Photodamage spares the distal digits owing to primate-like hand flexion

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Abstract

Sun-exposed areas of the body — including the face, neck, and extensor forearms — are chronically exposed to UV light and display signs of photoaging. The skin distal to the proximal interphalangeal (PIP) joint is, however, typically spared owing to the natural rest position of the hand. The inward curvature of the fingers, termed the finger flexion cascade, orients the skin distal to the PIP joint toward the ground as in knuckle-walking primates. The near constant protection of this area of skin from sun may reflect our primate ancestry, the daily activities of which included swinging through trees and knuckle-walking. Primates have elongated, inward curved fingers that were once advantageous for gripping branches during arboreal locomotion. Although natural selection has favored shorter, straighter fingers, the human hand continues to assume a natural shape of flexion at rest. The UV untouched, healthy skin at the ends of the fingers is a reminder of our primate heritage. This finding may provide a colorful, memorable means to reinforce to patients how photoaging is a manifestation of sun exposure rather than age.

Keywords: photodamage, photoaging, finger flexion cascade

Discussion

Sun-exposed areas of the body — including the face, neck, and extensor forearms — are chronically exposed to UV light and display signs of photoaging, including solar purpura and hemosiderin deposition, solar lentigines and ephelides, and actinic keratoses [1, 2]. The extensor forearms of many patients, especially older, light-skinned individuals, are often extensively involved. The skin distal to the proximal interphalangeal (PIP) joint is, however, typically spared (**Figure 1**) owing to the natural rest position of the hand (**Figure 2A**). The inward curvature of the fingers orients the skin distal to the PIP joint toward

Figure 1. *This human hand shows considerable photodamage, but the skin of and distal to the proximal interphalangeal joint is spared from photodamage.*

Figure 2. A) *The natural finger flexion cascade of a human hand at rest, which is similar to the distal digit flexion of the black gorilla paw,* ***(B)****.*

the ground as in knuckle-walking primates (**Figure 2B**).

The alignment of human fingers at rest is termed the finger flexion cascade or cascade sign and is caused by the resting tone and flexibility of the soft tissues of the hand. Each finger from the index to the pinky is sequentially flexed to a greater degree [3]. The finger flexion cascade provides a ready explanation for the apparent resistance to photodamage of skin distal to the PIP joints. The near constant protection of this area of skin from sun may reflect our primate ancestry, the daily activities of which included swinging through trees and knuckle-walking.

There is debate among evolutionary biologists as to whether humans are most closely descended from terrestrial, knuckle-walking primates like gorillas or from arboreal apes like chimpanzees and bonobos. However, the main difference between the hand structures of these two groups of primates is in the wrist rather than the fingers [4]. Both groups have elongated, inward curved fingers that were once advantageous for gripping branches during arboreal locomotion. Fossils from early hominids also show curved fingers, but over time natural selection favored fingers better suited for throwing, clubbing, and using primitive tools. Therefore, human fingers have become shorter and straighter and thumbs have become longer and stronger. Our hands now have increased dexterity and the ability to form specialized power and precision grips [5]. But at rest, the hand continues to assume its age-old flexion cascade inherited from evolutionary ancestors. The UV untouched, healthy skin at the ends of the fingers is a reminder of this heritage. This finding may provide a colorful, memorable means to reinforce to patients how photoaging is a manifestation of sun exposure rather than age.

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