individuals in frigid latitudes with insufficient central heating and those with maladies relieved by heat were disproportionately affected. The current terminology

translates to "redness from fire" despite numerous implicated heat sources [1].

EAI persists despite its decreased incidence. Space heaters and heated blankets along with occupations involving regular heat exposure, such as baking, welding, and firefighting, are all implicated [2]. With the ubiquity of devices utilizing heat exhaust fans, laptop computers are the most recent culprit. However, most cases of laptop-induced EAI occur on the anterior thighs [3]. We describe the uncommon presentation of EAI on the abdomen.

## Case Synopsis

A 25-year-old man presented with six months of progressive erythematous non-pruritic patches on his abdomen. He denied skin trauma, new detergents, recent travel, or sick contacts. He denied taking medications and ever having similar skin findings or serious illnesses, but he positioned his laptop computer on his abdomen for several hours every night while wearing a shirt. Physical exam revealed reticulated non-tender non-blanchable hyperpigmented patches across his abdomen without other lesions (**Figure 1**). The progressive findings after repetitive prolonged heat exposure in an otherwise healthy adult supported the diagnosis of EAI.

## Case Discussion

The differential diagnosis for EAI includes livedo reticularis and livedo racemosa. Livedo reticularis is patterned mottling of skin arterioles in bilateral extremities versus the irregular mottling of livedo racemosa on the trunk and proximal extremities [2].



**Figure 1.** Abdominal hyperpigmented reticulated patches with mild scaling and an inferior pink erosion. No other skin findings were present.

Livedo reticularis typically results from physiologic hypothermic vasospasm, but serious underlying diseases should be considered, including a congenital form termed *cutis marmorata telangiectatica congenita*. Acquired secondary etiologies include autoimmune connective tissue disorders, vasculitides, blood cell dyscrasias, vasoconstrictive medications, infections (e.g. hepatitis C vasculitis), and neoplasms (e.g. pheochromocytoma), [2]. Hypothyroidism can present with similar skin findings in the lower extremities [4]. Directed testing for these conditions reveals abnormalities not found in EAI.

Livedo racemose, described in individuals who suffered multiple cerebral strokes, relates to

vasculopathies, subendothelial smooth muscle proliferation, and subsequent occlusion of subcutaneous arterioles. This association is termed Sneddon syndrome. Poikiloderma is also a condition in the differential diagnosis and, when associated with telangiectasias and skin atrophy, can be caused by cutaneous T-cell lymphoma, dermatomyositis, and various genodermatoses [2].

Early EAI shows reticulated blanchable pink patches that trace networks of superficial dermal blood vessels, which dilate from repeated exposure to temperatures of 43 to 47 degrees Celsius. These temperatures are insufficient to cause immediate thermal burns, but ulcers develop if the intensity becomes too great [2-4]. A month or more may elapse from initial heat exposure to onset of skin lesions [5]. Eventually, the discolored patches become confluent and non-blanchable with interspersed hyperkeratotic plaques in more severely damaged areas. A burning sensation or pruritus may eventuate.

EAI develops from the sequence of focal vasodilation, telangiectasias, melanophage infiltrates, melanocyte activation, and deposition of hemosiderin and melanin in the upper dermis along with epidermal atrophy. The resultant hyperpigmentation can become permanent depending on the timeliness of intervention [6]. Although rare, squamous cell carcinoma and even Merkel cell carcinoma can develop within EAI lesions and should be suspected if lesions worsen despite heat source removal [2].

EAI is diagnosed by obtaining an accurate history and excluding potential etiologies, but biopsies can aid challenging cases. Initial management requires patient education and heat source removal. If the patient were using heat to treat pain, then the underlying pain source should be investigated. Complete resolution of EAI lesions can take months or years and is inversely related to the cumulative heat exposure [7]. Topical treatments targeting hyperpigmentation include hydroquinone, vitamin A derivatives, 5-fluorouracil, and lasers [5, 7]. Our patient was advised to rest his computer on a platform and within two months, his abdominal lesions regressed without additional therapy.

## Conclusion

EAI can occur anywhere on unprotected skin and is an ongoing clinical problem in all demographics as heat sources evolve. Guided questioning can expedite the diagnosis and prevent the development of ulcers, permanent skin discoloration, and even skin cancers.

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## References

1. Patel DP. The evolving nomenclature of erythema ab igne-redness from fire. *JAMA Dermatol.* 2017;153:685. [PMID: 28700799].
2. Bologna JL, Jorizzo JL, Schaffer JV. *Dermatology*. 3rd ed. Saunders; 2012.
3. Riahi RR, Cohen PR. Laptop-induced erythema ab igne: report and review of literature. *Dermatol Online J.* 2012;18:5. [PMID: 22747929].
4. du Vivier A. *Atlas of Clinical Dermatology*. 4th ed. Saunders; 2012.
5. El-Ghandour A, Selim A, Khachemoune A. Bilateral lesions on the legs. *J Fam Pract.* 2007;56:37-39. [PMID: 17217896].
6. Barnhill LB, Crowson AN, Magro CM, et al. *Dermatopathology*. 3rd ed. McGraw-Hill; 2010.
7. Morrison M, Cotton J, LaFond A. Reticulated erythematous patch on teenager's foot. *J Fam Pract.* 2014;63:537- 539. [PMID: 25353026].

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